

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

**NATIONALLY ACCREDITED (III CYCLE) WITH “A” GRADE BY NAAC**

**ISO 9001:2015 Certified**

**TIRUCHIRAPPALLI – 620 018**

**PG AND RESEARCH DEPARTMENT OF PHYSICS**



**B.Sc., PHYSICS SYLLABUS**

**(2023-2024 and Onwards)**

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)  
TIRUCHIRAPPALLI-620 018**

**PG AND RESEARCH DEPARTMENT OF PHYSICS**

**VISION**

To establish a substratum for excellence and creation of knowledge by igniting the essence of learning physics and exploring its area of research with novel ideas.

**MISSION**

**Our mission is two – fold.**

- To provide an outstanding and distinctive education to our undergraduate and postgraduate students.
- To expand our research enterprises via centers and institutes to achieve national and international prominence in strategic research areas.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

<b>PEOs</b>	<b>Statements</b>
<b>PEO1</b>	<p><b>LEARNING ENVIRONMENT</b></p> <p>To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.</p>
<b>PEO2</b>	<p><b>ACADEMIC EXCELLENCE</b></p> <p>To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.</p>
<b>PEO3</b>	<p><b>EMPLOYABILITY</b></p> <p>To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.</p>
<b>PEO4</b>	<p><b>PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY</b></p> <p>To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.</p>
<b>PEO5</b>	<p><b>GREEN SUSTAINABILITY</b></p> <p>To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.</p>

## PROGRAMME OUTCOMES FOR B.Sc PHYSICS PROGRAMME

<b>PO NO.</b>	<b>On completion of B.Sc Physics Programme, The students will be able to</b>
<b>PO 1</b>	<b>Domain Knowledge:</b> Analyse, design and develop solutions by applying firm fundamental concepts of basic sciences and expertise in discipline.
<b>PO 2</b>	<b>Problem solving:</b> Ability to think rationally, analyse and solve problems adequately with practical knowledge to assess the environmental issues.
<b>PO 3</b>	<b>Creative thinking and Team Work:</b> Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems.
<b>PO 4</b>	<b>Employability:</b> Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate.
<b>PO 5</b>	<b>Life Long Learning:</b> Assure consistent improvement in the performance and arouse interest to pursue higher studies in premium institutions.

**PROGRAMME SPECIFIC OUTCOMES FOR B.Sc PHYSICS PROGRAMME**

**B.Sc PHYSICS CURRICULUM [2023-2024 and Onwards]**

<b>PSO NO.</b>	<b>Programme Specific Outcomes Students of B.Sc Physics will be able to</b>	<b>POs Addressed</b>
<b>PSO1</b>	Intensify the student academic capability, unique qualities and transferable skills which will give them opportunity to evolve as responsible citizens.	PO1, PO2, PO4
<b>PSO2</b>	Explain the fundamentals laws involved in physics.	PO1, PO5
<b>PSO3</b>	Understand the theory and consequence of the various physical occurrence.	PO1, PO2, PO3, PO5
<b>PSO4</b>	Carryout experiments to interpret the laws and concepts of Physics.	PO1, PO2, PO5
<b>PSO5</b>	Relate the theories learnt and the skills procured to solve enduring problems.	PO1, PO2, PO3, PO5



## Cauvery College for Women (Autonomous)

### PG & Research Department of Physics

#### B.Sc., Physics

#### LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(For the Candidates admitted from the Academic year 2023-2024 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Language Course-I (LC)	பொதுத்தமிழ் - I	23ULT1	6	3	3	25	75	100
			Hindi ka Samanya Gyan aur Nibandh	23ULH1						
			Poetry, Grammar and History of Sanskrit Literature	23ULS1						
			Foundation Course: Paper I- French I	23ULF1						
	II	English Language Course- I(ELC)	General English -I	23UE1	6	3	3	25	75	100
	III	Core Course – I(CC)	Properties of Matter and Acoustics	23UPH1CC1	5	5	3	25	75	100
				23UPH1CC1P	3	3	3	40	60	100
		First Allied Course- I (AC)	Calculus and Fourier Series	22UPH1AC1	4	3	3	25	75	100
				22UPH1AC2	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	Value Education	23UGVE	2	2	-	100	-	100
<b>Total</b>					<b>30</b>	<b>22</b>				<b>700</b>
II	I	Language Course-II (LC)	பொதுத்தமிழ் - II	23ULT2	6	3	3	25	75	100
			Hindi Literature & Grammar –II	22ULH2						
			Prose, Grammar and History of Sanskrit Literature	23ULS2						
			Basic French - II	22ULF2						
	II	English Language Course- II(ELC)	General English - II	23UE2	6	3	3	25	75	100
	III	Core Course – II (CC)	Mechanics and Relativity	22UPH2CC2	5	5	3	25	75	100
				23UPH2CC2P	3	3	3	40	60	100
		Core Course -III (CC)	Introduction to Digital Electronics	23UPH2CC3	2	2	3	25	75	100
				22UPH2AC3	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-II (AECC)	Environmental Studies	22UGEVS	2	2	-	100	-	100
			Innovation and Entrepreneurship	22UGIE	2	1	-	100	-	100
	Extra Credit Course		SWAYAM	As per UGC Recommendation						
	<b>Total</b>					<b>30</b>	<b>22</b>			

<b>THEORY</b>	
Attendance	3
Library	3
Seminar/Quiz/ Assignment	4
CIA - I	7.5
CIA - II	7.5
<b>Total</b>	<b>25</b>

<b>PRACTICAL</b>	
Observation	5
Record	10
Continuous Performance in Practical	10
Model Practical	15
<b>Total</b>	<b>40</b>

<b>Semester I</b>	<b>Internal Marks: 25</b>			<b>External Marks: 75</b>	
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>HRS/WEEK</b>	<b>CREDITS</b>	
<b>23UPH1CC1</b>	<b>PROPERTIES OF MATTER AND ACOUSTICS</b>	<b>CC-I</b>	<b>5</b>	<b>5</b>	

### Course Objectives

- To build the elastic behavior in terms of three moduli of elasticity and working of torsion pendulum.
- To apply the concept of bending of beams and analyze the expression, quantify, and understand nature of materials.
- To study the concept of surface tension and viscosity of fluids and learn about an analogous solution to many engineering problems
- To analyze simple harmonic motions mathematically and understand the concept of resonance and set up experiment to evaluate frequency of vibration.
- To understand the concepts of acoustics and the significance of building construction. Able to apply ultrasonic knowledge in real life.

### Pre-requisites

- Knowledge about the concepts of elasticity and bending moment
- Fundamental knowledge of capillarity, viscosity of various liquids
- Develop the idea of formula, frequency of vibration and factors affecting the architectural acoustics

### Course Outcome and Cognitive Level Mapping

<b>CO Number</b>	<b>CO Statement On the successful completion of the Course, the Student will be able to</b>	<b>Cognitive Level</b>
<b>CO 1</b>	Understand the basic ideas of Physical properties of different states of matter and sound	K1, K2
<b>CO 2</b>	Analyze the characteristics of elasticity, viscosity, surface tension and the requisites of good acoustics	K3
<b>CO 3</b>	Evaluate the ideas of elasticity and excess pressure of surface tension in fluids and analyze the capillarity nature in liquids	K4
<b>CO 4</b>	Apply the concepts of moduli of elasticity, surface tension, viscosity, waves and acoustics	K3, K5
<b>CO 5</b>	Develop the idea of bending of beams, empirical relations between surface tension and temperature, stokes formula, frequency of vibration of strings and factors affecting the architectural acoustics	K4

### Mapping of CO with PO and PSO

<b>Cos</b>	<b>PSO 1</b>	<b>PSO 2</b>	<b>PSO 3</b>	<b>PSO 4</b>	<b>PSO 5</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>
<b>CO 1</b>	3	3	3	2	1	3	2	3	2	1
<b>CO 2</b>	3	3	2	3	1	3	2	3	2	2
<b>CO 3</b>	3	3	2	1	1	3	3	2	2	1
<b>CO 4</b>	3	3	3	2	2	3	3	2	3	1
<b>CO 5</b>	3	3	3	2	1	3	3	2	2	1

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” – indicates there is no correlation



## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p><b>ELASTICITY</b>  Hooke's law-stress-strain diagram- Elastic constants- Poisson 's ratio -relation between elastic constants and Poisson 's ratio -Work done in stretching and twisting a wire-twisting couple on a cylinder-rigidity modulus by static torsion-torsional pendulum (with and without masses)</p>	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	<p><b>BENDING OF BEAMS</b>  Cantilever -Expression for bending moment-expression for depression at the loaded end of the cantilever -oscillations of a cantilever-expression for time period-experiment to find Young 's modulus-non-uniform bending-experiment to determine young's modulus by Koenig 's method-uniform bending-expression for elevation-experiment to determine Young's modulus using microscope</p>	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	<p><b>FLUID DYNAMICS:</b> Surface Tension: definition-molecular forces-Excess pressure over curved surface-application to spherical and cylindrical drops and bubbles-determination of surface tension - Jaeger's method-variation of surface tension with temperature  Viscosity: Definition- Streamline and turbulent flow- Rate of flow of liquid in a capillary tube -Poiseuille's formula-corrections-terminal velocity and stoke's formula-variation of viscosity with temperature</p>	22	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	<p><b>WAVES AND OSCILLATIONS</b>  Simple Harmonic Motion (SHM)-differential equation of SHM-graphical representation of SHM-Composition of two S.H.M in a straight line and at right angles-Lissajous's figures-Free, Damped, Forced vibrations - Resonance and sharpness of resonance  Laws of transverse vibration in strings - Determination of AC frequency using sonometer - Determination of frequency using Melde's string apparatus</p>	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	<p><b>ACOUSTICS OF BUILDINGS AND ULTRASONICS:</b>  Intensity of sound-Decibel-Loudness of sound-Reverberation- Sabine's reverberation formula-acoustic intensity-factors affecting the acoustics of buildings  Ultrasonic waves: -Production of ultrasonic waves-Piezoelectric crystal method-Magnetostriction effect-application of ultrasonic waves</p>	20	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

VI	<b>SELF STUDY FOR ENRICHMENT:</b> (Not to be included for External Examination) Rigidity modulus of different materials - I- shaped grids and its uses - surface tension of soap bubble - sonic waves and its types – application of acoustics.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
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### Text Books

1. Murugesan, R., (2012). *Properties of Matter and Acoustics*. (3<sup>rd</sup> edition) S.Chand& Co, New Delhi.
2. Mathur, D.S., (2010). *Elements of Properties of Matter*. (1<sup>st</sup> edition) S. Chand & Company, New Delhi.
3. Khanna, D.R., & Bedi, R.S., (1969). *Textbook of Sound*. (7<sup>th</sup> edition) Atmaram and sons, New Delhi.
4. Subrahmanyam, N., & BrijLal., (2015). *Textbook of Sound*. (2<sup>nd</sup> edition) Vikas Publishing House, Chennai.

### Reference Books

1. Smith, C.J., (1960). *General Properties of Matter and Acoustics*. Orient Longman Publishers, Hyderabad.
2. Gulati, H.R., (1977). *Fundamentals of General Properties of Matter*. (5<sup>th</sup> edition) R. Chand& Co, New Delhi.
3. French, AP., (1973). *Vibration and waves*. (2<sup>nd</sup> edition), MIT Introductory Physics, Arnold-Heinmann, India.

### Web References

1. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
2. <http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html>
3. <https://www.youtube.com/watch?v=gT8Nth9NWPM>
4. <https://www.youtube.com/watch?v=m4u-SuaSu1s&t=3s>
5. <https://www.biolinscientific.com/blog/what-are-surfactants-and-how-do-they-work>
6. <https://learningtechnologyofficial.com/category/fluid-mechanics-lab/>
7. <http://www.sound-physics.com/>
8. <http://nptel.ac.in/courses/112104026/>

### Pedagogy

Chalk and Talk, Assignment, Group discussion and quiz

### Course Designer

Dr.S.Gowri

Semester I	Internal Marks: 25	External Marks: 75		
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
23UPH1CC1P	PROPERTIES OF MATTER AND ACOUSTICS (P)	CP-I	3	3

### Course Objectives

- To help students to enhance their experimental skills.
- To gain hands-on experience with a variety of techniques.
- To learn the basic principles and procedures of laboratory work.

### Pre-requisites

- Basic knowledge on usage of scientific apparatus.

### Course Outcome and Cognitive Level Mapping

CO Number	CO Statement	Cognitive Level
	<b>On the successful completion of the Course, the Student will be able to</b>	
CO 1	Select the equipment and get the necessary accessories.	K1
CO 2	Demonstrate the use of equipment for various measures.	K2
CO 3	Construct the experiment by arranging and assembling the equipment.	K3
CO 4	Solve the physical quantity using the relevant formula after gathering accurate data through observations. Keep a detailed record of all laboratory activities.	K3
CO 5	Apply experimental approaches to correlate with physics theory to develop practical understanding.	K3

### Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	1	1	1	2	1	3	2	1	2	1
CO 2	2	3	2	2	2	3	3	1	2	1
CO 3	1	1	2	3	1	3	2	1	3	1
CO 4	2	3	3	3	2	1	3	1	3	2
CO 5	3	2	3	3	3	1	3	2	3	2

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation

## Syllabus

### LIST OF EXPERIMENTS (Any 8)

1. Determination of rigidity modulus without mass using Torsional pendulum.
2. Determination of rigidity modulus with masses using Torsional pendulum.
3. Determination of Young's modulus by uniform bending – load depression graph.
4. Determination of Young's modulus by non-uniform bending – scale & telescope
5. Determination of Young's modulus by cantilever – load depression graph.
6. Determination of rigidity modulus by static torsion.
7. Determination of surface tension & interfacial surface tension by drop weight method.
8. Determination of co-efficient of viscosity by Stokes' method – terminal velocity.
9. Determination of viscosity by Poiseuille's flow method.
10. Determination of g using compound pendulum.
11. Sonometer – determination of frequency of tuning fork.

### Text Book

1. Ouseph, C.C., Rao, U.J., Vijayendran, V., (2016). *Practical Physics and Electronics*. S.Viswanathan, Printers & Publishers Pvt Ltd., Chennai.

### Reference Book

1. Prof.Namboodirippad, M.N., Prof..Daniel, P.A., (1982). *B.Sc., Practical Physics*. G.B.C. Publications, Cochin.

### Web References

1. <https://vlab.amrita.edu/?sub=1&brch=280&sim=550&cnt=1>
2. <https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1518&cnt=4>
3. <https://vlab.amrita.edu/?sub=1&brch=280&sim=602&cnt=2>
4. <https://vlab.amrita.edu/?sub=1&brch=280&sim=210&cnt=2>

### Pedagogy

Demonstration, practical sessions, and viva voce

### Course Designer

Dr.N.Manopradha

**FIRST ALLIED COURSE-I (AC)**  
**CALCULUS AND FOURIER SERIES**

(For B.Sc Physics & Chemistry)

(2022-2023 and Onwards)

Semester I	Internal Marks: 25		External Marks:75	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
22UPH1AC1/ 22UCH1AC1	CALCULUS AND FOURIER SERIES	ALLIED	4	3

**Course Objective**

- Explore the students with mathematical methods formatted for their major concepts and train them in basic Integrations.
- Analyze mathematical statements and expressions.
- Evaluate the fundamental concepts of Differentiation and Integration.

**Course Outcomes**

**Course Outcome and Cognitive Level Mapping**

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
CO1	Explain the concepts of Calculus and Fourier series	K1,K2
CO2	Classify the problem models in the respective area.	K3
CO3	Solve various types of problems in the corresponding stream.	K3
CO4	Identify the properties of solutions in the core area.	K3
CO5	Discover the applications of Calculus and Fourier series.	K4

**Mapping of CO with PO and PSO**

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2	3	2	2	2	2
CO2	3	2	2	2	2	3	2	2	2	2
CO3	3	2	2	2	2	3	2	2	2	2
CO4	3	2	2	2	2	3	2	2	2	2
CO5	3	2	2	2	2	3	2	2	2	2

“1” – Slight (Low) Correlation – “2” – Moderate (Medium) Correlation –

“3” – Substantial (High) Correlation – “-” indicates there is no correlation.

**Syllabus**

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p><b>Successive Differentiation:</b></p> <p>The <math>n^{\text{th}}</math> derivative – Standard results – Method of splitting the fractional expressions into partial fractions - Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the <math>n^{\text{th}}</math> derivative of a product (proof not needed) – A complete formal proof by induction (proof not needed) - Curvature- Circle, radius and center of curvature - Cartesian formula for the radius of curvature–Simple problems in all these.</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	<p><b>Evaluation of integrals:</b></p> <p>Integration of Rational algebraic functions– Rule (a) – Rule (b) Integration of the form <math>\int \frac{lx+m}{ax^2+bx+c} dx</math> – Rule (c)- Integration of Irrational functions : Integration of the form <math>\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx</math> – Integration of the form <math>\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}}</math> - Integration of the form <math>\int \frac{dx}{a+b\cos x}</math>.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	<p><b>Reduction Formula:</b></p> <p>Properties of definite integrals –Reduction formula (when n is a positive integer) for</p> <p>1] <math>\int e^{ax} x^n dx</math> 2] <math>\int x^n \cos ax dx</math> 3] <math>\int \sin^n x dx</math> 4] <math>\int_0^{\frac{\pi}{2}} \sin^n x \cos^m x dx</math> (without proof) and illustrations.</p>	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	<p><b>Double and Triple Integrals:</b></p> <p>Definition of the double integral-Evaluation of Double integral (Problems Only)- Change of order and evaluation of the double integral (Problems only).</p>	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	<p><b>Fourier Series:</b></p> <p>Definition of Fourier Series – Finding the Fourier Coefficients for a given periodic function with period <math>2\pi</math> - Even and Odd functions –Half range Fourier series.</p>	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

VI	<p><b>Self-Study for Enrichment : (Not to be included for External examination)</b></p> <p>Radius of curvature when the curve is in Polar coordinates - (i) <math>\int \frac{dx}{ax^2 + bx + c}</math> (ii) <math>\int \frac{dx}{\sqrt{ax^2 + bx + c}}</math> - (1)</p> <p><math>\int \cos^n x dx</math> (2) <math>\int_0^{\frac{\pi}{2}} \cos^n dx</math> -Triple Integrals in simple cases(Problems Only)- Development in cosine series - Development in sine series.</p>	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
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### Text Books

- Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume I*. S. Viswanathan Pvt Limited.
- Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume II*. S. Viswanathan Pvt Limited.
- Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume III*. S. Viswanathan Pvt Limited.

UNIT-I	Chapter 3:Sections 1.1 to 1.6,2.1,2.2[1] Chapter 10:Sections 2.1 to 2.3 [1]
UNIT-II	Chapter 1:Sections 7.1,7.3,7.4,8(CASE II, CASE V), 9 [2]
UNIT-III	Chapter 1:Sections 11,13.1 to 13.5 [2]
UNIT-IV	Chapter 5:Sections 2.1,2.2,4 [2]
UNIT-V	Chapter 6:Sections 1to 4[3]

### Reference Books

- Sankarappan, S. Arulmozhi,G. (2006). *Vector Calculus, Fourier series and Fourier Transforms*. Vijay Nicole Imprints Private Limited.
- Vittal, P.R.(2014). *Allied Mathematics*. Margham Publications.
- Singaravelu, A.(2003). *Differential Calculus and Trigonometry*. R Publication.

### Web Links

- <https://www.youtube.com/watch?v=tBtF3Lr-VLk&t=64s>
- <https://www.youtube.com/watch?v=Z4oSGuAZrZM>
- [https://www.youtube.com/watch?v=w6llnAQX\\_f8](https://www.youtube.com/watch?v=w6llnAQX_f8)
- <https://www.youtube.com/watch?v=LMcj8o0ERNE>
- <https://www.youtube.com/watch?v=GAwOGCvWv0>
- <https://www.youtube.com/watch?v=9X3gqehcFII>

### Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

### Course Designers

- Dr. P. Saranya
- Ms.L.Mahalakshmi
- Ms.P.Geethanjali

**FIRST ALLIED COURSE-II (AC)**  
**ALGEBRA, ANALYTICAL GEOMETRY OF 3D & TRIGONOMETRY**  
 (For B.Sc Physics & Chemistry)

(2022-2023 and Onwards)

<b>Semester I</b>	<b>Internal Marks: 25</b>	<b>External Marks:75</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>Hrs / Week</b>	<b>CREDITS</b>
22UPH1AC2/ 22UCH1AC2	<b>ALGEBRA, ANALYTICAL GEOMETRY OF 3D &amp; TRIGONOMETRY</b>	<b>ALLIED</b>	<b>4</b>	<b>3</b>

**Course Objective**

- Analyze the mathematical methods formatted for their major concepts.
- Evaluate the problems in Algebra and Trigonometry.
- Explain the basics of Three-Dimensional geometry.

**Course Outcomes**

**Course Outcome and Cognitive Level Mapping**

CO Number	CO Statement	Cognitive Level
	On the successful completion of the course, students will be able to	
<b>CO1</b>	Explain various notions in Algebra, Analytical Geometry of 3D & Trigonometry.	K1,K2
<b>CO2</b>	Identify the problem models.	K3
<b>CO3</b>	Apply the concepts of Algebra, Analytical Geometry of 3D & Trigonometry.	K3
<b>CO4</b>	Solve the given problems in the respective stream.	K3
<b>CO5</b>	Analyze the applications of the core area.	K4

**Mapping of CO with PO and PSO**

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
<b>CO1</b>	2	2	2	3	2	3	2	2	2	2
<b>CO2</b>	2	2	2	3	2	3	2	2	2	2
<b>CO3</b>	2	2	2	3	2	3	2	2	2	2
<b>CO4</b>	2	2	2	3	2	3	2	2	2	2
<b>CO5</b>	2	2	2	3	2	3	2	2	2	2

“1” – Slight (Low) Correlation – “2” – Moderate (Medium) Correlation –

“3” – Substantial (High) Correlation – “-” indicates there is no correlation.



## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p><b>Series Expansion:</b></p> <p>Application of Binomial Theorem to summation of series – Approximate values – Summation of series by Exponential series - Summation of series by Logarithmic series (Formulae only).</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
II	<p><b>Matrices:</b></p> <p>Matrix-Special types of Matrices –Scalar multiplication of a matrix-Equality of matrices-Addition of matrices-Subtraction of matrices- Symmetric matrix-Skew symmetric matrix-Hermitian and Skew Hermitian matrix –Multiplication of matrix – Inverse matrix-Inner product-Solution of simultaneous equations-Rank of a matrix-Elementary transformation of a matrix-A system of <math>m</math> homogeneous linear equations in <math>n</math> unknowns-Linear dependence and independence of vectors-System of non-homogeneous linear equations - Eigen values and Eigenvectors.(Applications only)</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
III	<p><b>Three Dimensional Geometry:</b></p> <p>The Sphere – Definition- The equation of a sphere when the center and radius are given-The equation of a sphere to find its center and radius- The length of the Tangent Plane from a point to the sphere – The Plane Section of a sphere – Equation of a circle on a sphere – Intersection of two spheres in a circle.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
IV	<p><b>Expansion of Trigonometric functions:</b></p> <p>Expansions of <math>\cos n\theta</math> and <math>\sin n\theta</math> - Expansion of <math>\tan(A + B + C + \dots)</math> (omitting examples on formation of equations) –Powers of sines and cosines of <math>\theta</math> in terms of functions of multiples of <math>\theta</math> – Expansions of <math>\cos^n \theta</math> when <math>n</math> is a positive integer – Expansions of <math>\sin^n \theta</math> when <math>n</math> is a positive integer – Expansions of <math>\sin \theta</math> and <math>\cos \theta</math> in a</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.

	series of ascending powers of $\theta$ - The expansions of $\sin \theta$ and $\cos \theta$ to find the limits of certain expressions.			
V	<b>Hyperbolic functions:</b> Hyperbolic functions – Relation between hyperbolic functions – Relations between hyperbolic functions and circular functions - Inverse hyperbolic functions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
VI	<b>Self-Study for Enrichment :</b> <b>(Not to be included for External examination)</b> Series which can be summed up by the Logarithmic series - Simple applications of Matrices- The equation of the tangent plane to the sphere at a point. (Only problems) - Expansion of $\tan \theta$ in terms of powers of $\theta$ - Separation of real and imaginary parts of $\tanh(x+iy)$ .	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.

### Text Books

1. Manichavasagam Pillai, T.K. Natarajan,T.& Ganapathy, K.S.(2015). *Algebra, Volume I*. S. Viswanathan Pvt Limited.
2. Manichavasagam Pillai, T.K. (2015). *Algebra, Volume II*. S.Viswanathan Pvt Limited.
3. Manichavasagam Pillai, T.K. & Natarajan,T. (2016). *A Text book of Analytical Geometry Part-II 3D*. New Gamma Publishers.
4. Manichavasagam Pillai, T.K. & Narayanan,S.(2013). *Trigonometry*. S. Viswanathan Pvt Limited.

UNIT-I Chapter 3:Sections 10,14[1]

Chapter 4:Sections 3,7,9 [1]

UNIT-II Chapter 2:Sections 1 to 16 [2]

UNIT-III Chapter 4:Sections 1-5,6,6.1,7,8 [3]

UNIT-IV Chapter 3:Sections 1 to 4, 4.1,5,5.1[4]

UNIT-V Chapter 4:Sections 1,2,2.1 to 2.3[4]

## Reference Books

1. Arumugam, s.Issac, A. (2017). Analytical Geometry 3D and Vector calculus. New Gamma Publishing house.
2. Pandey, H.D. Khan, M.Q. & Gupta, B.N.(2011). A Text Book of Analytical Geometry and Vector Analysis. Wisdom Press.
3. Singaravelu, A. (2003). Differential Calculus and Trigonometry. R Publication.

## Web Links

1. <https://www.youtube.com/watch?v=JayFh5EJHcU>
2. <https://www.youtube.com/watch?v=h5urBuE4Xhg>
3. <https://www.youtube.com/watch?v=59z6eBynJuw>
4. <https://www.youtube.com/watch?v=9DyPyJb2N9g>
5. <https://www.youtube.com/watch?v=HOk2XLeFPDk>
6. <https://www.youtube.com/watch?v=G1C1Z5aTZSQ>

## Pedagogy

Power point presentations, Group Discussions, Seminar, Quiz, Assignment.

## Course Designers

1. Dr. P. Saranya
2. Dr.L.Mahalakshmi
3. Ms.P.Geethanjali

Course Code	Course Name	Category	L	T	P	S	Cr edits	Inst . Hrs	Marks		
									CIA	External	Total
23UGVE	VALUE EDUCATION	Ability Enhancement Compulsory Course-I (AECC)	30	-	-	-	2	2	100	-	100
Year		I									
Semester		I									
Prerequisites		Basic Understanding of Values									
<b>Learning Objectives</b>											
1	To enrich the knowledge about ethics and values.										
2	To instil Moral and Social Values and Loyalty and to appreciate the rights of others.										
3	To explain the role of ethics in the operation of human conduct										
4	To promote an understanding and framework for students to achieve value based positive and purposeful lives for themselves and their communities.										
5	To build excellent citizens and leaders for the country										

### Course Outcomes and Cognitive Level Mapping

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

CO NUMBER	CO STATEMENT	COGNITIVE LEVEL
CO1	To understand the importance of values and ethical issues at micro, mezzo and macro level of the society and the workplace.	<b>K1, K2</b>
CO2	To apply values and ethics in the daily life.	<b>K3</b>
CO3	To exhibit Ethical Leadership in the workplace and in the society.	<b>K4</b>
CO4	To think logically and reasonably and to handle moral issues with greater clarity	<b>K5</b>
CO5	To Engage in ethical debate and formulate ethical justification.	<b>K6</b>

## Syllabus

UNIT	CONTENT	HOURS
I	<p><b>Value education:</b> Meaning, Definition, purpose and significance in the present world.</p> <p><b>Human Values For Life:</b> Truth, commitment, honesty and integrity, humility, forgiveness, love, empathy, ability to sacrifice, care, unity, inclusiveness, Self esteem, self-confidence, punctuality – Time, task and resource management.</p>	6
II	<p><b>Ethics:</b> The Essence of Ethics, Determinants and Consequences of Ethics in Human Interaction. Dimensions of Ethics. Ethics in private and public relationships. Role of family, society and educational institutions in inculcating moral and ethical values</p>	6
III	<p><b>Theory &amp; Approaches in Ethics:</b> Kohlberg’s theory, Gilligan’s theory, Damon’s View of Moral Identity, &amp; Deontology. The Utilitarian Approach, The Rights Approach, The Fairness or Justice Approach, The Common-Good Approach, The Virtue Approach &amp; Ethical Problem Solving Approach.</p>	6
IV	<p><b>Moral Thinkers &amp; Philosophical Schools of Thought and their contribution:</b> Socrates, Plato, Aristotle, Epicurus, Stoicism. Thomas Aquinas , Contractarianism, Thomas Hobbes, John Locke, Jean-Jacques Rousseau, John Rawls, John Stuart Mill, Emanuel Kant and Hegel, Mother Teresa, Chanakya, Kautilya, Sarojini Naidu, Thiruvalluvar, Rabindranath Tagore, Mahatma Gandhi, Dr. Ambedkar, Bharathiyar and Bharathidasan.</p>	6
V	<p><b>Values and Ethics in Public administration:</b> ethical concerns and dilemmas in government and private institutions; laws, rules, regulations and conscience as sources of ethical guidance; accountability and ethical governance; ethical issues in international relations and funding; corporate governance. Information sharing and transparency in government, Codes of Ethics, Codes of Conduct, Citizen’s Charters, Quality of service delivery, Utilization of public funds, challenges of corruption.</p>	6
VI	<p><b>Self Study for Enrichment</b></p> <p>Learners need to list ways of practicing human Values. Group Discussion needs to be conducted on strategies to promote human values at various levels – family, community, society, nation and global.</p>	-

### **Text Books:**

1. ETHICS, INTEGRITY & APTITUDE (Prabhat Prakashan). (2021). (n.p.): Prabhat Prakashan.
2. Political Parties and Administrative Reforms in India: At the Centre, in the States and in the Local Bodies. (2019). (n.p.): Notion Press.
3. Sharma, P. D. (2015). Ethics, Integrity and Aptitude: Foundational Values for Civil Service in India. India: Rawat Publications.
4. Vozzola, E. C. (2014). Moral Development: Theory and Applications. United Kingdom: Taylor & Francis.
5. Thinkers and Theories in Ethics. (2011). Ukraine: Britannica Educational Pub..

### **Reference Books:**

1. Bandiste, D.D.: Humanist Values: A Source Book, B.R. Publishing Corporation, Delhi, 1999
2. Ethics in Governance. (2021). (n.p.): K.K. Publications.
3. Maheshwari, S. (2002). Administrative Reforms in India. Germany: Macmillan India.
4. Bandiste, D.D.: Humanist Values: A Source Book, B.R. Publishing Corporation, Delhi, 1999.
5. Saxena, N. C. (2019). What Ails the IAS and Why It Fails to Deliver: An Insider's View. India: SAGE Publications.
6. Xavier Alphonse S.J (2008) We Shall Overcome – A Textbook on life coping skills ICRDCE Publication, Chennai

### **Web References**

1. <https://publicintegrity.org>
2. <https://www.ethicssage.com>
3. <https://darpg.gov.in>
4. <https://www.ethics.org>
5. <https://ethicsunwrapped.utexas.edu/glossary/integrity>

### **Pedagogy**

Chalk& Talk, Seminar, PPT Presentation, Group Discussion, Blended Method, and Case Study.

## **ABILITY ENHANCEMENT COMPULSORY COURSE (AECC ) I : VALUE EDUCATION (23UGVE)**

### **Assessment Rubrics for 100 Marks**

1. Designing Posters / video making / preparation of Album – **20 marks**
2. Case study presentation / Narration of stories / Writing stories – **20 Marks**
3. Writing essay based on the individual life experience following human values –personal, family and society level (minimum 10 pages) – **20 Marks**
4. **VIVA VOCE - 40 Marks**

<b>S. No</b>	<b>RUBRICS FOR VIVA VOCE</b>	<b>MARKS</b>
1.	Theoretical Knowledge	20
2.	Values Practiced	10
3.	Attitude & Commitment	10
<b>Total</b>		<b>40</b>

**Course Designer Dr.G.Mettilda Buvaneswari**

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
22UPH2CC2	MECHANICS AND RELATIVITY	CC-II	5	5

### Course Objectives

- To find the time of flight and impact velocity of a projectile that lands at a different height from that of launch.
- To explain motion along curved path.
- To illustrate the motion of rigid bodies and outline laws of gravitation.
- To make use of the ideas of frames of reference.

### Pre-requisites

- A solid understanding of scalars and vectors.
- Fundamental concepts of physics.
- Basic understanding of Newtonian mechanics.

### Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the Course, the Student will be able to	Cognitive Level
CO 1	Define the effects of a change in the position of any physical object or event.	K1
CO 2	Demonstrate laws and principles in physics.	K2
CO 3	Apply the mathematical tools in understanding physics.	K3
CO 4	Make use of simple concepts of mechanics in daily life.	K3
CO 5	Analyse the principles behind the mechanics of objects travelling at relativistic speeds.	K4

### Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	2	3	3	3	3	3	3	2	2	3
CO 2	2	3	3	3	3	3	3	2	2	3
CO 3	2	3	3	3	3	3	3	2	3	3
CO 4	2	3	3	2	3	3	2	2	2	3
CO 5	2	3	3	2	3	3	2	2	2	3

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation



## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p><b>PROJECTILE, IMPACT AND FRICTION:</b></p> <p>Projectile – Path of a projectile is a parabola – Range of horizontal and inclined plane – Impulse of a force – Impulsive force – Impact between two smooth bodies – Laws of impact – Direct and oblique impacts – Impact of a smooth sphere on a smooth horizontal plane – Loss in kinetic energy due to direct and oblique impacts – Friction – Laws of friction – Angle of friction.</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	<p><b>MOTION ON A PLANE CURVE:</b></p> <p>Centripetal and centrifugal forces – Hodograph – Expression for normal acceleration by the hodograph method – Motion of cyclist along a curved path – Motion of a railway carriage round a curved track – Upsetting of a carriage on a curved level track – Motion of a carriage on a banked-up curve – Effect of the Earth's rotation on the value of the acceleration due to gravity – Variation of g with altitude.</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	<p><b>DYNAMICS OF RIGID BODIES AND GRAVITATION:</b></p> <p>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.</p> <p>Newton's laws of gravitation – Kepler's laws of planetary motion – Deduction of Newton's law of gravitation – Determination of G – Boy's method.</p>	25	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	<p><b>FRAMES OF REFERENCE:</b></p> <p>Frames of reference: Inertial and Non-Inertial – Galilean Transformation: Transformation of position, length, velocity and acceleration – Galilean invariance: Newton's law of motion, law of conservation of momentum and energy – Transformation equation for one frame of reference rotating with its axis with respect to an inertial frame – Coriolis force – Foucault's pendulum.</p>	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

V	<b>SPECIAL THEORY OF RELATIVITY:</b> 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 ( $E = mc^2$ ).	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	<b>SELF STUDY FOR ENRICHMENT:</b> <b>(Not to be included for External Examination)</b> Angular acceleration – Relation between the torque and angular acceleration of a rigid body – Conservation of energy – Conical pendulum – Moment of Inertia of a flywheel – Torsion pendulum.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

### Text Books

1. Narayanamurthi, M., and Nagarathinam, N., (2008). *Dynamics*. (8<sup>th</sup> edition) The National Publishing Company, Chennai.
2. Mathur, D.S., and Hemne, P.S., (2015). *Mechanics*. (Revised edition) S. Chand & Company Ltd., New Delhi.

### Reference Books

1. Narayanamurthi, M., and Nagarathinam, N., (2002). *Statics, Hydrostatics and Hydrodynamics*. (3<sup>rd</sup> edition) The National Publishing Company, Chennai.
2. Murugesan, R., (2016). *Mechanics and Mathematical Physics*. (3<sup>rd</sup> edition) S. Chand & Company Ltd., New Delhi.
3. Brijilal Subramaniam, (1990). *Mechanics and Relativity*. (1<sup>st</sup> edition), Margham Publications.
4. Murugesan, R., and Kiruthiga Sivaprasath, (2016). *Modern Physics*. (18<sup>th</sup> edition) S. Chand & Company Ltd., New Delhi.

### Web References

1. <https://courses.lumenlearning.com/suny-osuniversityphysics/chapter/4-3-projectile-motion/>
2. <http://www.jbsw.shikshamandal.org/wp-content/uploads/2016/07/2-Gravitation.pdf>
3. <https://vlab.amrita.edu/?sub=1&brch=280&sim=518&cnt=1>
4. <https://www.youtube.com/watch?v=wD7C4V9smG4>
5. <https://www.youtube.com/watch?v=TgH9KXEQ0YU>

### Pedagogy

Chalk and Talk, Assignment, Group discussion and Quiz

### Course Designer

Dr.N.Manopradha

<b>Semester II</b>	<b>Internal Marks: 40</b>	<b>External Marks: 60</b>		
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>HRS/WEEK</b>	<b>CREDITS</b>
<b>23UPH2CC2P</b>	<b>MECHANICS AND DIGITAL ELECTRONICS (P)</b>	<b>CP-II</b>	<b>3</b>	<b>3</b>

### Course Objectives

- To give students a foundational understanding of how to measure various physical quantities.
- To use scientific equipment to estimate various physical properties.
- To investigate the basic idea behind digital technology.
- To construct basic logic gates using distinct components.

### Pre-requisites

- Basic knowledge on usage of scientific apparatus.

### Course Outcome and Cognitive Level Mapping

<b>CO Number</b>	<b>CO Statement On the successful completion of the Course, the Students will be able to</b>	<b>Cognitive Level</b>
CO1	Select the equipment and get the necessary accessories.	K1
CO2	Explain the experiment's fundamental concepts.	K2
CO3	Make use of fundamental principles and experiment circumstances.	K3
CO4	Experiment with the laboratory norms.	K3
CO5	Examine the applications.	K4

### Mapping of CO with PO and PSO

<b>Cos</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	1	1	1	2	1	3	2	1	2	1
CO2	2	3	2	2	2	3	3	1	2	1
CO3	1	1	2	3	1	3	2	1	3	1
CO4	2	3	3	3	2	1	3	1	3	2
CO5	3	2	3	3	3	1	3	2	3	2

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation

## **Syllabus**

### **LIST OF EXPERIMENTS (Any 8)**

1. Young's modulus – Non-Uniform bending (Pin and Microscope).
2. Young's modulus – Non - Uniform bending (Optic lever).
3. Sonometer – Determination of unknown frequency.
4. Verification of Logic gates.
5. Construction of Half and Full adder.
6. NAND as UBB.
7. NOR as UBB.
8. Spectrometer –  $\mu$  of solid prism.
9. Concave lens – Focal length determination.
10. Determination of Poisson's ratio of ductile specimen using strain gauges.
11. Verification of Euler- Bernoulli Hypothesis.
12. Verification of Flexural Stress Formula.

### **Text Book**

1. Ouseph, C.C., Rao, U.J., Vijayendran, V., (2016). *Practical Physics and Electronics*. S.Viswanathan, Printers & Publishers Pvt Ltd., Chennai.

### **Reference Book**

1. Prof.Namboodirippad, M.N., Prof.Daniel, P.A., (1982). *B.Sc., Practical Physics*. G.B.C. Publications, Cochin.

### **Web References**

1. <https://vlab.amrita.edu/?sub=1&brch=280&sim=210&cnt=2>
2. <https://vlab.amrita.edu/?sub=1&brch=280&sim=1509&cnt=1>
3. <https://de-iitr.vlabs.ac.in/exp/truth-table-gates/simulation.html>
4. <https://amrita.olabs.edu.in/?sub=1&brch=6&sim=244&cnt=4>

### **Pedagogy**

Demonstration, practical sessions and viva voce.

### **Course Designer**

Dr.N.Manopradha

Semester II	Internal Marks: 25		External Marks: 75	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
23UPH2CC3	INTRODUCTION TO DIGITAL ELECTRONICS	CC-III	2	2

### Course Objectives

- To learn about different numbers systems and their conversion from one to another.
- To understand the workings of logic gates and equations.
- To acquire Knowledge about Boolean laws to draw Karnaugh maps.
- To know the uses of encoders, decoders, multiplexers and demultiplexers.
- To understand the workings of flip-flops and to analyze sequential circuits.

### Pre-requisites

- Basic knowledge of the binary number system.
- Fundamental ideas on logic gates.
- Basic knowledge of the conversion of a number system.

### Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the Course, the Students will be able to	Cognitive Level
CO 1	Understand the basic knowledge of Number system, Logic gates, Combinational circuit, Boolean expression and Flip flops	K1
CO 2	Interpret the concept of number conversion, logic circuits and thereby develop equivalent circuits.	K2
CO 3	Develop the concept of number conversion and combinational logic circuits.	K3
CO 4	Examine different number system, arithmetic and logic functions with appropriate selection of inputs and check the possible outputs for arithmetic and logic circuits.	K4
CO 5	Simplify the arithmetic operation of the number system. Apply the Boolean expressions in the K Map and design the flip flop.	K5

### Mapping of CO with PO and PSO

COs	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PO 1	PO 2	PO 3	PO 4	PO 5
CO 1	3	3	3	2	2	3	3	2	2	2
CO 2	2	2	2	2	2	3	3	2	3	3
CO 3	2	3	3	2	2	3	3	3	3	3
CO 4	2	2	3	3	3	3	3	3	3	3
CO 5	3	3	3	3	3	3	3	3	3	3

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” – indicates there is no Correlation

## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<b>NUMBER SYSTEM AND CODE:</b> Binary number system – Binary to decimal conversion – Decimal to binary conversion – Octal numbers – Conversion of octal numbers – Hexadecimal numbers – Conversion of hexadecimal numbers.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	<b>ARITHMETIC CIRCUITS:</b> Binary addition – Binary subtraction – Binary multiplication – Binary Division – Half and Full adder – Half and Full subtractor.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	<b>DIGITAL LOGIC AND LOGIC CIRCUITS:</b> Basic gates – NOT, OR, AND – EX-OR gates – Universal logic gates – NOR, NAND – Boolean laws – Simplification of Boolean Expression and Demorgan's theorems.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	<b>APPLICATION OF BOOLEAN THEOREM – K-MAP:</b> Sum-of-Products- Product of sum – Truth table to Karnaugh map – Pairs, Quads, and Octets – Karnaugh map simplifications – Don't care condition.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	<b>FLIP – FLOPS:</b> R-S flip-flops – Clocked R-S flip-flop – Edge-triggered RS flip flop – J-K flip – D flip-flop – T flip flop – Applications of flip-flops.	6	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	<b>SELF STUDY FOR ENRICHMENT:</b> <b>(Not to be included for External Examination)</b> Application of number system Physical Quantity – Counting – Electrical project circuit.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

## **Text Books**

1. Donald P Leach, Albert Paul Malvino, Goutam Saha, (2011). *Digital Principles and Applications*. (7<sup>th</sup> edition) Tata McGraw – Hill Publishing Company Limited, New Delhi.
2. Jain, R.P, (2009). *Modern Digital Electronics*. (4<sup>th</sup> edition) Tata McGraw Hill Education Private Limited, Noida.
3. Vijayendran, V, (2003). *Digital fundamentals*. (1<sup>st</sup> edition) S. Viswanathan Printers and Publishers Pvt. Ltd, Chennai.
4. Virendra Kumar, (2007). *Digital electronics Theory and Experiments*. (2<sup>nd</sup> edition) New Age International Publishers, Chennai.

## **Reference Books**

1. James W. Bignel, (2007). *Digital Electronics*. (5<sup>th</sup> edition) Cengage learnings, Uttar Pradesh.
2. Mandal S.K, (2017). *Digital Electronics Principles & Applications*. (1<sup>st</sup> edition) McGraw Hill Education, Karnataka.
3. Thomas L. Floyd, (2015). *Digital Fundamentals*. (11<sup>th</sup> edition) Pearson Education, Bengaluru.
4. Kothari, D.P., J.S. Dhillon, (2016). *Digital Circuits and Design*. (1<sup>st</sup> edition) Pearson Education, Bengaluru.

## **Web References**

1. <https://circuitglobe.com/rs-flip-flop.html>
2. <http://hyperPhysics.phy-astr.gsu.edu/hbase/Electronic/jkflipflop.html>
3. <https://circuitglobe.com/half-adder-and-full-adder-circuit.html>
4. <https://programmerbay.com/construct-4-to-1-multiplexer-using-logic-gates/>
5. <https://www.electronicshub.org/demultiplexerdemux/>
6. <https://www.elprocus.com/designing-of-2-to-4-line-decoder/>
7. <https://www.electricaltechnology.org/2018/05/bcd-to-7-segment-display-decoder.html>

## **Pedagogy**

Chalk and Talk, Assignment, Group discussion and quiz

## **Course Designer**

Dr.S.Priya

**ALLIED COURSE – III****(For Physics)****ODE, PDE, LAPLACE TRANSFORMS AND VECTOR ANALYSIS****(2022-2023 Onwards)**

Semester II	Internal Marks: 25	External Marks: 75		
COURSE CODE	COURSE TITLE	CATEGORY	Hrs /Week	CREDITS
22UPH2AC3	ODE, PDE, LAPLACE TRANSFORMS AND VECTOR ANALYSIS	ALLIED	4	3

**Course Objective**

- Explain the basics of Ordinary Differential Equations.
- Emphasize in the field of Partial Differential Equations.
- Explore the mathematical methods formatted for major concepts.

**Course Outcomes****Course Outcome and Cognitive Level Mapping**

CO Number	CO Statement	Knowledge Level
CO1	Explain various notions in ODE, PDE, Laplace transforms & Vector Analysis.	K1, K2
CO2	Classify the problem models in the respective area.	K3
CO3	Identify the properties of solutions in the core area.	K3
CO4	Solve various types of problems in the corresponding stream.	K3
CO5	Analyze the applications of the core area.	K4

**Mapping of CO with PO and PSO**

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	2	2	2	3	2	3	3
CO2	3	2	2	2	2	2	3	2	3	3
CO3	3	2	2	2	2	2	3	2	3	3
CO4	3	2	2	2	2	2	3	2	3	3
CO5	3	2	2	2	2	2	3	2	3	3

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-” indicates there is no correlation.



## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<p><b>Ordinary Differential Equations:</b>            Equations of the first order but of higher degree – Type A: Equations solvable for <math>\frac{dy}{dx}</math> - Type B: Equations solvable for <math>y - dx</math>            Equations solvable for <math>x</math>-Clairaut's Form (simple cases only).  <b>Linear equations with constant coefficients:</b>            Definitions – The operator D- Complementary function of a linear equation with constant co-efficients - Particular integral: General method of finding P.I- Special methods for finding P.I.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	<p><b>Partial differential equations:</b>            Classification of integrals–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(Geometrical Meaning is not needed)-(only problems in all the above) – (No proof needed for any formula).</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	<p><b>Laplace Transforms:</b>            Laplace Transforms – Definition -Sufficient conditions for the existence of Laplace transform-Basic results-Laplace transform of periodic functions-Some general theorems-Evaluation of integrals using Laplace transform.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	<p><b>Inverse Laplace Transform:</b>            The Inverse Transform –Modification of results obtained in finding Laplace transforms to get the inverse transforms of functions- Laplace Transforms to solve ordinary differential equations with constant co-efficients.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	<p><b>Vector Differentiation:</b>            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.  <b>Gradient, Curl and Divergence:</b>            Scalar and Vector point functions – Gradient of a scalar point function-Directional derivative of a scalar point function-Equations of tangent plane and normal line to a level surface.  <b>Divergence and curl of a vector point function:</b>            Definition- Curl of a vector point function- irrotational vector.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	<p><b>Self -Study for Enrichment:</b>  <b>(Not included for End Semester Examination)</b>            Equations that do not contain <math>x</math> and <math>y</math> for explicitly- Equations reducible to the standard form - Piecewise continuity - Laplace Transforms to solve ordinary differential equations with variable co-efficients - Physical interpretation of divergence of a vector - Physical interpretation of curl of a vector-Vector identity.</p>	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

### **Text Book**

1. Narayanan. S, Manicavachagam Pillai. T. K. (2016). *Differential Equations and its applications*. S. Viswanathan Pvt Limited.
2. Vittal. P. R, Malini. V. (2016). *Vector Analysis*. Margham Publications.

### **Chapters and Sections**

**UNIT-I Chapter 4: Sections 1-3 [1]**

**Chapter 5: Sections 1-4 [1]**

**UNIT-II Chapter 12: Sections 1-5.4 [1]**

**UNIT-III Chapter 9: Sections 1-5 [1]**

**UNIT- IV Chapter 9: Sections 6-8 [1]**

**UNIT- V Chapter 1: Pages (1-24,26-35) [2]**

### **Reference Books**

1. Narayanan. S, Manicavachagam Pillai. T. K. (2003). *Calculus, Vol. III*. S.Viswanathan Pvt Limited.
2. Arumugam Isaac. (2014). *Differential Equations and Applications*. New Gamma Publishing House.
3. Sankarappan. S, Arulmozhi. G. (2006). *Vector Calculus, Fourier Series and Fourier Transforms*. Vijay Nicole Imprints Private Limited.

### **Web References**

1. [https://www.youtube.com/watch?v=OM01KTc0\\_9w](https://www.youtube.com/watch?v=OM01KTc0_9w)
2. <https://youtu.be/zlfsh1SyH58>
3. <https://www.youtube.com/watch?v=dCVBZbebl8Y>
4. <https://www.youtube.com/watch?v=Y8GXpS31CGI>
5. <https://www.youtube.com/watch?v=IVJjm5FE4x8>
6. <https://www.youtube.com/watch?v=FXTt6Sa79mI>
7. [https://www.academia.edu/35399426/CHAPTER\\_1\\_VECTOR\\_DIFFERENTIATION](https://www.academia.edu/35399426/CHAPTER_1_VECTOR_DIFFERENTIATION)

### **Pedagogy**

Power point presentation, Group Discussion, Seminar, Assignment.

### **Course Designer**

1. Dr.L.Mahalakshmi

<b>Semester II</b>	<b>InternalMarks:100</b>			
<b>COURSECODE</b>	<b>COURSETITLE</b>	<b>CATEGORY</b>	<b>HRS/ WEEK</b>	<b>CREDI TS</b>
<b>22UGEVS</b>	<b>ENVIRONMENTAL STUDIES</b>	<b>ABILITY ENHANCEMENTCOMP ULSORYCOURSE</b>	<b>2</b>	<b>2</b>

### Course Objective

**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 and Cognitive Level Mapping

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Cognitive Level</b>
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

### Mapping of CO with PO and PSO

<b>Cos</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
CO1	2	2	2	3	3	2	2	3	2	3
CO2	3	3	2	3	3	3	2	3	3	3
CO3	2	3	3	2	3	3	3	3	3	2
CO4	2	3	3	3	2	3	2	3	3	3
CO5	3	3	2	3	3	3	3	2	3	3

**“1”–Slight (Low) Correlation**

**“3”–Substantial (High)Correlation**

**“2” – Moderate (Medium) Correlation**

**“-“indicates there is no correlation**

## Syllabus

UNIT	CONTENT	HOURS	COS	COGNITIVE LEVEL
I	Introduction to environmental studies Definition, scope and importance. Need for public awareness	06	CO1, CO2, CO3, CO4	K1, K2, K3, K4
II	<p><b>Natural Resources: Renewable and non-renewable resources:</b></p> <p>a. Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.</p> <p>b. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflict over water, dams benefits and problems.</p> <p>c. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.</p> <p>d. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.</p> <p>e. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.</p> <p>f. Land resources: Land resources, land degradation, man-induced Landslides, soil erosion and desertification.</p> <p>Role of an individual in conservation of natural resources.</p>	06	CO1, CO2, CO3, CO4	K1, K2, K3, K4
III	<p><b>Ecosystems</b> 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: -Forest ecosystem, Grassland ecosystem and Desert ecosystem, Aquatic ecosystems, (ponds, streams, lakes, rivers, oceans, nestuaries)</p>	06	CO1, CO2, CO3, CO4	K1, K2, K3, K4

IV	<p><b>Bio diversity and Environmental Pollution</b>  Introduction,types and value of biodiversity.India as a mega diversity nation. Hot-spots of biodiversity.Threatsto biodiversity:habitatloss,poaching of wildlife,man-wildlife conflicts.Endangered and endemic species of India.Conservation of biodiversity:In-situand Ex-situ conservation of biodiversity.Definition,Causes,effects and control measures of :Air Pollution, Water Pollution, Soil Pollution, Noise pollution,Nuclear hazards,Solid waste Management:Causes,effects and control measures of urban and industrial wastes. E-Waste Management:Sources and Types of E-waste.Effect of E-waste on environment and humanbody.Disposal of E-waste,Advantages of Recycling E-waste.Role of an individual inprevention of pollution.Disastermanagement:floods,earthquake , cyclone and landslides.</p>	06	CO1, CO2, CO3, CO4	K1, K2, K3, K4
V	<p><b>Social Issues and the Environment</b>  Water conservation,rain water harvesting,water shedmanagement. Climate change,global warming, acid rain,ozone layer depletion, Waste land reclamation.  <b>Environment Protection Act</b>  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.</p>	06	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

## 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(R)
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480p
4. Clark R.S. Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani E & Hepworth, M.T. 2001.
6. De A.K. Environmental Chemistry, Wiley Eastern Ltd
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.
9. Hawkins, R.E. Encyclopedia of India Natural History, Bombay Natural History Society, Bombay.
10. Heywood, V.H & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press 1140 p.
11. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws Himalaya Pub.

## Pedagogy

**Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar**

## Course Designer

**Dr. B. Thamilmaraivelvi**