ALLIED PHYSICS
I B.Sc Mathematics and II B.Sc Chemistry & II B.Sc Geology

COURSE	**ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS – I**
CREDITS	3
COURSE OBJECTIVES	To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.

UNITS	**COURSE DETAILS**
UNIT-I	**WAVES, OSCILLATIONS AND ULTRASONICS:** simple harmonic motion (SHM) – composition of two SHMs at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of AC frequency using sonometer (steel and brass wires) – ultrasound – production – piezoelectric method – application of ultrasonics: medical field.
UNIT-II	**PROPERTIES OF MATTER:** *Elasticity*: elastic constants – bending of beam – theory of non- uniform bending – determination of Young's modulus by non-uniform bending – energy stored in a stretched wire – torsion of a wire – determination of rigidity modulus by torsional pendulum. *Viscosity*: streamline and turbulent motion – critical velocity – coefficient of viscosity – Poiseuille's formula – comparison of viscosities – burette method. *Surface tension*: definition – molecular theory – droplets formation–shape, size and lifetime– drop weight method – interfacial surface tension.
UNIT-III	**HEAT AND THERMODYNAMICS:** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – liquefaction of Oxygen– Linde's process of liquefaction of air. Laws of thermodynamics – heat engine – Carnot's cycle – efficiency – entropy – change of entropy in reversible and irreversible process.
UNIT-IV	**ELECTRICITY AND MAGNETISM:** potentiometer – principle – measurement of thermo emf using potentiometer –magnetic field due to a current carrying conductor – Biot-Savart's law – field along the axis of the coil carrying current – peak, average and RMS values of ac current and voltage – power factor and current values in an AC circuit – types of switches in household and factories– Smart wifi switches- fuses and circuit breakers in houses.
UNIT-V	**DIGITAL ELECTRONICS AND DIGITAL INDIA:** logic gates, OR, AND, NOT, NAND, NOR , EXOR logic gates – universal building blocks – Boolean algebra – De Morgan's theorem – verification.
TEXT BOOKS	1. R.Murugesan (2001), AlliedPhysics,S. Chand&Co,NewDelhi. 2. BrijlalandN.Subramanyam (1994), WavesandOscillations,VikasPublishing House,NewDelhi. 3. BrijlalandN.Subramaniam (1994), PropertiesofMatter,S.Chand&Co.,NewDelhi. 4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8^{th} edition), S.Chand&Co.,New Delhi. 5. R.Murugesan(2005), OpticsandSpectroscopy,S.Chand&Co,NewDelhi.

	6. A.Subramaniyam, AppliedElectronics2nd Edn.,NationalPublishingCo.,Chennai.
REFERENCEBOOKS	1. ResnickHallidayandWalker(2018).FundamentalsofPhysics(11th edition),JohnWilleyand Sons, Asia Pvt.Ltd., Singapore. 2. V.R.KhannaandR.S.Bedi (1998), TextbookofSound1st Edn. Kedharnaath Publish & Co, Meerut. 3. N.S.KhareandS.S.Srivastava (1983), ElectricityandMagnetism10th Edn.,Atma Ram&Sons, New Delhi. 4. D.R.Khannaand H.R. Gulati(1979). Optics,S. Chand &Co.Ltd.,New Delhi. **5.** V.K.Metha(2004).Principlesofelectronics6th Edn. S.Chandandcompany.
WEBLINKS	1. https://youtu.be/M_5KYncYNyc 2. https://youtu.be/ljJLJgIvaHY 3. https://youtu.be/7mGqd9HQ_AU 4. https://youtu.be/h5jOAw57OXM 5. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/ 6. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://www.youtube.com/watch?v=gT8Nth9NWPMhttps://www.youtube.com/watch?v=9mXOMzUruMQ&t=1s https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3shttps://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

At the end of the course , the student will be able to:

COURSE OUTCOMES	**CO1**	Explain types of motion and extend their knowledge in the study of various dynamic motions analyze and demonstrate mathematically. Relate theory with practical applications in medical field.
	CO2	Explain their knowledge of understanding about materials and their behaviors and apply it to various situations in laboratory and real life. Connect droplet theory with Corona transmission.
	CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the back ground of growth of this technology.
	CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric

		correlatetheconnectionbetweenelectricfieldandmagneticfieldan danalyzethemmathematicallyverifycircuitsandapplytheconcepts to construct circuits and study them.
	CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and intend their ideas to universal building blocks. Infer operations using Boolean algebra and acquire elementary ideas of IC circuits.

MAPPING WITH PROGRAM OUT COMES:

CO/PO	**PO**					**PSO**				
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S

COURSE	**ODD SEMESTER - CORE**
COURSETITLE	**ALLIED PRACTICALS – II**
CREDITS	3/2
COURSE OBJECTIVES	Apply various physics concepts to understand Properties of Matter and waves, set up experimentation to verify theories, quantify and analyse, able to do error analysis and correlate results

ANY Ten only

1. Young's modulus by non-uniform bending using pin and microscope.
2. Rigidity modulus by static torsion method.
3. Rigidity modulus by torsional oscillations without mass.
2. Surface tension and interfacial Surface tension – drop weight method.
3. Comparison of viscosities of two liquids – burette method
4. Specific heat capacity of a liquid – Newton's Law of Cooling.
5. Verification of laws of transverse vibrations using sonometer.
6. Calibration of low range voltmeter using potentiometer.
7. Verification of truth tables of basic logic gates using ICs
8. Wavelength of Mercury lines Using –Spectrometer and Grating.
9. Characterisation of Zener Diode
10. Use of NOR as universal building block.
11. Use of NAND as universal building block.
12. Characterisation of Semiconductor Diode.
13. Verification of De-Morgan's Theorem –Using Logic gates.

Note : Use of digital balance permitted

METHOD OF EVALUATION:

Continuous InternalAssessment	End Semester Examination	Total	Grade
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COURSE	**ALLIED PAPER**
COURSETITLE	**ALLIED PHYSICS –II**
CREDITS	3
COURSE OBJECTIVES	To understand the basic concepts of optics, modern Physics, concepts of relativity and quantum physics, semiconductor physics, and electronics.

UNITS	COURSE DETAILS
UNIT-I	**OPTICS: i**nterference – interference in thin films –colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – diffraction – diffraction of light vs sound – normal incidence – experimental determination of wavelength using diffraction grating (no theory) – polarization – polarization by double reflection – Brewster's law – optical activity.
UNIT-II	**ATOMIC PHYSICS:** atom models – Bohr atom model – mass number – atomic number – nucleons – vector atom model – various quantum numbers – Pauli's exclusion principle –photo electric effect – Einstein's photoelectric equation – applications of photoelectric effect.
UNIT-III	**NUCLEAR PHYSICS:** nuclear models – liquid drop model – magic numbers – shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and uses –controlled and uncontrolled chain reaction – nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor – breeder reactor. Nuclear fusion – thermonuclear reactions – differences between fission and fusion.
UNIT-IV	**INTRODUCTION TO RELATIVITY AND GRAVITATIONAL WAVES**: frame of reference – postulates of special theory of relativity – Galilean transformation equations – Lorentz transformation equations – derivation – length contraction – time dilation – twin paradox – mass-energy equivalence.
UNIT-V	**SEMICONDUCTOR PHYSICS:** p-n junction diode – forward and reverse biasing – characteristic of diode – zener diode – characteristic of zener diode – voltage regulator – full wave bridge rectifier – construction and working – advantages (no mathematical treatment).

TEXT BOOKS	1. R.Murugesan (2005), Allied Physics,S.Chand& Co,NewDelhi. 2. K.Thangaraj and D.Jayaraman(2004), Allied Physics, Popular Book Depot, Chennai. 3. Brijlal and N.Subramanyam (2002), Textbook of Optics, S.Chand & Co,NewDelhi. 4. R.Murugesan (2005), Modern Physics, S.Chand & Co,NewDelhi. 5. A.Subramaniyam Applied Electronics, 2nd Edn.,National Publishing Co.,Chennai.
REFERENCE BOOKS	1. Resnick Halliday and Walker (2018), Fundamentals of Physics, 11th Edn., JohnWilley and Sons, Asia Pvt.Ltd.,Singapore. 2. D.R.Khanna and H.R. Gulati (1979).Optics, S.Chand &Co.Ltd.,New Delhi. 3. A.Beiser (1997), Concepts of Modern Physics,TataMc GrawHillPublication,NewDelhi. 4. Thomas L. Floyd (2017), Digital Fundamentals, 11th Edn., Universal Book Stall, NewDelhi. 5. V.K.Metha(2004), Principles of electronics, 6th Edn. ,S.Chandand Company, New Delhi.
WEBLINKS	1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo 2. https://www.youtube.com/watch?v=JrRrp5F-Qu4 3. https://www.validyne.com/blog/leak-test-using-pressure-transducers/ 4. https://www.atoptics.co.uk/atoptics/blsky.htm - 5. https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

METHOD OF EVALUATION:

Continuous Internal Assessment	End Semester Examination	Total	Grade
25	**75**	**100**	

COURSE OUTCOMES:

At the end of the course, the student will be able to:

COURSEOUTCOMES	**CO1**	Explain the concepts of interference diffraction using principles of super position of waves and rephrase the concept of polarization based on wave patterns

	CO2	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance of interpreting improving theoretical models based on observation. Appreciate interdisciplinary nature of science and in solar energy related applications.
	CO3	Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy, safety measures carried.
	CO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa.
	CO5	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices.

MAPPING WITH PROGRAM OUT COMES:

CO/PO	**PO**					**PSO**				
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CO1	S	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S	M
CO3	M	S	S	S	S	M	S	S	S	S
CO4	S	S	S	S	S	S	S	M	S	S
CO5	M	S	S	S	S	S	S	S	S	S