Physics –I for Allied

(For I B.Sc. Mathematics students)

Effective for 2021 -24 batch onwards

Course Code :	**Credits**	**05**
L: T: P: S : 6:0:0:0	**CIA Marks : 40**	
Exam Hours : 03	**ESE Marks : 60**	

Learning Objectives: Demonstrate basic principles of physics and one's knowledge of physicsrelate theoretical concepts acquired at schooling level to do experiments.

Course Outcomes: At the end of the Course, the Student will be able to:

Knowledge level -   K1(Remembering), K2(Understanding), K3(Applying), K4(Analyzing)

K5(Evaluating), K6(Creating)

CO1	Explain SHM, Extend their knowledge in the study of various dynamic motions analyzes and it demonstrates mathematically. Relate theory with practical applications in medical field.	**K2, K4**
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.	**K3**
CO3	Comprehend basic concept of thermodynamics concept of entropyand associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.	**K5**
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyzethem mathematically verify circuits and apply the concepts to construct circuits and study them.	**K3, K4, K6**
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. . Acquire information about various Govt. programs/ institutions in this field.	**K2**
CO6	Construct circuits using semiconductor devices and ICs and analyze their working.	**K3,K4**

Mapping of Course Outcomes to Program Outcomes:

Strongly correlated – 3   moderately correlated – 2   weakly correlated –1

CO/PO/ PSO	PO										PSO				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
CO1	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	2	3	3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

S.No.	CONTENTS OF MODULE	Hrs	COs
1	**Unit 1: Waves, Oscillations and Ultrasonics** Simple harmonic motion – composition of two simple harmonic motion at right angles (periods in the ratio 1:1) – Lissajous figures – uses – laws of transverse vibrations of strings – determination of a.c frequency using sonometer (steel and brass wires) Ultrsound- production – piezoelectric method – Application of ultrasonics : In Medical field- lithotripsy, ultrasonography- ultrasonoimaging- ultrasonics in dentistry, physiotheraphy, opthalmology – advantages of noninvasive surgery – Ultrasonics in green chemistry	1	CO1

2	**Unit 2: Properties of Matter** Elasticity: Elastic constant – 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 behind Human saliva Droplets formation–shape, size and lifetime- Physics behind COVID transmission through droplets- drop weight method – interfacial surface tension.	**1**	**CO2**
3	**Unit 3: Heat and Thermodynamics** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – Liquefaction of Oxygen gas– Linde's process of Liquefaction from separation from Air– Liquid oxygen for medical Purpose– importance of cryocoolers -thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle- efficiency – entropy – change of entropy in reversible and irreversible process.	**1**	**CO3**
4	**Unit 4: 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	**1**	**CO4**
5	**Unit 5: 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 – Overview of initiatives Government of India: Software Technological Parks of India under MeitY; – NIELIT- Semiconductor Laboratories under Dept. of Space – An Introduction to Digital India	**1**	**CO5 & CO6**

TEXT BOOKS:

1. R. Murugesan (2001). Allied Physics, S. Chand & Co, New Delhi.
2. Brijlal and N. Subramanyam (1994). Waves and Oscillations, Vikas Publishing house,New Delhi.
3. Brij Lal and N.Subramaniam (1994). Properties of Matter, S. Chand & Co., New Delhi.
4. J.B.Rajam and C.L.Arora (1976). Heat and Thermodynamics (8th edition), S.Chand &Co., New Delhi.
5. R. Murugesan (2005). Optics and Spectroscopy, S.Chand & Co, New Delhi.
6. A. Subramaniyam Applied Electronics (2nd Edition), National Publishing Co., Chennai.

REFERENCE BOOKS:

1. Resnick Halliday and Walker (2018). Fundamentals of Physics (11th edition), John Willey and Sons, Asia Pvt. Ltd., Singapore.
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4. D.R. Khanna and H.R. Gulati (1979). Optics, S. Chand & Co. Ltd., New Delhi.
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WEB LINKS:

https://youtu.be/M_5KYncYNyc

https://youtu.be/ljJLJgIvaHY

https://youtu.be/7mGqd9HQ_AU

https://youtu.be/h5jOAw57OXM

http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html

https://www.youtube.com/watch?v=gT8Nth9NWPM

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https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s

https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-

they-work

https://learningtechnologyofficial.com/category/fluid-mechanics-lab/

Physics –II for Allied

Course Code :		**Credits**	**5**
L: T: P: S **: 6:0:0:0**		**CIA Marks** **: 40**	
Exam Hours : 03		**ESE Marks** **: 60**	

Learning Objectives:
Understand the basic concepts of optics, modern physics, concepts of relativity and quantum physics, semiconductor physics, and digital electronics. Plan and execute experiments and appropriate methods.

Course Outcomes: At the end of the Course, the Student will be able to:
Knowledge level - K1(Remembering) ,K2(Understanding),K3(Applying) ,K4(Analyzing)

,K5(Evaluating) ,K6(Creating)

CO1	Explain the concepts of Interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns	K2
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.	K3,K4
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 nucleus process like fission and fusion . Understand the importance of nuclear energy, safety measures carried and get our Govt.agencies like DAE guiding the country in the nuclear field.	K3,K2
CO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and translate the mathematical equation to physical concepts and vice versa. Relate this with current research in this field and get an overview of research projects of National and International importance , like LIGO, ICTS, and opportunities available for them.	K3,K2
CO5	Summarize the working of semiconductor devices like junction diode, zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.	K2,K3

Mapping of Course Outcomes to Program Outcomes:

Strongly correlated - 3   **moderately correlated - 2**   **weakly correlated -1**

CO/PO/ PSO	PO										PSO				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
CO1	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3
CO2	3	3	3	3	2	3	3	3	3	3	3	3	2	2	3
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CO4	3	3	3	3	2	3	3	3	3	3	3	3	2	2	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

S.No.	CONTENTS OF MODULE	Hrs	COs
1	**Unit 1 : Optics** Interference – interference in thin films - Colors of thin films – air wedge – determination of diameter of a thin wire by air wedge – Diffraction – bending of light vs. bending of sound - normal incidence – experimental determination of wavelength using diffraction grating (no theory) - polarization – polarization by double reflection – Brewster's law – optical activity- application in Sugar industries	1	CO1

2	**Unit 2: Atomic Physics** Atom model – Bohr atom model – mass number – atomic number – nucleons- vector atom model – various quantum numbers – Pauli's exclusion principle – electronic configuration of elements and periodic classification of elements - Bohr magneton – Stark effect –Zeeman effect (Elementary ideas only) – Photo electric effect- Einstein's Photoelectric equation-Applications of photoelectric effect : Solar cells, solar panels, digital cameras	**1**	**CO2**
3	**Unit 3: Nuclear Physics** Nuclear model – liquid drop model – magic numbers - shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and its uses –controlled and uncontrolled chain reaction - nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor - breeder reactor – importance of commissioning PFBR in our country- heavy water disposal, safety of reactors: Seismic and floods- introduction to DAE, IAEA - nuclear fusion - thermonuclear reactions – difference between fission and fusion.	**1**	**CO3**
4	**Unit 4 : 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 – An introduction on Gravitational waves, LIGO, importance of GWAstrophysics –ICTS, opportunities at International Centre for Theoretical Sciences	**1**	**CO4**
5	**Unit 5: Semiconductor Physics** pn 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)- USB cell phone charger- introduction to e-Vehicles and EV charging stations	**1**	**CO5**

TEXT BOOKS:

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5. V.K. Metha (2004). Principles of electronics (6th edition), S.Chand and company.

WEB LINKS:

https://www.berkshire.com/learning-center/delta-p-facemask/
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https://www.youtube.com/watch?time_continue=318&v=D38BjgUdL5U&feature=emb_logo
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https://www.atoptics.co.uk/atoptics/blsky.htm -https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects
https://books.google.co.in/books?id=grqxTeY1z4oC&pg=PA897&lpg=PA897&dq=size+of+nitrogen+molecule+and+blue+light&source=bl&ots=hC0V9FvzP-&sig=ACfU3U270Hhk0SD3yXV10QDHjPrC1qGnDg&hl=en&sa=X&ved=2ahUKEwjKgrP6rvzpAhWNyDgGHRB_DGYQ6AEwDnoECA0QAQ#v=onepage&q=size%20of%20nitrogen%20molecule%20and%20blue%20light&f=false

https://youtu.be/JLz7qASICYU

https://youtu.be/u6m4lI-qZ58

https://youtu.be/C0HsQykDdKg

Physics –I for Allied

(For II B.Sc. Chemistry students)
Effective for 2020-23 batch onwards

Course Code :		**Credits**	**05**
L: T: P: S : 6:0:0:0		**CIA Marks : 40**	
Exam Hours : 03		**ESE Marks : 60**	

Learning Objectives: Demonstrate basic principles of physics and one's knowledge of physicsrelate theoretical concepts acquired at schooling level to do experiments.

Course Outcomes: At the end of the Course, the Student will be able to:

Knowledge level -   K1(Remembering) ,K2(Understanding),K3(Applying) ,K4(Analyzing)

K5(Evaluating) ,K6(Creating)

CO1	Explain SHM, Extend their knowledge in the study of various dynamic motions analyzes and it demonstrates mathematically. Relate theory with practical applications in medical field.	K2, K4
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.	K3
CO3	Comprehend basic concept of thermodynamics concept of entropyand associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.	K5
CO4	Articulate the knowledge about electric current resistance, capacitance in terms of potential electric field and electric correlate the connection between electric field and magnetic field and analyzethem mathematically verify circuits and apply the concepts to construct circuits and study them.	K3, K4, K6
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. Acquire information about various Govt. programs/ institutions in this field.	K2
CO6	Construct circuits using semiconductor devices and ICs and analyze their working.	K3,K4

Mapping of Course Outcomes to Program Outcomes:

Strongly correlated – 3   moderately correlated – 2   weakly correlated –1

CO/PO/ PSO	PO										PSO				
	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5
CO1	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO2	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO3	3	2	2	3	3	2	3	2	3	3	3	3	2	3	3
CO4	3	3	3	3	3	3	3	2	3	3	3	3	3	3	3
CO5	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
CO6	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

S.No.	CONTENTS OF MODULE	Hrs	COs
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2	**Unit 2: Properties of Matter** Elasticity: Elastic constant – 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 behind Human saliva Droplets formation–shape, size and lifetime- Physics behind COVID transmission through droplets- drop weight method – interfacial surface tension.	**1**	**CO2**
3	**Unit 3: Heat and Thermodynamics** Joule-Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of inversion – Liquefaction of Oxygen gas– Linde's process of Liquefaction from separation from Air– Liquid oxygen for medical Purpose– importance of cryocoolers -thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heat engine – Carnot's cycle-efficiency – entropy – change of entropy in reversible and irreversible process.	**1**	**CO3**
4	**Unit 4: 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	**1**	**CO4**
5	**Unit 5: 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 – Overview of initiatives Government of India: Software Technological Parks of India under MeitY; – NIELIT- Semiconductor Laboratories under Dept. of Space – An Introduction to Digital India	**1**	**CO5 & CO6**

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Physics –II for Allied

(For II B.Sc. Chemistry students)
Effective for 2020-23 batch onwards

Course Code :		Credits	5
L: T: P: S : 6:0:0:0		**CIA Marks** : 40	
Exam Hours : 03		**ESE Marks** : 60	

Learning Objectives:
Understand the basic concepts of optics, modern physics, concepts of relativity and quantum physics, semiconductor physics, and digital electronics. Plan and execute experiments and appropriate methods.

Course Outcomes: At the end of the Course, the Student will be able to:
Knowledge level - K1(Remembering) ,K2(Understanding),K3(Applying) ,K4(Analyzing)

,K5(Evaluating) ,K6(Creating)

CO1	Explain the concepts of Interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns	K2
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.	K3,K4
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 nucleus process like fission and fusion . Understand the importance of nuclear energy, safety measures carried and get our Govt.agencies like DAE guiding the country in the nuclear field.	K3,K2
CO4	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and translate the mathematical equation to physical concepts and vice versa. Relate this with current research in this field and get an overview of research projects of National and International importance , like LIGO, ICTS, and opportunities available for them.	K3,K2

CO5	Summarize the working of semiconductor devices like junction diode, zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.	K2,K3

Mapping of Course Outcomes to Program Outcomes:

Strongly correlated - 3   **moderately correlated - 2**   **weakly correlated -1**

CO/PO/ PSO	PO										PSO				
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CO1	3	3	3	3	3	3	3	2	2	3	3	3	3	3	3
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S.No.	CONTENTS OF MODULE	Hrs	COs
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3	**Unit 3: Nuclear Physics** Nuclear model – liquid drop model – magic numbers - shell model – nuclear energy – mass defect – binding energy – radioactivity – uses – half life – mean life - radio isotopes and its uses –controlled and uncontrolled chain reaction - nuclear fission – energy released in fission – chain reaction – critical reaction – critical size- atom bomb – nuclear reactor - breeder reactor – importance of commissioning PFBR in our country- heavy water disposal, safety of reactors: Seismic and floods- introduction to DAE, IAEA - nuclear fusion - thermonuclear reactions – difference between fission and fusion.	**1**	**CO3**
4	**Unit 4 : 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 – An introduction on Gravitational waves, LIGO, importance of GWAstrophysics – ICTS, opportunities at International Centre for Theoretical Sciences	**1**	**CO4**
5	**Unit 5: Semiconductor Physics** pn 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)- USB cell phone charger- introduction to e-Vehicles and EV charging stations	**1**	**CO5**

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https://www.atoptics.co.uk/atoptics/blsky.htm -
https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects

https://www.metoffice.gov.uk/weather/learn-about/weather/optical-effects
https://books.google.co.in/books?id=grqxTeY1z4oC&pg=PA897&lpg=PA897&dq=size+of+nitr ogen+molecule+and+blue+light&source=bl&ots=hC0V9FvzP-&sig=ACfU3U270Hhk0SD3yXV10QDHjPrC1qGnDg&hl=en&sa=X&ved=2ahUKEwjKgrP6rv zpAhWNyDgGHRB_DGYQ6AEwDnoECA0QAQ#v=onepage&q=size%20of%20nitrogen%20molecule%20and%20blue%20light&f=false

https://youtu.be/JLz7qASICYU

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