

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

**NATIONALLY ACCREDITED WITH “A+” GRADE BY NAAC**

**TIRUCHIRAPPALLI – 620 018**

**PG AND RESEARCH DEPARTMENT OF PHYSICS**



**B.Sc., PHYSICS SYLLABUS**

**2025-2026 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 [2025-2026 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 2025-2026 and onwards)**

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. /	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Language Course-I (LC)	தமிழ் இலக்கிய வரலாறு - I	25ULT1	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
		Core Practical - I (CP)	Properties of Matter and Acoustics (P)	23UPH1CC1P	3	3	3	40	60	100
		First Allied Course- I (AC)	Calculus and Fourier Series	22UPH1AC1	4	3	3	25	75	100
		First Allied Course- II (AC)	Algebra, Analytical Geometry of 3D & Trigonometry	22UPH1AC2	4	3	3	25	75	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal - Universal Human Values	25UGVE	2	2	-	100	-	100
	Total				30	22				700

<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>

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

### 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

CO Number	CO Statement On the successful completion of the Course, the Student will be able to	Cognitive Level
CO 1	Understand the basic ideas of Physical properties of different states of matter and sound	K1, K2
CO 2	Analyze the characteristics of elasticity, viscosity, surface tension and the requisites of good acoustics	K3
CO 3	Evaluate the ideas of elasticity and excess pressure of surface tension in fluids and analyze the capillarity nature in liquids	K4
CO 4	Apply the concepts of moduli of elasticity, surface tension, viscosity, waves and acoustics	K3, K5
CO 5	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

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	1	3	2	3	2	1
CO 2	3	3	2	3	1	3	2	3	2	2
CO 3	3	3	2	1	1	3	3	2	2	1
CO 4	3	3	3	2	2	3	3	2	3	1
CO 5	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	<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)	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
II	<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	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
III	<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	22	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
IV	<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	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	<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	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 griders 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 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. 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 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

“3” – Substantial (High) Correlation

“2” – Moderate (Medium) Correlation

“-” indicates there is no correlation.

## Syllabus

UNIT	CONTENT	HOURS	COs	COGNITIVE LEVEL
I	<b>Successive Differentiation:</b> 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) - Curvature- Circle, radius and center of curvature - Cartesian formula for the radius of curvature–Simple problems in all these.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
II	<b>Evaluation of integrals:</b> Integration of Rational algebraic functions– Rule (a) – Rule (b) Integration of the form $\int \frac{lx+m}{ax^2+bx+c} dx$ – Rule (c)- Integration of Irrational functions : Integration of the form $\int \frac{px+q}{\sqrt{ax^2+bx+c}} dx$ – Integration of the form $\int \frac{dx}{(x+p)\sqrt{ax^2+bx+c}}$ - Integration of the form $\int \frac{dx}{a+b \cos x}$ .	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
III	<b>Reduction Formula:</b> Properties of definite integrals –Reduction formula (when n is a positive integer) for 1] $\int e^{ax} x^n dx$ 2] $\int x^n \cos ax dx$ 3] $\int \sin^n x dx$ $\frac{\pi}{2}$ 4] $\int_0^{\frac{\pi}{2}} \sin^n x \cos^m x dx$ (without proof) and illustrations.	13	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
IV	<b>Double and Triple Integrals:</b> Definition of the double integral-Evaluation of Double integral (Problems Only) - Change of order and evaluation of the double integral (Problems only).	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
V	<b>Fourier Series:</b> Definition of Fourier Series – Finding the Fourier Coefficients for a given periodic function with period $2\pi$ - Even and Odd functions –Half range Fourier series.	10	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4
VI	Self-Study for Enrichment: (Not to be included for External examination) <b>Radius of curvature when the curve is in Polar co-ordinates</b> - (i) $\int \frac{dx}{ax^2+bx+c}$ (ii) $\int \frac{dx}{\sqrt{ax^2+bx+c}}$ - (1) $\int \cos^n x dx$ (2) $\int_0^{\frac{\pi}{2}} \cos^n x dx$ - <b>Triple Integrals in simple cases(Problems Only)-</b> <b>Development in cosine series - Development in sine series.</b>	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4

### Text Books

1. Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume I*. S. Viswanathan Pvt Limited.
2. Narayanan, S & Manichavasagam Pillai, T.K. (2015). *Calculus Volume II*. S. Viswanathan Pvt Limited.
3. 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

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 Links

1. <https://www.youtube.com/watch?v=tBtF3Lr-VLk&t=64s>
2. <https://www.youtube.com/watch?v=Z4oSGuAZrZM>
3. [https://www.youtube.com/watch?v=w6llnAQX\\_f8](https://www.youtube.com/watch?v=w6llnAQX_f8)
4. <https://www.youtube.com/watch?v=LMcj8o0ERNE>
5. [https://www.youtube.com/watch?v=\\_GAwQGCyWy0](https://www.youtube.com/watch?v=_GAwQGCyWy0)
6. <https://www.youtube.com/watch?v=9X3ggehcfII>

### Pedagogy

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

### Course Designers

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

**FIRST ALLIED COURSE-II (AC)**  
**ALGEBRA, ANALYTICAL GEOMETRY OF 3D & TRIGONOMETRY**  
 (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
22UPH1AC2/ 22UCH1AC2	ALGEBRA, ANALYTICAL GEOMETRY OF 3D & TRIGONOMETRY	ALLIED	4	3

**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 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 PO and PSO**

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	<b>Series Expansion:</b> Application of Binomial Theorem to summation of series – Approximate values – Summation of series by Exponential series - Summation of series by Logarithmic series (Formulae only).	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
II	<b>Matrices:</b> 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 $m$ homogeneous linear equations in $n$ unknowns-Linear dependence and independence of vectors-System of non-homogeneous linear equations - Eigen values and Eigenvectors.(Applications only)	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
III	<b>Three-Dimensional Geometry:</b> 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.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.
IV	<b>Expansion of Trigonometric functions:</b> Expansions of $\cos n\theta$ and $\sin n\theta$ - Expansion of $\tan (A + B + C + \dots)$ (omitting examples on formation of equations) –Powers of sines and cosines of $\theta$ in terms of functions of multiples of $\theta$ – Expansions of $\cos^n \theta$ when $n$ is a positive integer – Expansions of $\sin^n \theta$ when $n$ is a positive integer – Expansions of $\sin \theta$ and $\cos \theta$ in a series of ascending powers of $\theta$ - The expansions of $\sin \theta$ and $\cos \theta$ to find the limits of certain expressions.	12	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4.

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> (Not to be included for External examination) 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=HOk2XLLeFPDk>
6. <https://www.youtube.com/watch?v=G1C1Z5aTZSQ>

### Pedagogy

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

### Course Designers

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