J.J. College of Arts and Science (Autonomous)

Department of Physics

Proposed Course Structure based on TANSCHE and UGC - LOCF

(Choice Based Credit System)

(Applicable for the Candidates admitted from academic year 2023-2024 Onwards)

B.Sc. Physics - Semester I

Sl.No.	Course Category	Course Code	Course	Overall Credits	Total Contact Hours/Week	Marks		
						CIA	ESE	Total
Semester I								
1	Part - I	U1R3TL1/ HL1/FL1	Language - I (Tamil/Hindi/French)	3	6	25	75	100
2	Part - II	U1R3EL1	Language - I (English)	3	6	25	75	100
3	Part - III	U1R3PHCC1	Properties of matter and sound	5	5	25	75	100
4		U1R3PHCC2P	Practical I - (Covering CC1)	5	5	40	60	100
5		U1R3PHDSE1	Mathematics - I	3	4	25	75	100
6	Part - IV	U1R3PHSEC1 **(NME1)**	To be opted from other Department	2	2	25	75	100
7		U1R3PHFC	Introductory Physics	2	2	25	75	100
			Total	**23**	**30**			**700**

Semester II

Sl.No.	Course Category	Course Code	Course	Overall Credits	Total Contact Hours/Week	Marks		
						CIA	ESE	Total
Semester II								
1	Part - I	U2R3TL2/ HL2/FL2	Language - II (Tamil/Hindi/French)	3	6	25	75	100
2	Part - II	U2R3EL2	Language - II (English)	3	6	25	75	100
3	Part - III	U2R3PHCC3	Heat, Thermodynamics and Statistical Physics	5	5	25	75	100
4		U2R3PHCC4P	Practical II - (Covering CC3)	5	5	40	60	100
5		U2R3PHDSE2	Mathematics - II	3	4	25	75	100
6	Part - IV	U2R3PHSEC2 **(NME2)**	To be opted from other Department	2	2	25	75	100
7		U2R3PHSEC3	Physics for everyday life	2	2	25	75	100
			Total	**23**	**30**			**700**

Title of the Course : Properties of Matter and Sound

Category : Core Course

Course Code : U1R3PHCC1

Nature of Skill : Skill Development

Marks : CIA : 25 + Ext: 75 = 100 : Hrs / Week : 06

Credits : 05 Total Inst.Hrs : 90

COURSE OBJECTIVES

1.Tounderstandthedifferentmoduliof elasticity

2.To understand the basic concepts of Youngs Modulus

3.To Acquire skill for deducing expression for surface tension and co-efficient of viscosity

4.ToDevelopskillincompositionoftwoS.H.M

5.ToRecognizetheconceptofsounddistribution inauditorium bySabine'sformula

UNIT-1:ELASTICITY:(Inst. Hrs : 18)

Hooke's law – stress-strain diagram – elastic constants –Poisson's ratio – Relation between elastic constants and Poisson's ratio – work done 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: (Inst. Hrs : 18)

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's modulus – non-uniform bending– experiment to determine Young's modulus by Koenig's method – uniform bending – expression for elevation – experiment to determine Young's modulus using microscope

UNIT-III:FLUID DYNAMICS: (Inst. Hrs : 18)

Surface tension: Definition – molecular forces– excess pressure over curved surface – application to spherical and cylindrical drops and bubbles – determination of surface tension by Jaegar's method–variation of surface tension with temperature

Viscosity: Definition – streamline and turbulent flow – rate of flow of liquid in a capillary tube – Poiseuille's formula –corrections – terminal velocity and Stoke's formula– variation of viscosity with temperature

UNIT-IV:WAVES AND OSCILLATIONS: (Inst. Hrs : 18)

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 of AC frequency using sonometer –determination of frequency using Melde's string apparatus

UNIT-V:ACOUSTICS OF BUILDINGS AND ULTRASONICS: (Inst. Hrs : 18)

Intensity of sound – decibel – loudness of sound –reverberation – Sabine's reverberation formula – acoustic intensity – factors affecting the acoustics of buildings.

Ultrasonic waves: production of ultrasonic waves – Piezoelectric crystal method – magnetostrictioneffect – application of ultrasonic waves

TEXT BOOKS

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand& Co.
2. BrijLal& N. Subrahmanyam, 2003, Properties of Matter, S.Chand& Co
3. D.R.Khanna&R.S.Bedi, 1969, Textbook of Sound, AtmaRam& sons
4. BrijLal 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.

REFERENCEBOOKS

1. C.J. Smith, 1960, General Properties of Matter, Orient Longman Publishers
2. H.R. Gulati, 1977, Fundamental of General Properties of Matter, Fifth edition,R. Chand& Co.

3.,A.P French, 1973, Vibration and Waves, MIT Introductory Physics, Arnold-Heinmann India

WEBLINKS

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
4. https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s
5. https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work
6. https://learningtechnologyofficial.com/category/fluid-mechanics-lab/

7. http://www.sound-physics.com/
8. http://nptel.ac.in/courses/112104026/

COURSE OUTCOMES:

Atthe endofthecourse,the studentwillbeableto

CO1: Relate elastic behavior in terms of three modulii of elasticity and working of torsion pendulum- **K3**

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 engineering problems.**– K4**

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 of ac mains - **K4**

CO5: Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves – **K2**

MAPPING WITH PROGRAM OUT COMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**),MEDIUM(**M**)andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	M	M	S	M	M	S	M	S
CO2	M	S	S	S	M	M	S	M	S	S
CO3	S	M	S	M	S	S	M	S	S	S
CO4	S	S	S	S	S	M	S	M	M	M
CO5	M	M	S	S	M	S	S	S	S	M

Title of the Course : Practical-I

Category : Core Course

Course Code : U1R3PHCC2P

Nature of Skill : Skill Development

Marks : CIA : 40 + Ext: 60 = 100 : Hrs / Week : 03

Credits : 05 Total Inst.Hrs :45

COURSE OBJECTIVES

1.Tounderstandthe basic concepts of elasticity

2.To acquire the knowledgein surface tension

3.To understand basic concepts of moment of inertia

4.To acquire knowledge about co efficient of viscosity of liquids.

5.To learn about the basic concepts of Hook's law.

(Any Twelve Experiments)

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 Young's modulus by stretching of wire with known masses.
8. Verification of Hook's law by stretching of wire method.
9. Determination of Young's modulus by uniform bending – load depression graph.
10. Determination of Young's modulus by non-uniform bending – scale & telescope.
11. Determination of Young's modulusby cantilever – load depression graph.
12. Determination of Young's modulus by cantilever – oscillation method
13. Determination of Young's modulus by Koenig's method – (or unknown load)
14. Determination of rigidity modulus by static torsion.
15. Determination of Y, n and K by Searle's double bar method.
16. Determination of surface tension & interfacial surface tension by drop weight method.
17. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
18. Determination of critical pressure for streamline flow.
19. Determination of Poisson's ratio of rubber tube.

20. Determination of viscosity by Poiseullie's flow method.
21. Determinationradius of capillary tube by mercury pellet method.
22 Determinationof g using compound pendulum

REFERENCE BOOKS:

1. A text book of practical Physics–M.N. Srinivasan and others–Sultan Chand &Sons, New Delhi.
2. Practical Physics, S.Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
3. Practical Physics – A. DhanaLakshmi and K.R. Paramasivam – Apsara Publication, Trichy.

Online Resource:

1. **https://www.google.com/search?q=First+B.Sc.+Physics+partctical+experimentde&rlz=1C1VDKB_enIN954IN954&oq=First+B.Sc.+Physics+partctical+experimentde&aqs=chrome..69i57j33i10i160l2j33i22i29i30l2.38539j0j7&sourceid=chrome&ie=UTF-8**

COURSE OUT COME:

Onthesuccessfulcompletionofthecoursethestudentswillbeableto:

CO-1. Acquire the knowledge in moduli of Elasticity – K1

CO-2. Understand the concepts in surface tension. **–K2**

CO-3.Understand the concepts ofviscosity. **–K2**

CO-4. Determine the moment of inertia in solid material**–K5**

CO-5. Acquire the basic knowledge in gravitation (g)**–K1**

Title of the Course: Major Practical-I						**Course Code: U1R3PHCC2P**					
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	2	3	2	2	2.3
CO2	3	2	2	3	2	3	3	3	3	2	2.6
CO3	2	2	3	2	2	2	3	3	2	2	2.3
CO4	2	3	3	2	2	3	3	2	1	2	2.3
CO5	3	3	3	2	2	2	2	3	2	3	2.5
									Mean Overall Score		2.4
									Result		**High**

Title of the Course	**:**	**PHYSICS OF MUSIC**
Category	**:**	**Non Major Elective Course**
Course Code	**:**	**U1R3PHSEC1:1**
Nature of Skill	**:**	**Employability**

Marks: CIA :25+ Ext:75=100	**Hrs/Week**	**:**	**02**
Credits: 02	**Total Inst.Hrs**	**:**	**30**

COURSE OBJECTIVES

1.To acquire the knowledge in Scientific Study of Music.

2.To understand the concept in Simple Vibrating Systems.

3.Toanalyze the concept in Musical Tone.

4.To acquire the knowledge in Production of Musical Sounds.

5.To understand the concept of Recording Music &Sound .

UNIT-I **(Inst:Hrs:06)**

SCIENTIFIC STUDY OF MUSIC: Vibrations of Atoms of Matter– Vibrations Coupling to Air – Propagation of Sound Waves in Air, other Media, Fluids & Solids – Velocity, Frequency, Wavelength, Time Period, Intensity: Definition and Unit Fs – Classification of Sound on Frequency and Velocity– Human & Animal Sound Perception– Mechanism of Ear and Hearing – Psychoacoustics.

UNIT-II **(Inst:Hrs:06)**

SIMPLE VIBRATING SYSTEMS: Simple Harmonic Motion – Tuning Fork– Amplitude, Phase, Energy,Energy Loss/Damping/ Dissipation – Power – Travelling Waves and Standing Waves– Laws of Vibration in Stretched Strings– One-Dimensional Medium – Open and Closed Organ Pipes – Over Tones, Harmonics – Quality of Sound: Pitch, Timber, Loudness – Octaves, Musical Notes.

UNIT-III **(Inst:Hrs:06)**

MUSICAL TONE: Pure/Simple Tones – Sine/Cosine Waves– Well-Defined Frequencies, Wavelengths, Amplitudes & Phases– Partial Tones – Assembly of Pure Tones– Mix of Different Frequencies & Amplitudes– Complex Tone – Superposition of Simple Tones – Complex Waveform– Periodic Complex Waveform – Formants – Resonances– Sound Envelope.

UNIT-IV **(Inst:Hrs:06)**

PRODUCTION OF MUSICAL SOUNDS: Human Voice,Mechanism of Vocal Sound Production – Larynx (Sound Box) – ***Stringed Instruments***: Plucked &Bowed, Guitar, Mandolin, Violin, Piano, Etc. – ***Wind Instruments*:** Whistles, Flute, Saxophone, Pipe Organ, Bag Pipes,Etc – ***Percussion Instruments***:Plates, Membranes,Drums, Cymbals, Xylophone Etc. – ***Electronic Instruments*:** Keyboards, Electric Guitars, Rhythm Pads, Etc. – Analog and Digital Sound Synthesizers,–MIDI Instrument– Computer Generated Music.

UNIT-V (Inst:Hrs:06)

RECORDING OF MUSIC & SOUND: Edison Phonograph – Cylinder & Disk Records – Magnetic Wire and Tape Recorders –Digital Recording (E.G. To CD, DVD, Etc.)– Analog Transducers, Condenser, Dynamic Microphones, Loudspeaker – Complex Sound Fields – Near & Far Fields of Acoustic– Spectral Analysis Techniques – Continuous & Discrete Fourier Transforms, Digital Signal Processing – Digital Filtering – Specifications of Recording Studios.

TEXT BOOKS

1 . Physics and Music: The Science of Musical Sound by Harvey White (2014)

2. Good Vibrations – The Physics of Music by Barry Parker, (2009)

3.Physics and Music: Essential Connections and Illuminating Excursions by Kinko Tsuji and Stefan C. Müller(2021).

REFERENCE BOOKS:

1. The History of Musical Instruments by Curt Sachs, (2006)

WEB LINKS:

1.https://sciencing.com/the-physics-of-music-waves-beats-frequencies-13722354.html

2.https://www.physicsclassroom.com/class/sound

After completion of this course, students will be able to

CO1- Acquire the knowledge in Scientific Study of Music- **K1**

CO2- Understand the concept in Simple Vibrating Systems- **K2**

CO3-Analyze the concept in Musical Tone- **K4**

CO4- Acquire the knowledge in Production of Musical Sounds- **K1**

CO5- Understand the concept of Recording Music & Sound **-K2**

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**3**),MEDIUM (**2**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	2	2	1	2	2	2	2
CO2	3	2	2	2	2	3	3	3	2	2
CO3	2	2	3	2	3	3	2	3	2	2
CO4	2	3	3	2	2	1	2	3	3	2
CO5	1	3	3	2	2	3	2	3	2	2

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	3	2	2	1	2	2	2	2
CO2	3	2	2	2	2	3	3	3	2	2
CO3	2	2	3	2	3	3	2	3	2	2
CO4	2	3	3	2	2	1	2	3	3	2
CO5	1	3	3	2	2	3	2	3	2	2

Title of the Course	**:**	**ASTROPHYSICS**
Category	**:**	**Non Major Elective Course**
Course Code	**:**	**UIR3PHSEC1:2**
Nature of Skill	**:**	**Skill Development**
Marks: CIA :25+ Ext:75=100 Hrs/Week	**:**	**02**
Credits: 02 Total Inst.Hrs	**:**	**30**

COURSE OBJECTIVES

1. To understand the principle of Telescopes.
2. To understand the basic concepts of solar system.
3.To study the different Types of Eclipses.
4.To study the basic concepts of galaxies.
5.To acquire the Knowledge through different activities in astrophysics.

UNIT-I **(Inst:Hrs:06)**

TELESCOPES: Optical Telescopes – Magnifying Power, Brightness, Resolving Power and F/A Ratio – Types of Reflecting and Refracting Telescopes – Detectors and Image Processing – Radio Telescopes – Hubble Space Telescope.

UNIT-II **(Inst:Hrs:06)**

SOLAR SYSTEM: Bode's Law of Planetary Distances – Meteors, Meteorites, Comets, Asteroids – Kuiper Belt – Oort Cloud – Detection of Gravitational Waves – Recent Advances in Astrophysics.

UNIT-III **(Inst:Hrs:06)**

ECLIPSES: Types of Eclipses – Solar Eclipse – Total and Partial Solar Eclipse – Lunar Eclipse – Total and Partial Lunar Eclipse – Transits.

THE SUN: Physical and Orbital Data – Solar Atmosphere – Photosphere – Chromosphere – Solar Corona – Prominences – Sunspots – 11year Solar Cycle – Solar Flares.

UNIT-IV **(Inst:Hrs:06)**

STELLAR EVOLUTION: H-R Diagram – Birth & Death of Low Mass, Intermediate Mass and Massive Stars – Chandrasekar Limit – White Dwarfs – Neutron Stars – Pulsars – Black Holes – Supernovae.

GALAXIES: Classification of Galaxies – Galaxy Clusters –Interactions of Galaxies, Dark Matter and Super Clusters – Evolving Universe.

UNIT-V **(Inst:Hrs:06)**

ACTIVITIES IN ASTROPHYSICS:

(i) Basic construction of telescope

(ii) Develop models to demonstrate eclipses/planetary motion

(iii) Night sky observation

(iv) Conduct case study pertaining to any topic in this paper

(v) Visit to any one of the National Observatories

Any three activities to be done compulsorily.

TEXT BOOKS

1. BaidyanathBasu, (2001). An introduction to Astrophysics, Second printing, Prentice – Hall of India (P) Ltd, New Delhi
2. K.S.Krishnaswamy, (2002), Astrophysics – a modern perspective, New Age International (P) Ltd, New Delhi.

3.Shylaja, B.S. &Madhusudan, H.R.,(1999), Eclipse: A Celestial Shadow Play, Orient BlackSwan,

REFERENCES BOOKS:

1.Abell,Morrison and Wolf, 1987, Explolration of the Universe, 5th ed., Saunders College Publ.Carrol and Ostli e,2007

2.Introduction to Modern Astrophysics, 2nd ed., Pearson International William J.Kaufinann, III, 1977, Macmillan Publishing company, London.Abhyankar, K.D., Universities Press.

WEB LINKS:

1.https://physics.wustl.edu/introductionastrophysics.

2.https://web.astro.princeton.edu/academic/undergraduate-program/introduction-astrophysics

After completion of this course, students will be able to

CO1- Acquire the knowledge on the elements of space dynamics, solar system with their small bodies, universe and its neighbors and life in universe-**K1**

CO2- Understand the basic concepts of space dynamics, solar system:structure, activity and its features etc-**K2**

CO3- Understand the great number of diverse phenomena in the Universe through Physics like origin and nature of universe –subjects relevance to contemporary social issues-**K2**

CO4- Apply the scientific thinking to the real world problems and qualitative analysis about the solar system and their members-**K3**

CO5- Understand and demonstrate the formation of solar and lunar eclipses. Apply the knowledge and to communicate the scientific information's about universe, solar system, and life in Mars: pre Mariner and post Mariner-**K2**

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**3**),MEDIUM (**1**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	1	2	2	3	2	1	3
CO2	3	3	3	1	2	2	3	2	1	3
CO3	3	3	3	1	2	2	3	2	1	3
CO4	3	3	3	1	2	2	3	2	1	3
CO5	3	3	3	1	2	2	3	2	1	3

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	3	1	2	2	3	2	1	3
CO2	3	3	3	1	2	2	3	2	1	3
CO3	3	3	3	1	2	2	3	2	1	3
CO4	3	3	3	1	2	2	3	2	1	3
CO5	3	3	3	1	2	2	3	2	1	3

Title of the Course	**:**	**Introductory Physics**
Category	**:**	**Foundation Course**
Course Code	**:**	**U1R3PHFC**
Nature of Skill	**:**	**Skill Development**

Marks : CIA : 25 + Ext: 75 = 100 : Hrs / Week : 02

Credits : 02 Total Inst.Hrs :30

COURSE OBJECTIVES

1.Tounderstandthe basic concept of vectors

2.To understand the basic concepts of different types of forces

3.Gain the knowledge in different forms of en4rgy

4.ToDevelopthe skill in different types of motion incompositionoftwoS.H.M

5.ToRecognizetheconceptofsurface tension and types materials in daily use.

UNIT-I **(Inst. Hrs. : 06)**

Vectors, scalars –examples for scalars and vectorsfrom physical quantities – addition, subtraction of vectors – resolution and resultant of vectors – units and dimensions– standard physics constants

UNIT-II **(Inst. Hrs. : 06)**

Different types of forces–gravitational, electrostatic, magnetic, electromagnetic, nuclear – mechanical forces like, centripetal, centrifugal, friction, tension, cohesive, adhesive forces

UNIT-III **(Inst. Hrs. : 06)**

Different forms of energy– conservation laws of momentum, energy – typesof collisions –angular momentum– alternate energy sources–real life examples

UNIT-IV **(Inst. Hrs. : 06)**

Types of motion– linear, projectile, circular, angular, simple harmonic motions – satellite motion – banking of a curved roads– stream line and turbulent motions – wave motion – comparisonof light and sound waves – free, forced, damped oscillations

UNIT-V **(Inst. Hrs. : 06)**

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 BOOKS

1. D.S.Mathur, 2010, Elements of Properties of Matter, S.Chand& Co
2. BrijLal& N. Subrahmanyam, 2003, Properties of Matter,S.Chand& Co.

REFERENCEBOOKS

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

WEBLINKS

1. http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.htmlhttps://science.nasa.gov/ems/ https://eesc.columbia.edu/courses/ees/climate/lectures/radiation_hays/

COURSEOUTCOMES:

CO1: Apply concept of vectors to understand concepts of Physics and solve problems– **K3**

CO2: Appreciate different forces present in Nature while learning about phenomena related to these different forces– **K4**

CO3: Quantify energy in different process and relate momentum, velocity and energy– **K5**

CO4: Differentiate different types of motions they would encounter in various courses and understand their basis– **K5**

CO5: Relate various properties of matter with their behaviour and connect them with different physical parameters involved– **K5**

MAPPING WITH PROGRAM OUTCOMES:

Mapcourseoutcomes**(CO)**foreachcoursewithprogramoutcomes**(PO)**inthe3-pointscaleofSTRONG(**S**),MEDIUM(**M**)andLOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	S	S	S	S	S	S	S	M	S	M
CO2	M	S	S	S	M	S	S	M	M	M
CO3	S	S	S	M	S	S	S	M	S	M
CO4	S	S	S	S	S	S	S	M	M	M
CO5	S	M	S	S	S	S	S	M	M	S

Title of the Course	**:**	**Heat, Thermodynamics and Statistical Physics**
Category	**:**	**Core Course**
Course Code	**:**	**U2R3PHCC3**
Nature of Skill	**:**	**Skill Development**
Marks : CIA : 25 + Ext: = 75 = 100	**:**	**Hrs / Week : 15**
Credits : 05		**Total Inst. Hrs : 75**

COURSE OBJECTIVES

1. The course focuses to understand a basic in conversion of temperature in Celsius, Kelvin and Fahrenheit scales.
2. To understand the practical exhibition and explanation of transmission of heat in good and bad conductor.
3. To study the process of making heat to do mechanical work
4. To Relate the laws of thermodynamics and entropy in everyday life
5. To explore the knowledge of statistical mechanics and its relation

UNIT-I **(Inst. Hr. : 15)**

CALORIMETRY: specific heat capacity – specific heat capacity of gases C_P & C_V–Meyer's relation – Joly's method for determination of C_V – Regnault's method for determination of C_P

LOWTEMPERATUREPHYSICS: Joule-Kelvin effect – porous plug experiment – Joule-Thomson effect –Boyle temperature

UNIT-II **(Inst. Hr. : 15)**

THERMODYNAMICS-I: Zeroth law and first law of thermodynamics – P-V diagram – heat engine –efficiency of heat engine – Carnot's engine, construction, working and efficiency of petrol engine and diesel engines – comparison of engines.

UNIT-III **(Inst. Hr. : 15**

THERMODYNAMICS-II: Second law of thermodynamics –entropy of an ideal gas – entropy change in reversible and irreversible processes – T-S diagram –thermo dynamical scale of temperature – Maxwell's thermo dynamical relations –Clasius-Clapeyron's equation (first latent heat equation) – third law of thermodynamics – unattainability of absolute zero – heat death.

UNIT-IV **(Inst. Hr. : 15)**

HEATTRANSFER: Modes of heat transfer: conduction, convection and radiation.

Conduction: Thermal conductivity – determination of thermal conductivity of a good conductor by Forbe's method – determination ofthermal 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's law of cooling from Stefan's law.

UNIT-V **(Inst. Hr. : 15)**

STATISTICALMECHANICS: Definition of phase-space – micro and macro states – ensembles –different types of ensembles – classical and quantum Statistics – Maxwell-Boltzmann statistics – expression for distribution function – Bose-Einstein statistics – expression for distribution function – Fermi-Dirac statistics –expression for distribution function – comparison of three statistics.

TEXT BOOKS

1. Brijlal &N. Subramaniam, 2000, Heat and Thermodynamics, S.Chand& Co.
2. Narayanamoorthy&KrishnaRao, 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.

REFERENCEBOOKS

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, 6th Edition.
5. Sears, Zemansky, Hugh D. Young,Roger A. Freedman, 2021 University Physics with Modern Physics 15th Edition, Pearson.

WEBLINKS

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

COURSE OUTCOMES:

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 Condensed Matter Physics

CO2: Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines.

CO3: Able to analyze performance of thermodynamic systems *viz* efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy.

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 analyse them

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

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes**(CO)**for each course with program outcomes**(PO)** in the 3-point scale of STRONG(**S**), MEDIUM(**M**) and LOW(**L**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	3	3	3	3	2	3	2
CO2	2	3	3	3	2	3	3	2	2	2
CO3	3	3	3	2	3	3	3	2	3	2
CO4	3	3	3	3	3	3	3	2	2	2
CO5	3	3	2	3	3	3	2	2	3	2

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	3	1	2	2	3	2	2	3
CO2	3	3	3	1	2	2	3	2	2	3
CO3	3	3	3	1	2	2	3	2	2	3
CO4	3	3	3	1	2	2	3	2	2	3
CO5	3	3	3	1	2	2	3	2	2	3

Title of the Course	**:**	**Practical-II**
Category	**:**	**Core Course**
Course Code	**:**	**U2R3PHCC4P**
Nature of Skill	**:**	**Skill Development**
Marks : CIA : 40 + Ext: 60 = 100	**:**	**Hrs / Week : 05**
		Total Inst. Hrs : 75
Credits : 05		

COURSE OBJECTIVES

1. To understand the basic concepts of elasticity
2. To acquire the knowledge in surface tension
3. To understand basic concepts of moment of inertia
4. To acquire knowledge about co efficient of viscosity of liquids.
5. To learn about the basic concepts of Hook's law.

(Any Twelve 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 Charlaton'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/graphical method),
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-Boltzmans law.
10. Determination of thermal conductivity of rubber tube.
11. Helmholtz resonator.
12. Velocity of sound through a wire 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.
18. Frequency of AC by using sonometer.

REFERENCE BOOKS:

4. A text book of practical Physics–M.N. Srinivasan and others–Sultan Chand & Sons, New Delhi.
5. Practical Physics, S. Somasundaram, V. Balachandran, S. Padmanathan, Apsara Publications, Tiruchirapalli.
6. Practical Physics – A. Dhana Lakshmi and K.R. Paramasivam – Apsara Publication, Trichy.

Online Resource:

2. **https://www.google.com/search?q=First+B.Sc.+Physics+partctical+experimentde&rlz=1C1VDKB_enIN954IN954&oq=First+B.Sc.+Physics+partctical+experimentde&aqs=chrome..69i57j33i10i160l2j33i22i29i30l2.38539j0j7&sourceid=chrome&ie=UTF-8**

COURSE OUT COME:

On the successful completion of the course the students will be able to:

CO-1. Acquire the knowledge in moduli of Elasticity **– K1**

CO-2. Understand the concepts in surface tension. **–K2**

CO-3.Understand the concepts of viscosity. **– K2**

CO-4. Determine the moment of inertia in solid material **–K5**

CO-5. Acquire the basic knowledge in gravitation (g) **– K1**

Title of the Course: Practical-II						**Course Code: U2R3PHCC4P**					
Course Outcomes (COs)	**Programme Outcomes (POs)**					**Programme Specific Outcomes (PSOs)**					**Mean Score of COs**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	2	2	2	2	3	2	3	2	2	2.3
CO2	3	2	2	3	2	3	3	3	3	2	2.6
CO3	2	2	3	2	2	2	3	3	2	2	2.3
CO4	2	3	3	2	2	3	3	2	1	2	2.3
CO5	3	3	3	2	2	2	2	3	2	3	2.5
									Mean Overall Score		2.4
									Result		**High**

Title of the Course	**:**	**Medical Physics**
Category	**:**	**Non Major Elective Course**
Course Code	**:**	**U2R3PHSEC2:1**
Nature of Skill	**:**	**Employability**

Marks: CIA :25+ Ext:75=100 **Hrs/Week : 02**

Credits: 02 **Total Inst.Hrs : 30**

COURSE OBJECTIVES

1. To study the functions of various biopotentials and electrodes..
2. To understand the basic concepts of biopotentials based Instrumentation.
3. To acquire the Knowledge in radiation safety.
4. To understand the working principle of medical imageing.
5. To acquire the Knowledge in diagnostics.

UNIT-I **(Inst:Hrs:06)**

BIO-POTENTIALS AND ELECTRODES: Transport of Ions Through Cell Membrane-Resting and Action Potential - Characteristics of Resting Potential – Bio-Electric Potential – Design Of Medical Instruments – Components of Bio-Medical Instrumentation – Electrodes – Electrode Potential – Metal Microelectrode – Depth And Needle Electrodes – Types of Surface Electrode – The Ph Electrode.

UNIT-II **(Inst:Hrs:06)**

BIO-POTENTIAL BASED INSTRUMENTATION: Electrocardiography (ECG) – Origin of Cardiac Action Potential - ECG Lead Configuration –Block Diagram of ECG Recording Set Up (Qualitative) – Electroencephalography (EEG) – Origin of EEG – Action and Evoked Potentials - Brain Waves – Block Diagram of Modern EEG Set Up – Electromyography (EMG) – Block Diagram of EMG Recording Setup.

UNIT-III **(Inst:Hrs:06)**

OPERATION THEATRE AND SAFETY: Diathermy – Block Diagram of the Electrosurgical Diathermy– Shortwave, Microwave, Ultrasonic Diathermy – Ventilators – Servo Controlled Systems –**RADIATION SAFETY:** Units of Radiation - Pocket Dosimeter – Pocket Type Radiation Alarm – Thermo-Luminescence Dosimeter.

UNIT-IV **(Inst:Hrs:06)**

MEDICAL IMAGING: Nuclear Imaging Technique –Computer Tomography (CT) – Principle – Mathematical Basis of Image Construction –Block Diagram of CT Scanner – Ultrasonic Imaging Systems – Construction of Transducer – Display Modes – MRI Principle and Instrumentation.

UNIT-V **(Inst:Hrs:06)**

DIAGNOSTICS AND SPECIALITIES:X-Rays in Radiography – Fluoroscopy – Comparison– Image Intensifiers – Angiography – Applications of X-Ray Examination (*Problems*).

LASER IN MEDICINE: Laser Interactions With Biomolecules – Advantages of Laser Surgery – Endoscopy – Types of Endoscopes with their Operation (Qualitative).

TEXT BOOKS

1. Biomedical Instrumentation and measurement, Leslie Cromwell, PHI, 2015
2. Medical Instrumentation, M. Arumugam, Anuradha agencies, 1992
3. Medical Electronics, M.J.Kumar Doss, Prathibha Publishers, 1987
4. Medical Physics, John R. Cameron and James G. Skofronick, Thrift books, Atlanta, 1985

Electronic Instruments and Instrumentation Technology, M. M.M.Anand, PHI, 2015.

REFERENCE BOOKS:

1.Biomedical Instrumentation and measurements by Leslie Cromwell, Fred.J.Welbell Erich A.Pfeiffer.Prentice Hall India, Second Edition-1990.

WEB LINKS:

1.https://www.news-medical.net/health/The-Role-of-Physics-in-Medicine.aspx

2.https://inis.iaea.org/collection/NCLCollectionStore/_Public/47/024/47024156.pdf

After completion of this course, students will be able to

CO1- Study the function of bioelectric potentials and its importance and understand the different types of waveforms generated by organs- **K2**

CO2- Learn the fundamental knowledge of the electrodes to sense biopotentials- **K1**

CO3- Learn the basic concepts and interpretations of ECG and BP.Understand the anatomy of the nervous system and its signal measurements (EMG, CAT)-**K1**

CO4- Analyze and understand the applications of the imaging techniquestransmission(x- ray and ultrasound)-**K4**

CO5- Updating the knowledge in recent trends of measuring bio-signals- **K3**

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**3**),MEDIUM (**2**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	2	1	1	2	1	2	3	3
CO2	3	3	2	1	2	2	1	2	3	3
CO3	3	3	2	2	1	2	2	3	3	3
CO4	3	3	3	2	1	2	1	3	3	3
CO5	3	3	3	2	1	2	1	3	3	3

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	2	1	1	2	1	2	3	3
CO2	3	3	2	1	2	2	1	2	3	3
CO3	3	3	2	2	1	2	2	3	3	3
CO4	3	3	3	2	1	2	1	3	3	3
CO5	3	3	3	2	1	2	1	3	3	3

Title of the Course	**:**	**HOME ELECTRICAL INSTALLATION**
Category	**:**	**Non Major Elective Course**
Course Code	**:**	**U2R3PHSEC2:2**
Nature of Skill	**:**	**Employability**

Marks: CIA :25+ Ext:75=100 Hrs/Week : 02

Credits: 02 Total Inst.Hrs : 30

COURSE OBJECTIVES

1.To Study the different eiectric parameters and units.

2.to understand the basic concepts of Transmission of electricity.

3.To study the basic concepts of electrical wiring.

4.To learn the basic concepts of power rating.

5.To acquire knowledge in safety precautions and servicing.

UNIT-I (Inst:Hrs:06)

SIMPLE ELECTRICAL CIRCUITS: Charge, Current, Potential Difference, Resistance – Simple Electrical Circuits – DC Ammeter, Voltmeter, Ohmmeter – Ohm's Law – Difference Between DC and AC – Advantages of AC over DC – Electromagnetic Induction - Transformers – Inductors/Chokes – Capacitors/Condensers – Impedance – AC Ammeter, Voltmeter –Symbols and Nomenclature.

UNIT-II (Inst:Hrs:06)

TRANSMISSION OF ELECTRICITY: Production and Transmission of Electricity – Concept of Power Grid – Series and Parallel Connections – Technicalities of Junctions and Loops in Circuits –Transmission Losses (Qualitative) – Roles of Step-Up and Step-Down Transformers – Quality of Connecting Wires – Characteristicsof Single and Multicore Wires.

UNIT-III (Inst:Hrs:06)

ELECTRICAL WIRING: Different Types of Switches – Installation of Two Way Switch – Role of Sockets, Plugs, Sockets - Installation of Meters – Basic Switch Board – Electrical Bell – Indicator – Fixing of Tube Lights and Fans – Heavy Equipment Like AC, Fridge, Washing Machine, Oven, Geyser, Jet Pumps – Provisions for Inverter – Gauge Specifications of Wires for Various Needs.

UNIT-IV **(Inst:Hrs:06)**

POWER RATING AND POWER DELIVERED: Conversion of Electrical Energy in to Different Forms – Work done by Electrical Energy – Power Rating of Electrical Appliances – Energy Consumption – Electrical Energy Unit in Kwh – Calculation of EB Bill – Joule's Heating – Useful Energy and Energy Loss – Single and Three Phase Connections – Measures to Save Electrical Energy – Energy Audit.

UNIT-V **(Inst:Hrs:06)**

SAFETY MEASURES: Insulation for Wires – Colour Specification for Mains, Return and Earth – Understanding of Fuse and Circuit Breakers – Types of Fuse: Kit-Kat, HRC, Cartridge, MCB, ELCB – Purpose of Earth Line – Lighting Arrestors – Short Circuiting and Over Loading – Electrical Safety – Tips to Avoid Electrical Shock – First Aid for Electrical Shock – Fire Safety for Electric Current.

TEXT BOOKS

1. Wiring a House: 5th Edition by Rex Cauldwell, (2014).Black& Decker Advanced Home Wiring, 5th Edition: Backup 2 2
2. Power - Panel Upgrades - AFCI Protection - "Smart" Thermostats, by Editors of Cool Springs Press, (2018).

REFERENCE BOOKS:

1. Complete Beginners Guide to Rough in Electrical Wiring: by Kevin Ryan (2022).

WEB LINKS:

1.https://www.electricaltechnology.org/2013/09/electrical-wiring.html

2.https://electrical-engineering-portal.com/download-center/books-and-guides/electrical-engineering/electrical-wiring-home

After completion of this course, students will be able to

CO1- Learn the fundamentals of electricity, electrical parameters and testing tool-**K1**

CO2- Understand different methods of Transmission of electricity- **K2**

CO3- Study the different types of electrical components, symbols, types of circuits and tools- **K2**

CO4- Study the various methods ofcalculated the power rating and power delivered- **K2**

CO5- Learn the safety precautions and servicing of wiring a house and industry. Hands on training on house wiring and troubleshooting the electricalcircuits

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**3**),MEDIUM (**2**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	2	1	2	1	3	3	2
CO2	3	3	3	2	1	2	1	3	3	2
CO3	3	3	3	3	1	1	2	3	3	2
CO4	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	1	1	2	3	3	3
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	3	2	1	2	1	3	3	2
CO2	3	3	3	2	1	2	1	3	3	2
CO3	3	3	3	3	1	1	2	3	3	2
CO4	3	3	3	2	1	1	2	3	3	3
CO5	3	3	3	3	1	1	2	3	3	3

Title of the Course	**:**	**PHYSICS FOR EVERY DAY LIFE**
Category	**:**	**Skill Enhancement Course**
Course Code	**:**	**U2R3PHSEC3**
Nature of Skill	**:**	**Skill Development**

Marks: CIA :25+ Ext:75=100 **Hrs/Week : 02**

Credits: 02 **Total Inst. Hrs : 30**

COURSE OBJECTIVES

1. To understand the concepts of Mechanical objects.
2. To know the different types of optical instruments.
3. To understand the basic idea of physics of home appliances.
4. To study the basic concepts of solar energy.
5. To acquire the Knowledge of Indian physicist and their contribution.

UNIT-I **(Inst.Hrs:6)**

MECHANICAL OBJECTS: Spring Scales – Bouncing Balls –Roller Coasters – Bicycles – Rockets and Space Travel.

UNIT-II **(Inst.Hrs:6)**

OPTICAL INSTRUMENTS AND LASER: Vision Corrective Lenses – Polaroid Glasses – UV Protective Glass – Polaroid Camera – Colour Photography – Holography and Laser.

UNIT-III **(Inst.Hrs:6)**

PHYSICS OF HOME APPLIANCES: Bulb – Fan – Hair Drier – Television – Air Conditioners – Microwave Ovens – Vacuum Cleaners

UNIT-IV **(Inst.Hrs:6)**

SOLAR ENERGY: Solar Constant – General Applications of Solar Energy – Solar Water Heaters – Solar Photo – Voltaic Cells – General Applications of Solar Cells.

UNIT-V **(Inst.Hrs:6)**

INDIAN PHYSICIST AND THEIR CONTRIBUTIONS:C.V.Raman, HomiJehangirBhabha, Vikram Sarabhai, Subrahmanyan Chandrasekhar, VenkatramanRamakrishnan, Dr. APJ Abdul Kalam and their Contribution to Science and Technology.

TEXT BOOKS

1. The Physics in our Daily Lives, UmmeAmmara, Gugucool Publishing, Hyderabad, 2019.

2. For the love of physics, Walter Lawin, Free Press, New York, 2011.

WEB LINKS

1.https://www.scientificworldinfo.com/2021/10/applications-of-physics-in-everyday-life.html

After completion of this course, students will be able to

CO1- Acquire knowledge in basic Physics - **K1**

CO2-Analyse the Optical Instruments and Laser- **K4**

CO3- Explain the function of the Physics of Home Appliances –**K3**

CO4- Understand the requirement of Renewable energy resources **-K2**

CO5- Acquire knowledge in Indian physicist and their contributions-**K1**

MAPPING WITH PROGRAM OUT COMES:

Map course outcomes **(CO)** for each course with program outcomes **(PO)**in the 3-point scale of STRONG (**3**),MEDIUM (**2**) and LOW (**1**).

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**
CO1	3	3	3	1	2	2	3	2	2	3
CO2	3	3	3	1	2	2	3	2	2	3
CO3	3	3	3	1	2	2	3	2	2	3
CO4	3	3	3	1	2	2	3	2	2	3
CO5	3	3	3	1	2	2	3	2	2	3

	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**	**PSO6**	**PSO7**	**PSO8**	**PSO9**	**PSO10**
CO1	3	3	3	1	2	2	3	2	2	3
CO2	3	3	3	1	2	2	3	2	2	3
CO3	3	3	3	1	2	2	3	2	2	3
CO4	3	3	3	1	2	2	3	2	2	3
CO5	3	3	3	1	2	2	3	2	2	3