AVS College of Arts & Science (Autonomous)

AVS

COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

Attur Main Road, Ramalingapuram, Salem - 106.

(Recognized under section 2(f) & 12(B) of UGC Act 1956 and

Accredited by NAAC with 'A' Grade)

(Co - Educational Institution | Affiliated to Periyar University, Salem

ISO 9001 : 2015 Certified Institution)

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Syllabus for

B. Sc PHYSICS

CHOICE BASED CREDIT SYSTEM –

LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK

(CBCS – LOCF)

(Applicable to the Candidates admitted from 2023-24 onwards)

VISION

- To attain excellence in the field of education by creating competent scholars with a touch of human values.

MISSION

- To accomplish eminence in the academic domain.
- To provide updated infrastructure.
- To educate value based education.
- To impart skills through efficient training programs.
- To cultivate culture and tradition with discipline and determination.

REGULATIONS

1. Eligibility for Admission:

Candidates seeking admission to the first year of the Bachelor of Science – Physics shall be required to have passed the Higher Secondary examination with Mathematics, Physics and Chemistry conducted by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Syndicate subject to the conditions as may be prescribed there to are permitted to and qualify for B.Sc., (Physics) degree examinations of this University after a course of study of three academic years.

2. Duration:

The course for the degree of Bachelor of Science shall consist of three years divided into six semesters within ternal assessment under a choice-based credit system.

3. Eligibility for award of degree:

The scheme of examination of the different semester shall be as follows;

Total Marks: 4700

Part I: 400

Part II: 400

Part III: 2800

Part IV: 1000

Part V: 100

Total Credits: 140

Part I: 12

Part II: 12

Part III: 89

Part IV: 26

Part V: 1

4. Course of Study: B.Sc., Physics

The course of study shall comprise instruction in the following subjects according to the syllabus and books prescribed from time to time.

5. Scheme of Examination:

Semester Based (choice-based credit system CBCE)

6. Passing Rules: 40 % in Continues Internal Assessment and 40% in End Semester Examinations

i) Theory

40 % of Internal Assessment (10/25)

40% of External Assessment(30/75)

ii) Practical

40 % of Internal Assessment (10/25) /(16/40)

40% of External Assessment(30/75)/(24/60)

Programme Outcomes (POs) On successful completion of the B. Sc Physics	
PO1	Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one‟s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations.
PO5	Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and effect relationships; ability to plan, execute and report the results of an experiment or investigation
PO7	Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO8	Scientific reasoning: Ability to analyze, interpret and draw conclusions from

	quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.
PO10	Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

Program Specific Outcomes (PSOs)	
After the successful completion of B. Sc Physics programme the students are expected to	
PSO1	Placement: To prepare the students who will demonstrate respectful engagement with others‟ ideas, behaviors, and beliefs and apply diverse frames of reference to decisions and actions.
PSO2	Entrepreneur: To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate start-ups and high potential organizations
PSO3	Research and Development: Design and implement HR systems and practices grounded in researches that comply with employment laws, leading the organization towards growth and development.
PSO4	Contribution to Business World: To produce employable, ethical and innovative professionals to sustain in the dynamic business world
PSO5	Contribution to the Society: To contribute to the development of the society by collaborating with stakeholders for mutual benefit.
PSO6	Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

Programme Educational Objectives (PEOs) The B. Sc Physics programme describe accomplishments that graduates are expected to attain within five to seven years after graduation.	
PEO1	Lifelong learning: Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
PEO2	Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
PEO3	Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PEO4	Multicultural competence: To possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PEO5	To carry out experiments to understand the laws and concepts of Physics. To apply the theories learnt and the skills acquired to solve real time problems. To acquire a wide range of problem solving skills, both analytical and computational and to apply them.

CREDIT DISTRIBUTION FOR 3 YEARS B. Sc PHYSICS PROGRAMME

Part	Course Type	Credits per Course	No. of Papers	Total Credits
Part I	Language – I (Tamil/Hindi/French)	3	4	**12**
Part II	Language – II (English)	3	4	**12**
Part III	Core Courses- Theory	4	10	40
	Core Courses- Practical	3	6	18
	Major Elective Courses- Theory	3	3	9
	Major Elective Courses- Practical	-	-	-
	Generic Discipline Specific/ Allied Courses - Theory	4	4	16
	Generic Discipline Specific/ Allied Courses - Practical	3	2	6
			Total	**89**
Part IV	Non Major Elective Courses	2	2	4
	Skill Enhancement Courses	2	5	10
	Professional Competency Skill Enhancement Course	2	1	2
	EVS (Environmental Studies)	2	1	2
	Value Education	2	1	2
	Internship	2	1	2
	Field Project	2	1	2
	Research Project (for PG only)	-	-	-
	MOOC/ SWAYAM/ NPTEL Courses / Foundation course	2	2	2
			Total	**26**
Part V	Extension Activity (NSS/NCC/Physical Education)	1	1	1
Part VI	Naan Mudhalvan Scheme (Online Examination &Project work) /	2	-	-
			Total Credits	**140**

CONSOLIDATED SEMESTER WISE AND COMPONENT WISE CREDIT DISTRIBUTION FOR 3 YEARS B. Sc PHYSICS PROGRAMME

Parts	Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI	Total Credits
Part I	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part II	**3**	**3**	**3**	**3**	**-**	**-**	**12**
Part III	**13**	**13**	**13**	**13**	**19**	**18**	**89**
Part IV	**4**	**4**	**3**	**6**	**7**	**2**	**26**
Part V	**-**	**-**	**-**	**-**	**-**	**1**	**1**
Total	**23**	**23**	**22**	**25**	**26**	**21**	**140**

*Part I, II and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programmes and the other components IV and V have to completed during the duration of the programmes as per the norms, to be eligible for obtaining the UG degree.

METHOD OF EVALUATION

Evaluation	Components		Marks
Internal Evaluation	Continuous Internal Assessment Test	15	25 Marks
	Assignments	3	
	Class Participation	2	
	Distribution of marks for Attendance (in percentage) 96 – 100: 5 Marks 91 – 95: 4 Marks 86 – 90: 3 Marks 81 – 85: 2 Marks	5	
External Evaluation	End Semester Examination		75 Marks
Total			**100 Marks**

Note: 1.UG Programmes- A candidate must score minimum 10 marks in Internal and 30 marks in External Evaluation.

2. PG Programmes- A candidate must score minimum 13 marks in Internal and 38 marks in External Evaluation.

CONTINUOUS INTERNAL ASSESSMENT

Categorizing Outcome Assessment Levels Using Bloom's Taxonomy

level	Cognitive Domain	Description
K1	Remember	It is the ability to remember the previously learned concepts or ideas.
K2	Understand	The learner explains concepts or ideas.
K3	Apply	The learner uses existing knowledge in new contexts.
K4	Analyze	The learner is expected to draw relations among ideas and to compare and contrast.
K5	Evaluate	The learner makes judgements based on sound analysis.
K6	Create	The learner creates something unique or original.

Question Paper Blue Print for Continuous Internal Assessment- I& II

Duration: 2 Hours							Maximum: 50 marks
Section	K level						Marks
	K1	K2	K3	K4	K5	K6	
A (no choice)	10						10 X 1 =10
B (no choice)		1	1				2 X 5 =10
C (either or choice)				3			3 x 10 = 30
Total							50 marks

Note: K4 and K5 levels will be assessed in the Model Examination whereas K5 and K6 Levels will be assessed in the End Semester Examinations.

Question Paper Blue Print for Continuous Internal Assessment- I

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section - B	Section - C
I	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
I or II	-	-	Q.N. 14 A, 14 B
II	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Continuous Internal Assessment- II

Time: 2 Hours Total Marks: 50 Marks Minimum Pass: 20 Marks

Unit	Section - A	Section - B	Section - C
III	Q.N. 1, 2, 3, 4, 5	Q.N. 11	Q.N. 13 A, 13 B
III or IV	-	-	Q.N. 14 A, 14 B
IV	Q.N. 6, 7, 8, 9, 10	Q.N. 12	Q.N. 15 A, 15 B

SECTION – A (10 X 1 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ALL THE QUESTIONS

SECTION – C (3 X 10 = 30 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Examination & End Semester Examination

Duration: 3 Hours		Maximum: 75 marks						
Section		K level						Marks
		K1	K2	K3	K4	K5	K6	
A (no choice, three questions from each unit)		15						15 X 1 =15
B (choice, one question from each unit)			1	1				2 X 5 =10
C (either or choice& two questions from each unit)	*Courses with K4 as the highest cognitive level*				4	1		5 x 10 = 50
	Course with K5 as the highest cognitive level wherein three K4 questions and two K5 questions are compulsory.				3	2		
	Course with K6 as the highest cognitive level wherein two questions each on K4, K5 and one question on K6 are compulsory.				2	2	1	
Total								75 marks

Question Paper Blue Print for Model Examination & End Semester Examination

Time: 2 Hours Total Marks: 75 Marks Minimum Pass: 30 Marks

Unit	Section - A	Section - B	Section - C
I	Q.N. 1, 2, 3	Q.N. 16	Q.N. 21 A, 21 B
II	Q.N. 4, 5, 6	Q.N. 17	Q.N. 22 A, 22 B
III	Q.N. 7, 8, 9	Q.N. 18	Q.N. 23 A, 23 B
IV	Q.N. 10, 11, 12	Q.N. 19	Q.N. 24 A, 24 B
V	Q.N. 13, 14, 15	Q.N. 20	Q.N. 25 A, 25 B

SECTION – A (15 X 1 = 15 Marks)

ANSWER ALL THE QUESTIONS

SECTION – B (2 X 5 = 10 Marks)

ANSWER ANY TWO QUESTIONS

SECTION – C (5 X 10 = 50 Marks)

ANSWER ALL THE QUESTIONS (Either or Choice)

Question Paper Blue Print for Model Practical Examination & End Semester Examination (Practical)

Time: 3 Hours Total Marks: 60 Marks Minimum Pass: 24 Marks

Practical Marks	Maximum Mark	Minimum Mark
Internal	40	16
External	60	24
Total	100	40

Evaluation for End Semester Examinations (Practical)

Record	10 marks
Formula with expansion	05 marks
Observation with data	20 marks
Viva-voce	05 marks
Calculation	15 marks
Result with units	05 marks
TOTAL	**60 MARKS**

*Submission of record with due certification is a must for external practical examinations.

**A student should complete all requires experiments to get 10 marks for the record.

Scheme of Examination for B. Sc Physics

First Year – Semester - I

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA01	Podhu Tamil - I	3	3	25	75	100
II	23UFEN01	General English – I	3	3	25	75	100
III	23UPHCT01	Core Course I - Properties of Matter and Sound	5	5	25	75	100
III	23UPHCP01	Core Course Practical - I	3	3	25	75	100
III	23UMAAT01	Allied Mathematics I - Algebra and Calculus	4	5	25	75	100
IV	23UPHFC01	Foundation Course – Introductory Physics	2	2	25	75	100
IV	23UTANE01	Non Major Elective Course - PechuKalai Thiran	3	2	25	75	100
Total			**22**	**23**	**175**	**525**	**700**

First Year – Semester - II

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA02	Podhu Tamil - II	3	3	25	75	100
II	23UFEN02	General English – II	3	3	25	75	100
III	23UPHCT02	Core Course II - Heat, Thermodynamics and Statistical Mechanics	5	4	25	75	100
III	23UPHCP02	Core Course Practical – II	3	3	25	75	100
III	23UMAAP01	Allied Mathematics Practical	3	4	25	75	100
III	23UMAAT02	Allied Mathematics II – Differential Equations and Laplace Transforms	4	2	25	75	100
IV	23UPHSE01	Skill Enhancement Course I - Instrumentation	3	2	25	75	100
IV	23UGENE02	Non Major Elective Course - Oceanography	3	2	25	75	100
Total			**24**	**23**	**200**	**600**	**800**

Second Year – Semester - III

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA03	Podhu Tamil - III	3	3	25	75	100
II	23UFEN03	General English – III	3	3	25	75	100
III	23UPHCT03	Core Course III - General Mechanics and Classical Mechanics	5	4	25	75	100
III	23UPHCP03	Core Course Practical – III	3	3	25	75	100
III	23UCHAT01	Generic - III Allied Chemistry– I	4	4	25	75	100
III	23UCHAP01	Allied Chemistry –I (Practical*)	3	2	25	75	100
IV	23UPHSE02	Skill Enhancement Course II Entrepreneurial Based	2	1	25	75	100
IV	23UPHSE03	Skill Enhancement Course III - Computational methods and Programming in C	2	2	25	75	100
IV	23UES01	Environmental studies (EVS)	2	-	25	75	100
Total			**26**	**22**	**225**	**675**	**900**

Second Year – Semester - IV

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
I	23UFTA04	Podhu Tamil - IV	3	3	25	75	100
II	23UFEN04	General English – IV	3	3	25	75	100
III	23UPHCT04	Core Course IV - Optics and Spectroscopy	5	4	25	75	100
III	23UPHCP04	Core Course Practical – IV*	3	3	25	75	100
III	23UCHAT02	Generic - IV Allied Chemistry– II	4	4	25	75	100
III	23UCHAP02	Allied Chemistry – II (Practical*)	2	2	25	75	100
IV	23UPHSE04	Skill Enhancement Course IV - Electronic devices	2	2	25	75	100
IV	23UPHSE05	Skill Enhancement Course V- Communication systems	2	2	25	75	100
IV	23UES01	Environmental studies (EVS)	2	2	25	75	100
Total			**24**	**25**	**200**	**600**	**800**

Third Year – Semester - V

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UPHCT05	Core Course V - Atomic Physics and Lasers	5	5	25	75	100
III	23UPHCT06	Core Course VI - Relativity and Quantum Mechanics	5	4	25	75	100
III	23UPHCT07	Core Course VII - Electricity and Magnetism	5	4	25	75	100
III	23UPHE01	Elective I - Energy Physics	3	3	25	75	100
III	23UPHE02	Elective II - Materials Science	3	3	25	75	100
III	23UPHCP05	Core Course Practical – V*	3	3	25	75	100
IV	23UEV01	Value Education	2	2	25	75	100
IV	23UPHIO01	Internship/Industrial visit/Field visit**	-	2	25	75	100
Total			**24**	**26**	**200**	**600**	**800**

Third Year – Semester - VI

Part	Course Code	Course Title	Ins. Hrs	Credit	CIA	ESE	Total
III	23UPHCT08	Core Course VIII - Nuclear and Particle Physics	5	3	25	75	100
III	23UPHCT09	Core course IX - Solid State Physics	5	3	25	75	100
III	23UPHCT10	Core Course X - Digital Electronics &Microprocessor 8085	5	3	25	75	100
III	23UPHE03	Elective III - Nanoscience & Nanotechnology	2	3	25	75	100
III	23UPHCP06	Core Course Practical – VI*	2	3	25	75	100
IV	23UPHPR01	Project***	4	3	-	-	100
IV	23UPHPC01	Professional Competency Skills	2	2	25	75	100
V	23UEX01	Extension Activity	2	1	-	-	100
Total			**27**	**21**	**150**	**450**	**800**

****Ins. Hrs** – Instructional Hours**, CIA-** Continuous Internal Assessment**, ESE-** End Semester Examination

Semester: I	Course Code: 23UPHCT01	Hours/Week: 5	Credit: 5
COURSE TITLE: CORE COURSE – I PROPERTIES OF MATTER AND SOUND			

Course Overview:

1. Demonstrate the general view of elasticity
2. Apply basic physics law in daily life
3. Understand the mechanisms of bending of beams
4. Understand the waves and oscillations.

Learning Objectives:

1. Study of the properties of matter leads to information which is of practical value to both the physicist and the engineers.
2. It gives us information about the internal forces which act between the constituentparts of the substance.
3. Students who undergo this course are successfully bound to get a better insight and understanding of the subject.
4. Identify and describe properties of matter, including: flexibility, strength, transparency, hardness, water resistance, size, color, weight, and texture.
5. Identify and describe three phases of matter: solid, liquid, and gas. Identify and describe the particles that make up a solid, liquid, and gas.

Unit - I	Elasticity	09 Hours

Hooke's Law – Stress-Strain Diagram – Elastic Constants –Poisson's Ratio – Relation between Elastic Constants and Poisson's Ratio – Workdone in Stretching and Twisting a wire – Twisting Couple on a Cylinder – Rigidity Modulus by Static Torsion – Torsional Pendulum (With and Without Masses).

Unit - II	Bending of Beams	09 Hours

Cantilever – Expression for Bending Moment – Expression for Depression at the Loaded end of the Cantilever – Oscillations of a Cantilever – Expression for Time Period – Experiment to find Young'sModulus – Non - Uniform Bending – Experiment to Determine Young'sModulus by Koenig's Method – Uniform Bending – Expression for Elevation – Experiment to determine. Young's Modulus using Microscope

Unit - III	Fluid Dynamics and Viscosity	09 Hours

Surface Tension: Definition – Molecular Forces – Excess Pressure overCurved Surface – Application to Spherical and Cylindrical drops and Bubbles – Determination of Surface Tension by Jaegar's Method – Variation of Surface Tension with Temperature. Definition – Streamline and Turbulent Flow – Rate of Flowof Liquid in a Capillary Tube –Viscosity Poiseuille's Formula –Corrections – Terminal Velocity and Stoke's Formula– Variation of with Temperature.

Unit - IV	Waves and Oscillations	09 Hours

Simple Harmonic Motion (SHM) – Differential Equation of SHM – Graphical Representation of SHM – Composition of Two SHM in a Straight Line and at Right Angles – Lissajous's Figures- Free, Damped,Forced Vibrations – Resonance and Sharpness of Resonance.

Laws of Transverse Vibration in Strings – Sonometer – Determination ofAC Frequency using Sonometer – Determination of Frequency using Melde's String Apparatus

Unit - V	Acoustics of Buildings and Ultrasonics	09 Hours

Intensity of Sound – Decibel – Loudness of Sound –Reverberation – Sabine's Reverberation Formula – Acoustic Intensity – Factors Affecting the Acoustics of Building Production of Ultrasonic Waves – Piezoelectric Crystal Method – Magnetostriction Effect – Application of UltrasonicWaves.

Text Book(s):

1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co.
2. BrijLal & N. Subrahmanyam, 2003, Properties ofMatter, S. Chand & Co
3. D.R. Khanna & R.S. Bedi, 1969, Textbook of Sound, Atma Ram & sons
4. Brij Lal and N. Subrahmanyam, 1995, A Text Book of Sound, Second revised edition, Vikas Publishing House.
5. R.Murugesan,2012, Properties of Matter, S. Chand & Co.

Reference Books:

1. C.J. Smith, 1960, General Properties of Matter, OrientLongman Publishers
2. H.R. Gulati, 1977, Fundamental of General Properties ofMatter, Fifth edition, R Chand & Co.
3. A.P French, 1973, Vibration and Waves, MIT IntroductoryPhysics, Arnold - Heinmann India.

Web Resources:

1. https://www.biolinscientific.com/blog/what-are-surfactants-and- how-do-they-work
2. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html
3. https://www.youtube.com/watch?v=gT8Nth9NWPM

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Relate elastic behavior in terms of three modulii of elasticity andworking of torsion pendulum.	K1
CO2	Able to appreciate concept of bending of beams and analyzeth expression, quantify and understand nature of materials.	K2
CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineeringproblems.	K3
CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency ofac mains	K4
CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	L	M	S	L	L	L
CO2	M	S	S	L	M	S	L	L	L
CO3	S	M	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low

Semester: I	Course Code: 23UPHCP01	Hours/Week: 3	Credit: 3
COURSE TITLE: CORE COURSE PRACTICALS I – PROPERTIES OF MATTER EXPERIMENTS			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Apply various physics concepts to understand Properties of Matter,set up experimentation to verify theories, quantify and analyse, ableto do error analysis and correlate results

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum
3. Determination of moment of inertia of an irregular body.
4. Verification of parallel axes theorem on moment of inertia.
5. Verification of perpendicular axes theorem on moment of inertia.
6. Determination of moment of inertia and g using Bifilar pendulum.
7. Determination of Youngs modulus by stretching of wire with known masses.
8. Verification of Hooks law by stretching of wire method.
9. Determination of Youngs modulus by uniform bending – load depression graph.
10. Determination of Youngs modulus by non-uniform bending – scale & telescope.
11. Determination of Youngs modulus by cantilever – load depression graph.
12. Determination of Youngs modulus by cantilever – oscillation method
13. Determination of Youngs modulus by Koenigs method – (or unknown load)
14. Determination of rigidity modulus by static torsion.
15. Determination of Y, n and K by Searles double bar method.
16. Determination of surface tension & interfacial surface tension by dropweight method.
17. Determination of co-efficient of viscosity by Stokes method – terminal velocity.
18. Determination of critical pressure for streamline flow.
19. Determination of Poissons ratio of rubber tube.
20. Determination of viscosity by Poiseullies flow method.

21. Determination radius of capillary tube by mercury pellet method.
22. Determination of g using compound pendulum.

Reference books:

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
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CO2	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.	K2
CO3	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineeringproblems.	K3
CO4	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency ofac mains	K4
CO5	Understand the concept of acoustics, importance of constructing buildings with good acoustics.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	M	S	L	M	S	L	L	L
CO2	M	S	S	L	M	S	L	L	L
CO3	S	M	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low

Semester: I	Course Code: 23UPHFC01	Hours/Week:2	Credit: 2
COURSE TITLE: FOUNDATION COURSE - INTRODUCTORY PHYSICS			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the fundamentals of physics
4. Understand the nuclear physics and its reactions.

Learning Objectives:

1. To help students get an overview of Physics before learning theircore courses.
2. To serve as a bridge between the school curriculum and the degree programme.
3. To understand the fundamentals of physics
4. To understand the energy
5. To understand the motion and properties of matter

Unit - I	Fundamentals	04 Hours

Vectors, Scalars – Examples for Scalars and Vectors from Physical Quantities – Addition, Subtraction of Vectors – Resolution and Resultantof Vectors – Units and Dimensions– Standard Physics Constants.

Unit - II	Forces	04 Hours

Different Types of Forces – Gravitational, Electrostatic, Magnetic, Electromagnetic, Nuclear – Mechanical Forces like, Centripetal, Centrifugal, Friction, Tension, Cohesive, Adhesive Forces.

Unit - III	Energy	04 Hours

Different forms of Energy – Conservation Laws of Momentum, Energy –Types of Collisions – Angular Momentum – Alternate Energy Sources – Real Life Examples.

Unit - IV	Motion	04 Hours

Types of Motion – Linear, Projectile, Circular, Angular, Simple Harmonic Motions – Satellite Motion – Banking of a Curved Roads –Stream Line and Turbulent Motions – Wave Motion – Comparison ofLight and Sound Waves – Free, Forced, Damped Oscillations.

Unit - V	Properties of Matter	04 Hours

Surface Tension – Shape of Liquid Drop – Angle of Contact – Viscosity – Lubricants – Capillary Flow – Diffusion – Real Life Examples – Properties and Types of Materials in Daily

use - Conductors, Insulators – Thermal and Electric.

Text Book(s):

1. D.S. Mathur, 2010, Elements of Properties of Matter, S. Chand & Co

2. BrijLal & N. Subrahmanyam, 2003, Properties of Matter, S. Chand & Co.

Reference Books:

1. H.R. Gulati, 1977, Fundamental of General Properties of Matter,Fifth edition, S. Chand & Co.

Web Resources:

1. http://hyperphysics.phy- astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/

2. https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the Fundamentals of Physics	K1
CO2	Understand the Force	K2
CO3	Demonstrate general physics in energy	K3
CO4	Apply basic physics in motion	K4
CO5	To understand the concept of properties of matter	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	L	M	S	L	L	L
CO2	S	S	S	L	M	S	L	L	L
CO3	S	S	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UFS01	Hours/Week: 4	Credit: 4
COURSE TITLE: BASICS OF FORENSIC SCIENCE (B.Sc., Forensic Science)			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the mechanisms of electrical devices
4. Understand the nuclear physics and its reactions.

Learning Objectives:

1. To understand the laws in Physics
2. To understand thermal physics
3. To understand electromagnetic concepts
4. To understand the electricity
5. To understand the nuclear physics

Unit - I	Mechanics	07 Hours

Force, Conservative and Non conservative force, rotational motion of inertia, expression of M.I. of regular shaped bodies, Keplar's law, Acceleration due to gravity, Simple harmonic motion and Compound pendulum, Newton's laws of motion

Unit - II	Thermal Physics	07 Hours

Concept of temperature, ideal gas equation and its laws, Vander waals equations, reversible And irreversible process, Zerothlaw, first, second and third law of thermodynamics, Carnot's cycle.

Unit - III	Electro Magnetism	07 Hours

Coulomb's law, electric field, magnetic field due to current, Gauss theorem and its applications, Amperes law, Kirchhoff's law and their applications

Unit - IV	Wheat Stone Bridge	07 Hours

Wheatstone bridge and its sensitivity, rectifiers, amplifiers, semiconductors an its types of Junction, paramagnetic, diamagnetic, ferromagnetic materials and properties.

Unit - V	Nuclear Physics	07 Hours

Nuclear forces, Nuclear models(elementary ideas), concept of nuclear quantum number, Magic number. Nuclear reactions: Artificial activity, transmutations of elements, fission,

Fusion, radio activity, half life period, nuclear reactor.

Text Book(s)

1. Engineering physics 7th enlarged, revised edition 2004, Schand and company.

2. Modern Physics concept and application, Sanjeev puri, Narosa Publications.

Reference Books:

1. Mechanics, Murugesan

2. William H. hai and john. A Engineering electromagnetic, Mc graw hill

Web Resources:

1. https:/online courses. Swayam2.ac.in/nec19 sc05/preview

2. https:/www.mooc-list.com/course/basic physics-open2study

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the quantum mechanics and electromagnetic physics	K1
CO2	Understand the thermal physics	K2
CO3	Demonstrate general physics phenomena	K3
CO4	Apply basic physics in daily life	K4
CO5	To understand the nuclear physics and its reactions.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	L	M	S	L	L	L
CO2	S	S	S	L	M	S	L	L	L
CO3	S	S	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UFSE01	Hours/Week: 3	Credit: 3
COURSE TITLE: BASICS OF PHYSICS LAB (B.Sc., Forensic Science)			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Apply various physics concepts to understand Mechanics, Thermal physics set up experimentation to verify theories, quantify and analyze, able to do error analysis and correlate results

1. Standard operating procedures for Vernier Caliper, Micrometer Screw Guage and Travelling Microscope.
2. To determine the value of 'g' by the compound pendulum.
3. To find the moment of inertia of a fly wheel about its own axis of rotation OR.
4. To verify Newton law of cooling.
5. To determine the moment of inertia of the given irregular shaped body by Torsion pendulum.
6. To demonstrate gravity of Newton's law.

Reference books:

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the Fundamentals of Physics	K1
CO2	Understand the Force	K2
CO3	Demonstrate general physics in energy	K3
CO4	Apply basic physics in motion	K4
CO5	To understand the concept of properties of matter	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	L	M	S	L	L	L
CO2	S	S	S	L	M	S	L	L	L
CO3	S	S	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UPHCT02**	**Hours/Week:5**	**Credit: 4**
COURSE TITLE: CORE COURSE II - HEAT, THERMODYNAMICS AND STATISTICAL MECHANICS			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the mechanisms of electrical devices
4. Understand the heat and its reactions.

Learning Objectives:

1. To understand the laws in Physics
2. To understand thermal physics
3. To understand thermo dynamic concepts
4. To understand the statistical mechanics
5. To understand the heat transfer

Unit - I	**Calorimetry**	**09 Hours**

Specific Heat Capacity – Specific Heat Capacity of Gases CP& CV– Meyer's Relation – Joly's Method for Determination of CV – Renault's Method for Determination of CP.

Low Temperature Physics: Joule-Kelvin Effect – Porous Plug Experiment - Joule - Thomson Effect – Boyle temperature – Temperature of Inversion

Unit - II	Thermodynamics-I	09 Hours

Zeroth Law and First Law of Thermodynamics – P-V Diagram – HeatEngine – Efficiency of Heat Engine – Carnot's Engine, Construction, Working and Efficiency of Petrol Engine and Diesel Engines – Comparison of Engines.

Unit - III	Thermodynamics-II	09 Hours

Second Law of Thermodynamics – Entropy of an Ideal Gas – Entropy Change in Reversible and Irreversible Processes – T - S Diagram – Thermodynamical scale of Temperature – Maxwell's Thermodynamical Relations –Clasius - Clapeyron's Equation (First Latent Heat Equation) – Third Law of Thermodynamics – Unattainability of Absolute Zero – HeatDeath.

Unit - IV	Heattransfer	09 Hours

Modes of Heat Transfer: Conduction, Convection and Radiation.

Conduction: Thermal Conductivity – Determination of Thermal Conductivity of a Good Conductor by Forbe's Method – DeterminationOf thermal Conductivity of a Bad Conductor by Lee's Disc Method.

Radiation: Black Body Radiation (Ferry's Method) – Distribution of Energy in Black Body Radiation – Wien's Law and Rayleigh Jean's Law–Planck's Law of Radiation – Stefan's Law – Deduction of Newton'sLaw of Cooling from Stefan's Law.

Unit - V	Statistical mechanics	09 Hours

Definition of Phase-Space – Micro and Macro States – Ensembles – Different types of Ensembles – Classical and Quantum Statistics – Maxwell - Boltzmann Statistics – –Bose - Einstein Statistics – Fermi- Dirac Statistics – Comparison of three statistics.

Text Book(s):

1. Brijlal & N. Subramaniam, 2000, Heat andThermo dynamics, S. Chand & Co.
2. Narayanamoorthy & Krishna Rao, 1969, Heat, Triveni Publishers, Chennai.
3. V.R.Khanna & R. S. Bedi, 1998 1st Edition, Text book of Sound, Kedharnaath Publish & Co, Meerut
4. Brijlal and N. Subramanyam, 2001, Waves and Oscillations,Vikas Publishing House, New Delhi.

5. Ghosh, 1996, Text Book of Sound, S. Chand &Co.
6. R. Murugeshan & Kiruthiga Sivaprasath, Thermal Physics, S. Chand& Co.

Reference Books:

1. J.B. Rajam & C.L. Arora, 1976, Heat and Thermodynamics, 8th edition, S. Chand & Co. Ltd.
2. D.S. Mathur, Heat and Thermodynamics, Sultan Chand & Sons.
3. Gupta, Kumar, Sharma, 2013, Statistical Mechanics, 26th Edition, S. Chand & Co.
4. Resnick, Halliday & Walker, 2010, Fundamentals of Physics, 6thEdition.
5. Hugh D. Young, Roger A. Freedman, 2021University Physics with Modern Physics 15th Edition, Pearson.

Web Resources:

1. https://youtu.be/M_5KYncYNyc
2. https://www.youtube.com/watch?v=4M72kQulGKk&vl=en

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature physics. Student identifies the relationship between heat capacity, specific heat capacity. The study of Low temperature Physics sets the basis for the students to understand cryogenics, superconductivity, super fluidity and CondensedMatter Physics	K1
CO2	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrolengines	K2
CO3	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy	K3
CO4	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyze them	K4
CO5	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac. Apply to quantum particles such as photon and electron	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	S	S	S	S	M	S
CO2	M	S	S	S	M	S	S	M	M
CO3	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	M	M
CO5	S	S	M	S	S	S	M	M	S

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UPHCP02**	**Hours/Week: 3**	**Credit: 3**
COURSE TITLE: CORE COURSE PRACTICAL II - HEAT, OSCILLATIONS, WAVES & SOUND EXPERIMENTS			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Apply their knowledge gained about the concept of heat and sound waves, resonance, calculate frequency of ac mains set up experimentation to verify theories, quantify and analyze, able to doerror analysis and correlate results

(Any EIGHT Experiments)

1. Determination of specific heat by cooling – graphical method.
2. Determination of thermal conductivity of good conductor by Searle's method.
3. Determination of thermal conductivity of bad conductor by Lee's disc method.
4. Determination of thermal conductivity of bad conductor by Charlatan's method.
5. Determination of specific heat capacity of solid.
6. Determination of specific heat of liquid by Joule's electrical heating method (applying radiation correction by Barton's correction/graphicalmethod),
7. Determination of Latent heat of a vaporization of a liquid.

8. Determination of Stefan's constant for Black body radiation.
9. Verification of Stefan's-Boltzmann's law.
10. Determination of thermal conductivity of rubber tube.
11. Helmholtz resonator.
12. Frequency of tuning fork using Sonometer.
13. Determination of velocity of sound using Kunds tube.
14. Determination of frequency of an electrically maintained tuning fork
15. To verify the laws of transverse vibration using sonometer.
16. To verify the laws of transverse vibration using Melde's apparatus.
17. To compare the mass per unit length of two strings using Melde's apparatus.

Frequency of AC by using sonometer.

Reference books:

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Acquires knowledge on Instrumentation	K1
CO2	To know the transducers and sensors	K2
CO3	Acquires knowledge on how to use digital Instruments	K3
CO4	To know the functions of medical instrumentations	K4
CO5	Understand the concepts of gas analyzers	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	M	S	S	S	S	S	S	M	S
CO2	M	S	S	S	M	S	S	M	M
CO3	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	M	M
CO5	S	S	M	S	S	S	M	M	S

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UPHSE01**	**Hours/Week:2**	**Credit: 2**
COURSE TITLE: SKILL ENHANCEMENT COURSE I - INSTRUMENTATION			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the mechanisms of electrical devices
4. Understand the heat and its reactions.

Learning Objectives:

1. To study the instrument with its principle and observe themethod of their functioning.
2. To provide a good foundation in measurements
3. To inspire interest in the knowledge of concepts regardingmeasurements.
4. To understand the statistical mechanics
5. To understand the heat transfer

Unit - I	**Performance Characteristics of an Instrumentation System**	**04 Hours**

Introduction – System configuration – Problem Analysis – Basic Characteristics of measuring devices – Calibration - Generalized measurement – Zero – order system – Second order system– Dead timeelement – Specification and testing of dynamic response.

Unit - II	Sensors and Transducers	04 Hours

Basic principles of sensors – pressure sensor (Strain Gauge) – IR sensor -Characteristics of transducers – variable resistance transducer – variable capacitance transducer – Voltage and current transducer.

Unit - III	Digital Instruments	04 Hours

Introduction – Digital Multimeter – Digital panel meter – Digital frequency meter – Digital Measurement of time – Universal counter – Digital tachometer – Digital PH meter.

Unit - IV	Medical Instrumentation	04 Hours

ECG - EEG – Lead systems and recording methods – typical waveforms – X-ray machine – Digital Stethoscope – Computer tomography – MRI – Ultrasonography – Thermography – Pacemakers –Ventilators – Dialyzers.

Unit - V	Gas Analyzers and Pollution Monitoring Instruments	04 Hours

Types of gas analyzers – Oxygen, NO2 and H2S types – IR analyser – Airpollution standards – Air pollution detector – Dust and smoke detector –Radiation monitoring instruments – Area radiation dosimeter – personal radiation dosimeter – radiation warning alarm.

Text Book(s):

1. E.A. Doebelin, Measurement Systems-Applications and Design, TataMcGraw Hill,(1990)
2. CS Rangan, GR Sharma, V.S.V. Mani, Instrumentation Devices andSystems, Second Edition, Tata McGraw Hill, (2011) 3.R.S. Khandpur, Hand book of Analytical Instruments, Tata McGraw Hill (2003).

Reference Books:

1. D. Patranabis, Sensors and Transducers, Prentice Hall of India, (1999)
2. M. Arumugam, Bio-medical Instrumentation, Anuradha Agencies,(2002)
3. John G. Webster, Medical Instrumentation: Application and Design, John Wiley & Sons Inc (2009)
4. John P. Bentley Principles of Measurement Systems, Third Edition, Pearson Education, (2000)

Web Resources:

1.https://www.electronicshub.org/ir-sensor/

2.https://www.electronicsforu.com/technology-trends/learn- electronics/ir-led-infrared-sensor-basics

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Acquires knowledge on Instrumentation	K1
CO2	To know the transducers and sensors	K2
CO3	Acquires knowledge on how to use digital Instruments	K3
CO4	To know the functions of medical instrumentations	K4
CO5	Understand the concepts of gas analyzers	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	M	S	S	S	S	S	S	M	S
CO2	M	S	S	S	M	S	S	M	M
CO3	S	S	S	M	S	S	S	M	S
CO4	S	S	S	S	S	S	S	M	M
CO5	S	S	M	S	S	S	M	M	S

S - Strong, M – Medium, L – Low

Semester: II	Course Code: 23UPHA02	Hours/Week:5	Credit: 4
COURSE TITLE: ALLIED PHYSICS – II (For B.Sc., Mathematics/Geology/Chemistry)			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the mechanisms of electrical and electronic devices
4. Understand the heat and its reactions.

Learning Objectives:

1. To understand the basic concepts of optics.
2. To provide a good foundation in modern Physics
3. To inspire interest in the knowledge of concepts of Relativity and Quantum Physics.
4. To understand the semiconductorPhysics
5. To understand the Electronics

Unit - I	Optics	07 Hours

Interference – 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 – Application in Sugar Industries

Unit - II	Atomic Physics	07 Hours

Atom Models – Bohr Atom Model – Mass Number – Atomic Number – Nucleons – Vector Atom Model – Various Quantum Numbers – Pauli's Exclusion Principle – Electronic Configuration– Periodic Classification Of Elements – Bohr Magneton – Stark Effect – Zeeman Effect (Elementary Ideas Only) – Photo ElectricEffect – Einstein's Photoelectric Equation – Applications of Photoelectric Effect: Solar Cells, Solar Panels, Optoelectric Devices

Unit - III	Nuclear Physics	07 Hours

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 – Importance of Commissioning PFBR in Our Country – Heavy Water Disposal, Safety of Reactors: Seismic andFloods –Introduction to DAE, IAEA – Nuclear Fusion – Thermonuclear Reactions – Differences between Fission and Fusion.

Unit - IV	Introduction to Relativity andGravitational Waves	07 Hours

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 – Introduction on Gravitational Waves, LIGO, ICTS Opportunities at International Centre for Theoretical Sciences

Unit - V	Semiconductor Physics	07 Hours

P-N Junction Diode – Forward And Reverse Biasing – Characteristic of Diode – Zener Diode – Characteristic of ZenerDiode – 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

Text Book(s):

1. R. Murugesan (2005), Allied Physics, S. Chand & Co, New Delhi.
2. K. Thangaraj and D. Jayaraman (2004), Allied Physics, Popular Book Depot, Chennai.
3. Brijlal and N. Subramanyam (2002), Text book of Optics, S. Chand & Co, New Delhi.
4. R. Murugesan (2005), Modern Physics, S. Chand & Co, New Delhi.
5. A. Subramaniyam Applied Electronics, 2nd Edn., National Publishing Co., Chennai.

Reference Books:

1. Resnick Halliday and Walker (2018), Fundamentals of Physics,11thEdn., John Willey 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, Tata Mc Graw Hill Publication, New Delhi.
4. Thomas L. Floyd (2017), Digital Fundamentals, 11thEdn.Universal Book Stall, New Delhi.
5. V.K .Metha (2004), Principles of electronics, 6thEdn. S.Chandand Company, New Delhi.

Web Resources:

1. https://www.berkshire.com/learning-center/delta-p-facemask/https://www.youtube.com/watch?v=QrhxU47gtj4ht tps://www.youtube.com/watch?time_continue=318&v=D38Bj gUdL5U&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

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:

Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Explain the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns	K1
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 inter disciplinary nature of science and in solar energy related applications.	K2
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 and getour Govt. agencies like DAE guiding the country in the nuclear field.	K3
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. 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.	K4
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.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S
CO3	M	S	S	S	S	M	S	S	S
CO4	S	S	S	S	S	S	S	M	S
CO5	M	S	S	S	S	S	S	S	S

S - Strong, M – Medium, L – Low

Semester: II	**Course Code: 23UPHAP02**	**Hours/Week: 3**	**Credit: 2**
COURSE TITLE: ALLIED PHYSICS PRACTICALS – II (For B.Sc., Mathematics/Geology/Chemistry)			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Apply various Physics concepts to understand concepts of Light, electricity and magnetism and waves, set up experimentation to verify theories, quantify and analyze, able to do error analysis andcorrelate results

1. Radius of curvature of lens by forming Newton's rings
2. Thickness of a wire using air wedge
3. Wavelength of mercury lines using spectrometer and grating
4. Refractive index of material of the lens by minimum deviation
5. Refractive index of liquid using liquid prism
6. Determination of AC frequency using sonometer
7. Specific resistance of a wire using PO box
8. Thermal conductivity of poor conductor using Lee's disc
9. Determination of figure of merit table galvanometer
10. Determination of Earth's magnetic field using field along the axis of a coil
11. Characterisation of Zener diode

12. Construction of Zerner/IC regulated power supply
13. Construction of AND, OR, NOT gates using diodes and transistor NOR gate as a universal building block

Reference books:

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion	K1
CO2	Acquire the knowledge on the conservation laws	K2
CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces	K3
CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept	K4
CO5	Appreciate Lagrangian system of mechanics, apply D'Alemberts principle	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	M	S	S	S	M	S
CO2	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	S	M	S
CO5	S	S	M	S	S	M	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UPHCT03	Hours/Week:5	Credit: 4
COURSE TITLE: CORE COURSE III - GENERAL MECHANICS AND CLASSICAL MECHANICS			

Course Overview:

1. Demonstrate general physics phenomena.
2. Apply basic physics law in daily life.
3. Understand the mechanisms of electrical devices.
4. Understand the physics laws.

Learning Objectives:

1. To have a basic understanding of the laws and principles of mechanics.
2. To apply the concepts of forces existing in the system.
3. To understand the forces of physics in everydaylife.
4. To visualize conservation laws.
5. To apply Lagrangian equation to solve complex problems.

Unit - I	Laws of Motion & Gravitation	09 Hours

Newton's Laws – Forces – Equations of Motion – Frictional Force – Motion of a particle in a Uniform Gravitational Field – Types of Everyday Forces in Physics.

Classical Theory of Gravitation – Kepler's Laws, Newton's Law of Gravitation – Determination of G by Boy's Method – Earth - Moon System – Weightlessness – Earth Satellites – Parking Orbit – Earth Density – Mass of The Sun – Gravitational Potential.

Unit - II	Conservation Laws of Linear andAngular Momentum	09 Hours

Conservation of Linear and Angular Momentum – Internal Forces andmomentum Conservation – Center of Mass – Examples – General Elastic Collision of Particles of Different Masses – System with Variable Mass – Examples – Conservation of Angular Momentum – Torque due to Internal Forces – Torque due to Gravity – Angular Momentum about Center of Mass – Proton Scattering by Heavy Nucleus.

Unit - III	Conservation Laws of Energy	09 Hours

Introduction – Significance of Conservation Laws – Law of Conservation of Energy concepts of Work- Power – Energy – Conservative Forces – Potential Energy and

Conservation of Energy in gravitational and Electric Field – Examples –Non-Conservative Forces –General Law of Conservation of Energy.

Unit - IV	Rigid Body Dynamics	09 Hours

Translational and Rotational Motion – Angular Momentum – Moment of Inertia – General Theorems of Moment of Inertia – Examples – Rotation About Fixed Axis – Kinetic Energy of Rotation – Examples –Body Rolling along a Plane Surface – Body Rolling Down an Inclined Plane – Gyroscopic Precision – Gyrostatic Applications.

Unit - V	Lagrangian Mechanics	09 Hours

Generalized Coordinates – Degrees of Freedom – Constraints - Principle of Virtual Work and D' Alembert's Principle –Lagrange'sEquation from D' Alembert's Principle – Application –Simple Pendulum – Atwood's Machine.

Text Book(s):

1. J.C. Upadhyaya, 2019, Classical Mechanics, HimalayaPublishing house, Mumbai.
2. P. Durai Pandian, Laxmi Durai Pandian, Muthamizh Jayapragasam, 2005, Mechanics, 6th revised edition,S. Chand & Co.
3. D. S. Mathur & P. S. Hemne, 2000, Mechanics, RevisedEdition, S.Chand & Co.
4. Narayanamurthi, M. & Nagarathnam. N, 1998, Dynamics.The National Publishing, Chennai.
5. Narayanamurthi, M. and Nagarathnam, N, 1982, Statics,Hydrostatics and Hydrodynamics, The National Publishers, Chennai.

Reference Books:

1. Goldstein Herbert, 1980, Classical Mechanics. U.S.A: Addisonand Wesely.
2. Halliday, David & Robert, Resnick, 1995, Physics Vol.I. NewAge, International, Chennai.
3. Halliday, David Robert Resnick and Walker Jearl, 2001, Fundamentals of Physics, John Wiley, New Delhi

Web Resources:

1. https://youtu.be/X4_K-XLUIB4
2. https://nptel.ac.in/courses/115103115
3. https://www.youtube.com/watch?v=p075LPq3Eas
4. https://onlinecourses.nptel.ac.in/noc22_me96/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the Newton's Law of motion, understand general theory of relativity, Keeper's laws and Realize the basic principles behind planetary motion	K1
CO2	Acquire the knowledge on the conservation laws	K2
CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces	K3
CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept	K4
CO5	Appreciate Lagrangian system of mechanics, applyD‟ Alemberts principle	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	M	S	S	S	M	S
CO2	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	S	M	S
CO5	S	S	M	S	S	M	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UPHCP03	Hours/Week: 3	Credit: 2
COURSE TITLE: CORE COURSE PRACTICAL III - ELECTRICITY EXPERIMENTS			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Construct circuits to learn about the concept of electricity, current,resistance in the path of current, different parameters that affect a circuit. Set up experiments, observe, analyze and assimilate the concept

1. Calibration of low range and high range voltmeter using potentiometer
2. Calibration of ammeter using potentiometer.
3. Measurement of low resistances using potentiometer.
4. Determination of field along the axis of a current carrying circular coil.
5. Determination of earth‟s magnetic field using field along axis of currentcarrying coil.
6. Determination of specific resistance of the material of the wire using PO box.
7. Determination of resistance and specific resistance using Carey Foster's bridge.
8. Determination of internal resistance of a cell using potentiometer.
9. Determination of specific conductance of an electrolyte.
10. Determination of e.m.f of thermo couple using potentiometer
11. Determination of capacitance using Desauty's bridge and B.G./Spot galvanometer / head phone.
12. Determination of figure of merit of BG or spot galvanometer.
13. Comparison of EMF of two cells using BG. Comparison of capacitance using BG.

Reference books:

1. M.N. Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Understand the Newton's Law of motion, understand generaltheory of relativity, Kepler's laws and Realize the basic principles behind planetary motion	K1
CO2	Acquire the knowledge on the conservation laws	K2
CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces	K3
CO4	Gain knowledge on rigid body dynamics and solve problemsbased on this concept	K4
CO5	Appreciate Lagrangian system of mechanics, applyD‟ Alemberts principle	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	S	S	S	M	S	S	S	M	S
CO2	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	S	M	S
CO5	S	S	M	S	S	M	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UPHSE02	Hours/Week: 2	Credit: 2
COURSE TITLE: SKILL ENHANCEMENT COURSE II - (Entrepreneurial Based) DIGITAL PHOTOGRAPHY			

Course Overview:

1. Demonstrate general physics phenomena.
2. Apply basic physics law in daily life.
3. Understand the mechanisms of electrical devices.
4. Understand the physics laws.

Learning Objectives:

1. To understand the principles of photography and image formation andthe science and arts behind it.
2. To apply the principles in the visual system.
3. To understand the concepts in everydaylife.
4. To understand the essential componentsof conventional and digital Cameras and also the different image processing techniques.

Unit - I	Photography and Basic Principle of ImageFormation	04 Hours

Principle – Chemical Route and Digital Route – Light, Wavelengths, Colours – Shadows – Light Intensity and Distance – Making Light form Images –Pin – Hole Images – Practical Limitations to Pin-Hole Images – Lens Instead of Pin – Hole – Focal Length And Image Size – Imaging of Closer Subjects.

Unit - II	Lenses – Controlling The Images	04 Hours

Photographic Lens – Focal Length and Angle of View **(**Problems**)** – Focusing Movement – Aperture and F – Numbers **(**Problems**)** – Depthof Field– Depth of Focus – Image Stabilization – Lenses for Digital Cameras – Lens and Camera Care.

Unit - III	Camera Using Films and its Types	04 Hours

Camera and its Essential Components – Shutter – Aperture – Light Measurement – Film Housing – Camera types: View Camera – View Finder Camera – Reflex Camera – Single Lens Reflex (SLR) Camera

Unit - IV	Digital Cameras Principle and Types	04 Hours

Principle of Digital Image Capturing – Comparison of Digital And Analog Picture Information – Megapixel – Grain, Noise and Pixel Density – Optical and Digital Zooming – Image Stabilizer – Bit Depth White Balance – Colour Modes – File Formats (TIFF, RAW &JPEG)

Storage Cards and Types – Digital Cameras: Camera Phones – Compact Camera – Hybrid Camera – Digital SLR

Unit - V	The Digital Image – Postproduction	04 Hours

Hardware: Computer and its Peripherals – Software: Saving Digital File – Basic Editing: Navigating the Image – Undo/Redo/History – Crop – Rotate – Brightness &Contrast – Colour Balance – Hue/Saturation – Dodge/Burn – Cloning &Retouching – Removing AnElement In An Image – Advanced Editing: Histogram/Levels – Curves – Selection Tools: Magic Wand – Printing Digital Images: Inkjet. Printer – Laser Printer – Dye Sub Printer – Lambda/Light Jet Printers.

Text Book(s):

1. Michel J. Lang ford , Anna Fox & Richard Sawd on Smith, Basicphotography, 9th Edition, 2010-NL, Focal press, London
2. Henry Carroll, Read this if you want to take great photographsof people, Laurence King Publishing

Reference Books:

1. Mark Galer, Digital Photography in Available Lightessentials kills, 2006, Focal press, London
2. Paul Harcourt Davies, The Photo grapher's practical handbook,2005, UKPRESS

Web Resources:

1. http://nptel.ac.in/courses/112104026/

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion	K1
CO2	Acquire the knowledge on the conservation laws	K2
CO3	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces	K3
CO4	Gain knowledge on rigid body dynamics and solve problems based on this concept	K4
CO5	Appreciate Lagrangian system of mechanics, applyD' Alemberts principle	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	M	S	S	S	M	S
CO2	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	S	M	S
CO5	S	S	M	S	S	M	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UPHSE03	Hours/Week: 2	Credit: 2
COURSE TITLE: SKILL ENHANCEMENT COURSE III - COMPUTATIONAL METHODS AND PROGRAMMING IN C			

Course Overview:

1. Demonstrate general physics phenomena.
2. Apply basic C programme in daily life.
3. Understand the mechanisms of electronics devices.
4. Understand the concepts of C programme.

Learning Objectives:

1. This course will provide the necessary basic concepts of errors in computing and a few numerical methods for finding zeros of non- linear functions.
2. To provide the basics of the C programminglanguage..
3. To understand the C programme in everydaylife.
4. To visualize fundamentals of C programme.
5. To apply array to solve complex problems.

Unit - I	Errors in Computing	04 Hours

Significant digits – Inherent Errors – Numerical Errors – Modelling Errors – Absolute and Relative Errors – Error Propagation – Conditioning and stability – Convergence of iterative process.

Unit - II	Roots of Equations	04 Hours

Algebraic, Polynomial, Transcendental equations – Methods of the solution – Iterative methods – Starting and stopping iterative process – Evaluation of polynomials – Bisection method – False Position method-Related problems.

Unit - III	C-Fundamentals	04 Hours

Character set – Keywords - data types – variable types - constants – identifiers – keywords – operators and expressions – Input and Output functions.

Unit - IV	Control Statements	04 Hours

(Syntax and examples for each) If – else, Nested if-else, Switch – Case,Break, While Loop, for loop, Do-While statement, go to.

Unit - V	Functions and Arrays	04 Hours

Declaration and definition of a function – accessing a function – passing parameters to a function Defining an array – processing an array – singledimensional array – multidimensional array – simple programs (Addition, Subtraction, Multiplication of two matrices - Ascending and Descending order).

Text Book(s):

1. E. Balagurusamy, Numerical Methods, Mc Graw Hill Publishers, 2017.

2. S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of Indi a,2012

Reference Books:

1. E.Balagurusamy, Programmingin ANSIC, Mc Graw Hill Publishers, 2019, 8th Edn

2. B.Gottfried, Schaum's Outline of Programming with C, Mc Graw Hill Publishers, 1996

Web Resources:

1. https://beginnersbook.com/2014/01/c-tutorial-for- beginners-with- examples/

2. https://onlinecourses.swayam2.ac.in/cec20_cs02/preview

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes:
Upon successful completion of this course, the student will be able to

COs	Statements	Bloom's Level
CO1	Develop a C program.	K1
CO2	Control the sequence of the program and give logical outputs.	K2
CO3	Implement strings in your C program.	K3
CO4	Store different data types in the same memory.	K4
CO5	Manage I/O operations in your C program.	K5

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	M	S	S	M	S	S	S	M	S
CO2	S	S	S	M	S	M	S	S	S
CO3	S	S	S	S	S	S	M	S	M
CO4	M	S	S	S	M	S	S	M	S
CO5	S	S	M	S	S	M	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	**Course Code: 23UPHA01**	**Hours/Week: 5**	**Credit: 4**
COURSE TITLE: ALLIED PHYSICS – I (For B.Sc., Mathematics/ Geology/Chemistry)			

Course Overview:

1. Demonstrate general physics phenomena
2. Apply basic physics law in daily life
3. Understand the heat and thermodynamics
4. Understand the waves oscillations and ultrasonic's

Learning Objectives:

1. To impart basic principles of Physics that which would be helpful for students who have taken programmes other than Physics.
2. To understand the waves, oscillations and ultrasonic's
3. To understand the properties of matter
4. To understand the electricity
5. To understand the digital electronics and digital India

Unit - I	Waves, Oscillations and Ultrasonics	07 Hours

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 – Lithotripsy, Ultrasonography – Ultrasonoimaging- Ultrasonics in Dentistry – Physiotheraphy, Opthalmology – Advantages of Noninvasive Surgery – Ultrasonics in GreenChemistry.

Unit - II	Properties of Matter	07 Hours

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 - Covid Transmission Through Droplets, Saliva – Drop Weight Method – Interfacial Surface Tension.

Unit - III	Heat and Thermodynamics	07 Hours

Joule - Kelvin effect – Joule-Thomson porous plug experiment – theory – temperature of for inversion – liquefaction of Oxygen – Linde's process of liquefaction of air – liquid Oxygen medicalpurpose – importance of cry coolers – thermodynamic system – thermodynamic equilibrium – laws of thermodynamics – heatengine – Carnot's cycle – efficiency – entropy – change of entropyin reversible and irreversible process.

Unit - IV	Electricity and Magnetism	07 Hours

Potentiometer – Principle – Measurement of Thermo EMF UsingPotentiometer – 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 AnAc Circuit – Types Of Switches In. Household And Factories– Smart Wifi Switches - Fuses And Circuit Breakers In Houses

Unit - V	Digital Electronics and Digital India	07 Hours

Logic Gates, OR, AND, NOT, NAND, NOR ,EXOR Logic Gates –Universal Building Blocks –

Boolean Algebra – De Morgan's Theorem – Verification – Overview Of Government Initiatives: Software Technological Parks Under Meity, NIELIT- Semiconductor Laboratories Under Dept. Of Space An Introduction To Digital India.

Text Book(s):

1. R. Murugesan (2001), Allied Physics, S. Chand & Co, New Delhi.
2. Brijlal and N. Subramanyam (1994), Waves and Oscillations, Vikas PublishingHouse, New Delhi.
3. Brijlal 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. A. Subramaniyam, AppliedElectronics2nd Edn.,NationalPublishingCo.,Chennai.

Reference Books:

1. Resnick Halliday and Walker (2018).Fundamentals of Physics (11th edition), John Willey and Sons, Asia Pvt. Ltd., Singapore.
2. V.R. Khannaand R.S. Bedi (1998), TextbookofSound1st Edn. Kedharnaath Publish & Co, Meerut.
3. N.S. Khare and S.S. Srivastava (1983),Electricity and Magnetism 10th Edn.,AtmaRam&Sons, New Delhi.
4. D.R. Khanna and H.R. Gulati (1979). Optics, S. Chand &Co. Ltd., New Delhi.

Web Resources:

1. https://youtu.be/M_5KYncYNyc
2. https://youtu.be/ljJLJgIvaHY

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
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 inmedical field.	K1
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.	K2
CO3	Comprehend basic concept of thermodynamics concept of entropy and associated theorems able to interpret the process of flow temperature physics in the background of growth of this technology.	K3
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 analyze them mathematically verify circuits and apply the concepts to construct circuits and study them.	K4
CO5	Interpret the real life solutions using AND, OR, NOT basic logic gates and in tend their ideas to universal building blocks.Infer operations using Boolean algebra and acquire elementary idea of IC circuits. Acquire information about various Govt. programs/ institutions in this field.	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	S	S	S	S	S	S
CO2	M	S	S	S	M	S	S	S	S
CO3	M	S	S	S	S	M	S	S	S
CO4	S	S	S	S	S	S	S	M	S
CO5	M	S	S	S	S	S	S	S	S

S - Strong, M – Medium, L – Low

Semester: III	Course Code: 23UPHAP01	Hours/Week: 3	Credit: 3
COURSE TITLE: ALLIED PHYSICS PRACTICALS – I (For B. Sc Mathematics/ Geology/Chemistry)			

Course Overview:

1. To understand practically various physics applications

Learning Objectives:

1. Apply various physics concepts to understand Properties of Matterand waves, set up experimentation to verify theories, quantify and analyze, able to do error analysis and correlate results

1. Young's modulus by non-uniform bending using pin and microscope
2. Young's modulus by non-uniform bending using optic lever, scale and telescope
3. Rigidity modulus by static torsion method
4. Rigidity modulus by torsional oscillations without mass
5. Surface tension and interfacial Surface tension – drop weight method
6. Comparison of viscosities of two liquids – burette method
7. Specific heat capacity of a liquid – half time correction
8. Verification of laws of transverse vibrations using sonometer
9. Calibration of low range voltmeter using potentiometer
10. Determination of thermo emf using potentiometer
11. Verification of truth tables of basic logic gates using ICs
12. Verification of De Morgan's theorems using logic gate ICs.
13. Use of NAND as universal building block.

Reference books:

M.N.Srinivasan, S. Balasubramanian, R. Ranganathan, A textbook of PRACTICAL PHYSICS, Sultan Chand and sons educational publishers, New Delhi. Edition 2017

Teaching Methodology: Videos, Audios, PPT, Role Play, Field Visit, Seminar, Chalk & Talk, Lecturing, Case Study, Demonstration, Problem Solving, Group Discussion, Flipped Learning

Learning Outcomes: Upon successful completion of this course, the student will be able to		
COs	**Statements**	**Bloom's Level**
CO1	Understand the Fundamentals of Physics	K1
CO2	Understand the Force	K2
CO3	Demonstrate general physics in energy	K3
CO4	Apply basic physics in motion	K4
CO5	To understand the concept of properties of matter	K5
K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate, K6 – Create		

Mapping (COs vs POs)									
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**
CO1	S	S	S	L	M	S	L	L	L
CO2	S	S	S	L	M	S	L	L	L
CO3	S	S	S	L	M	M	M	L	L
CO4	S	S	S	L	M	M	M	L	L
CO5	S	S	M	L	M	M	M	L	L

S - Strong, M – Medium, L – Low