

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

NATIONALLY ACCREDITED (IV CYCLE) WITH “A+” GRADE BY NAAC

TIRUCHIRAPPALLI – 620 018

PG AND RESEARCH DEPARTMENT OF PHYSICS



B.Sc., PHYSICS SYLLABUS

(2026-2027 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)

PEOs	Statements
PEO1	<p>LEARNING ENVIRONMENT</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>
PEO2	<p>ACADEMIC EXCELLENCE</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>
PEO3	<p>EMPLOYABILITY</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>
PEO4	<p>PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY</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>
PEO5	<p>GREEN SUSTAINABILITY</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

PO NO.	On completion of B.Sc Physics Programme, The students will be able to
PO 1	Domain Knowledge: Analyse, design and develop solutions by applying firm fundamental concepts of basic sciences and expertise in discipline.
PO 2	Problem solving: Ability to think rationally, analyse and solve problems adequately with practical knowledge to assess the environmental issues.
PO 3	Creative thinking and Team Work: Develop prudent decision-making skills and mobility to work in teams to solve multifaceted problems.
PO 4	Employability: Self-study acclimatize them to observe effective interactive practices for practical learning enabling them to be a successful science graduate.
PO 5	Life Long Learning: 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 [2026-2027 and Onwards]

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



CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

PG AND RESEARCH DEPARTMENT OF PHYSICS

B.Sc., Physics

CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(For the candidates admitted from the academic year 2026-2027 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs./	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Ability Enhancement Course – I (AEC - I)	பொதுத்தமிழ் – I	26ULT1	6	3	3	30	70	100
			Hindi Language and Literature-I	26ULH1						
			Sanskrit Prose and Vocabulary	26ULS1						
			Basic French – I	26ULF1						
	II	Ability Enhancement Course – II (AEC - II)	General English – I	26UE1	6	3	3	30	70	100
	III	Core Course – I(CC-I)	Properties of Matter and Acoustics	26UPH1CC1	5	5	3	30	70	100
			Core Practical - I (CP-I)	Properties of Matter and Acoustics (P)	26UPH1CP1	3	3	3	40	60
		Allied Course - I (AC-I)	Mathematics – I	26UPH1AC1	3	3	3	30	70	100
		Allied Course -II (AC-II)	Mathematics – II	26UPH1AC2	3	3	3	30	70	100
	IV	Ability Enhancement Compulsory Course-I (AECC-I)	Value Education	26UGVE	2	2	-	100	-	100
Ability Enhancement Compulsory Course-II (AECC-II)		Cyber Security	26UGCS	2	2	-	100	-	100	
Total					30	24				800
II	I	Ability Enhancement Course – III (AEC - III)	பொதுத்தமிழ் – II	26ULT2	6	3	3	30	70	100
			Hindi Language and Literature-II	26ULH2						
			Sanskrit Poetry and Grammar – I	26ULS2						
			Basic French – II	26ULF2						
	II	Ability Enhancement Course – IV (AEC - IV)	General English – II	26UE2	6	3	3	30	70	100
	III	Core Course – II (CC-II)	Mechanics and Relativity	26UPH2CC2	5	5	3	30	70	100
			Core Practical - II (CP-II)	Mechanics and Digital Electronics (P)	26UPH2CP2	3	3	3	40	60
		Allied Course - III (AC-III)	Mathematics – III	26UPH2AC3	3	3	3	30	70	100
		Allied Course Practical-I (ACP-I)	Mathematical Computation using MATLAB (P)	26UPH2ACP1	3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-III (AECC-III)	Environmental Science	26UGES	2	2	-	100	-	100
Ability Enhancement Compulsory Course-IV (AECC-IV)		Innovation and Entrepreneurship	26UGIE	2	2	-	100	-	100	
Extra Credit Course #			SWAYAM	As per UGC Recommendation						
Total					30	24				800

III	I	Ability Enhancement Course – V (AEC - V)	பொதுத்தமிழ் – III	26ULT3	6	3	3	30	70	100		
			Hindi Language and Literature-III	26ULH3								
			Sanskrit Didactics, Alankara and Grammar – II	26ULS3								
			Intermediate French-I	26ULF3								
	II	Ability Enhancement Course – VI (AEC - VI)	Learning Grammar Through Literature – I	26UE3	6	3	3	30	70	100		
	III	Core Course–III (CC-III)	Thermal Physics and Statistical Mechanics	26UPH3CC3	6	5	3	30	70	100		
				Core Practical -III(CP-III)	Thermal Physics (P)	26UPH3CP3	3	3	3	40	60	100
				Allied Course- IV (AC-IV)	Chemistry – I	26UPH3AC4	4	3	3	30	70	100
				Allied Course Practical-II (ACP-II)	Chemistry-I (P)	26UPH3ACP2	3	3	3	40	60	100
	IV	Interdisciplinary Course- I (ID-I)	Introduction to NCC@	26UNC3ID1	2	2	3	30	70	100		
				Physics in Everyday Life							26UPH3ID1	
				Basic Tamil – I							26ULC3BT1	
				Special Tamil – I							26ULC3ST1	
		Ability Enhancement Compulsory Course-V (AECC-V)	Health and Wellness *	26UGHW	2*	1	-	100	-	100		
Extra Credit Course #			SWAYAM	As per UGC Recommendation								
Total					30	23				800		
IV	I	Ability Enhancement Course – VII (AEC - VII)	பொதுத்தமிழ் – IV	26ULT4	6	3	3	30	70	100		
			Hindi Language and Literature-IV	26ULH4								
			Sanskrit Drama and Grammar – III	26ULS4								
			Intermediate French –II	26ULF4								
	II	Ability Enhancement Course – VIII (AEC - VIII)	Learning Grammar Through Literature– II	26UE4	6	3	3	30	70	100		
	III	Core Course – IV(CC-IV)	Electricity, Magnetism and Electromagnetism	26UPH4CC4	5	5	3	30	70	100		
				Core Practical - IV(CP-IV)	Electricity and Magnetism (P)	26UPH4CP4	3	3	3	40	60	100
				Allied Course- V (AC-V)	Chemistry – II	26UPH4AC5	3	3	3	30	70	100
				Allied Course Practical-III (ACP-III)	Chemistry – II(P)	26UPH4ACP3	3	3	3	40	60	100
	IV	Interdisciplinary Course- II (ID-II)	Specialisation in Army@	26UNC4ID2	2	2	2	-	100	100		
				Photography and Videography							26UPH4ID2	
				Basic Tamil - II							26ULC4BT2	
				Special Tamil - II							26ULC4ST2	
		Skill Enhancement Course – I (SEC-I)	Web Designing (P)	26UPH4SEP1	2	2	3	40	60	100		
Extra Credit Course #			SWAYAM	As per UGC Recommendation								
Total					30	24				800		
30 Days INTERNSHIP during Semester Holidays												

V	III	Core Course – V(CC-V)	Optics	26UPH5CC5	6	5	3	30	70	100	
		Core Course – VI (CC-VI)	Atomic and Nuclear Physics	26UPH5CC6	6	5	3	30	70	100	
		Core Practical- V(CP-V)	General Physics -I (P)	26UPH5CP5	3	3	3	40	60	100	
		Core Practical- VI(CP-VI)	Electronics -I (P)	26UPH5CP6	3	3	3	40	60	100	
		Internship *	Internship	26UPH5INT	-	2	-	20	80	100	
		Discipline Centric Elective Course– I (DCEC-I)	A. Materials Science	26UPH5DCE1A	5	4	3	30	70	100	
			B. Laser Physics	26UPH5DCE1B							
			C. Astrophysics and Cosmology	26UPH5DCE1C							
		Discipline Centric Elective Course– II (DCEC-II)	A. Analog and Digital Electronics	26UPH5DCE2A	5	4	3	30	70	100	
			B. Sensors, Transducers and IoT	26UPH5DCE2B							
C. Renewable Energy Sources and Applications	26UPH5DCE2C										
Ability Enhancement Compulsory Course-VI(AECC-VI)	Introduction to Disaster Management	26UGDM	2	2	-	100	-	100			
Extra Credit Course #		SWAYAM	As per UGC Recommendation								
Total					30	28				800	
VI	III	Core Course – VII (CC-VII)	Fundamentals of Microprocessor	26UPH6CC7	6	5	3	30	70	100	
		Core Course – VIII (CC-VIII)	Classical and Quantum Physics	26UPH6CC8	5	5	3	30	70	100	
		Core Practical –VII (CP-VII)	Electronics -II (P)	26UPH6CP7	3	3	3	40	60	100	
		Core Practical –VIII(CP-VIII)	Microprocessor (P)	26UPH6CP8	3	3	3	40	60	100	
		Discipline Centric Elective Course– III (DCEC-III)	A. Medical Physics	26UPH6DCE3A	5	4	3	30	70	100	
			B. Computational Physics	26UPH6DCE3B							
			C. Robotics and Automation	26UPH6DCE3C							
		Project	Project Work	26UPH6PW	5	3	-	20	80	100	
		IV	Skill Enhancement Course – II (SEC-II)	Professional Competency-General Studies for Competitive Examinations	26UPH6SE2	2	2	2	-	100	100
			Ability Enhancement Compulsory Course-VII (AECC-VII)	Gender Studies	26UGGS	1	1	-	100	-	100
V	Extension Activity *		26UGEA	-	1	-	-	-	-		
Total					30	27				800	
Grand Total					180	150				4800	
<ul style="list-style-type: none"> • @ NCC is one of the choices in GEC. Only the NCC cadets are eligible to chooses this course. However, NCC Course is a Compulsory Course for the NCC Cadets. If the Cadet has not studied Tamil in the school level, she has to take Basic Tamil Course. • *Shall be outside instruction hours • # Should complete a minimum of one Extra Credit Course from Semester II onwards 											

PG AND RESEARCH DEPARTMENT OF PHYSICS
CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME
BASED CURRICULUM FRAMEWORK (CBCS LOCF)

(For the Candidates admitted from the Academic year 2026-2027 and onwards)

Curriculum Structure

Courses & Credits for UG Science Programmes

Part	Course	No. of Courses	Hours	Credits	Total Credits
I	Ability Enhancement Course	4	6	12	12
II	Ability Enhancement Course	4	6	12	12
III	Core (Theory)	8	5/6	8*5=40	105
	Core (Practical)	8	3	8*3=24	
	Project Work	1	5	3	
	Internship	1	-	2	
	Allied Courses	8	4/3	8*3=24	
	DCEC	3	5	3*4=12	
IV	IDC	2	2	2*2=4	20
	SEC	2	2	2*2=4	
	AECC-I -Value Education	1	2	2	
	AECC-II Cyber Security	1	2	2	
	AECC-III- Environmental Science	1	2	2	
	AECC-IV-Innovation and Entrepreneurship	1	2	2	
	AECC-V- Health and Wellness	1	-	1	
	AECC-VI - Introduction to Disaster Management	1	2	2	
	AECC-VII Gender Studies	1	1	1	
V	Extension Activities		-	1	01
		48		150	150

Semester I	Internal Marks: 30		External Marks: 70	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
26UPH1CC1	PROPERTIES OF MATTER AND ACOUSTICS	CC-I	5	5

Course Objective

- To build the conceptual understanding of materials with mathematical skills and reviews the prior knowledge of properties of matter.
- To study the basics of bending of beams and its applications.
- To understand the concepts of viscosity and surface tension.
- To learn about Acoustics of buildings
- To study the concept of ultrasonics and its applications

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Entrepreneurship, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values/Indian Knowledge System	Environment and Sustainability
3.	Course relevant to Local/Regional/National/ Global needs	Global needs
4.	Course focus on Sustainable Developmental Goals	SDG 3,4,6,9

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Explain the introduction of different properties of matter namely elasticity, mass, viscosity, and surface tension.	K1, K2
CO2	Identify the concept of bending of a beam, uniform bending, and non-uniform bending of the beam.	K2, K3
CO3	Apply the concepts of surface tension and its methods	K3
CO4	Analyze the properties of Viscosity in fluids and analyze the capillarity nature in liquids	K 4
CO5	Interpret the concepts of intensity of sound and to understand the concept of ultrasonics and its applications	K5

Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	1	3	2	3	2	1
CO2	3	3	2	3	1	3	2	3	2	2
CO3	3	3	2	1	1	3	3	2	2	1
CO4	3	3	3	2	2	3	3	2	3	1
CO5	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>ELASTICITY Hooke's law-stress-strain diagram- Elastic constants- Poisson 's ratio -relation between elastic constants -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>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	<p>BENDING OF BEAMS Cantilever -Expression for bending moment-expression for depression at the loaded end of the cantilever -oscillations of a cantilever -experiment to find Young 's modulus- non-uniform bending-experiment to determine Young's modulus using microscope</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	<p>FLUID DYNAMICS: 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</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	<p>VISCOSITY: Definition- Streamline and turbulent flow- Rate of flow of liquid in a capillary tube-Poiseuille's formula-corrections- correction-Terminal velocity- Stokes formula- Stoke 's method for coefficient of viscosity-Searle 's viscometer-Viscosity of gas- Meyer's formula</p>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	<p>ACOUSTICS OF BUILDINGS AND ULTRASONICS: 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>	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	<p>SELF STUDY FOR ENRICHMENT: (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 and advances in ultrasound imaging</p>	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Murugesan, R., (2012). *Properties of Matter and Acoustics*, (Reprint 2020), S. Chand & Co, New Delhi.
2. Brijlal & Subrahmanyam N, (1989), *Properties of Matter*, (5th Edition), Eurasia Publishing House (Pvt) Ltd, New Delhi.
3. Khanna, D.R., & Bedi, R.S., (1969). *Textbook of Sound*, (8th Edition), Atmaram and sons, Uttar Pradesh

Reference Books

1. Murugesan, R., & Kiruthiga Sivaprasath, (2012). *Properties of Matter and Acoustics*, (Revised Edition), S. Chand & Co, New Delhi.
2. Saighal, R.L., (1998). *Text Book of Sound*, (2nd Edition). Chand & Company, New Delhi.
3. Gulati, H.R., (1982). *Fundamentals of General Properties of Matter*. (5th Edition) S.Chand & Co, New Delhi

Web References

1. <https://www.insula.com.au/physics/1279/L7.html>
2. <https://www.insula.com.au/physics/1279/L7.html>
3. <https://www.youtube.com/watch?v=CQGlgu-8dmA>
4. <https://hyperphysics.phy-astr.gsu.edu/hbase/pbuoy.html>
5. [https://kanchiuniv.ac.in/coursematerials/Physics%20book_Final%20\(1\).pdf](https://kanchiuniv.ac.in/coursematerials/Physics%20book_Final%20(1).pdf)

Pedagogy

Chalk and Talk, Assignment, Group discussion, and quiz

Course Designer

Dr. G. Maheswari

Dr. S. Gowri

Semester I	Internal Marks: 40	External Marks: 60		
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
26UPH1CP1	PROPERTIES OF MATTER AND ACOUSTICS (P)	CP-I	3	3

Course Objectives

- To enhance experimental skills in determining physical constants like Young's modulus, rigidity modulus, surface tension, viscosity and acceleration due to gravity.
- To gain hands-on experience with precision instruments and techniques such as torsional pendulum, optical lever, capillary flow, sonometer and ultrasonic apparatus.
- To develop proficiency in data analysis, graphical interpretation and error estimation for reliable experimental results.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values/Indian Knowledge System.	Professional Ethics, Environment and Sustainability, Human Values
3.	Course relevant to Local/Regional/National/ Global needs	National and Global needs
4.	Course focus on Sustainable Developmental Goals	SDG 4, 9, 11, 12, 13

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	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. Measurement of rigidity modulus using a Torsional pendulum.
2. Estimation of rigidity modulus using static torsion method.
3. Evaluation of Young's modulus by uniform bending using Pin and Microscope.
4. Determination of Young's modulus through non-uniform bending with Pin and Microscope.
5. Calculation of Young's modulus by non-uniform bending method using Scale and Telescope.
6. Study of Young's modulus using cantilever method: Load-Depression graph.
7. Measurement of surface tension and interfacial surface tension via drop weight method.
8. Estimation of coefficient of viscosity using Stokes' method (terminal velocity).
9. Analysis of coefficient of viscosity by Poiseuille's capillary flow method.
10. Evaluation of acceleration due to gravity (g) using a compound pendulum.
11. Measurement of Frequency of a tuning fork by Sonometer.

Text Book

1. Aruldas, G. and Rajagopal, P., (2021), *Practical Physics for Degree Students*, Universities Press, Hyderabad.
2. Gupta, S.L. and Kumar, V., (2018), *Practical Physics (Vol. I & II)*, Pragati Prakashan, Meerut.
3. Ouseph, C.C., Rao, U.J. and Vijayendran, V., (2016), *Practical Physics and Electronics*, S. Viswanathan Printers & Publishers Pvt Ltd., Chennai.

Reference Book

1. Squires, G.L., (2018), *Practical Physics*, Cambridge University Press, Cambridge.
2. Worsnop, B.L. and Flint, H.T., (2015), *Advanced Practical Physics for Students*, Asia Publishing House, Mumbai.
3. Namboodirippad, M.N. and 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. R. Gayathri

ALLIED COURSE -I (AC-I)
MATHEMATICS-I
(For B.Sc Physics & Chemistry)
(2026-2027 and Onwards)

Semester I	Internal Marks: 30		External Marks:70	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
26UPH1AC1/ 26UCH1AC1A	MATHEMATICS-I	ALLIED COURSE -I	3	3

Course Objectives

- 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.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values\ Indian Knowledge System	Professional Ethics/Environment and Sustainability
3.	Course relevant to Local/Regional/National/ Global needs	National/ Global need
4.	Course focus on Sustainable Developmental Goals	SDG 4,8,9,12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
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	Successive Differentiation: The n^{th} derivative – Standard results – Method of splitting the fractional expressions into partial fractions - Trigonometrical transformation – Formation of equations involving derivatives – Leibnitz formula for the n^{th} derivative of a product (proof not needed) – A complete formal proof by induction (proof not needed).	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	Curvature: Definition of Curvature – Circle, Radius and Centre of Curvature – Cartesian formula for the radius of curvature - The coordinates of the centre of curvature – Radius of Curvature when the curve is given in Polar Co-ordinates.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	Evaluation of integrals: Integration of Rational algebraic functions– Rule (a) – Rule (b) Type ii: Integration of the form $\int \frac{lx+m}{ax^2+bx+c} dx$ – Rule (c) - Integration of Irrational functions: Case II: Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ – Case V: Integration of the form $\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}}$ - Integration of the form $\int \frac{dx}{a+b \cos x}$.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	Double Integrals: Definition of the double integral-Evaluation of Double integral- Change of order and evaluation of the double integral (Simple Problems Only in all these).	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	Fourier Series: Definition of Fourier Series – Finding the Fourier Coefficients for a given periodic function with period 2π - Even and Odd functions –Half range Fourier series.	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	Self-Study for Enrichment : (Not to be included for External examination) Evolutes and Involute - (i) $\int \frac{dx}{ax^2+bx+c}$ (ii) $\int \frac{dx}{\sqrt{ax^2+bx+c}}$ -Double integral in polar co-ordinates - Triple Integrals - Development in cosine series - Development in sine series.	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

Text Books

1. Narayanan, S & Manichavasagam Pillay, T.K. (2015). *Calculus Volume I*. S. Viswanathan (Printers and Publishers) Pvt Limited.
2. Narayanan, S & Manichavasagam Pillay, T.K. (2015). *Calculus Volume II*. S. Viswanathan (Printers and Publishers) Pvt Limited.
3. Narayanan, S & Manichavasagam Pillay, T.K. (2015). *Calculus Volume III*. S. Viswanathan (Printers and Publishers) Pvt Limited.

Chapters and Sections

UNIT-I	Chapter 3:Sections 1.1 - 1.6,2.1,2.2[1]
UNIT-II	Chapter 10:Sections 2.1- 2.4,2.6 [1]
UNIT-III	Chapter 1:Sections 7.1,7.3 (Rule (a),Rule (b)-Type ii,Rule (c)),7.4,8(CASE II, CASE V), 9 [2]
UNIT-IV	Chapter 5:Sections 2.1,2.2[2]
UNIT-V	Chapter 6:Sections 1 - 4[3]

Reference Books

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

Web References

1. <https://theengineeringmaths.com/wp-content/uploads/2017/08/Chapter-1-Successive-Differentiation-.pdf>
2. <https://www.youtube.com/watch?v=tBtF3Lr-VLk&t=64s>
3. https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/UNIT-2_14.pdf
4. <https://www.youtube.com/watch?v=AEdGYEiE86Q>
5. <https://www.youtube.com/watch?v=Z4oSGuAZrZM>
6. <https://www.youtube.com/watch?v=GAwQGCyWy0>
7. <https://www.youtube.com/watch?v=9X3gqehcFII>

Pedagogy

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

Course Designer

Dr.L.Mahalakshmi

ALLIED COURSE -II (AC - II)
MATHEMATICS-II
(2026-2027 and Onwards)

Semester I	Internal Marks: 30		External Marks:70	
COURSE CODE	COURSE TITLE	CATEGORY	Hrs / Week	CREDITS
26UPH1AC2 / 26UCH1AC2A	MATHEMATICS-II	ALLIED COURSE	3	3

Course Objectives

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

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Entrepreneurship, Skill Development
2.	Course integrates cross cutting issues relevant to Professional Ethics/Gender sensitization/ Environment and Sustainability/ Human Values/ Indian Knowledge System	Professional Ethics, Sustainability
3.	Course relevant to Local/Regional/National/ Global needs	Global need
4.	Course focus on Sustainable Developmental Goals	SDG 4,5,9,12

Course Outcomes

Course Outcome and Cognitive Level Mapping

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

Mapping of CO with POs and PSOs

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2	3	2	2	2	2
CO2	2	2	2	3	2	3	2	2	2	2
CO3	2	2	2	3	2	3	2	2	2	2
CO4	2	2	2	3	2	3	2	2	2	2
CO5	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>Series Expansion: Application of the Binomial Theorem to summation of series.</p> <p>Summation: Exponential series - Logarithmic series- Series which can be summed up by the Logarithmic series (Problems only).</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
II	<p>Matrices: Inverse Matrix- Inner product- Solution 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 and Eigenvectors. (Applications only)</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
III	<p>Three Dimensional Geometry: 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 is a circle – 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>Expansion of Trigonometric functions: Expansions of $\cos n\theta$ and $\sin n\theta$ - Expansion of $\tan(A \pm B \pm C \pm \dots)$ (omitting examples on formation of equations) –Powers of sines and cosines of θ in terms of functions of multiples of θ – Expansions of $\cos^n \theta$ when n is a positive integer – Expansions of $\sin^n \theta$ when n is a positive integer.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
V	<p>Hyperbolic functions: Hyperbolic functions – Relation between hyperbolic functions – Relations between hyperbolic functions and circular functions - Inverse hyperbolic functions.</p>	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
VI	<p>Self-Study for Enrichment : (Not to be included for External examination) Series which can be summed up by the Logarithmic series - 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-Simple applications of Matrices- The equation of the tangent plane to the sphere at a point. (Only problems) - Expansion of $\tan^{-1} x$ in terms of powers of x- Separation of real and imaginary parts of $\tanh(x+iy)$.</p>	-	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*. S. Viswanathan Pvt Limited .
4. Manichavasagam Pillai, T.K. & Narayanan, S. (2013). *Trigonometry*. S. Viswanathan Pvt Limited.

Chapters and Sections

- UNIT-I Chapter 3: Sections 10 [1]
Chapter 4: Sections 3, 7, 9 [1]
- UNIT-II Chapter 2: Sections 8 -11, 13- 16 [2]
- UNIT-III Chapter 4: Sections 1- 7 [3]
- UNIT-IV Chapter 3: Sections 1 to 4 [4]
- UNIT-V Chapter 4: Sections 1, 2 [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 References

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 Designer

Dr. R. Radha