

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**  
**NATIONALLY ACCREDITED (III CYCLE) WITH “A” GRADE BY NAAC**  
**ISO 9001:2015 Certified**  
**TIRUCHIRAPPALLI – 18**

**PG & RESEARCH DEPARTMENT OF PHYSICS**



**B.Sc., PHYSICS SYLLABUS**  
**(2019-2022)**

## **PROGRAMME OUTCOMES**

On completion of program, the graduates will able

**PO1:** To intensify the students academic capability, unique qualities and transferable skills which will give them opportunity to evolve as responsible citizens.

**PO2:** To explain the fundamentals laws involved in physics.

**PO3:** To understand the theory and consequence of the various physical occurrence.

**PO4:** To carryout experiments to interpret the laws and concepts of physics.

**PO5:** To relate the theories learnt and the skills procured to solve enduring problems.

## **PROGRAMME EDUCATIONAL OBJECTIVES (PEO)**

**PEO1:** To provide the students with academic excellence, leadership qualities and professional ethics to address the needs of the scientific community.

**PEO2:** To motivate the students to pursue higher education in well renowned institutions.

**PEO3:** To acquire placement in educational institutions, engineering and industrial firms.

**PEO4:** To provide the students with creative and analytical skills for the sustainable developments and nation building initiatives

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**  
**B.Sc., PHYSICS PROGRAMME STRUCTURE**  
**UNDER CHOICE BASED CREDIT SYSTEM**  
**(For the candidates admitted from the academic year 2019-2020 onwards)**

Sem	Part	Course	Title	Course code	Inst Hrs/ week	Credit	Exam Hrs	Marks		Total		
								Int	Ext			
I	I	Language Course I (LC)	இக் கால இலக்கியம்	19ULT1	6	3	3	25	75	100		
			Story,Novel,Hindi Literature –1 & Grammar-I	19ULH1								
			History of Popular Tales,Literature and Sanskrit Story	19ULS1								
			Communication in French-I	19ULF1								
	II	English Language Course –I (ELC)	Functional Grammar for Effective Communication-I	19UE1	6	3	3	25	75	100		
	III	Core Course-I (CC)	Properties of Matter, Waves and Acoustics	19UPH1CC1	6	5	3	25	75	100		
				Core Practical –I (CP)	Physics Practical – I	19UPH1CC1P	3	3	3	40	60	100
				First Allied Course- I (AC)	Mathematics – I	19UPH1AC1	4	3	3	25	75	100
				First Allied Course- II (AC)	Mathematics – II	19UPH1AC2	3	-	-	-	-	-
	IV	Value Education	Value Education	19UGVE	2	2	3	25	75	100		
<b>Total</b>					<b>30</b>	<b>19</b>				<b>600</b>		
II	I	Language Course II (LC)	இடைக்கால இலக்கியமும் புதினமும்	19ULT2	6	3	3	25	75	100		
			Prose,Dramma,Hindi Literature -2 & Grammer –II	19ULH2								
			Poetry Textual Grammar&Alakara	19ULS2								
			Communication in French-II	19ULF2								
	II	English Language Course II (ELC)	Functional Grammar for Effective Communication-II	19UE2	6	3	3	25	75	100		
	III	Core Course-II (CC)	Mechanics and Relativity	19UPH2CC2	6	5	3	25	75	100		
				Core Practical –II (CP)	Physics Practical–II	19UPH2CC2P	3	3	3	40	60	100
				First Allied Course- II (AC)	Mathematics – II	19UPH1AC2	3	3	3	25	75	100
				First Allied Course- III(AC)	Mathematics – III	19UPH2AC3	4	3	3	25	75	100
	IV	Environmental Studies	Environmental Studies	19UGES	2	2	3	25	75	100		
	<b>Total</b>					<b>30</b>	<b>22</b>				<b>700</b>	

III	I	Language Course-III (LC)	காப்பியமும் நாடகமும்	19ULT3	6	3	3	25	75	100		
			Medieval,Modern poetry&History of Hindi Literature-3	19ULH3								
			Prose,Textual Grammar & Vakyarachana	19ULS3								
			Communication in French-III	19ULF3								
	II	English Language Course-III (ELC)	Reading and Writing for Effective Communication-I	19UE3	6	3	3	25	75	100		
	III	Core Course-III (CC)	Thermal Physics and Statistical Mechanics	19UPH3CC3	6	5	3	25	75	100		
				Core Practical –III (CP)	Physics Practical-III	19UPH3CC3P	3	3	3	40	60	100
				Second Allied Course-I (AC)	Chemistry –I	19UPH3AC4	4	3	3	25	75	100
				Second Allied Course-I (AP)	*Chemistry Practical – I	19UPH3AC1P	3	-	-	-	-	-
	IV	Non Major Elective –I For those who studied Tamil Under Part-I a)Basic Tami for other language students. b)Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree program	Troubleshooting of Electrical Appliances	19UPH3NME1	2	2	3	25	75	100		
			Basic Tamil	19ULC3BT1								
			Special Tamil	19ULC3ST1								
	V	Extra Credit Course	Swayam Online Course	To be fixed later	As per UGC Recommendations							
	<b>Total</b>					<b>30</b>	<b>19</b>				<b>600</b>	

**15 Days Internship during Semester Holidays**

IV	I	Language Course -IV (LC)	பண் றைய இலக்கியம்	19ULT4	6	3	3	25	75	100		
			Letter Writing,General Essays,Technical Terms,Proverbs,Idioms&Pharases,Hindi Literature-4	19ULH4								
			Drama,History of Drama Literature	19ULS4								
			Communication in French-IV	19ULF4								
	II	English Language Course –IV (ELC)	Reading and Writing for Effective Communication-II	19UE4	6	3	3	25	75	100		
	III	Core Course-IV (CC)	Electricity, Magnetism and Electromagnetism	19UPH4CC4	5	5	3	25	75	100		
				Core Practical –IV (CP)	Physics Practical- IV	19UPH4CC4P	3	3	3	40	60	100
				Second Allied Course-I (AP)	Chemistry Practical - I*	19UPH3AC1P	3	3	3	40	60	100
				Second Allied Course-II (AC)	Chemistry –II	19UPH4AC5	3	3	3	25	75	100
	IV	Non Major Elective –II For those who studied Tamil Under Part-I a)Basic Tami for other language students. b)Special Tamil for those who studied Tamil upto +2 but opt for other languages in degree program	Audio and Video System	19UPH4NME2	2	2	3	25	75	100		
			Basic Tamil	19ULC4BT2								
			Special Tamil	19ULC4ST2								
	Skill Based Elective-I	Biomedical Instrumentation	19UPH4SBE1A	2	2	3	25	75	100			
			Photography and Videography	19UPH4SBE1B								

	V	Extra Credit Course	Internship	19UPH4INT	-					
			Swayam Online Course	To be fixed later	As per UGC Recommendations					
			<b>Total</b>		<b>30</b>	<b>24</b>				<b>800</b>
V	III	Core Course-V (CC)	Optics	19UPH5CC5	5	5	3	25	75	100
		Core Course-VI (CC)	Atomic and Nuclear Physics	19UPH5CC6	5	5	3	25	75	100
		Core Course-VII (CC)	Analog Electronics	19UPH5CC7	6	5	3	25	75	100
		Core Practical- V (CP)	Physics Practical-V	19UPH5CC5P	3	3	3	40	60	100
		Major Based Elective-I	Materials Science	19UPH5MBE1A	5	5	3	25	75	100
			Laser Physics	19UPH5MBE1B						
	IV	Skill Based Elective-II	Physics concepts through Simulation	19UPH5SBE2A	2	2	3	25	75	100
			Cell Phone Servicing	19UPH5SBE2B						
		Skill Based Elective-III	Web Designing	19UPH5SBE3A	2	2	3	25	75	100
			Electrical Wiring	19UPH5SBE3B						
		UGC Jeevan Kaushal Life Skills	Professional Skills	19UGPS	2	2	3	25	75	100
	V	Extra Credit Course	Swayam Online Course	To be fixed later	As per UGC Recommendations					
				<b>Total</b>		<b>30</b>	<b>29</b>			
VI	III	Core Course-VIII (CC)	Digital Electronics and Microprocessor Fundamentals	19UPH6CC8	5	4	3	25	75	100
		Core Course-IX(CC)	Classical and Quantum Physics	19UPH6CC9	6	5	3	25	75	100
		Core Practical- VI (CP)	Physics Practical – VI	19UPH6CC6P	3	3	3	40	60	100
		Major Based Elective-II	Communication Physics	19UPH6MBE2A	5	5	3	25	75	100
			Computational Physics	19UPH6MBE2B						
		Major Based Elective-III	Medical Physics	19UPH6MBE3A	5	4	3	25	75	100
			Astrophysics and Cosmology	19UPH6MBE3B						
	Project	Project Work	19UPH6PW	5	4	-	-	-	100	
	V	Gender studies	Gender Studies	19UGGS	1	1	3	25	75	100
		Extension Activities	Extension Activities	19UGEA	-	1	-	-	-	-
			<b>Total</b>		<b>30</b>	<b>27</b>				<b>700</b>
<b>Grand Total</b>					<b>180</b>	<b>140</b>				<b>4200</b>

**Project:** 100 Marks

- i. Internal Component - Nil
- ii. External Components - 100 Marks
  - Review-I- 20 Marks
  - Review-II- 20 Marks
  - Report Valuation - 40 Marks
  - Viva Voce - 20 Marks

**Core Papers :** 09

**Core Practical:** 06

**List of Allied Courses:**

**Allied Course I** - Mathematics

**Allied Course II** - Chemistry

**List of Skill Based Electives:**

**Skill Based Elective I** – Biomedical Instrumentation/ Photography and Videography

**Skill Based Elective II** – Physics concepts through simulation/ Cell Phone Servicing

**Skill Based Elective III** – Web Designing/ Electrical Wiring

**List of Major Based Electives:**

**MBE I** - Material Science/Laser Physics

**MBE II** - Communication Physics/Computational Physics

**MBE III** - Medical Physics/Astrophysics and Cosmology

**Extra credit course: Swayam Online Course**

<b>Semester-I</b>	<b>PROPERTIES OF MATTER, WAVES &amp; ACOUSTICS</b>	<b>Hours/Week-6</b>	
<b>Core Course – I</b>		<b>Credits-5</b>	
<b>Course Code -19UPH1CC1</b>		<b>Internal 25</b>	<b>External 75</b>

### Objective

To build the conceptual understanding of materials with mathematical skills and reviews the prior knowledge of properties of matter.

### Course outcome

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Define the basic ideas of elasticity and to assesses the bending movement of a beam in the form of cantilever and girders	K1
CO2	Explain the simple harmonic motion and its composition	K2
CO3	Develop the equation of wave motion and analyze its modes of Vibration	K3
CO4	Apply the properties of surface tension in fluids and analyze the capillarity nature in liquids.	K3
CO5	Illustrate the concepts of intensity of sound and to Calculate the Reverberation time and identify the factors affecting the acoustics of buildings.	K2

### Mapping with Program Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	S	M	M
<b>CO2</b>	S	S	S	L	M
<b>CO3</b>	S	S	S	S	S
<b>CO4</b>	M	S	S	M	S
<b>CO5</b>	S	S	S	S	S

S-Strong; M-Medium; L-Low

## CORE COURSE – I

### PROPERTIES OF MATTER, WAVES & ACOUSTICS

#### Syllabus

#### Unit- I: Properties of matter

20hrs

Elasticity: Basic ideas -Work Done per Unit Volume- Relations between elastic constants- Poisson's Ratio-Limiting Values of Poisson's Ratio-Twisting Couple on a Cylinder (or a Wire)- Torsion pendulum-Determination of Rigidity Modulus-Bending of Beams-Bending Moment-Cantilever Loaded at Free End-Depression of a Beam Supported at the Ends and Loaded at the Centre (weight of the beam neglected)-Determination of Y by Bending of a Beam- I form of Girders.

#### Unit -II: Harmonic Oscillation

20hrs

Periodic Motion- Simple Harmonic Motion and Harmonic Oscillator- Energy of a Harmonic Oscillator- Examples of Harmonic Oscillator- Anharmonic Oscillator-Composition of Two Simple Harmonic Motions of Equal Periods in a Straight Line - Composition of Two Rectangular Simple Harmonic Motions of Equal Periods: Lissajous Figures - Damping Force-Damped Harmonic Oscillator-Examples of Damped Harmonic Oscillator-Power Dissipation-Quality Factor-Forced Harmonic Oscillator.

#### Unit –III: Waves

15hrs

Wave Motion-General Equation of Wave Motion- Plane Progressive Harmonic Wave-Energy Density for a Plane Progressive Wave- Intensity of a Wave-Transverse Waves in Stretched Strings- Modes of Transverse Vibrations of Strings- Longitudinal Waves in Rods and Gases-Fourier's Theorem-Wave Velocity and Group Velocity

#### Unit -IV: Fluids

20hrs

Surface Tension: Definition and dimensions of surface tension - Excess of pressure over curved surfaces - Application to spherical and cylindrical drops and bubbles - Variation of Surface tension with temperature - Jaegar's method.

Viscosity: Co-efficient of viscosity and its dimensions - Rate of flow of liquid in a capillary tube - Poiseuille's formula - Experiment to determine co-efficient of viscosity of a liquid - Variation of viscosity of a liquid with temperature - Applications of viscosity.

#### Unit -V: Acoustics

15hrs

Intensity of Sound- Decibel and Bel- Loudness of Sound- Noise Pollution-Ultrasonics: Production of Ultrasonic Waves- Piezo Electric Crystal Method- Determination of Velocity of Ultrasonic Waves in a Liquid - Acoustic Grating-Application of Ultrasonic Waves-Reverberation- Sabine's Formula- Absorption Coefficient-Acoustics of Buildings.



### Text Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	D.S. Mathur	Elements of Properties of Matter	S.Chand	2010	10 <sup>th</sup> Reprint
2.	J.C Upadhyaya	Mechanics	Himalaya	2017	12 <sup>th</sup> Edition
3.	R.Murugeshan & Kiruthiga Sivaprasath	Properties of Matter and Acoustics	S.Chand	2012	10 <sup>th</sup> Edition
4.	Brij Lal & Subramaniam	Text book of Sound	Vikas	2008	2 <sup>nd</sup> Edition
5.	Frank.s.Crawford, Jr.	Berkeley Physics course Vol 3 on Waves	Mcgraw-hill	2017	Revised Edition

### Reference Books

S. No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	K Rama Reddy, S Raghavan & D VN Sarma	Elements of Mechanics	Universities Press	1994	1 <sup>st</sup> Edition
2.	Mahendra K Verma	Introduction to Mechanics	Universities Press	1995	1st Edition
3.	F.H.Newman & V.H.L.Searle	The General Properties of Matter	Edward Arnold	1961	Revised Edition

### Pedagogy:

Lecture with OHP presentation, online Assignment, slip tests, Technical quiz

### Course Designer:

Dr.S.Gowri

<b>Semester-I</b>	<b>PHYSICS PRACTICAL - I</b>	<b>Hours/Week-3</b>	
<b>Core Practical – I</b>		<b>Credits-3</b>	
<b>Course Code - 19UPH1CC1P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objective

To enable the student to gain practical knowledge

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Find the appropriate data accurately and keep systematic record of laboratory activities.	K1
CO2	Demonstrate the usage of equipment's for various measurements.	K2
CO3	Develop practical knowledge by applying the experimental methods to correlate with the Physics theory.	K3
CO4	Utilize standard methods to measure the young's modulus of the given material.	K3
CO5	Build hands on experience using various techniques.	K3

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	S	S	S
<b>CO2</b>	M	S	S	M	M
<b>CO3</b>	S	M	S	M	M
<b>CO4</b>	S	S	M	S	M
<b>CO5</b>	S	M	M	S	S

S – Strong; M – Medium; L – Low

**Core Practical – I**  
**PHYSICS PRACTICAL - I**

**Syllabus**

**List of experiments – Any Ten**

1. Measurements of length (or diameter) using Vernier calipers, Screw gauge and Travelling microscope.
2. Young's modulus – Uniform bending (Pin and Microscope).
3. Young's modulus – Cantilever depression (scale and telescope).
4. Static Torsion – Determination of n.
5. Surface Tension – Capillary rise method.
6. Surface Tension and Interfacial Surface Tension – Drop weight method.
7. Coefficient of viscosity of liquid – Variable pressure head.
8. Comparison of Viscosities of two liquids – HARE's apparatus.
9. Coefficient of viscosity of liquid – Searle's viscometer method.
10. Viscosity of liquid – Stoke's method.
11. Coefficient of viscosity of liquid – Constant pressure head.
12. Sonometer – determination of frequency of tuning fork.
13. Melde's Experiment – Transverse and longitudinal.
14. Rigidity modulus – Dynamic method.
15. CRO – Study of wave forms – Lissajous figures – f determination.

**Textbook**

S.No.	Authors	Title of the Book	Year of Publication	Publishers	Edition
1.	C.C. Ouseph, U.J. Rao, V.Vijayendran	Practical Physics and Electronics	2016	S.Viswanathan, Printers & Publishers Pvt Ltd	1 <sup>st</sup>

**Reference book**

S.No.	Authors	Title of the Book	Year of Publication	Publishers	Edition
1.	Prof.M.N.Namboodirippad, Prof.P.A.Daniel	B.Sc., Practical Physics	1982	G.B.C. Publications	1 <sup>st</sup>

**Pedagogy**

Demonstration, practical sessions and viva voce.

**Course Designer:**

Ms.N.Manopradha

<b>Semester-II</b>	<b>MATHEMATICS-I</b>	<b>Hours/Week-4</b>	
<b>Allied course – I</b>		<b>Credits-3</b>	
<b>Course code-19UPH1AC1</b>		<b>Internal 25</b>	<b>External 75</b>

## OBJECTIVE

To equip the students with mathematical methods formatted for their major concepts and train them in basic Integrations.

## COURSE OUTCOMES

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	Explain the concepts of successive differentiation and Leibnitz theorem	K2
<b>CO2</b>	Describe curvature, radius of curvature in Cartesians	K2
<b>CO3</b>	Compute integrals of various types	K3
<b>CO4</b>	Solve integrals by trigonometric substitution and by parts.	K3
<b>CO5</b>	Interpret the properties of definite integrals and evaluate them.	K2
<b>CO6</b>	Apply reduction formula and evaluate the integrals.	K3
<b>CO7</b>	Compute double and triple integrals.	K3
<b>CO8</b>	Classify Fourier series for full range, half range and odd & even functions.	K3

## ALLIED COURSE – I (AC)

### MATHEMATICS-I

#### Syllabus:

#### UNIT- I (15 HOURS)

Successive Differentiation -  $n^{\text{th}}$  derivative of standard functions (Derivation not needed) simple problems only - Leibnitz Theorem (proof not needed) and its applications- Curvature and radius of curvature in Cartesian only (proof not needed)–Simple problem in all these.

#### UNIT- II (15 HOURS)

Evaluation of integrals of types

$$1] \int \frac{px+q}{ax^2+bx+c} dx \quad 2] \int \frac{px+q}{\sqrt{ax^2+bx+c}} dx \quad 3] \int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}} \quad 4] \int \frac{dx}{a+b\cos x}$$
$$5] \int \frac{dx}{a+b\sin x} \quad 6] \int \frac{(a\cos x+b\sin x+c)}{(p\cos x+q\sin x+r)} dx$$

Integration by trigonometric substitution and by parts of the integrals

$$1] \int \sqrt{a^2-x^2} dx \quad 2] \int \sqrt{a^2+x^2} dx \quad \int \sqrt{x^2-a^2} dx$$

#### UNIT- III (13 HOURS)

General properties of definite integrals – Evaluation of definite integrals of types

$$1] \int_a^b \frac{dx}{\sqrt{(x-a)(b-x)}} \quad 2] \int_a^b \sqrt{(x-a)(b-x)} dx \quad 3] \int_a^b \sqrt{\frac{x-a}{b-x}} dx$$

Reduction formula (when n is a positive integer) for

$$1] \int e^{ax} x^n dx \quad 2] \int_a^{\frac{\pi}{2}} \sin^n x dx \quad 3] \int_a^{\frac{\pi}{2}} \cos^n x dx \quad 4] \int_0^{\frac{\pi}{2}} \sin^n x dx \quad 5] \int_0^{\frac{\pi}{2}} \cos^n x dx \text{ (with proof) and}$$
$$6] \int_0^{\frac{\pi}{2}} \sin^n x \cos^m x dx \text{ (without proof) and illustrations.}$$

#### UNIT- IV (10 HOURS)

Evaluation of Double and Triple Integrals in simple cases(Problems Only) - Changing the order and evaluating the double integration (Cartesian only).

#### UNIT –V (07 HOURS)

Definition of Fourier Series – Finding the Fourier Coefficients for a given periodic function with period  $2\pi$  - Use of Odd and Even functions in evaluating Fourier Coefficients – Half range sine and cosine series.

**DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%**

**ASSESSMENT: SEMINAR, ASSIGNMENT**

**TEXT BOOKS:**

S.No	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	S. Narayanan, T.K. Manichavasagam Pillai	Calculus, Volume I.	S. Viswanathan Pvt Limited	2003
2	S. Narayanan, T.K. Manichavasagam Pillai	Calculus, Volume II.	S. Viswanathan Pvt Limited	2003
3	S. Narayanan, T.K. Manichavasagam Pillai	Calculus, Volume III.	S. Viswanathan Pvt Limited	2003

**CHAPTERS AND SECTIONS:**

S.NO.	UNIT	CHAPTER	Text Book	SECTIONS
1	I	3	1	1.1-2.2
		10	1	2.1-2.3
2	II	1	2	7.3(TYPE-2), 8(CASE 2,5), 9
		1	2	8 (RELEVANT)
3		1	2	8 (RELEVANT),11,13.1-13.5
4	IV	5	2	2.1,3.1,4
5	V	6	3	1-7

**REFERENCE BOOK:**

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	S. Arumugam, Issac and Somasundaram	Trigonometry & Fourier series	New Gamma Publishers	1999

**COURSE DESIGNERS:**

- Ms.P.SARANYA
- Ms.S.VIDHYA

<b>Semester-I&amp;II</b>	<b>MATHEMATICS-II</b>	<b>Hours/Week-3</b>	
<b>Allied course – II</b>		<b>Credits-3</b>	
<b>Course code-19UPH1AC2</b>		<b>Internal 25</b>	<b>External 75</b>

## OBJECTIVES

- To equip the students with mathematical methods formatted for their major concepts.
- To train them in Algebra and Trigonometry.
- To inculcate the basics of Three Dimensional geometry.

## SYLLABUS:

### UNIT I: Series Expansion (22 Hours)

Application of Binomial Theorem to summation of series – Approximate values – Summation of series by Exponential series - Summation of series by Logarithmic series (Formulae only) – Series which can be summed up by Logarithmic series.

### UNIT II: MATRICES (10 Hours)

Matrix-Special types of Matrices –scalar multiplication of matrices-equality of matrices-addition of matrices-subtraction of matrices- Symmetric matrix-skew symmetric matrix-Hermitian matrix-Skew Hermitian matrix –Multiplication of matrix – inverse matrix-orthogonal matrix-Solutions of simultaneous equations-Rank of a matrix-Elementary transformation of a matrix-A system of m homogeneous linear equations in ‘n’ unknowns-linear dependence and independence of vectors-system of non-homogeneous linear equations - Eigen values, Eigenvectors – Simple applications only.(proof not needed).

### UNIT III: Three Dimensional geometry (30 Hours)

Coplanar lines-the condition that two given straight lines should be coplanar- Finding the shortest distance between two given lines and the equation of the plane containing them- Sphere – Definition- The equation of the sphere to find its centre and radius- the length of the Tangent Plane from a point to the sphere – Plane Section of a sphere – Equation of a circle on a sphere – intersection of two spheres-Equation of the tangent plane to the sphere at a point. (Only problems in all the above).

### UNIT IV: Expansion of Trigonometric functions (10 Hours)

Expansion of  $\sin n\theta$ ,  $\cos n\theta$ ,  $\tan n\theta$  (n being a positive integer) – expansion of  $\sin^n \theta$ ,  $\cos^n \theta$ ,  $\sin^m \theta \cos^n \theta$  in a series of sines and cosines of multiples of  $\theta$  ( $\theta$  given in radians) – Expansion of  $\sin \theta$ ,  $\cos \theta$  and  $\tan \theta$  in terms of powers of  $\theta$  (only problems in all the above).

### UNIT V: Hyperbolic functions (18 Hours)

Euler’s Formula for  $e^{i\theta}$  - Definition of Hyperbolic functions – Formulae involving Hyperbolic functions – Relation between Hyperbolic and Circular functions – Expansion of  $\sinh x$ ,  $\cosh x$  and  $\tanh x$  in powers of  $x$  – Expansion of Inverse hyperbolic functions  $\sinh^{-1} x$ ,  $\cosh^{-1} x$  and  $\tanh^{-1} x$ - Separation of real and imaginary parts of  $\sin(x+iy)$ ,  $\cos(x+iy)$ ,  $\tan(x+iy)$ ,  $\sinh(x+iy)$ ,  $\cosh(x+iy)$  and  $\tanh(x+iy)$ .

**DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%**

**Pedagogy: Assignment, seminar, Group Discussion.**

**TEXT BOOKS:**

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	T.K.Manichavasagam Pillai, T.Natarajan, K.S.Ganapathy	Algebra, Volume I	S. Viswanathan Pvt Limited	2004
2	T.K.Manichavasagam Pillai	Algebra, Volume II	S. Viswanathan Pvt Limited	2004
3	T.K.Manichavasagam Pillai and T.Natarajan	A Text book of Analytical Geometry Part-II 3D	New Gamma Publishers	1991
4	T.K.Manichavasagam Pillai and T.Narayanan	Trigonometry	S. Viswanathan Pvt Limited	2013

**CHAPTERS AND SECTIONS:**

S.NO.	UNIT	CHAPTER	Text Book	SECTIONS
1	I	3	1	10,14
		4	1	3,7,9
2	II	2	2	1-16
3	III	3	3	7,8
		4	3	Fully
4	IV	3	4	Fully
5	V	4	4	Fully

**REFERENCE BOOK:**

S.NO.	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1	T.K.Manichavasagam Pillai	Analytical Geometry 3D and Vector calculus	New Gamma Publishers	1991



## COURSE OUTCOMES

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

CO Number	CO Statement	Knowledge Level
CO1	Define matrices and various procedures for solving matrices.	K1
CO2	Explain Binomial, Logarithmic and Exponential series.	K2
CO3	Describe skew lines, co planarity, sphere and several concepts on sphere.	K2
CO4	Classify series expansion of sine, cosines, and tangents in all manners.	K3
CO5	Compute using hyperbolic and inverse hyperbolic functions.	K3

### Mapping with Programme Outcomes

COS/POS	PO1	PO2	PO3	PO4	PO5	PO6
CO1	M	S	M	S	S	S
CO2	M	S	M	S	S	S
CO3	M	S	M	S	S	S
CO4	M	S	M	S	S	S
CO5	M	S	M	S	S	S

### COURSE DESIGNERS:

- Ms.P.SARANYA, Assistant Professor.
- Ms.S.VIDHYA, Assistant Professor.

<b>Semester-II</b>	<b>MECHANICS AND RELATIVITY</b>	<b>Hours/Week-6</b>	
<b>Core Course – II</b>		<b>Credits-5</b>	
<b>Course Code-19UPH2CC2</b>		<b>Internal 25</b>	<b>External 75</b>

### Objective

- To give a better insight of the change of position of any physical object or event and their consequences

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Recall the basic concepts of force, mass, acceleration, impulse and momentum.	K1
CO 2	Demonstrate and compute simple harmonic motion.	K2
CO 3	Illustrate the motion of rigid bodies and outline laws of gravitation.	K2
CO 4	Make use of the ideas of frames of reference.	K3
CO 5	Utilize the fundamental theories of special relativity.	K3

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	S
<b>CO2</b>	M	M	S	S	S
<b>CO3</b>	M	S	S	S	S
<b>CO4</b>	M	M	S	M	S
<b>CO5</b>	M	S	S	M	S

S – Strong; M – Medium; L – Low

## **CORE COURSE – II MECHANICS AND RELATIVITY**

### **Syllabus**

#### **UNIT I: Projectile, Impact and Friction**

**15 hrs**

Projectile – range of horizontal and inclined plane – Impact – Impulsive force – Laws of impact – Impact of a smooth sphere on a smooth horizontal plane – Direct and oblique impacts – Loss in kinetic energy – Friction – Laws of friction – Angle of friction.

#### **UNIT II: Simple Harmonic Motion**

**20 hrs**

Definition of Simple Harmonic Motion – Velocity, acceleration and period of simple harmonic motion – Phase of simple harmonic motion – Energy of a particle executing simple harmonic motion – Equation of motion for a body executing angular oscillations which are simple harmonic – Free, damped and forced harmonic oscillators – Forced vibration – Theory of forced vibrations – Sharpness of resonance – Power dissipation and Quality factor - Simple pendulum – Laws of simple pendulum, for small amplitudes – Loss or Gain of time.

#### **UNIT III: Dynamics of Rigid Bodies and Gravitation**

**30 hrs**

Moment of Inertia - Kinetic energy and angular momentum of rotating body - Theorems of perpendicular and parallel axes – Acceleration of a body rolling down an inclined plane without slipping – Oscillations of a small sphere on a large concave smooth surface – Compound pendulum – Centre of suspension and centre of oscillation – Centre of percussion – Minimum period of a compound pendulum – Kater's pendulum.

Newton's laws of gravitation – Kepler's laws of planetary motion – Deduction of Newton's law of gravitation – Determination of G – Boy's method.

#### **UNIT IV: Frames of Reference**

**15hrs**

Inertial frames of reference – Galilean Transformation - Galilean invariance – Transformation equation for one frame of reference rotating with its axis with respect to an inertial frame – Non-inertial frames and fictitious forces – Coriolis force – Foucault's pendulum.

#### **UNIT V: Special Theory of Relativity**

**10 hrs**

Michelson-Morley experiment - concept of ether - Einstein's special theory of relativity - Lorentz transformation - time dilation - length contraction – proper length and proper time - simultaneity - relativistic mass, momentum, force and acceleration - equivalence of mass and energy ( $E = mc^2$ ).

### Textbooks

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	M. Narayanamurthi and N. Nagarathinam	Dynamics	The National Publishing Company, Chennai	2008	8 <sup>th</sup>
2.	D.S. Mathur, P.S.Hemne	Mechanics	S. Chand & Company Ltd., New Delhi	2015	Revised edition 2012

### Reference books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	M. Narayanamurthi and N. Nagarathinam	Statics, Hydrostatics and Hydrodynamics	The National Publishing Company, Chennai	2002	3 <sup>rd</sup>
2.	R. Murugesan	Mechanics and Mathematical Physics	S. Chand & Company Ltd., New Delhi	2016	3 <sup>rd</sup>
3.	BrijilalSubramaniam	Mechanics and Relativity	Margham Publications	1990	1 <sup>st</sup>
4.	R. Murugesan Kiruthiga Sivaprasath	Modern Physics	S. Chand & Co.,	2016	18 <sup>th</sup>

### Pedagogy:

Chalk and talk, Assignment, Power point presentation

### Course Designer:

Ms.N.Manopradha

<b>Semester-II</b>	<b>PHYSICS PRACTICAL - II</b>	<b>Hours/Week-3</b>	
<b>Core Practical - II</b>		<b>Credits-3</b>	
<b>Course Code-19UPH2CC2P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objective

To understand the theory and develop practical application skills

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Recall the usage of basic laws and theories to study properties of sound and fluids.	K1
CO2	Interpret findings using the correct physical scientific framework.	K2
CO3	Develop skills in handling equipment.	K3
CO4	Utilize standard methods to measure the refractive index of the given material.	K3
CO5	Build intellectual communication skills and discuss the basic principles of scientific concepts in a group.	K3

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	M	M
<b>CO2</b>	M	S	S	S	S
<b>CO3</b>	S	M	S	S	S
<b>CO4</b>	S	S	M	M	M
<b>CO5</b>	S	S	S	M	M

**S** – Strong; **M** – Medium; **L** – Low

**CORE PRACTICAL – II**  
**PHYSICS PRACTICAL - II**

**Syllabus**

**List of experiments – Any Ten**

1. Spectrometer –  $\mu$  of solid prism.
2. Air wedge – thickness of thin wire.
3. Newton's Rings – RI of convex lens.
4. Long focus convex lens - f, R, refractive index-determination.
5. Concave lens – Focal length determination.
6. Young's modulus – Non-Uniform bending (Pin and Microscope).
7. Young's modulus – Uniform bending (Optic lever).
8. Sonometer – Verification of laws.
9. Melde's Experiment –RD of solid and liquid.
10. To study the Motion of Spring and calculate (a) Spring constant, (b) g and (c) Modulus of rigidity.
11. Determination of the Moment of Inertia of a Flywheel.
12. Determination of the elastic Constants of a wire – Searle's method.
13. Compound pendulum – g and k.
14. Kater's Pendulum – determination of g.
15. Moment of Inertia – Torsional Pendulum.

**Textbook**

S.No.	Authors	Title of the Book	Year of Publication	Publishers	Edition
1.	C.C. Ouseph, U.J. Rao, V.Vijayendran	Practical Physics and Electronics	2016	S.Viswanathan, Printers & Publishers Pvt Ltd	1 <sup>st</sup>

**Reference book**

S.No.	Authors	Title of the Book	Year of Publication	Publishers	Edition
1.	Prof.M.N.Namboodirippad, Prof.P.A.Daniel	B.Sc., Practical Physics	1982	G.B.C. Publications	1 <sup>st</sup>

**Pedagogy**

Demonstration, practical sessions and viva voce.

**Course Designer:**

Ms.N.Manopradha

<b>Semester-II</b>	<b>MATHEMATICS-III</b>	<b>Hours/Week-4</b>	
<b>Allied course - III</b>		<b>Credits-3</b>	
<b>Course code - 19UPH2AC3</b>		<b>Internal 25</b>	<b>External 75</b>

## OBJECTIVES

- To equip the students with mathematical methods formatted for their major concepts.
- To train them in the areas of ODE and PDE.
- To emphasize them in the field of Laplace transforms and Vectors.

## SYLLABUS:

### UNIT I : Ordinary Differential Equation (15 HOURS)

Ordinary Differential Equation of first order but of higher degree – Type A: Equations solvable for  $\frac{dy}{dx}$  -Type B: Equations solvable for y and x- Equations that do not contain x and y explicitly- Clairaut's Form (simple cases only) – linear equations with constant coefficients – Definition – the operator D-Equations homogeneous in x and y- Complementary function of a linear equation with constant co-efficients-Particular integral: General method of finding P.I- Special methods for finding P.I.

### UNIT II : Partial differential equations (15 HOURS)

Classification of integrals-General integral –Derivation of Partial differential equations by elimination of constants, by elimination of arbitrary function-Lagrange's method of solving the linear equation-Special methods –Standard forms-I,II,III,IV-Clairaut's form.(Geometrical Meaning is not needed)-(only problems in all the above – No proof needed for any formula).

### UNIT III : Laplace Transforms (10 HOURS)

Laplace Transforms – Definition – Piecewise continuity-Sufficient condition for the existence of Laplace transforms-Basic results-Laplace transforms of periodic functions-Some general theorems-Evaluation of integrals using Laplace transforms.

### UNIT IV: Inverse Laplace Transforms (10 HOURS)

The Inverse Transforms –Modification of results obtained in finding Laplace transforms to get the transformation of functions- Laplace Transforms to solve ordinary differential equations with constant co-efficient.

### UNIT V : Vector Differentiation(10 HOURS)

Limit of a vector function-continuity of vector functions-Derivative of a vector function-some standard results-geometrical significance of vector differentiation-Physical application of derivatives of vectors-partial derivative of a vector function-Gradient, curl divergence-Scalar and vector point functions-level surface –gradient of a scalar point function-directional derivative of a scalar point function-Equations of a tangent plane and normal line to a level surface-Divergence And curl of a vector point function-Definition- Curl of a vector point function-irrotational vector-Physical interpretation of divergence of a vector - Physical interpretation of curl of a vector-vector identities.

**DISTRIBUTION OF MARKS: THEORY 20% AND PROBLEMS 80%**

**Pedagogy: Assignment, seminar, Group Discussion.**

**TEXT BOOKS:**

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	S. Narayanan, T.K. Manicavachagam Pillai	Differential Equations and its applications	S. Viswanathan Pvt Limited	2016
2.	P.R.Vittal & V.Malini	Vector Analysis	Margham Publications	2016

**CHAPTERS AND SECTIONS:**

S.NO.	UNIT	CHAPTER	Text Book	SECTIONS
1.	I	4	1	1-4
		5	1	1-4
2.	II	12	1	1-5.4
3.	III	9	1	1-5
4.	IV	9	1	6-8
5.	V	1	2	FULLY

**BOOKS FOR REFERENCE:**

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	S. Narayanan, T.K. Manicavachagam Pillai	Calculus, Vol. III	S. Viswanathan Pvt Limited	2003
2.	M.L. Khanna	Differential Calculus	Jaiprakashnath and Co.,	2004

**COURSE OUTCOMES**

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

CO Number	CO Statement	Knowledge Level
CO1	Define Laplace transforms and solve.	K1
CO2	Rephrase the partial differential equations by eliminating constants and arbitrary functions and solve various types of PDE's.	K2
CO3	Solve ordinary differential equations under several methods.	K3
CO4	Apply inverse Laplace transforms and solve second order ODE	K3
CO5	Classify vectors and vector differentiation	K3



## Mapping with Programme Outcomes

<b>COS/POS</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>
<b>CO1</b>	M	S	M	S	S	S
<b>CO2</b>	M	S	M	S	S	S
<b>CO3</b>	M	S	M	S	S	S
<b>CO4</b>	M	S	M	S	S	S
<b>CO5</b>	M	S	M	S	S	S



**CAUVERY COLLEGE FOR WOMEN (Autonomous), TIRUCHIRAPPALLI- 18**  
**(Applicable to the candidates admitted from the Academic year 2019-20 onwards)**

**ENVIRONMENTAL STUDIES**

Semester	Course Title	Course Code	Category	Instructional Hours	Credits
II	ENVIRONMENTAL STUDIES	19UGES	PART IV	2	2

**PREAMBLE**

To train the students to get awareness about total environment and its related problems and to make them to participate in the improvement and protection of the environment.

**Course Outcome**

1. Outline the nature and scope of environmental studies
2. Illustrate the various types of natural resources and its importance.
3. Classification of various types of ecosystem with its structure and function.
4. Develop an understanding of various types of pollution and biodiversity.
5. List out the various types of social issues related with environment .

CO	CO Statement	Knowledge Level
CO1	Outline the nature and scope of environmental studies	K2
CO2	Illustrate the various types of natural resources and its importance.	K2
CO3	Classification of various types of ecosystem with its structure and function.	K2
CO4	Develop an understanding of various types of pollution and biodiversity.	K3
CO5	List out the various types of social issues related with environment .	K4

## ENVIRONMENTAL STUDIES

**Unit: 1** Introduction to environmental studies  
Definition, scope and importance. Need for public awareness

**Unit: 2** Natural Resources:  
Renewable and non-renewable resources:

- a) Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.
- c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.
- d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
- e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f) Land resources: Land as a resources, land degradation, man induced Landslides, soil erosion and desertification.  
Role of an individual in conservation of natural resources.

### **Unit: 3 Ecosystems**

- Concept, Structure and function of an ecosystem.
- Producers, consumers and decomposers
- Energy flow in the ecosystem and Ecological succession.
- Food chains, food webs and ecological pyramids
- Introduction, types, characteristic features, structure and function of the

following ecosystem:-

- a. Forest ecosystem
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, estuaries)

### **Unit: 4 Biodiversity and Environmental Pollution**

- Introduction, types and value of biodiversity
- India as a mega diversity nation
- Hot-spots of biodiversity
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Definition, Causes, effects and control measures of :

- a. Air Pollution
- b. Water Pollution
- c. Soil Pollution
- d. Noise pollution
- e. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

- Role of an individual in prevention of pollution
- Disaster management: floods, earthquake, cyclone and landslides.

#### **Unit: 5 Social Issues and the Environment**

- Water conservation, rain water harvesting, watershed management.
- Climate change, global warming, acid rain, ozone layer depletion,
- Wasteland reclamation.
- Environment Protection Act
- Wildlife Protection Act.
- Forest Conservation Act.
- Population explosion – Family Welfare Programmes
- Human Rights - Value Education
- HIV/ AIDS - Women and Child Welfare
- Role of Information Technology in Environment and human health

#### **References:**

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
  2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt Ltd, Ahamedabad – 380013, India, E-mail: [mapin@icenet.net](mailto:mapin@icenet.net)(R)
  3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
  4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)
  5. Cunningham, W.P.Cooper, T.H.Gorhani E & Hepworth, M.T. 2001.
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  7. Down to Earth, Centre for Science and Environment (R)
  8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford University, Press 473p.
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  10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
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  12. Mckinney, M.L. & Schoch R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition 639 p.
  13. Mhaskar A.K. Matter Hazardous, Techno-Science Publications (TB)
  14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
  15. Odum, E.P. 1971 Fundamentals of Ecology. W.B. Saunders Co. USA. 574 p
  16. Rao MN & Datta, A.K. 1987 Waste Water treatment, Oxford & IBH Publication Co. Pvt Ltd 345 p.
  17. Sharma B.K. 2001 Environmental chemistry Goel Publ House, Meerut.
  18. Survey of the Environment, The Hindu (M ).
  19. Townsend C. Harper, J and Michael Begon, Essentials of Ecology, Blackwell science (TB)
  20. Trivedi R.K. Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
  21. Trivedi R.K. and P.K. Goel, Introduction to air pollution, Techno-Science Publications (TB).
  22. Wagner K.D. 1998 Environmental Management. W.B. Saunders Co. Philadelphia USA 499 p
  - (M) Magazine (R) Reference (TB) Textbook
  23. <http://nbaindia.org/uploaded/Biodiversityindia/Legal/33%20Biological%20Diversity%20Rules,%202004.pdf>.
- .....

<b>Semester-III</b>	<b>THERMAL PHYSICS AND STATISTICAL MECHANICS</b>	<b>Hours/Week-6</b>	
<b>Core Course – III</b>		<b>Credits-5</b>	
<b>Course Code-19UPH3CC3</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To gain knowledge in heat transfer, entropy, production of low temperature and liquefaction of gases and thermal radiation.
- To understand the phenomena connected with radiation, conduction, different thermal capacities of substances.
- To acquire a solid understanding of the fundamental laws of thermodynamics and statistical physics.

### Course Outcomes

On the completion of the course, students will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Define Laws of thermodynamics	K1
CO2	Interpret Maxwell thermodynamic relations	K2
CO3	Explain transmission of heat	K2
CO4	Summarize Statistical thermodynamics	K2
CO5	Apply the Specific heat of solids and gases	K3

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	M	M
<b>CO2</b>	S	M	M	M	M
<b>CO3</b>	S	M	M	M	M
<b>CO4</b>	S	M	M	M	M
<b>CO5</b>	S	M	L	S	M

S – Strong; M – Medium; L – Low

**CORE COURSE - III**  
**THERMAL PHYSICS AND STATISTICAL MECHANICS**

**Syllabus**

**UNIT I: THERMODYNAMICS – I**

**18hrs**

Thermodynamic system - Zeroth law of thermodynamics - internal energy First law of thermodynamics - reversible and irreversible process - Carnot's ideal heat engine - Carnot's cycle - internal combustion engine - Otto and diesel engine - second law of thermodynamics - entropy - change in entropy during reversible and irreversible process - T- dS equation- second law of thermodynamics - third law of thermodynamics–Clausius'sClaypeyron's latent heat equations.

**UNIT II: THERMODYNAMICS II**

**18hrs**

Statistical equilibrium - Maxwell's thermodynamic relations - Joule Thomson cooling - temperature of inversion- thermodynamic potential -- Joule Thomson porous plug experiment - Joule Thomson expansion - -- Linde's method – Adiabatic demagnetization –liquefaction of gases - liquefaction of hydrogen and Helium adiabatic demagnetization - Practical applications of low temperature – Refrigerating mechanism – Air conditioning machines.

**UNIT III: TRANSMISSION OF HEAT**

**18hrs**

Coefficient of thermal conductivity- rectilinear flow of heat along a bar Forbes method - Lee's method for bad conductors and liquids - convection and its applications - Black body - Stefan Boltzmann law - Wien's displacement law - Rayleigh - Jeans law - Planck's law -derivation and experimental verification of Stefan's law - Newton's law of cooling from Stefan's law- solar constant - temperature of the Sun - Angstrom's Pyroheliometer

**UNIT IV: SPECIFIC HEAT**

**18hrs**

Specific heat of solids – Method of mixtures – Dulong and Petit's law - Quantum theory - Einstein's theory of specific heat – Debye's theory of specific heat– Specific heat of liquids – Newton's law of cooling - Specific heat of gases – Mayer's Relation – Quantization of various contributions to energy of diatomic molecules – Specific heat of diatomic gases.

**UNIT V: STATISTICAL THERMODYNAMICS**

**18hrs**

Phase space – Statistical equilibrium - Microstates and Macrostates – probability theorems in statistical thermodynamics Maxwell Boltzmann distribution law - Maxwell - Boltzmann distribution in terms of temperature - ideal gas - quantum statistics - B-E statistics -Application of B-E statistics to photon gases – F-D statistics

### Text Books

S.No	Authors	Title of the book	Year of Publication	Publishers	Edition
1	Brijlal and Subramaniyam	Heat and Thermodynamics	2017	Chand & Co.	5 <sup>th</sup> edition
2	J.B.Rajam and C.L Arora	Heat and Thermodynamics	2009	S. Chand & Company New Delhi :	9 <sup>th</sup> edition

### Reference books

S.No	Authors	Title of the book	Year of Publication	Publishers	Edition
1	M.Narayanamoorthy & N. Nagarathinam,	Heat	1987	National publishing Co, Chennai,	8 <sup>th</sup> Edition
2	D.S. Mathur	Heat and Thermodynamics	2014	S. Chand & Co.	5 <sup>th</sup> edition

### Pedagogy

Chalk and talk, Power point presentation, Group discussion and Seminars, Animation video and Quiz

### Course Designer:

Dr.R.Gayathri

<b>Semester-III</b>	<b>PHYSICS PRACTICAL- III</b>	<b>Hours/Week-3</b>	
<b>Core Practical - III</b>		<b>Credits-3</b>	
<b>Course Code-19UPH3CC3P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objectives

- To introduce the various method of experimental physics
- To gain the knowledge of physics principles
- To impart the creative skills among the industrial applications

### Course Outcomes

On the successful completion of the course, the student will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Apply the physics principle involved in the various instruments; also relate the principles to new application.	K1
CO2	Understand the theoretical concepts of transmission of heat with the experimental knowledge	K2
CO3	Use the theoretical ideas of spectrometer	K3
CO4	Expand the creative skills that are essential for industrial applications	K6

### Mapping with program outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	M
<b>CO2</b>	S	M	S	S	M
<b>CO3</b>	M	S	M	M	M
<b>CO4</b>	S	S	M	S	S

S – Strong; M – Medium; L – Low

### List of experiments

1. Specific heat capacity of a liquid – Newton’s law of cooling.
2. Emissive power of a surface – Spherical calorimeter
3. Thermal conductivity of a bad conductor – Lee’s disc.
4. Joule’s Calorimeter - Specific heat capacity
5. Spectrometer- Refractive index (Hollow prism)
6. Potentiometer – Calibration of low range voltmeter
7. Potentiometer – Ammeter calibration
8. Characteristics of Junction and Zener Diodes
9. Transistor Characteristics’ – CE Configuration
10. Meter Bridge – Specific Resistance



### Text Books

S.No	Authors	Title of the book	Publishers	Year of publication	Edition
1.	Dr.S.Somasundaram	Practical Physics	Apsara publications, Tiruchirappalli	2012	Revised
2.	R. Sasikumar	Practical Physics	PHI Learning Pvt. Ltd, New Delhi	2011	Revised

### Reference Books

S.No	Authors	Title of the book	Publishers	Year of publication	Edition
1.	S.Srinivasan	A Text Book of Practical physics	S.Sultanch and publications	2001	Revised edition
2.	Department of Physics	Practical Physics,	St.Joseph's College, Tiruchirapalli	2011	Revised edition

### Pedagogy

Demonstration and practical sessions

### Course Designer

Dr R. Meenakshi

**SECOND ALLIED COURSE-I**  
**CHEMISTRY – I**  
**2019-2020 ONWARDS**

<b>Semester-III</b>	<b>CHEMISTRY – I</b>	<b>Hours/Week-4</b>	
<b>Second Allied Course-I</b>		<b>Credit-3</b>	
<b>Course Code-19UPH3AC4</b>		<b>Internal 25</b>	<b>External 75</b>

**Objectives**

- To stimulate the concepts in basic chemistry and apply them in real world problems.
- To learn the fundamental concepts of rate of reaction and renewable energy sources
- To study the types ,structure and properties of solids

**Course Outcomes**

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

<b>Co number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO 1	Recall the types of crystal structure and terms involved in kinetics and chemical equilibrium.	<b>K1</b>
CO 2	Compare the theories of bonding with metal atoms.	<b>K2</b>
CO 3	Discuss the properties of benzene, naphthalene and halogen compounds.	<b>K2</b>
CO4	Apply the concepts of electron displacement effect in organic compounds.	<b>K3</b>

**Mapping with Programme Outcomes**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	M	M	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	M	S	S	S
<b>CO4</b>	S	M	M	M	S

**S-Strong; M-Medium**

## SECOND ALLIED COURSE-I

### CHEMISTRY – I

2019-2020 ONWARDS

#### UNIT I BIO INORGANIC AND INDUSTRIAL CHEMISTRY

(12

hrs)

Coordination Chemistry: Nomenclature – Werner's, Sidgwick and Pauling's theories. Chelation-industrial importance of EDTA, Biological role of hemoglobin and Chlorophyll. Industrial chemistry: Fuel gases–water gas, producer gas, LPG gas, and natural gas. Fertilizers – NPK and mixed fertilizers- Soaps and detergents.

#### UNIT II BASICS OF ELECTRON DISPLACEMENT REACTIONS AND CHEMISTRY OF PESTICIDES (12 hrs)

Polar effects: Inductive effect– Relative strength of aliphatic monocarboxylic acid and aliphatic amines. Resonance – condition and consequences of resonance – resonance of energy. Acidic property of phenol and basic property of aniline. Hyperconjugation – Heat of hydrogenation - Bond length, dipole moment and Steric effect. Halogen compounds: Important chlorohydrocarbons. Types of solvents - Polar and Non polar.

Pesticides – Dichloromethane, chloroform, carbon tetrachloride, DDT, BHC Malathion, Parathion and chlorodane.

#### UNIT III ORGANIC REACTIONS AND MEDICINAL CHEMISTRY (12hrs)

Aromatic compounds: Structure, stability, resonance, aromaticity and substitution reaction of benzene. nitration, halogenations and alkylation. Naphthalene – isolation, properties and uses.

Organic reaction: Benzoin, Perkin, Cannizzaro, Claisen, Biuret, and Haloform reactions- organic compounds possessing analgesics, antibacterial, anti- inflammatory, antibiotics, antiseptic and disinfectant, anesthetics local and general (Structures not necessary)

#### UNIT IV SOLID STATE AND ENERGETICS

(12 hrs)

Solid state: Typical crystal lattices - unit cell, elements of symmetry, Bragg's equation, Weiss Indices, Miller indices, Simple, Body centered and Face centered lattices.

Energetic: First law of thermodynamics – state and path function – need for the second law – Carnot cycle, spontaneous and Non – spontaneous processes.

#### UNIT V CHEMICAL KINETICS AND MATERIALS FOR RENEWABLE ENERGY

(12 hrs)

Chemical Kinetics: Order, molecularity, rate constant for zero, first and second order reactions- Effect of temperature on reaction rate (Arrhenius theory).

Renewable energies: Batteries, Solar cell, H<sub>2</sub> production fuel cell, e-Vehicles.

## Textbooks

S.No	Author name	Year of Publication	Title of the book	Publisher name
1.	Puri B R, Sharma L R, Kalia K K,	1993	Principles of Inorganic chemistry	Shoban lal Nagin Chand&Co.,
2.	Madan R D	2000	Modern Inorganic Chemistry	S.Chand and Company Ltd.,
3.	Soni P.L.	2006	Text Book of organic Chemistry	S. Chand & Co, New Delhi
4.	Bahl B S and Arun Bahl	1997	Advanced Organic Chemistry	Sulthan Chand and Co
5.	Puri B.R. Sharma L.R. and Pathania M.S.	2013	Principles of Physical Chemistry	35 th edition, New Delhi: Shoban Lal Nagin Chand and

## Reference Books

S.No.	Author name	Year of Publication	Title of the book	Publisher name
1	Gopalan. R	2012	Text Book of Inorganic Chemistry	2 <sup>nd</sup> Edition, Hyderabad, Universities Press, (India)
2	Morrison R.T. and Boyd R.N., Bhattacharjee S. K.	2011	Organic Chemistry	7 <sup>th</sup> edition, Pearson India,

## Pedagogy

Chalk and Talk, power point Presentation, Group discussion, Seminar, Interaction, problem solving.

## Course Designers

- ❖ Ms. N.Anusuya, Assistant Professor, Department of Chemistry.
- ❖ Dr. K.Shenbagam, Assistant Professor, Department of Chemistry

**SECOND ALLIED COURSE- I(AP)**  
**CHEMISTRY PRACTICAL - I**  
**2019-2020 ONWARDS**

<b>Semester-III</b>	<b>CHEMISTRY PRACTICAL - I</b>	<b>Hours/Week-3</b>	
<b>Second Allied Course-I(AP)</b>		<b>Credit-3</b>	
<b>Course Code-19UPH3AC1P</b>		<b>Internal 40</b>	<b>External 60</b>

**Objectives**

- To learn the techniques of titrimetric analyses.
- To know the estimation of several cations and anions
- To know the estimation of total hardness of water.

**Course outcomes**

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

<b>CO</b>	<b>CO Statements</b>	<b>Knowledge Level</b>
<b>CO1</b>	Recall the basic principles of volumetric analysis	K1
<b>CO2</b>	Demonstrate the experimental methods of volumetric analysis	K2
<b>CO3</b>	Compare the hardness present drinking water	K2

**Mapping with Programme Outcome**

<b>CO/PO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	M	M
<b>CO2</b>	S	S	S	M	M
<b>CO3</b>	S	S	S	M	M

**S-Strong ; M- Medium**

**SECOND ALLIED COURSE- I(AP)**  
**CHEMISTRY PRACTICAL - I**  
**2019-2020 ONWARDS**

**Hours/Week: 3**  
**Credits: 3**

**VOLUMETRIC AND ORGANIC QUANTITATIVE ANALYSIS I**

**Volumetric Analysis**

**1. Acidimetry and alkalimetry**

(a) Strong acid vs strong base (b) Weak acid vs strong base (c) Determination of hardness of water.

**2. Permanganometry**

(a) Estimation of ferrous sulphate (b) Estimation of oxalic acid

**3. Iodometry**

(a) Estimation of potassium dichromate (b) Estimation of potassium permanganate

**II. Organic Analysis**

Analyse the following organic Compounds.

1. Carbohydrate, 2. Amide, 3. Aldehyde, 4. Ketone, 5. Acid & 6. Amine

The students may be trained to perform the specific reactions like tests for elements (nitrogen only), aliphatic or aromatic, saturated or unsaturated and functional group present and record their observations.

**Text Books**

S. No.	Author's Name	Year of Publication	Title of the Book	Publisher's Name
1.	R. Gopalan	2000	Elements of analytical chemistry	S. Chand, New Delhi]
2.	N. S. Gnanapragasam and G. Ramamurthy	1998	Organic Chemistry lab manual	S. Viswanathan and Co. Pvt. Ltd

**Course Designers**

- ❖ **Ms. N.Anusuya**, Assistant Professor, Department of Chemistry.
- ❖ **Dr. K.Shenbagam**, Assistant Professor, Department of Chemistry

<b>Semester-III</b>	<b>TROUBLESHOOTING OF ELECTRICAL APPLIANCES</b>	<b>Hours/Week-2</b>	
<b>Non Major Elective – I</b>		<b>Credits-2</b>	
<b>Course Code-19UPH3NME1</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To create awareness about types and handling of domestic appliances.
- To acquire knowledge about principles of operation, working and applications of various appliances.
- To give knowledge and competencies regarding servicing, repair, fault diagnosis for consumer electronics.

### Course Outcomes

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

<b>CO number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Identify the electronic components in any given appliances.	K2
CO 2	Understand the terminology of Soldering & De-soldering technique.	K2
CO 3	Understand the working function of electrical appliances	K2
CO 4	Identification of problem arise in Home appliances Carry out fault rectification.	K2

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1</b>	S	L	L	M
<b>CO2</b>	S	L	L	M
<b>CO3</b>	S	L	L	M
<b>CO4</b>	S	L	L	M

**S** – Strong; **M** – Medium; **L** – Low

**NON MAJOR ELECTIVE – I**  
**TROUBLESHOOTING OF ELECTRICAL APPLIANCES**

**Syllabus**

**UNIT I Introduction to Electricity** **5hrs**

Electric Charge – Voltage -Electric Current - Ohm’s Law- Electric Potential-Serial and Parallel Circuit-Transformer

**UNIT II Electronic and Electrical Components** **6hrs**

Active and Passive Components-Resistors-Capacitors and Inductors-Semiconducting Devices: Diodes-Transistors - Integrated Circuits -Digital ICs for logic gates.

**UNIT III Soldering/ de- Soldering Techniques** **6hrs**

Principles of solder connections-soldering flux- Flux removal after soldering-Safety, health and medical aspects in soldering.

**UNIT IV Basic Functionality of Electrical Equipment** **6hrs**

Working principle /functionality- Main Components of a Tube light, Fan, Water Heater iron box and Refrigeration System- Common occurring faults- Possible causes and solution.

**UNIT V Basic Functionality Motor Appliances** **8hrs**

Working principle and Functioning of motor (mixer/juicer/grinder)- Functioning of motor - Common occurring faults - possible causes and solution.



## Textbooks

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	<a href="#">R Murugesan</a>	Electricity and Magnetism	S. Chand Publishing	2017	4th
2	V.K Mehta Rohit Mehta	Principles of Eelectronics	S. Chand Publishing	2014	7 <sup>th</sup>
3.	Walter C Bosshart	Printed Circuits Boards	McGraw-Hill	1995	-
4	<a href="https://www.electrical4u.com/working-principle-of-a-tube-light">https://www.electrical4u.com/working-principle-of-a-tube-light</a>	-	-	-	-
5	<a href="https://www.academia.edu/26360706/JUICER-MIXER-">https://www.academia.edu/26360706/JUICER-MIXER-</a>	-	-	-	-

## Reference

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	Eric Kleinret	Troubleshooting and Repairing Major Appliances	McGraw-Hill Education	2013	3 <sup>rd</sup>
2	Shashi Bhushan Sinha	Handbook of Repair and Maintenance of Domestic Electronics Appliances	BPB	2016	1 <sup>st</sup>

## Pedagogy:

Chalk And Talk, Assignment, Power Point Presentation

## Course Designer:

Ms. R.A.KIRUTHIKA

<b>Semester-IV</b>	<b>ELECTRICITY , MAGNETISM AND ELECTROMAGNETISM</b>	<b>Hours/Week-5</b>	
<b>Core Course – IV</b>		<b>Credits-5</b>	
<b>Course Code-19UPH4CC4</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To develop knowledge in electrostatics and magneto statics so that students would apply theories of static and moving charges.
- To extend the understanding of its applications to instruments involving electric and magnetic fields.

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge level</b>
CO1	Demonstrate a mastery of Coulomb's law for the electric field, and apply it to systems of point charges. Use the principle of superposition and law of Gauss to calculate the electrical forces and the intensity of the electric field in various electricity problems	K2
CO2	Understand the implications of Kirchoff's rules . To calculate the magnetic forces that act on moving charges and the magnetic fields due to currents	K2
CO3	Identify the laws of magneto statics and the various properties of magnetic materials	K3
CO4	Build up strong problem solving skills by effectively formulate a circuit problem using Inductance, Resistance and capacitance.	K3
CO5	Develop the understanding of Dynamo and DC Motor using magnetization principle.	K3

### Mapping with programme outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1</b>	S	S	M	M
<b>CO2</b>	S	M	M	M
<b>CO3</b>	S	M	L	M
<b>CO4</b>	S	M	L	M
<b>CO5</b>	S	M	L	S

S – Strong; M – Medium; L – Low

**CORE COURSE – IV**  
**ELECTRICITY , MAGNETISM AND ELECTROMAGNETISM**

**Syllabus**

**Unit - I: Electrostatics**

**15hrs**

Point charge - Rest charge - charge distributions - coulomb's law - vector form - Principle of superposition - Gauss's Law and its applications -Electric Field due to a uniformly charged sphere, -hollow cylinder -solid cylinder) – Electric Potential – Potential at a point due to a uniformly charged conducting sphere – Principle of a capacitor– Capacity of a spherical and cylindrical capacitors – Energy stored in a charged capacitor–Loss of energy on sharing of charges between two capacitors.

**Unit - II: Current Electricity**

**15hrs**

Current and current density - equation of continuity - combination of resistance star and Delta transformations - grouping of cells - Ampere's circuital law and its applications - Field along the axis of a circular coil and Solenoid –Theory of Ballistic Galvanometer – Figure of merit – Damping Correction - Kirchhoff's laws - Wheatstone Bridge - Carry - Foster's Bridge- Potentiometer Calibration of ammeter and voltmeter- Comparison of resistance and capacitance.

**Unit -III: Magneto statics**

**15hrs**

Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law. Intensity of magnetization - Susceptibility – Types of magnetic materials – Properties Para, dia and ferro magnetic materials – Cycle of magnetization – Hysteresis – B-H curve – application of BH curve– Magnetic energy per unit volume

**Unit - IV: Electro Magnetic Induction**

**15hrs**

Laws of electromagnetic induction– Self and mutual induction– Self-inductance of a solenoid– Mutual inductance of a pair of solenoids–Coefficient of coupling– Experimental determination of self (Rayleigh's method) and mutual inductance– Growth and decay of current in a circuit containing L and R–Growth and decay of charge in a circuit containing C and R– Measurement of High resistance by leakage.

**Unit V: AC Circuits**

**15hrs**

Alternating EMF applied to series circuits containing LC, LR and CR– Alternating EMF applied to circuits containing L, C and R–Series and Parallel resonance circuits– Sharpness of resonance–Q factor– Comparison between Series and Parallel resonant circuits –Power in AC circuits (R, L-R, L-C-R only) – Power factor– Wattless current – Choke Coil – Transformer – Uses of Transformers – Skin Effect.

## Text Books

S.No	Authors	Title of the book	Year of Publication	Publishers	Edition
1	Brijlal and Subramaniam	Electricity and Magnetism	1990	S.Chand & Co.	18th edition
2	R.Murugesan	Electricity and Magnetism	2013	S.Chand & Co.	5 <sup>th</sup> edition
3	Sehgal - Chopra - Sehgal	Electricity and magnetism	2004	Sultan Chand and Sons Ltd,	6 <sup>th</sup> edition

## Reference books

S.No	Authors	Title of the book	Year of Publication	Publishers	Edition
1	K K.Tewari	Electricity and magnetism	2007	S. Chand & Co. Ltd., New Delhi	3 <sup>rd</sup> edition

## Pedagogy:

Lecture, Seminar, Assignment, Power point Presentation, Animation video and Quiz

## Course Designer:

Dr.R.Gayathri

<b>Semester-IV</b>	<b>PHYSICS PRACTICAL- IV</b>	<b>Hours/Week-3</b>	
<b>Core Practical – IV</b>		<b>Credits-3</b>	
<b>Course Code-19UPH4CC4P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objectives

- To introduce the various method of experimental physics
- To gain the knowledge of physics principles
- To impart the creative skills among the industrial applications

### Course Outcomes

On the successful completion of the course, the student will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Recall the principles of Wheatstone bridge and apply with P.O box.	K1
CO2	Understand the experimental knowledge of Potentiometer and its applications	K2
CO3	Apply the theoretical ideas of Ballistic Galvanometer	K3
CO4	Understand the applications of Spectrometer.	K2
CO5	Develop the understanding of resonance circuits	K3

### Mapping with program outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	M
<b>CO2</b>	S	S	S	S	M
<b>CO3</b>	S	S	M	M	M

### List of experiments

1. P.O.Box – Temperature coefficient.
2. Carey Foster's Bridge – R and p
3. Spectrometer i-d curve
4. Potentiometer – Temperature coefficient of R
5. Spectrometer – Grating – Normal incidence
6. Potentiometer – x of thermistor.
7. Potentiometer – High range voltmeter calibration.
8. Series and Parallel resonance circuits
9. Ballistic Galvanometer – Figure of merit.
10. B.G. – Absolute capacity of condenser.

### Text Books

S.No	Authors	Title of the book	Publishers	Year of publication	Edition
1.	Dr.S.Somasundaram	Practical Physics	Apsara publications, Tiruchirappalli	2012	Revised
2.	R. Sasikumar	Practical Physics	PHI Learning Pvt. Ltd, New Delhi	2011	Revised

### Reference Books

S.No	Authors	Title of the book	Publishers	Year of publication	Edition
1.	S.Srinivasan	A Text Book of Practical physics	S.Sultanch and publications	2001	Revised edition
2.	Department of Physics	Practical Physics,	St.Joseph's College, Tiruchirapalli	2011	Revised edition

### Pedagogy

Demonstration and practical sessions

### Course Designer

Dr R. Meenakshi

**SECOND ALLIED COURSE – II**  
**ALLIED CHEMISTRY-II**  
**2019-2020 ONWARDS**

<b>Semester-IV</b>	<b>ALLIED CHEMISTRY – II</b>	<b>Hours/Week-4</b>	
<b>Second Allied Course-II</b>		<b>Credit-4</b>	
<b>Course Code-19UPH4AC5</b>		<b>Internal</b>	<b>External</b>
		<b>25</b>	<b>75</b>

**Objectives**

- To stimulate the concepts in basic chemistry and apply them in real world problems.
- To learn the fundamental concepts of nuclear chemistry and photochemistry
- To study the structure and properties of carbohydrates.

**COURSE OUTCOMES**

<b>CO</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO 1	Recall the properties and applications of carbohydrates, amino acids and proteins	K1
CO 2	Understand the basics of nuclear chemistry	K2
CO 3	Apply the basic concepts of photochemistry	K3
CO4	Analyze the concepts of electrochemistry and material science	K4

**MAPPING OF CO WITH PO**

<b>CO</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	M	M	S
<b>CO2</b>	S	S	M	M	S
<b>CO3</b>	S	M	S	S	S
<b>CO4</b>	S	M	M	M	S

**S-Strong; M-Medium**

**SEMESTER\_IV**  
**ALLIED CHEMISTRY – II**  
**2019-2020 ONWARDS**

**UNIT I: NUCLEAR CHEMISTRY (12Hrs)**

Nuclear chemistry : Fundamental particles of nucleus- isotopes – isobars - isotones - isomers- distinction between chemical and nuclear reactions - nuclear stability - n/p ratio - nuclear forces- nuclear fission - fusion reaction- radioactive series- units of radioactivity - half life and average life - types of nuclear reactor - safe handling of radio isotopes - atomic energy programmes in India - applications of radio isotopes

**UNIT II: CARBOHYDRATES, AMINOACIDS AND PROTEINS (12Hrs)**

Carbohydrates: classification - glucose and fructose - preparation and properties - structure of glucose only - Fischer and Haworth cyclic structures- amino acids and proteins: - classification based on structure - essential and non - essentials amino acids -preparation - properties and uses - peptides-proteins-classification based on physical properties and biological functions - structure of proteins - primary and secondary structure (elementary treatment).

**UNIT III: PHOTO CHEMISTRY (12Hrs)**

Photochemistry: Introduction - Photosynthesis - comparison between thermal and photochemical reactions - Beer-Lambert law - Grotthus-Dropper law - Einstein's law of photochemical equivalence - quantum yield - Hydrogen-chlorine reaction (elementary idea only) - Jablonski diagram - photo process – phosphorescence – fluorescence – photosensitization – quenching - thermo luminescence - bio-luminescence - chemiluminescence- significances of photochemical process

**UNIT IV:ELECTROCHEMISTRY& MAGNETIC PROPERTIES OF MATERIALS (12Hrs)**

Galvanic cells - emf - standard electrode potential - reference electrodes - electrochemical series and its applications - corrosion and methods of prevention-galvanization, electroplating and cathodic protection. Magnetic properties of molecules: types of magnetic behavior- dia – para - ferro - antiferro magnetism - magnetic susceptibility - determination of magnetic moment using Guoy balance-applications of magnetic measurements.



**UNIT V: MATERIAL SCIENCE****(12Hrs)**

Ferrous and non-ferrous alloys- composition of glass and ceramics - Conductive polymers-types- synthesis and application- Biomedical applications of polymers- contact lens- dental polymers - artificial heart - kidney - skin and blood cell - water absorbing polymers- fiber reinforced composites - applications of grapheme - quantum dots - gold nano particles.

**TEXT BOOKS**

<b>S.No</b>	<b>Author name</b>	<b>Year of Publication</b>	<b>Title of the book</b>	<b>Publisher name</b>
1	Puri B R, Sharma L R, Kalia K K,	1993	Principles of Inorganic chemistry	Shoban Lal Nagin Chand&Co.,
2	Madan R D	2000	Modern Inorganic Chemistry	S.Chand and Company Ltd.,
3	Soni P.L.	2006	Text Book of organic Chemistry	S. Chand & Co, New Delhi
4	Bahl B S and Arun Bahl	1997	Advanced Organic Chemistry	Sulthan Chand and Co
5	Puri B.R. Sharma L.R. and Pathania M.S.	2013	Principles of Physical Chemistry	35 <sup>th</sup> edition, New Delhi: Shoban Lal Nagin Chand
6	Arnikar	1995	Elements of nuclear chemistry	New Age Publication
7	S L Kakani, Amit Kakani	2016	Material Science	New Age International Private Limited

## REFERENCE BOOKS

S.No.	Author name	Year of Publication	Title of the book	Publisher name
1	Gopalan. R	2012	Text Book of Inorganic Chemistry	2nd Edition, Hyderabad, Universities Press, (India)
2	Morrison R.T. and Boyd R.N., Bhattacharjee S. K.	2011	Organic Chemistry	7th edition, Pearson India,
3	<u>William D. Callister, Jr., David G. Rethwisch</u>	2018	Materials Science and Engineering	John Wiley & Sons, Limited,

### Pedagogy

Chalk and Talk, Power point Presentation, Group discussion, Seminar, Interaction, Problem solving

### Course Designers

- ❖ Ms. N.Anusuya, Assistant Professor, Department of Chemistry
- ❖ Dr. K.Shenbagam, Assistant Professor, Department of Chemistry

<b>Semester-IV</b>	<b>AUDIO AND VIDEO SYSTEM</b>	<b>Hours/Week-2</b>	
<b>Non Major Elective – II</b>		<b>Credits-2</b>	
<b>Course Code-19UPH4NME2</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- The state of the art in Audio and Video system will enable the students to comprehend concepts of modern electronic system.
- The knowledge acquired by students will help them to become familiar with concepts of audio and video systems.

### Course Outcomes

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

<b>CO number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Describing the basic idea in audio and video.	K1
CO 2	Identifying the audio devices.	K2
CO 3	Identifying the types of signals, correction in signals and know the transmission techniques.	K2
CO 4	Understanding the video section fundamentals.	K2
CO 5	Understanding the Gain and noise cancelling.	K2

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
<b>CO1</b>	S	L	L	M
<b>CO2</b>	S	L	L	M
<b>CO3</b>	S	L	L	M
<b>CO4</b>	S	L	L	M
<b>CO5</b>	S	L	L	M

**S** – Strong; **M** – Medium; **L** – Low

**NON MAJOR ELECTIVE – II**  
**AUDIO AND VIDEO SYSTEM**

**Syllabus**

**UNIT I: Characteristics of Sound** **6hrs**

Nature of Sound - Pressure and Intensity of sound waves - Sensitivity of human ear for sound  
Frequency of Sound waves-Resonance effect in sound systems-Helmholtz resonator-Reflection  
and diffraction of sound waves.

**UNIT II: Audio Devices** **8 hrs**

**Microphones:** Introduction-Characteristics of a Microphone - Requisites of a Good  
Microphone- Moving Coil Microphone-Ribbon Microphone-Carbon Microphone-Comparisons  
of Various Types of Microphones- Precautions while Using Microphones.

**Loudspeakers:** Characteristics of Loudspeakers-Moving Coil Cone Type Loudspeaker-  
Electrodynamics Loudspeaker.

**UNIT III: Digital Transmission And Coding Techniques** **5 hrs**

Introduction-Return to Zero and Non-Return to Zero- Unipolar and Bipolar Signals- ASK  
Format-PSK Format-FSK Format.

**UNIT IV: Video Section Fundamentals** **5 hrs**

Picture Reproduction - Video amplifier Requirements - Video amplifiers - Basic Video  
Amplifier Operation.

**UNIT V: Automatic Gain Control and Noise Cancelling Circuits** **6 hrs**

Advantages of AGC-Types of AGC-Variou AGC Systems–Peak AGC Systems- Keyed AGC  
Systems-Delayed AGC Systems- AGC adjustments- Noise cancellation.

### Text books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	N Subrahmanyam &Brijlal	A Text book of Sound	Vikas Publication House	2018	2 <sup>nd</sup>
2.	R.L.Saighal	A Text book of Sound	S.Chand & Co	2005	Revised Edition
3.	V.K. Meta Rohit Meta	Principles of electronics	S.Chand & Co	1995	Revised Edition
4.	R.R.Gulati	Monochrome And Colour Television	New Age International	1983	Reprint,2001

### Reference

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	R.G.Gupta	Audio and Video Systems	Mc Graw Hill Education Limited	2011	2 <sup>nd</sup>

### Pedagogy:

Chalk and talk, Assignment, power point presentation

### Course Designer:

Ms. R.A.KIRUTHIKA

<b>Semester-IV</b>	<b>BIOMEDICAL INSTRUMENTATION</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective – I</b>		<b>Credits-2</b>	
<b>Course Code-19UPH4SBE1A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To provide fundamental ideas of Biomedical instrumentation
- To acquire knowledge in medical imaging systems

### Course Outcomes

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

<b>CO number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Tell the fundamental principle and working of the biomedical instruments system	K1
CO 2	Explain about types of electrodes	K2
CO 3	Illustrate about Instrumentation recording and monitoring.	K2
CO 4	utilize knowledge in electrical safety in medical environment	K3
CO 5	outline the basic principles in imaging techniques	K2

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	M	S	M	S
<b>CO2</b>	M	S	M	M	M
<b>CO3</b>	S	M	S	M	S
<b>CO4</b>	M	M	M	S	M
<b>CO5</b>	M	M	S	M	S

S – Strong; M – Medium; L – Low

**SKILL BASED ELECTIVE – I A**  
**BIOMEDICAL INSTRUMENTATION**

**Syllabus**

**UNIT I: Fundamentals of Medical Instrumentation**

**6 hrs**

Role of Technology in Medicine – Basic medical instrumentation system – Performance requirements of medical instrumentation systems – PC-based medical instruments – Consumer and portable medical equipment – Micro-Electro-Mechanical Systems (MEMS) – General constraints in design of medical instrumentation systems.

**UNIT II: Electrodes and Transducers**

**6hrs**

Origin of Bioelectric signals – ECG – EEG – EMG – Limb electrodes – Floating electrodes – Pregelled disposable electrodes – Electrodes for EEG and EMG – Micro electrodes – Transducer – Classification of Transducers (basic ideas only)

**UNIT III: Biomedical Recorder and Foetal Monitoring Instruments**

**6 hrs**

Electrocardiograph – Block diagram description of an Electrocardiograph – The ECG leads – Effects of artefacts on ECG recordings – Major challenges in Electrocardiograph design – Multi-channel ECG machine – Cardiotocograph – Medical Ultrasound – Basic Pulse-Echo apparatus

**UNIT IV: Patient Safety**

**6 hrs**

Electric shock hazards – Gross shock – Effects of electric current on the human body – Microcurrent shock – Leakage currents – Types of leakage current – Precautions to minimize electric hazards – Testing of biomedical equipment

**UNIT V: Modern Imaging Systems**

**6hrs**

Computed Tomography – Basic principle – Contrast scale – Magnetic Resonance Imaging (MRI) system – Basic NMR components – Biological effect of NMR imaging – Advantages of NMR imaging system

**Textbooks**

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	R.S.Khandpur	Handbook of Biomedical Instrumentation	McGraw Hill Education	2014	3 <sup>rd</sup>

**Reference**

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Leslie Cromwell, Fred J. Weibell, Erich Pfeiffer A	Biomedical Instrumentation and Measurement	Prentice hall of India	1997	2 <sup>nd</sup>
2.	M.Arumugam	Bio-Medical Instrumentation	Anuradha Agencies	2003	-

**Pedagogy:**

Chalk and talk, Assignment, power point presentation

**Course Designer:**

Ms. N.Manopradha



<b>Semester-IV</b>	<b>PHOTOGRAPHY AND VIDEOGRAPHY</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective – I</b>		<b>Credits-2</b>	
<b>Course Code-19UPH4SBE1B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To acquire knowledge in modern cameras, and find a recommendation for which one you should buy, if you are in the market for one.
- To provide fundamental ideas about camera lenses, exposure, and lighting

### Course Outcomes

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

<b>CO number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Knowledge and skills in the use of basic tools, techniques, technologies and able to acquaint with basic camera operations.	K1
CO 2	Understanding of special features and utility purposes of various types of lenses and able to choose an appropriate lens for the job concerned	K1
CO 3	Demonstrate uses of cameras and lighting/digital technologies.	K2
CO 4	Utilize the concept of correct exposure and identify correct and incorrect exposure in photographs.	K3
CO 5	Apply understanding of aesthetics related to shooting and editing.	K3

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	M	M
<b>CO2</b>	M	S	M	M	M
<b>CO3</b>	M	M	S	M	S
<b>CO4</b>	M	M	M	S	S
<b>CO5</b>	M	M	S	S	S

S – Strong; M – Medium; L – Low

**SKILL BASED ELECTIVE – IB**  
**PHOTOGRAPHY AND VIDEOGRAPHY**

**Syllabus**

**UNIT I: Introduction** **3 hrs**

Digital Photography – Advantages and Disadvantages – SLR – Aperture – Shutter Speed – ISO Sensitivity

**UNIT II: Lenses** **6hrs**

Specialized Lenses – Telephoto Lens – Wide-Angle Lens – Lens Multiplication Factor - Zoom Lens – Prime Lens – Macro (or Close-Up) Lens – Fish-Eye Lens – Tilt And Shift Lenses

**UNIT III: Composing the Picture: Light, Framing, Focus** **9 hrs**

Composing the Picture – Lighting – Framing – Focus – Downloading and Storing Your Photos

**UNIT IV: Shooting video with DSLR** **6 hrs**

Fundamentals of the shoot – Exposure – Keeping the camera steady – Shooting to edit – Shooting Just Enough Variations – Watching and Learning from the Movies – Varying Focal Length – Mastering Shot Structure – Maintaining continuity between shots

**UNIT V: Getting Creative with Shoot** **6hrs**

Controlling Aperture for Effect – Finding the Best Angle – Using Camera Filters – Tooling with Camera Effects – Using Time-Lapse Photography

### Textbooks

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Brian Black	DSLR Photography for Beginners	Independently Published	2013	1 <sup>st</sup>
2.	John Carucci	Digital SLR Video & Filmmaking for Dummies	John Wiley & Sons, Inc.	2013	-

### Reference

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Tom Clark	Digital Photography Composition for Dummies	John Wiley & Sons, Inc.	2011	-

### Pedagogy:

Chalk and talk, Assignment, power point presentation

### Course Designer:

Ms. N.Manopradha

Semester-V	<b>OPTICS</b>	<b>Hours/Week-5</b>	
Core Course - V		<b>Credits-5</b>	
Course Code-19UPH5CC5		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To understand the basic ideas of geometric optics
- To gain knowledge of the working of optical instruments.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO 1	Outline the behaviour of light.	K2
CO 2	Explain the various types of aberration.	K2
CO 3	Demonstrate basic optical phenomena like interference, diffraction and polarization.	K2
CO 4	Predict optical elements and set-up basic experiments.	K3
CO 5	Apply the concepts of light.	K3

### Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4
CO1	S	S	L	S
CO2	S	M	M	S
CO3	S	S	M	S
CO4	M	M	M	S
CO5	S	S	S	S

S – Strong; M – Medium; L – Low

## CORE COURSE – V

### OPTICS

#### Syllabus

#### **UNIT -I : Geometrical Optics**

**18 hrs**

Matrix method in ray optics - Effect of translation, refraction - Thick and thin lens formulae Unit planes-Nodal planes-System of two thin lenses.

Lens aberrations - Spherical aberrations of a single surface -Astigmatism - Curvature of field-Distortion -Abbe's sine condition - Chromatic aberrations.

#### **UNIT- II : Interference**

**12 hrs**

Fresnel's biprism, Fresnel's mirrors and Lloyd's single mirror experiments Achromatic fringes-Interference in thin films(from reflected and transmitted light) -Fringes in wedge shaped films - Reflective and antireflective coatings - Michelson's interferometer - Determination of wavelength and refractive index.

#### **UNIT- III : Diffraction**

**15 hrs**

Rectilinear propagation of light - Zone plate - Fresnel diffraction - Diffraction at circular aperture, circular disc and a straight edge - Fraunhofer diffraction - Diffraction at a single and double slit - Missing orders in double slit - Theory of diffraction grating - Determination of wavelength - Dispersive power - Rayleigh's criterion and resolving power of a prism, grating, telescope and microscope

#### **UNIT- IV: Polarization**

**15 hrs**

Plane of polarization -Polarization by reflection - Brewster's law -Pile of plates- Polarization by refraction - Malu's law -Double refraction - Nicol prism - Huygen's explanation of double refraction - Elliptically and circularly polarized light -Quarter and half wave plates - Production and determination of plane, elliptically and circularly polarized light - Optical activity - Fresnel's theory-Specific rotation-Laurent's half shade polarimeter

#### **UNIT – V: Optical Instruments**

**15 hrs**

Microscopes – Simple Microscope (Magnifying glass) – Compound Microscope – Ultra-Microscope – Eyepieces - Huygen's Eyepiece - Ramsden's Eyepiese — Comparison of Eyepieces – Telescope – Refracting astronomical telescope – Abbe Refractometer – Pulfrich refractometer -Photographic Camera – Prism binoculars.

## Textbooks

S.No.	Author name	Title of the book	Publishers	Year of Publication	Edition
1.	Ajoy Ghatak	Optics	Tata McGraw Hill Co. (For Matrix methods)	2010	6 <sup>th</sup> Edition
2.	Dr. N. Subramaniam, Brijlal and Dr.M.N. Avathanulu	Optics	S. Chand & Co. Pvt.Ltd., New Delhi	2016 (Reprint)	25 <sup>th</sup> Revised Edition

## Reference books

S.No.	Author name	Title of the book	Publishers	Year of Publication	Edition
1	S.L.Kakani, K.C. Bhandari	A Text Book of Optics	S.Chand and Sons, New Delhi.	2002	2 <sup>nd</sup> Edition

## Pedagogy

Lecture, Seminar, Interaction, Assignment, Debate, power point presentation.

## Course Designer

Ms.D.Devi

<b>Semester-V</b>	<b>ATOMIC AND NUCLEAR PHYSICS</b>	<b>Hours/Week-5</b>	
<b>Core Course - VI</b>		<b>Credits-5</b>	
<b>Course Code-19UPH5CC6</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To acquire the knowledge of Atomic Physics.
- To familiarize the concepts of nuclear Physics

### Course Outcome

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

Co Number	CO statement	Knowledge level
CO 1	Outline the knowledge of basic properties of Cathode rays and Tue rays. Calculate the values of $e/m$ and Critical potential.	K2
CO 2	Extend the concept of vector atom model to draw the electronic configuration of atoms and the Periodic classification.	K2
CO 3	Apply the Quantum mechanical principles in Spectral transitions ( Lande's g factor)	K3
CO 4	Utilize the interaction of particle and matter to Solve the problem in nuclear physics.	K3
CO 5	Analyze nuclear radio activities and Apply the concepts of radio isotopes in general field.	K4

### Mapping with programme outcome

CO's	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	M	M
CO2	S	S	M	M	M
CO3	S	S	M	M	M
CO4	S	S	M	M	M
CO5	S	S	M	M	S

S–Strong; M–Medium; L–Low

**CORE COURSE – VI**  
**ATOMIC AND NUCLEAR PHYSICS**

**Syllabus**

**Unit -I: Cathode Rays and Tue Rays. 15 hrs**

Cathode rays – properties –  $e/m$  of cathode rays – Milliken’s oil drop method – Positive rays – Properties –  $e/m$  of Positive rays: Thomson’s parabola method – Aston’s Bain’s bridge - Determination of critical Potential – Franck and Hertz’s experiment - Davi’s and Goucher method.

**Unit- II: Vector Atom model 15 hrs**

Various quantum numbers, L-S and j-j Couplings – Pauli’s exclusion principle – electronic configuration of elements and periodic classification – magnetic dipole moment of electron due to orbital and spin motion – Bohr magnet ion stern and Gerlach experiment.

**Unit - III: Fine structure of special lines 15 hrs**

Special terms and notations – selection rules- intensity rule and internal rule – Fine structure of sodium D lines – Alkali spectra – Fine structure in Alkali spectra – spectrum of Helium –Zeeman effect - Larmor’s theorem – Debye’s quantum mechanical explanation of the normal Zeeman effect – Anamolous Zeeman effect – theoretical explanation - Lande’s ‘g’ factor and explanation of splitting of D1 and D2 lines of sodium.

**Unit - IV: Structure of Nuclei and Radioactivity 15 hrs**

Basic properties of nuclei- Composition – Charge – Size - Rutherford's experiment for estimation of nuclear size- density of nucleus- Mass defect and Binding energy- Packing fraction-  $BE/A$  vs  $A$  plot, stability of nuclei ( $N$  Vs  $Z$  plot) and problems. Radioactive disintegration concept of natural and artificial radioactivity- Properties of  $\alpha$ ,  $\beta$ ,  $\gamma$ -rays laws of radioactive decay-half-life- mean life (derivation not required)- units of radioactivity-successive disintegration and equilibriums - radioisotopes.

**Unit - V: Particle accelerators and detectors 15 hrs**

Linear accelerators- Cyclotron - Betatron - GM counter - Ionisation chamber

**Nuclear Reactions:** Types of Reactions and Conservation Laws - Concept of Compound and Direct Reaction -  $Q$  value equation and solution of the  $Q$  equation – problems - Fusion and fission definitions and qualitative discussion with examples.



## Text Books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	N.Subrahmanyam and Brijlal and seshan.	Atomic and nuclear Physics	S.Chand	2007	Revised edition
2	R.Murugesan Kiruthiga Sivaprasath	Modern Physics	S.Chand	2011	Revised edition
3	Beiser. Shobhit mahajan S.Rai Choudhury	Perspectives of Modern Physics	Tata McGraw Hill	2009	6 <sup>th</sup> edition

## Reference Books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	S.N. Ghosal	Atomic physics	S.chand	2007	Revised edition
2	S.N. Ghosal	Nuclear physics	S.chand	2008	Reprint

## Pedagogy

Lecture with Discussion, Power point presentation, Group discussion and Seminars.

## Course designer

Ms.S.Priya

<b>Semester-V</b>	<b>ANALOG ELECTRONICS</b>	<b>Hours/Week-6</b>	
<b>Core Course - VII</b>		<b>Credits-5</b>	
<b>Course Code-19UPH5CC7</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To acquire a diversified knowledge on semiconductors and diodes
- To impart the knowledge about the transistor characteristics in different configurations and different types of biasing
- To grasp the basic ideas of feedback and its application in amplifiers and oscillators

### Course Outcome

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

<b>CO number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Explain semiconductors, Rectifiers, and different types of diodes	K2
CO2	Outline the idea of field effect transistors and special semiconductor diodes	K2
CO3	Identify the operation of transistor and its characteristics	K3
CO5	Construct the various mathematical operations of operational amplifier	K3
CO4	Analyze the amplitude and frequency response characteristics of common amplification circuits.	K4

### Mapping with Program Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	S	M	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	S	M	S	S	S
CO5	S	S	S	S	S

S-Strong; M-Medium; L-Low

**CORE COURSE – VII**  
**ANALOG ELECTRONICS**

**Syllabus**

**UNIT-I Semiconductors and Diodes**

**16hrs**

Intrinsic and Extrinsic semiconductor-n-type semiconductor-p-type semiconductor-pn junction diode-Biasing of pn junction-Volt Ampere characteristics of pn junction -Rectifier-Half wave rectifier- full wave rectifier and full wave bridge rectifier-Zener diode-Characteristics of zener diode-Zener as a voltage stabiliser-Light Emitting Diode (LED)-Photo diode-LED-Tunnel diode-Varactor diode.

**UNIT-II Transistors**

**16hrs**

Circuit Analysis: Kirchoff's Current law (KCL)-Kirchoff's Voltage law (KVL)-Thevenin's theorem- Norton's theorem.

Transistor-Naming the transistor terminals-Transistor Action-Transistor Connections-Common Base connection- Common Emitter connection-Transistor load line analysis- Operating point-Faithful amplification-Transistor Biasing- stabilization-stability factor-Methods of transistor biasing- Base resistor method-Voltage divider bias method.

**UNIT-III Amplifiers, Oscillators and Multivibrators**

**22hrs**

Single stage Transistor amplifier-Practical Circuit of transistor Amplifier- D.C and A.C Equivalent circuits-Power amplifiers-Classification of Power Amplifiers-Expression for Collector Efficiency-Efficiency of Class A and Class B amplifiers- Push- pull amplifiers

Feedback-Negative voltage feedback in amplifier-Principle-Gain-Emitter Follower-Sinusoidal Oscillator-Types-Oscillatory Circuit- Positive feedback amplifier-Essentials-Barkhausen criterion-Colpitt's oscillator- Hartley oscillator -Phase shift oscillator-Wein bridge oscillator.

Multivibrators-Types of Multivibrators-Astable multivibrator-Monostable multivibrator- bistable multivibrator.

**UNIT-IV Special Semiconductor devices**

**18hrs**

Types of Field Effect Transistor-Junction Field Effect Transistor (JFET)-Difference between JFET and Bipolar Transistor-Metal Oxide Semiconductor FET (MOSFET)-Types of MOSFET-Silicon Controlled Rectifier (SCR)-V-I Characteristics of SCR-SCR as a switch-Triac-Diac-Unijunction Transistor (UJT)-UJT relaxation oscillator.

**UNIT-V Operational Amplifiers**

**18hrs**

Op-amp characteristics-Common mode rejection ratio (CMRR)-Inverting and Non inverting amplifier-Adder, Subtractor, Integrator, Differentiator-Voltage follower-Op-amp comparator-Log & antilog amplifier- Filters-low, high pass and band pass filters.

## Text Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	V.K. Mehta & Rohit Mehta	Principles of Electronics	S.Chand.	2012	11 <sup>th</sup> edition
2.	D.Chattopadhyay, P.C. Raxshit, B. Sara and Purkait	Foundations of electronics	New Age International	2006	7 <sup>th</sup> edition
3.	V. Vijayendran	Introduction to Integrated Electronics	S. Viswanathan	2010	6 <sup>th</sup> edition
4.	S. Salivahanan N. Suresh Kumar	Electronic Devices and Circuits	McGraw Hill Education	2011	2 <sup>nd</sup> edition

## Reference Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Theraja. B.L	Basic electronics solid state	S.Chand	2012	Reprint (2012)
2.	Millman and Halkias	Integrated Electronics	Tata Mc	2008	48 <sup>th</sup> Reprint

## Pedagogy

Lecture, Lecture with discussion, Technical quiz, Assignment

## Course Designer

Ms. J. Aarthi

<b>Semester-V</b>	<b>PHYSICS PRACTICAL - V</b>	<b>Hours/Week-3</b>	
<b>Core Practical –V</b>		<b>Credits-3</b>	
<b>Course Code-19UPH5CC5P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objectives

- To apply the theoretical knowledge of spectral, electrical and physical aspects of materials through hands on learning experience.
- To impart the creative skills among the industrial applications

### Course Outcomes

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

Co Number	CO statement	Knowledge level
CO 1	Verify the Optical and Spectral Properties of prism and Grating	K1
CO 2	Apply the fundamental laws to determine the properties of the given material	K1
CO 3	Construct and Apply the principles of semiconductor Devices as vibrators, Amplifiers and Oscillators	K2,k3

### Mapping With Programme Outcomes

CO's	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	M	S	M
CO3	S	S	M	S	S

S-Strong;M-Medium; L-Low

### Syllabus

#### List of Experiments:

1. Spectrometer – Grating - dispersive power.
2. Spectrometer - Cauchy's constants.
3. Field along the axis of a coil – determination of M.
4. Koenig's method – Uniform bending.
5. M and H - Absolute determination using deflection and vibration magnetometer.
6. Regulated power supply using Zener diode - Percentage of regulation.
7. Single stage - RC coupled amplifier – Transistor.
8. FET Characteristics.
9. Emitter follower .
10. Astable Multivibrator.
11. AND, OR and NOT gates using discrete components
12. Op - Amp -Adder and Subtractor.

## Text Books

S.No.	Authors	Title of the book	Year of Publication	Publishers	Edition
1	Dr. S. Somasundaram,	Practical Physics,	2012	Apsara publications, Tiruchirapalli	Reprint
2	Department of Physics	Practical Physics, (B.Sc. Physics Main),	1998	St.Joseph's College, Tiruchirapalli	Reprint

## Reference Books

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S.No.	Authors	Title of the book	Year of Publication	Publishers	Edition
1	S. Srinivasan,	A Text Book of Practical physics	2005	S. Sultan Chand	Reprint
2	R. Sasikumar	Practical Physics	2011	PHI Learning Pvt. Ltd New Delhi,	Reprint

## Pedagogy

Demonstration and practical sessions

## Course Designers

1. Ms.S.Priya
2. Ms.A.Mary Girija

<b>Semester-V</b>	<b>MATERIALS SCIENCE</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective –I</b>		<b>Credits-5</b>	
<b>Course Code-19UPH5MBE1A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To develop the knowledge in material science and to understand the chemical structure and bonding between the molecules
- To gain cognition on the defects in materials
- To acquire the knowledge about the materials and its mechanical properties

### Course Outcomes

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Define the different types of crystal structure and bonding in solids, and the physical ramifications of these differences. Give a type of bond, be able to explain its physical origin as well as strength	K1
CO2	Explain out the different kinds of technological properties of materials	K2
CO3	Classify the new materials in the material engineering and to understand their role in materials behavior	K2
CO4	Identify the materials defects and given a simple set on explaining the non – destructive testing in materials	K3
CO5	Explain the nuclear materials and uses of the materials in the space	K4

### Mapping with Programme Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	S	S	M	S
<b>CO2</b>	M	S	S	M	M
<b>CO3</b>	M	M	S	S	S
<b>CO4</b>	S	M	S	M	M
<b>CO5</b>	M	S	S	M	M

S – Strong; M – Medium; L – Low

## Major Based Elective –I A

### MATERIALS SCIENCE

#### Syllabus

#### **UNIT – I: Crystal Structure and Chemical Bonds**

**15 hrs**

Introduction to crystals – Classification of crystal system – Introduction to Bravais lattice – Lattice planes and Miller indices – Interplanar spacing in a cubic lattice – Cubic lattice – SC – BCC – FCC – Sodium chloride and Diamond crystal structure – Bonding of solids (Ionic, Covalent, Metallic, Hydrogen and Vander Waal)

#### **UNIT – II: Technological Properties**

**14 hrs**

Introduction to material science – Classification of engineering materials – Structure – Property relationships in materials - Stability and metastability – Selection of materials – Weldability – Machineability – Formability – Castability .

#### **UNIT – III: New Materials and Phase Transformation in Materials**

**11 hrs**

Metallic glass – Fiber reinforced materials – Metal matrix composites – SAW materials – Biomaterials – Ceramics.

Nucleation and Growth - solidification - Allotropic transformation- isothermal transformation - martensitic transformation - phase transformation in alloy steels.

#### **UNIT –IV: Mechanical Properties and Non Destructive Testing**

**20 hrs**

Fundamental Properties – Fatigue – Creep – Testing technique – Tensile – Compression – Hardness - Stress – Rupture – Elastic deformation – Fracture – Plastic deformation slip – Critical shear stress - Metals forming process – Deformation of crystals and polycrystalline materials.

Surface defect detection by NDT – Equipments using in NDT – Metallurgical microscope – Electron microscope – Scanning Electron Microscope(SEM) – Tunneling Electron Microscope (TEM) – Coolidge X-RAY tube – Production of ultrasonic waves – Magnetostriction ultrasonic generator – Piezo electric ultrasonic generator.

#### **UNIT –V Materials for Nuclear and Space Applications**

**15 hrs**

Nuclear fuels - fuel cladding- moderators, control materials -coolants - shielding materials - Space programme - structural material and their properties - system requirements - extreme high temperature materials - materials for thermal protection - pressure vessels - lubrication.



## Text Books

S.No	Authors	Title of the Book	Publishers	Year of publication	Edition
1.	M.Arumugam	Material Science	Anuradha agencies, Kombakonam	2009	1 <sup>st</sup> edition
2.	V.Raghavan	Material Science and Engineering	Prentice Hall	1993	5 <sup>th</sup> edition
3.	S.K. Hayra Choudhury	Materials Science and Processes	Indian Book Distributing Co	1991	1 <sup>st</sup> edition

## Reference Books

S.No	Authors	Title of the Book	Publishers	Year of publication	Edition
1.	S.O.Pillai	Solid State Physics	New Age International Private Limited	2005	6 <sup>th</sup> edition

## Pedagogy

Chalk and talk, power point presentation, assignment, seminar, interaction, problem solving

## Course Designer:

Ms.T.Noorunnisha

<b>Semester-V</b>	<b>LASER PHYSICS</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective –I</b>		<b>Credits-5</b>	
<b>Course Code-19UPH5MBE1B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To gain knowledge in the basic of lasers, enhance comprehension in the principles of lasers
- To familiarize with the diverse applications of lasers.

### Course Outcomes

On the completion of the course, students will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	Define the interaction of radiation with matter	K1
<b>CO2</b>	Explain the basic principle of laser	K2
<b>CO3</b>	Characterize the different types of laser	K2
<b>CO4</b>	Summarize Properties of laser	K2
<b>CO5</b>	Apply the laser principle in various field	K3

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
CO1	S	S	M	M
CO2	S	M	M	M
CO3	S	M	M	M
CO4	S	M	M	M
CO5	S	M	L	S

**S** – Strong; **M** – Medium; **L** - Low

# Major Based Elective -IB

## LASER PHYSICS

### Syllabus

#### **UNIT I: Interaction of Radiation with Matter**

**15hrs**

Introduction to electromagnetic radiation- wavelength- wave number- frequency- interaction of light with atoms and molecules-absorption- emission-kinetics of optical absorption-stimulated and spontaneous emission- intensity of spectral lines- line broadening mechanism.

#### **UNIT II: Basic Principles of Laser**

**15hrs**

Principle of lasers- population inversion-conditions of lasing action, characteristics of a laser coherence-monochromaticity- divergence- intensity- Einstein's co-efficients-laser pumping- two and three level laser systems.

#### **UNIT III: Types of Lasers**

**15hrs**

Solid state lasers-Ruby laser- Nd: YAG Laser- Semiconductor lasers- features of semiconductor lasers- diode lasers - Gas laser: He-Ne laser- CO<sub>2</sub> laser -liquid lasers: dye lasers and chemical lasers.

#### **UNIT IV: Control of Laser Properties and Production**

**15hrs**

Laser pumping-resonators- vibrational modes of resonators- number of modes per unit volume-open resonators-control resonators- Q factor-losses in the cavity-threshold condition-quantum yield-mode locking (active and passive).

#### **UNIT V: Applications of Lasers**

**15hrs**

Laser cutting – Welding – Drilling – Hologram – Recording and reconstruction of hologram- Lasers in Surgery – Lasers in ophthalmology – Lasers in cancer treatment -Optic fibre communication – Total internal reflection – Block diagram of fibre optic communication system – Advantages of fibre optic communication.

### Text Books

S.No.	Authors	Title of the book	Year of Publication	Publisher name	Edition
1	B.B.Laud	Laser and Nonlinear Optics	2011	New Age Interational	3 <sup>rd</sup> Edition
2	K.Thyagarajan and A.K.Ghatak	Lasers Theory and Applications	1986	Plenum Press	2 <sup>nd</sup> Edition

### Reference books

S. No.	Author name	Title of the book	Year of Publication	Publisher	Edition
1	Seigman	Lasers	1986	Oxford University Press	3 <sup>rd</sup> Edition
2	O.Seelto	Principles of Laser	2010	Springer Publication	5 <sup>th</sup> Edition

### Pedagogy

Chalk and talk, Power Point Presentation, Group discussion and Seminars, Animation video and Quiz

### Course Designer:

Dr.R.Gayathri

<b>Semester-V</b>	<b>PHYSICS CONCEPTS THROUGH SIMULATION</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective - II</b>		<b>Credits-2</b>	
<b>Course Code-19UPH5SBE2A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To provide a basic skills in animation and Photoshop
- To Create a physics oriented animations using Flash package
- To expose the Photoshop tools to prepare physics oriented objects

### Course Outcome

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Demonstrate the frame by frame animation using flash	K2
CO2	Explain the basic ideas of working with images	K2
CO3	Identify the basic Photoshop tool used in preparing the physics oriented objects	K3
CO5	Construct the animation of physics oriented objects using flash	K3
CO4	Construct the basic circuit diagram of physics using photoshop	K3

### Mapping with Program Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	S	M	M	S	S
CO2	S	M	M	S	S
CO3	S	M	M	S	S
CO4	S	M	M	S	S
CO5	S	M	M	S	S

S-Strong; M-Medium; L-Low

**Skill Based Elective – II A**  
**PHYSICS CONCEPTS THROUGH SIMULATION**

**Syllabus**

**Unit I: Introduction to Flash**

**4 Hrs**

Creating a document in Flash–Menu bar–stage and the paste board–tools panel–properties panel–library panel–timeline panel –motion editor panel–Defining Drawing modes–Exploring Drawing tools

**Unit II: Working with an Animation**

**6 Hrs**

Working with frames and key frames in Flash–Working with layers and layer folders in Flash–Creating a frame by frame Animation–Creating a shape Tween–Creating a motion Tween–Editing the motion path of a tweened object.

**Unit III: Introducing Photoshop**

**6 Hrs**

Introduction–menu bar–options bar–Creating a new document–Changing resolution and document size of an image–Modifying images: rotating–straightening–cropping–adjusting canvas size– creating and editing smart objects–working with shape and pen tools.

**Unit IV: Working with layers and Text**

**6 Hrs**

Layers–Creating new layer–creating a new layer from a selection–creating a layer group–Hiding and showing layers–Merging Layers–Aligning and Distributing layers–Deleting layers.

Creating a Text–Creating point Text–Creating paragraph Text–Creating Text on a path–Formatting text using the options Bar and the character panel–Working with Text–Wrapping Text–Checking for spelling mistakes–Rasterizing type layers.

**Unit V: working with painting tool and Exercises**

**8 Hrs**

Working with painting tools: Using Gradient Tool–Brush Tool–Mixer brush tool–color replacement tool–clone stamp tool–pattern stamp tool

Exercises: Animation using Flash: create and animate Simple pendulum, light dispersion of prism and atom model– Circuit diagram using Photoshop: Draw circuit diagram of Series resonance circuit, Zener diode, Transistor connection.

## Text Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Kogent Learning Solutions	Flash CS6 in simple Steps	Dreamtech Press	2013	Revised Edition
2.	DT Editorial Services	Photoshop CS6 in Simple Steps	Dreamtech Press	2018	New Edition

## Reference Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Daven Brown and et.al.,	Web Development for the Designmer	Macmillion	1997	First Edition

## Pedagogy

Lecture with practical demonstration

## Course Designer

Ms. J. Aarthi

<b>Semester-V</b>	<b>CELL PHONE SERVICING</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective - II</b>		<b>Credits-2</b>	
<b>Course Code-19UPH5SBE2B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To learn the basic cellular technologies of mobile communication
- To identify the causes of various problems in mobile phone and to learn the trouble shooting process
- To provide a basic skills in servicing the mobile phone

### Course Outcome

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Explain the fundamentals of cell phone	K2
CO2	Outline the chip level information of cell phone	K2
CO3	Identify the causes of problems in cell phone	K3
CO5	Identify the Problems in the cell phone and diagnose them	K3
CO4	Examine the basic concepts and tools used in servicing of Mobile phones	K3

### Mapping with Program Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	S	M	S	S	S
CO2	S	M	S	S	S
CO3	S	M	S	S	S
CO4	S	M	S	S	S
CO5	S	M	S	S	S

**S**-Strong; **M**-Medium; **L**-Low



## **Skill Based Elective – II B**

### **CELL PHONE SERVICING**

#### **Syllabus**

#### **Unit I: Principles of Cell Phone**

**6 Hrs**

Introduction-Cell Phone Network Technologies-Working of Global system for Mobile communication (GSM)/Code Division Multiple Access (CDMA)-4G Long Term Evaluation (LTE)-Advanced LTE-Information of Cell sites & Base Station-Operating system of smart Phones (Android, IOS, Windows)-General Packet Radio Service(GPRS)-Mobile software (pc suite)

#### **Unit II: Chip Level Study**

**6 Hrs**

Block Diagrams-Chip level information-Ball Grid Array (BGA)-Surface Mount Technology (SMT)-Surface Mount Device (SMD)-Soldering-De-Soldering-Identification of IC's-Assembling and Disassembling of mobile phones

#### **Unit III: Trouble Shooting I**

**6 Hrs**

Causes and Trouble shooting of Problems in a smart Phone-Hardware Problems-Network Problems-Display Problems-Touch Problems-Charging Problems-Battery Problems

#### **Unit IV: Trouble Shooting II**

**6 Hrs**

Over heating problems-Sound Problems-Keypad Problems-Simcard Problems-Hand set problems-Testing of Battery, Display, Antenna, Network, Simcard.

#### **Unit V: Repairing Tools, Testing, Software and Downloads**

**6 Hrs**

Internal parts of a mobile phone -Mobile phone repairing tools and Equipments-Disassembling and assembling the cell phone

Software unlocking and Flashing-Information related IMEI-Downloads of logos and Ring tones-Blue tooth

## Text Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Jochen Schiller	Mobile Communication	Pearson Education	2004	Second Edition
2.	M. Lotia and Pradeep Nair	Modern Mobile Phone Repair: Using computer software and Service Devices	BPB Publications	2015	First Edition
3.	Manahar Lotia	Modern Mobile Phone Introduction & Servicing	BPB Publications	2000	–

## Pedagogy

Power point Presentation, Lecture, and Demonstration

## Course Designer

Ms. J. Aarthi

<b>Semester-V</b>	<b>WEB DESIGNING</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective - III</b>		<b>Credits-2</b>	
<b>Course Code-19UPH5SBE3A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To understand the basic concepts in web designing
- To develop a web page.

### Course Outcome

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Discuss the basic ideas of create the web page	K2
CO2	Demonstrate the structure and working in a website programme	K2
CO3	Develop the Animating web pages	K3
CO4	Illustrate formatting and linking website pages	K3
CO5	Utilization of website	K3

### Mapping with Program Outcomes

<b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	M	S	M	M	S
CO2	M	S	M	S	S
CO3	M	M	S	M	S
CO4	M	S	M	S	S
CO5	S	M	M	M	S

S-Strong; M-Medium; L-Low

## **Skill Based Elective – III A**

### **WEB DESIGNING**

#### **Syllabus**

#### **UNIT-I: Creating a web page**

**6 hrs**

Web organization – finding web sites and web pages – display HTML source code – create HTML website folders – view a web page – modify a web page – format text with HTML tags.

#### **UNIT-II: Working in a website programme**

**6 hrs**

Structure of website – centre text – add horizontal line to a web page – changing font face – create hyperlinks on web pages – create a bulleted list – create a numbered list – create multi pages for a website.

#### **UNIT-III: Animating web pages**

**6 hrs**

Change text colour – change back ground colour – experiment with website colours – change hyperlink colours – acquire and insert graphics – allign graphics relative to text – format a graphic as a hyper link –change graphic border.

#### **UNIT-IV: Formatting and linking website pages**

**6 hrs**

Exploring the interface of website design and management software – design a new website – view a website – add pages to website – format web pages – link pages in a linear structure.

#### **UNIT-V: Publishing the website**

**6 hrs**

Presentation, interaction and information design – change background graphics and other properties of pages in a website – test hyperlinks and page properties –prepare and publish website.

## Text Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Weixel, Fulton, Barkslade, Morse	Multimedia Basics	Eswar Press	2004	-

## Reference Books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	R. N. Srivastava	Web Technology	Global Academic Publishers & Distributors	2011	First edition
2.	Daniel Gray	Web Design Fundamentals Hand Book	Sun Rise Printers Shahdara, Delhi	2000	First edition

## Pedagogy

Lecture with discussion, Power Point presentation, Technical quiz

## Course Designer

Dr. B. Anitha

<b>Semester-V</b>	<b>ELECTRICAL WIRING</b>	<b>Hours/Week-2</b>	
<b>Skill Based Elective - III</b>		<b>Credits-2</b>	
<b>Course Code-19UPH5SBE3B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To understand the basic ideas of electricity
- To impart knowledge on electrical wiring and their appliances.

### Course Outcome

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

CO Number	CO statement	Knowledge level
CO1	Recall the basic ideas of Electricity and Electric power generation	K1
CO2	Describe the wiring system and its types	K2
CO3	Illustrate Electrical Measuring instruments	K2
CO4	Explain different types of Electrical appliances	K2
CO5	Apply Safety Precaution in everyday life	K3

### Mapping with Program Outcomes

Cos	PO1	PO2	PO3	PO4	PO5
CO1	L	S	S	S	S
CO2	M	S	S	S	M
CO3	L	S	S	S	M
CO4	M	S	S	M	S
CO5	M	M	S	M	M

S-Strong; M-Medium; L-Low

**Skill Based Elective – III B**

## ELECTRICAL WIRING

### Syllabus

#### **UNIT - I: Electricity and Electric power generation**

**7 hrs**

Basic principles – Practical unit of electricity – International system (S.I) of units –Current, Volt, Resistance – Ohm’s law measurements – Electric power generation by Thermal, hydro, atomic and nuclear methods – Backup power suppliers (Invertors and Generators)

#### **UNIT – II: Wiring System**

**7 hrs**

Types of wiring – Series and Parallel Connections – AC and DC Conductors – Inductor, Capacitor and transformer – Distribution methods – Single phase and three phase – ISI Rules – Megger testing – Earthing.

#### **UNIT – III: Electrical Measuring Instruments**

**5 hrs**

Moving coil instruments – Voltmeter – Ammeter – Wattmeter– Kilowatt meter– Frequency meter– Multimeter.

#### **UNIT – IV: Electrical Appliances**

**5 hrs**

Electric fan – Refrigerator – Air Conditioner – Air cooler– Iron box–Water Heater –Washing machine.

#### **UNIT – V: Safety Precaution**

**6 hrs**

Electric shock– Precautions to avoid electric shock– Rescue steps in electric Shock – methods of resuscitation – Testing the insulation – Electric Line Circuit Breaker (ELCB).

## Text Books

S.No.	Author name	Title of the book	Publisher name	Year of Publication	Edition
1.	A.L. Anwani and I. Anwani,	Basic Electrical Engineering	Dhanpat Rai and Co (P) Ltd., Delhi	2014	19 <sup>th</sup> edition
2.	William D.Cooper	Electrical Instruments and Measurement Techniques	PHI Pvt Co., New Delhi	1997	-
3.	V.K Mehta Rohit Mehta	Principles of Eelectronics	S. Chand Publishing	2014	7 <sup>th</sup> edition

## Reference Books

S.No	Author name	Title of the book	Publisher name	Year of Publication	Edition
1.	B.L.Theraja	Textbook of Electrical Technology	S.Chand	2005	-
2.	Timothy J. Maloney	Electricity: Fundamental concepts and Applications	Delmar Publisher Inc	1992	-
3.	S.P.Bali	Consumer Electronics	Pearson Education, India	2005	-

## Pedagogy

Chalk and talk, Lecture, Seminar, Assignment, Power point presentation

## Course Designer

Dr. B. Anitha



<b>Semester-VI</b>	<b>DIGITAL ELECTRONICS AND MICROPROCESSOR FUNDAMENTALS</b>	<b>Hours/Week-5</b>	
<b>Core Course – VIII</b>		<b>Credits-4</b>	
<b>Course Code-19UPH6CC8</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To acquire knowledge of the basic Logic gates and its combinational circuits.
- To understand the fundamentals of microprocessor programs.

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Classify different number system	K2
CO2	Analyze different methods used for simplification of Boolean expressions.	K3
CO3	Develop Combinational logic circuits.	K3
CO4	Develop synchronous and asynchronous sequential circuits.	K3
CO5	Utilize the knowledge of programming concepts of 8085 for various applications.	K4

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	S	L
<b>CO2</b>	S	S	S	S	S
<b>CO3</b>	S	S	M	S	S
<b>CO4</b>	S	S	S	S	S
<b>CO5</b>	S	S	S	M	L

**S-Strong; M-Medium; L-Low**

## CORE COURSE – VIII

### DIGITAL ELECTRONICS AND MICROPROCESSOR FUNDAMENTALS

#### **Unit-I: Digital Electronics Fundamentals**

**20 hrs**

Number Systems – Binary, Decimal, Hexa Decimal -Conversion from one number system to another - BCD code - Logic gates - AND, OR, NOT gates and its truth tables-NAND and NOR gates - Universal building blocks - Binary addition-subtraction-multiplication and division-complement- subtraction by 1's and 2's complement forms.

#### **Unit-II: Simplification of Logic Circuits**

**15hrs**

Rules and laws of Boolean algebra - Demorgan's Theorems – Standard sum of product and product of sum forms –Min term and Max terms - Simplification of Boolean Expressions using Boolean Rules -Minimization Techniques for Boolean Expressions using Karnaugh Map( 2,3 and 4 variables).

#### **Unit-III: Combinational Circuits:**

**15 hrs**

Half adder- full adder- Half subtractor - Full subtractor - 4-bit adder/subtractor- Decoder - Encoder Multiplexer - Demultiplexer - A/D conversion – Successive approximation method – D/A conversion – R-2R ladder network.

#### **Unit-IV: Sequential Logic Circuits**

**20hrs**

**Flip Flops:** Introduction to Sequential Circuits -Flip Flops – RS Flip Flop – Clocked RS Flip Flop D Flip Flop – JK Flip Flop – T Flip Flop – Triggering of Flip Flops – Master Slave Flip Flop

**Shift Registers:** Introduction to shift registers-Basic Shift Register Operations-Types of shift registers - SISO – SIPO – PIPO – PISO- Applications of Registers.

**Counters:** Introduction to counters -Types of Counters-Asynchronous and synchronous counters –Ring counter-Johnson's counter –Ripple counter-4 Bit Binary Up/Down counter-BCD counter-Applications of counters.

#### **Unit-V: Microprocessor (INTEL 8085)**

**20 hrs**

Introduction to microprocessor and microcomputer – Architecture of Intel 8085 – Address bus – Data bus – Control bus – Pin configuration – Flags – Instruction format – Types of instructions – Addressing modes – Assembly language programming – Programmes for addition, subtraction, complement- Largest and smallest from the given list- Ascending and Descending Order.

## Textbooks

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Donald P Leach, Albert Paul Malvino and Goutam Saha	Digital principles and applications	McGraw-Hill Inc, US	1995	7 <sup>th</sup> Edition
2.	V. Vijayendran	Digital fundamentals	S. Viswanathan Printers and Publishers Pvt. Ltd	2003	1 <sup>st</sup> Edition
3.	Virendra Kumar	Digital electronics Theory and Experiments	New Age International Publishers	2007	2 <sup>nd</sup> Edition
4.	B.Ram	Fundamentals of Microprocessor and Microcomputers	Dhanpat Rai Publications, New Delhi	1986	5 <sup>th</sup> Edition

## Reference books

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	Jacob Millman and Christo Halkias, Chetan D Parikh	Integrated Electronics	Mc. Graw Hill	2001	2 <sup>nd</sup> Edition
2.	Herbert Taub and Donald Schilling	Digital integrated electronics	Mc. Graw Hill	1977	2 <sup>nd</sup> Edition
3.	Ramesh S.Gaonkar	Microprocessor Architecture Programming, And Applications with the 8085.	Pearson Education	1984	5 <sup>th</sup> Edition

## Pedagogy

Chalk and talk, Group Discussion, Seminar, Assignment, Power Point Presentation.

## Course Designer

Ms.D.Devi

<b>Semester-VI</b>	<b>CLASSICAL AND QUANTUM PHYSICS</b>	<b>Hours/Week-6</b>	
<b>Core Course – IX</b>		<b>Credits-5</b>	
<b>Course Code-19UPH6CC9</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To expose the students to the fundamentals of Theoretical Physics
- To provide the students with knowledge of the applications of Quantum Physics

### COURSE OUTCOMES

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO 1	Define the concepts of Conservation Laws for a single particle, D'Alembert's Principle, Lagrange's equation and its applications.	K1
CO 2	Relate the different concepts of Hamilton's equation of motion.	K2
CO 3	Classify the types of classical concepts and explain the De Broglie's matter waves.	K2
CO 4	Identify the basic postulates of quantum mechanics.	K3
CO 5	Develop the knowledge about solvable quantum states.	K3

### Mapping with Programme outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	M	M
<b>CO2</b>	S	S	M	M	M
<b>CO3</b>	S	S	S	M	M
<b>CO4</b>	S	M	M	M	M
<b>CO5</b>	S	S	M	M	M

**S** – Strong; **M** – Medium; **L** – Low

## CORE COURSE – IX

### CLASSICAL AND QUANTUM PHYSICS

#### **Unit – I: Elementary Principles of Classical Mechanics** **18 hrs**

Newtonian mechanics: Conservation laws for a single particle and a system of particles – Types of constraints – Generalized coordinates – D'Alembert's principle and Lagrange's equation of motion – Applications to : (a) Motion of one particle, (b) Atwood's machine and (c) bead sliding on rotating wire.

#### **Unit – II: Hamiltonian Formalism** **18 hrs**

Variational principle and derivation of Hamilton's equation of motion – Principle of least action – Phase space – cyclic coordinates – conservation theorems: generalized momenta and energy.

#### **Unit – III: Genesis of quantum transition** **20 hrs**

Inadequacy of classical concepts: Black body radiation - Planck's hypothesis – Photoelectric effect – Compton effect – de Broglie's hypothesis – matter waves – wave length, wave velocity and group velocity – Experimental evidences for de Broglie's matter waves: Davison and Germer experiment – G.P. Thomson's experiment – Heisenberg's uncertainty Principle.

#### **Unit – IV: Basic formalism of quantum mechanics** **18 hrs**

Setting of Schrodinger wave equation – Plane wave solution - Probability interpretation of  $\psi\psi^*$  and conditions on wave equation – Eigenfunctions and eigenvalues – Expectation values Linear and hermitian operators and their properties - Postulates of quantum mechanics - Ehrenfest's theorem.

#### **Unit – V: Exactly solvable systems** **16 hrs**

Free particle - Linear harmonic oscillator – Particle in a box – Rectangular barrier potential and tunnel effect – Rigid rotator – Hydrogen atom.

## Text books

S. No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	S.L. Gupta, V. Kumar and H.V.Sharma	Classical Mechanics	S.Chand & Company Ltd	2012	Revised
2.	R. Murughesan	Modern Physics	S. Chand & Company Ltd, New Delhi	2016	Revised
3.	G. Aruldas	Classical Mechanics	PHI Publisher	2008	Revised

## Reference books

S. No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	Ajoy Ghotak and S. Loganathan	Quantum Mechanics: Theory and Applications	Mc.Graw Hill	1999	6 <sup>th</sup>
2	H.Goldstein	Classical Mechanics	Narosa Book distributors, New Delhi	1980	Revised
3	N.C.Rana and P.S.Joag	Classical Mechanics	Tata Mc. Graw Hill, New Delhi	1991	Revised
4	P.M. Mathews and K. Venkatesan	A Text Book of Quantum Mechanics	Tata Mc.Graw Hill, New Delhi	1987	Revised

## Pedagogy

Lecture, Seminar, Interaction, Assignment, Power Point Presentation.

## Course Designer

Dr. M. Kavimani

<b>Semester - VI</b>	<b>PHYSICS PRACTICAL - VI</b>	<b>Hours/Week - 3</b>	
<b>Core Practical – VI</b>		<b>Credit - 3</b>	
<b>Course Code - 19UPH6CC6P</b>		<b>Internal 40</b>	<b>External 60</b>

### Objectives

- To apply the theoretical knowledge of Digital electronics and Microprocessor through hands on learning experience.
- To enhance the problem solving skills in Digital electronics and Microprocessor

### Course Outcomes

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO 1	Apply the Microprocessor concept mathematical to obtain quantitative results for arithmetic progression	K1
CO 2	Demonstrate the Basic and the Universal gates	K2
CO 3	Construct and analyses the concepts of multiplexers, shift registers and counters.	K3
CO 4	Apply the concepts of digital electronics and verify the results	K3

### Mapping with Programme Outcomes

<b>CO's</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	M	S	M
<b>CO2</b>	S	S	M	S	M
<b>CO3</b>	S	S	M	S	M
<b>CO4</b>	S	S	M	S	S

S–Strong; M–Medium; L–Low

**CORE PRACTICAL – VI**  
**PHYSICS PRACTICAL –VI**

**List of Experiments: Any Twelve**

**Section- A – Digital Electronics**

1. AND, OR and NOT gates using IC's.
2. NAND as universal gate.
3. NOR as universal gate.
4. Half Adder and Full adder circuits using logic gates.
5. Half Subtractor and Full Subtractor circuits using logic gates.
6. Flip flops using gates.
7. Demorgan's theorem.
8. BCD to 7 segment decoder- 7segment Led display.
9. Digital to analog converter.
10. Analog to digital converter.

**Section - B Microprocessor 8085.**

1. 8-bit addition and 8-bit subtraction.
2. 8-bit multiplication and 8-bit division.
3. Conversion from decimal to hexadecimal system.
4. Conversion from hexadecimal to decimal system.

**Text Books**

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	Dr.S.Somasundaram	Practical Physics,	Apsara publications Tiruchirapalli	2012.	Reprint
2	Department of Physics	Practical Physics	(B.Sc Physics Main), St. Joseph's College, Tiruchirapalli.	1998	Reprint



## Reference Books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1	S.Srinivasan, S.Sultan	A Text Book of Practical physics	Chand publications	2005	Reprint
2	R. Sasikumar	Practical Physics	PHI Learning Pvt. Ltd	2011	Reprint

## Pedagogy

Demonstration and practical sessions

## Course Designers

1. Ms. S.Priya
2. Ms. A.Mary Girija

<b>Semester-VI</b>	<b>COMMUNICATION PHYSICS</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective – II</b>		<b>Credits – 5</b>	
<b>Course Code- 19UPH6MBE2A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To acquire knowledge in basic concepts of communication systems.
- To learn about function of various communication systems.

### Course Outcomes

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

<b>CO Number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	Outline the basic concepts of modulation and demodulation	K1
CO2	Critique the ideas of radar system and its applications	K3
CO3	Predict the parameters such as total internal reflection, acceptance angle and numerical aperture in order to formulate the optical sensor	K3
CO4	Utilization of GSM, Cell, FAX, Modem and Wi-Fi in mobile communication system	K3
CO5	Design and analysis of satellite communication systems	K4

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	M	M	S	S	M
<b>CO2</b>	M	S	S	M	M
<b>CO3</b>	S	S	S	M	M
<b>CO4</b>	S	S	S	S	S
<b>CO5</b>	M	M	S	M	M

S–Strong; M–Medium; L–Low

## **MAJOR BASED ELECTIVE – II A**

### **COMMUNICATION PHYSICS**

#### **UNIT- I: Radio Communication**

**16 hrs**

Modulation – Need for modulation – Types of modulation – Modulation factor – Limitations of amplitude modulation – Frequency modulation – Comparison of AM and FM modulation – Demodulation – Essentials in demodulation – AM and FM radio receivers – Difference between FM and AM receivers.

#### **UNIT-II: Radar Communication**

**13 hrs**

Basic radar system – Radar range – Antenna scanning – Pulsed radar system – A-scope – Plan position indicator – Tracking radar – Moving target indicator – Doppler effect – MTI Principle – CW doppler radar – Frequency modulator CW Radar.

#### **UNIT-III: Optical Fiber Communication**

**16 hrs**

Structure of optical fiber – Principal and propagation of light in optical fiber – Total internal reflection – Acceptance angle – Numerical aperture – Types of optical fibers based on material – Number of modes – Refractive index profile – Fiber optical communication system – Fiber optic sensors.

#### **UNIT- IV: Wireless Communication**

**15 hrs**

GSM – Mobile services– Concept of cell – System architecture – Radio interface – Logical channels and frame hierarchy – Protocols – Localization and calling – Handover– Facsimile (FAX) – Application – VSAT (very small aperture terminals) – Modem – IPTV (internet protocol television ) – Wi-Fi – 3G.

#### **UNIT-V: Satellite Communication**

**15 hrs**

Introduction to satellite communication system – Satellite orbits – Classification of satellites – Basic components of satellite communication – Constructional features of satellites – Satellite foot points – Satellite communication in India.

## Text Books

S.No	Author name	Title of the book	Publisher name	Year of Publication	Edition
1.	Metha V.K	Principles of Electronics	S.Chand	2013	Reprint
2.	Anokh Singh and Chopra A.K	Principles of communication Engineering	S.Chand	2013	Reprint
3.	Mani I. P	A text book of Engineering Physics	Dhanam Publications	2014	Revised

## Reference Books

S.No	Author name	Title of the book	Publisher name	Year of Publication	Edition
1.	Dennis Roddy, John Coolen	Electronic Communication	PHI	1990	3 <sup>rd</sup> Edition
2.	Gerd Keiser	Optical fiber communications	McGrw Hill	2000	Reprint
3.	William C.Y. lee	Cellular telecommunication	Tata Mcgraw hill	1991	2 <sup>nd</sup> Edition

## Pedagogy

Lecture with Discussion, Power point presentation, Seminar, Assignment.

## Course Designer

Dr. B. Anitha

<b>Semester-VI</b>	<b>COMPUTATIONAL PHYSICS</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective – II B</b>		<b>Credits – 5</b>	
<b>Course Code- 19UPH6MBE2B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To solve the problems in physics using computational methods using MAT Lab.
- To Learn Scientific Word Processing using programming tools for preparing articles, papers etc. which include mathematical equations, picture and tables.

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	To understand the basic programming techniques in MATLAB.	K1
<b>CO2</b>	To address analytically intractable problem errors	K2
<b>CO3</b>	Create a user-interface graphics objects in MAT LAB	K2
<b>CO4</b>	To understand various numerical techniques	K2
<b>CO5</b>	To show how physics can be applied in a much broader context than discussed in traditional curriculum	K3

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
CO1	S	M	M	M
CO2	S	M	M	M
CO3	S	M	M	M
CO4	S	M	M	M
CO5	S	M	M	M

**S** – Strong; **M** – Medium; **L** – Low

## **MAJOR BASED ELECTIVE-II B COMPUTATIONAL PHYSICS**

### **UNIT I: Need of Computational Tools**

**10hrs**

Example of problems in physics requiring computational approach- Basic computer architecture and latest advancements - Introduction to MATLAB - MATLAB Features -Desktop windows- MATLAB help and demos - MATLAB Functions-operators and Commands-saving and Loading data.

### **UNIT – II: Error Analysis**

**15hrs**

Need for error analysis-Definition of error - Absolute error - Relative error - Precision - Addition - Subtraction -Multiplication - Division - Error in numerical methods - Truncation error - Round off Errors - Error propagation in arithmetic operations - Error propagation in iterated algorithms - Methods for reducing error - Mean - Median - Mode - Standard deviation -Variance - Correlation.

### **UNIT – III: Matlab and Data Visualization**

**15hrs**

Creation of arrays and matrices - Arithmetic Operations– Saving and Restoring- - Solution of simultaneous equations- MATLAB plot module – Import export data - Plotting graphs-1D plot – 2D plot – mesh – surf – 3D plots.

### **UNIT – IV: Numerical Methods using MAT Lab**

**15hrs**

Roots of algebraic and transcendental equations – bisection method, Newton Raphson method- solution of simultaneous linear equations by Gauss elimination methods- Interpolation – Lagrangian interpolation-Newton's interpolation-Numerical Integration: Trapezoidal, Simpson's method

### **UNIT –V: Applications in Physics using MAT Lab**

**20hrs**

Calculate time period using Simple Pendulum -Verify Hooke's Law - Falling object in one dimension - Two dimensional motion- Projectile motion - V-I Characteristics of Junction and Zener diode .

## Text Books

S.No.	Authors	Title of the book	Year of Publication	Publisher name	Edition
1	Amos Gilat	MATLAB An introduction with Applications	2007	John Wiley & Sons	4 <sup>th</sup> Edition
2	Kincaid D. and Chenney W	Numerical Analysis: Mathematics of Scientific Computing	2009	AMS, University Press, Hyderabad	1 <sup>st</sup> Edition
3	Rizwann Butt	Introduction to Numerical Analysis using MATLAB	2008	Jones and Bartlett Publishers	1 <sup>st</sup> Edition
4	Sastry S.S	Introductory Methods of Numerical Analysis	2005	Prentice Hall of India	4 <sup>th</sup> Edition
5	V.K.Mittal, R.C.Verma & S.C.Gupta	Computational Physics	2009	ANE Books	1 <sup>st</sup> Edition

## Reference Books

S.No.	Author name	Title of the book	Year of Publication	Publisher	Edition
1	Joel Franklin	Computational Methods for Physics	2018	Cambridge University Press	1 <sup>st</sup> Edition
2	Gupta, Agarwal and Varshney	Design And Analysis of Algorithms	2008	PHI Learning	2 <sup>nd</sup> Edition

## Pedagogy

Chalk and talk, Group discussion and Seminars and Quiz

## Course Designer:

Dr.R.Gayathri

<b>Semester-VI</b>	<b>MEDICAL PHYSICS</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective – III</b>		<b>Credits – 4</b>	
<b>Course Code- 19UPH6MBE3A</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To gain knowledge in general concepts of human body mechanism.
- To understand the principles, features and applications of ECG, EMG and EEG

### Course Outcomes

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

<b>CO number</b>	<b>CO statement</b>	<b>Knowledge level</b>
CO1	List out the importance of physics in medicine.	K1
CO2	Explain the concept of mechanics of a human body.	K2
CO3	Compare the principles of ECG EMG and EEG.	K2
CO4	Explain the production, types and application of lasers in medicine.	K2
CO5	Summarize the ultrasound imaging method and its application in medical field.	K2
CO6	Make use of medical imaging techniques in day today life.	K3

### Mapping with Programme Outcomes

<b>COs/POs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	S	S	S	M	S
<b>CO2</b>	S	M	S	M	M
<b>CO3</b>	M	S	S	S	M
<b>CO4</b>	S	M	M	S	M
<b>CO5</b>	S	M	M	S	S
<b>CO6</b>	M	S	S	S	S

S-Strong; M-Medium; L-Low



## MAJOR BASED ELECTIVE – III A

### MEDICAL PHYSICS

#### **UNIT - I: Mechanics of Human Body**

**15 hrs**

Static, Dynamic and Frictional forces in the Body –Composition, properties and functions of Bone – Heat and Temperature – Temperature scales –Clinical thermometer –thermography – Heat therapy – Cryogenics in medicine– Heat losses from body – Pressure in the Body – Pressure in skull, Eye and Urinary Bladder.

#### **UNIT- II: Medical Instrumentation**

**15 hrs**

Measurements of Non electrical parameters-Respiration-heart rate-temperature-blood Pressure - Electrical activity of the heart-effect of electrified on cardiac muscles stimulation laws-Arhythmias its detection- principles of Electro cardiography, Electromyography-Electroencephalography- measurement and displaying and recording of ECG- features of EMG &EEG and their applications.

#### **UNIT - III: Lasers in Medicine**

**15 hrs**

Introduction to laser-principle and production of laser- effects of laser radiation on tissues, Different types of lasers- photo thermal effects, photochemical effects –photodynamic therapy, Laser applications in therapy and diagnosis-ophthalmology,Fibreoptic endoscopy and dentistry. Laser as a beautician's tool-laser hazards-biological effects,

#### **UNIT- IV: Medical Imaging Techniques**

**15 hrs**

X-ray imaging-properties of X -rays- Production of X-rays-Planar X-ray imaging-instrumentation- $\gamma$ -ray imaging-principle and working of single crystal scintillation camera (gamma camera) Magnetic resonance imaging-Introduction-ideas of NMR-Advantages- Clinical MRI, MRI instrumentation-Biological effect of NMR.

#### **UNIT- V: Ultrasound Imaging**

**15 hrs**

Ultrasound imaging- generation and detection of ultrasound - Properties -reflection - Transmission - attenuation - Ultrasound Transducers, Ultrasound instrumentation Mechanical and electronic probes-probes for external and internal use-Principles of A-mode-B-mode-M-mode-Scanning. Hazards and safety of ultrasound.

## Textbooks

S.No	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	J.R.Cameron and J.G.Skofonick	Medical Physics	John Wiley & Sons	1978	1 <sup>st</sup> Edition
2.	R .W Wayanant	Lasers in Medicine	Plenum	2001	1 <sup>st</sup> Edition
3.	S .Webb	The physics of medical imaging	Hilger	1988	2 <sup>nd</sup> Edition
4.	R. S Khandpur	Handbook of Biomedical Instrumentation	Tata McGraw-Hill	1997	3 <sup>rd</sup> Edition
5.	S.Atheena Milagi Pandian	Biomedical Engineering	Amazon	2019	1 <sup>st</sup> Edition
6.	W.Mark Saltzman	Biomedical Engineering	Cambridge University Press	2009	1 <sup>st</sup> Edition

## Reference books

S.No.	Authors	Title of the book	Publishers	Year of Publication	Edition
1.	O.Glasser	Medical Physics Volume 1-3	Chicago	1946	2 <sup>nd</sup> Edition
2.	Leslie Cromwell	Biomedical Instrumentation and measurement	Prentice hall of India	1999	2 <sup>nd</sup> Edition
3.	John Webster G.	Medical Instrumentation Application and Design	John Wiley and sons	1998	3 <sup>rd</sup> Edition

## Pedagogy

Chalk and talk, Group Discussion, Seminar, Assignment, PPT.

## Course Designer

Ms.A.Mary Girija

<b>Semester-VI</b>	<b>ASTROPHYSICS AND COSMOLOGY</b>	<b>Hours/Week-5</b>	
<b>Major Based Elective – III</b>		<b>Credits – 4</b>	
<b>Course Code- 19UPH6MBE3B</b>		<b>Internal 25</b>	<b>External 75</b>

### Objectives

- To provide students with the basic knowledge about the theory and techniques of observational astronomy and physics of the astrophysical phenomenon.
- To Learn the the large scale structure of the Universe and its history

### Course Outcomes

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
<b>CO1</b>	Define the major constituents of the universe and planets	<b>K1</b>
<b>CO2</b>	Explain the stellar astronomy	<b>K2</b>
<b>CO3</b>	Analyse the milky way galaxy	<b>K2</b>
<b>CO4</b>	Analyse the clusters in galaxy	<b>K2</b>
<b>CO5</b>	Derive the Big bang theory	<b>K3</b>

### Mapping with Programme Outcomes

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>
CO1	S	S	M	M
CO2	S	M	M	M
CO3	S	M	M	M
CO4	S	M	M	M
CO5	S	M	L	S

S – Strong; M – Medium; L - Low

## **MAJOR BASED ELECTIVE-III B ASTROPHYSICS AND COSMOLOGY**

### **UNIT I: Introductory astronomy**

**15hrs**

History of Astronomy-Overview of the major constituents of the universe- Solar System-Planets - laws of motion of planets-inner planets- outer planets- Extra solar planets- Methods of detection of extra solar planets- Black body radiation-specific intensity- luminosity

### **UNIT II: Stellar astronomy**

**20hrs**

Measurement of stellar Parameters: Stars-general Distances to stars - trigonometric parallax; Stellar brightness – luminosity- flux-apparent magnitude- magnitude system- distance modulus- colour index- extinction- colour temperature- effective temperature- spectral classification of stars.

Stellar structure: Equation of Hydrostatic equilibrium - Bounds on Pressure and temperature in stars. Basics of radiative transfer emission coefficient- absorption coefficient-source function.

### **UNIT III: Evolution of stars**

**15hrs**

Stellar Evolution: General idea of Main sequence. Qualitative discussion on evolution away from Main sequence.

End Stage of Stars: White Dwarfs, Neutron stars- Estimating their Mass radii relation.

Binary stars : - visual binary, eclipsing binary - spectroscopic binary

### **UNIT IV: Galactic and Extragalactic astronomy**

**15hrs**

Milky way- Hubble classification of galaxies-Spiral galaxies-Elliptical galaxies-Irregular galaxies- Dwarf galaxies-Masses of galaxies-Rotation curves of galaxies-Dark matter. Groups and clusters of galaxies- Interacting galaxies-

### **UNIT V: Cosmology**

**10hrs**

Standard Candles ( Cepheids and SNe Type1a), Cosmic Distance Ladder, Olbers Paradox, Hubble Expansion, Cosmological Principle, Newtonian Cosmology

## Text Books

S.No.	Authors	Title of the book	Year of Publication	Publisher name	Edition
1	Shu F	The physical universe,	1982	Univ Science Book	1 <sup>st</sup> Edition
2	Bradley W. Carroll & Dale A. Ostlie	An introduction to Modern Astrophysics	2006	Pearson	2 <sup>nd</sup> Edition
3	IGNOU	Basics of Astronomy - IGNOU course book PHE-15 Astronomy and Astrophysics	2006	Neeraj Publications	1 <sup>st</sup> Edition

## Reference Books

S.No	Author name	Title of the book	Year of Publication	Publisher	Edition
1	Harwit M.	Astrophysical concepts	2000	Springer	2 <sup>nd</sup> Edition
2	G. B. Rybicki & Lightman A. P.	Radiative processes in Astrophysics	1986	Wiley-VCH	2 <sup>nd</sup> Edition

## Pedagogy:

Chalk and talk, Power Point Presentation, Group discussion and Seminars, Quiz

## Course Designer:

Dr.R.Gayathri