



**B.Sc. MATHEMATICS: CHOICE BASED CREDIT SYSTEM  
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)**

**(Applicable to the candidates admitted from the academic year 2022-2023 onwards)**

**Revised as on 05.01.2023**

Sem.	Part	Course	Title	Ins.Hrs	Credit	Exam Hours	Marks		Total	
							Int.	Ext.		
I	I	Language Course – I (LC) (Tamil \$/Other Languages + #)		6	3	3	25	75	100	
	II	English Course - I (ELC)		6	3	3	25	75	100	
	III	Core Course – I (CC)	Differential Calculus and Trigonometry		5	5	3	25	75	100
		Core Course – II (CC)	Integral Calculus and Fourier Series		5	5	3	25	75	100
		First Allied Course – I (AC)	Physics / Computer Science / Financial Accounting		4	4	3	25	75	100
		First Allied Practical (AP)	Physics / Computer Science		2	-	-	-	-	-
		First Allied Course – II (AC)	Financial Accounting							
	IV	Value Education		2	2	3	25	75	100	
<b>TOTAL</b>				<b>30</b>	<b>22</b>	-	-	-	<b>600</b>	
II	I	Language Course - II (LC) (Tamil \$/Other Languages + #)		6	3	3	25	75	100	
	II	English Course - II (ELC)		6	3	3	25	75	100	
	III	Core Course – III (CC)	Differential Equations		5	5	3	25	75	100
		Core Course – IV (CC)	Analytical Geometry 3D		5	5	3	25	75	100
		First Allied Practical (AP)	Physics / Computer Science		2	2	3	40	60	100
		First Allied Course – II (AC)	Financial Accounting				3	25	75	
		First Allied Course – II (AC)	Physics / Computer Science		4	4	3	25	75	100
		First Allied Course – III (AC)	Financial Accounting							
		Add on Course – I ##	Professional English- I		*6	4	3	25	75	100
	IV	Environmental Studies		2	2	3	25	75	100	
<b>TOTAL</b>				<b>30+6*</b>	<b>27</b>	-	-	-	<b>800</b>	

\$ For those who studied Tamil upto 10<sup>th</sup> +2 (Regular Stream

+ Syllabus for other Languages should be on par with Tamil at degree level

# Those who studied Tamil upto 10<sup>th</sup> +2 but opt for other languages in degreelevel under Part I should study special Tamil in Part IV

**## The Professional English – Four Streams Course is offered in the 2<sup>nd</sup> and 3<sup>rd</sup> Semester (only for 2022-2023 Batch) in all UG Courses. It will be taught apart from the Existing hours of teaching/additional hours of teaching (1 hour /day) as a 4 credit paper as an add on course on par with Major Paper and completion of the paper is must to continue his/her studies further. (As per G.O. No. 76, Higher Education (K2) Department dated: 18.07.2020).**

**\* The Extra 6 hrs./Cycle as per the G.O. 76/2020 will be utilized for the Add on Professional English Course.**

**@ NCC Course is one of the Choices in Non-Major Elective Course. Only the NCC cadets are eligible to choose this course. However, NCC Course is not a Compulsory Course for the NCC Cadets.**

\*\* Extension Activities shall be outside instruction hours.

### LIST OF ALLIED COURSES:

#### First Allied Course (Any one)

1. Physics
2. Computer Science
3. Financial Accounting

#### Second Allied Course (Any one)

1. Mathematical Statistics
2. Chemistry
3. Management Accounting

### LIST OF MAJOR BASED ELECTIVE COURSES:

#### Group A (Any one)

1. Operations Research
2. Stochastic Processes
3. Number Theory

#### Group B (Any one)

1. Graph Theory
2. Mathematical Modelling
3. Astronomy

### SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Course	No. of Courses	No. of Credits	Marks	
1.	I	Language Courses	4	12	400	
2.	II	English Courses	4	12	400	
3.	III	Core Courses	14	70	1400	
4.		Core Practical	1	4	100	
5.		Allied Courses I & II	4	16	400	
6.		Allied Practical	2	4	200	
7.		Major Based Elective Courses	2	6	200	
8.		Add -on Course (Professional English I & II)	2	8	200	
9.		IV	Non Major Elective Courses	2	4	200
10.			Skill Based Elective Courses	2	4	200
11.	Soft Skill Development		1	2	100	
12.	Value Education		1	2	100	
13.	Environmental Studies		1	2	100	
14.	V	Gender Studies	1	1	100	
15.		Extension Activities	1	1	0	
<b>Total</b>			<b>42</b>	<b>148</b>	<b>4100</b>	

## **PROGRAMME LEARNING OBJECTIVES:**

- To have a comprehension of the instruments required to have the option to quantitatively examine and comprehend the common and social world,
- To be able to take care of issues, think scientifically, and reason quantitatively.
- To be able to get to and convey Mathematical data.
- To take an interest effectively in Mathematics related occasions in particular Conferences/Seminars/Workshops and Quiz programs.

## **PROGRAMME OUTCOMES:**

**Area information:** Demonstrate information on essential ideas, standards and uses of the particular science discipline.

**Logical and Technical Skills:** Ability to deal with/utilize suitable apparatuses/strategies/gear with a comprehension of the standard working methods, wellbeing perspectives/impediments.

**Basic reasoning and Problem settling:** Identify and basically break down appropriate issues in the important order utilizing proper instruments and strategies just as ways to deal with coming to feasible end results/arrangements.

**Individual and collaboration:** Exhibit the possibility to successfully achieve assignments freely and as a part or pioneer in various groups, and in multidisciplinary settings.

**Powerful Communication:** Communicate successfully in spoken and composed structure just as through electronic media with mainstream researchers just as with society on the loose.

**Society:** Analyse the effect of logical and innovative advances on nature and society and the requirement for reasonable improvement.

**Morals:** Commitment to proficient morals and duties.

**Deep-rooted learning:** Ability to participate in long-lasting learning with regard to the fast advancements in the control.

## **PROGRAMME SPECIFIC OUTCOMES:**

- Explicate the concepts of pure and applied Mathematics by demonstrating the knowledge and understanding of the mathematical principles in multidisciplinary environments.
- Demonstrate a computational ability in solving a wide array of mathematical problems.
- Utilize mathematical skills of the logical and scientific approach.
- Appreciate the beauty of Mathematics with the attainment of proficiency in problem solving, computational skills, critical thinking, technical and quantitative reasoning.

**First Year**

**CORE COURSE I  
DIFFERENTIAL CALCULUS AND  
TRIGONOMETRY  
(Theory)**

**Semester I**

**Code:**

**Credit: 5**

**COURSE OBJECTIVES:**

- To inculcate what a derivative is in terms of the idea of a tangent line to the graph of a function, how a derivative can be used to describe the rate of change of one quantity with respect to another, and how to relate the geometric ideas to the analytic ideas.
- To understand intuitive explanation of the process of taking a limit, to compute basic limits of functions and understand the importance of limits to the process of differentiation and be able to compute the derivative of a simple function.
- To know continuity as related to functions and able to relate an intuitive notion of continuity to the mathematical definition of continuity, to compare and contrast the ideas of continuity and differentiability.
- To recognize and use the vocabulary of angles (including standard position, initial and terminal sides, quadrantal angles, acute, right, and obtuse angles)
- To know the usage of right triangles to evaluate the six trigonometric functions
- To compute the six trigonometric functions of any angle and use the unit circle to define the six trigonometric functions for all real numbers.

**UNIT – I:**

Functions and Limits: Constants and variables – Functions – Classification of functions - Limits.

**UNIT – II:**

Methods of Successive Differentiation – Leibnitz's Theorem and its applications- Increasing & Decreasing functions –Maxima and Minima of functions of two variables.

**UNIT – III:**

Curvature – Radius of curvature in Cartesian and Polar Coordinates – Centre of curvature– Radius of curvature – Evolutes& Involutives

**UNIT – IV:**

Expansions of  $\sin(nx)$ ,  $\cos(nx)$ ,  $\tan(nx)$ – Expansions of  $\sin^n x$ ,  $\cos^n x$  –Expansions of  $\sin(x)$ ,  $\cos(x)$ ,  $\tan(x)$  in powers of  $x$ .

**UNIT – V:**

Hyperbolic functions – Relation between hyperbolic & Circular functions- Inverse hyperbolic functions.

## **UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):**

The Double angle formulas and The Half-angles identities.

### **REFERENCES:**

1. S.Narayanan and T.K.ManicavachagamPillai, **Calculus Volume I**, S.Viswanathan (Printers&Publishers) PvtLimited , Chennai -2011.
2. S.Arumugam& others, **Trigonometry and Fourier series**, New Gamma Publications -1999

UNIT – I : Chapter I Sections 1 to 10 of [1]

UNIT – II : Chapter III Sections 1.1 to 2.2, Chapter IV Section 2.1, 2.2 & Chapter V 1.1 to 1.4 of [1]

UNIT – III : Chapter X Sections 2.1 to 2.6 of [1]

UNIT – IV : Chapter 1 Section 1.2 to 1.4 of [2]

UNIT – V : Chapter 2 Section 2.1 & 2.2 of [2]

3. S.Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.
4. S. Narayanan, T.K. ManichavasagamPillai, Trigonometry, S. ViswanathanPvt Limited, and Vijay Nicole Imprints Pvt Ltd, 2004.

### **COURSE OUTCOME:**

After completing this course, the students will be able to;

- Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
- Compare and contrast the ideas of continuity and differentiability.
- Find maxima, minima, critical points and inflection points of functions and to determine the concavity of curves.
- Convert angles from degrees to radians and vice versa.
- Compute the length of a circular arc given the radius and the interior angle.
- Understand the definitions of the inverse trigonometric functions, compute the domain and range of the hyperbolic and inverse trigonometric functions and to find exact values of composite functions with inverse trigonometric functions.

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**First Year**

**CORE COURSE II**  
**INTEGRAL CALCULUS AND FOURIER SERIES**  
**(Theory)**

**Semester I**

**Code:**

**Credit: 5**

**COURSE OBJECTIVES:**

- To get exposed to the concepts of reduction formulae and Fourier series.
- To apply double and triple integral to find the area and volume.
- To understand the concepts of Beta and Gamma functions and their applications.

**UNIT – I:**

Definite integrals - Integration by parts and reduction formulae.

**UNIT – II:**

Geometric Application of Integration-Area under plane curves: Cartesian co-ordinates -Area of a closed curve - Examples - Areas in polar co-ordinates.

**UNIT – III:**

Double integrals – changing the order of Integration – Triple Integrals.

**UNIT – IV:**

Beta and Gamma functions and the relation between them –Integration using Beta and Gamma functions.

**UNIT – V:**

Fourier series- definition - Fourier Series expansion of periodic functions with Period  $2\pi$  – Use of odd & even functions in Fourier Series. Half-range Fourier Series – Development in Cosine series – Development in Sine series.

**UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):**

Chemical, Physical and Biomedical Applications of Fourier series.

**REFERENCES:**

1. S.Narayanan and T.K.ManicavachagamPillai, Calculus Volume II, S.Viswanathan (Printers& Publishers) Pvt. Limited, Chennai -2011.
2. S. Narayanan, T.K. Manicavachagam Pillai, Calculus, Vol. III, S. Viswanathan Pvt. Limited, and Vijay Nicole Imprints Pvt. Ltd, 2004.

UNIT – I	: Chapter 1 section 11, 12 & 13 of [1]
UNIT – II	: Chapter 2 section 1.1, 1.2,1.3& 1.4 of [1]
UNIT – III	: Chapter 5 section 2.1, 2.2 & 4 of [1]
UNIT – IV	: Chapter 7 section 2.1 to 2.5 of [1]
UNIT – V	- Chapter 6 Section 1, 2, 3, 4, 5.1, 5.2 of [2]

**REFERENCE(S):**

1. Shanti Narayan, Differential & Integral Calculus.
2. Dr. S.Arumugam and Prof. A.ThangapandiIssac, Fourier series, New Gamma Publishing house.

**COURSE OUTCOMES:**

After completing this course, the students will be able to:

- Derive reduction formula and thereby evaluate some standard integrals.
- Explain the properties of Beta and Gamma functions and apply it to compute the integral.
- Identify odd and even functions and determine Fourier series expansion of these given functions.
- Apply change of variable method to evaluate double integral.
- Utilize double and triple integral to compute area and volume of a solid.

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**First Year**

**CORE COURSE III  
DIFFERENTIAL EQUATIONS  
(Theory)**

**Semester II**

**Code:**

**Credit: 5**

**COURSE OBJECTIVES:**

- To know the order and degree of the ODE's.
- To study DEs and PDEs of first and second order.
- To identify some specific methods and solve them.
- To make difference between ODE and PDE.
- To know some standard methods.

**UNIT – I:**

Equations of the first order and first degree – Variable separable – Homogeneous, Non-homogeneous, Linear equations – Bernoulli's equation – Exact differential equations: Sufficient condition for exact differential equations – Practical rules for solving exact differential equations.

**UNIT – II:**

First order, higher degree differential equations– Equations solvable for  $dy/dx$ , solvable for  $y$ , solvable for  $x$ , Clairaut's form – Homogeneous equations in  $x$  and  $y$ – simple problems.

**UNIT – III:**

Particular integrals of second order differential equations with constant coefficients - Linear equations with variable coefficients – Method of Variation of Parameters (Omit third & higher order equations)..

**UNIT – IV:**

Formation of Partial Differential Equation – General, Particular & Complete integrals – Solution of PDE of the standard forms - Lagrange's method - Charpit's method and few standard forms.

**UNIT – V:**

PDE of second order homogeneous equation with Constant coefficients – Particular integrals of the forms  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^r y^s$  and  $e^{ax+by}.f(x,y)$ .

**UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):**

Moving Boundary Value Problems

**REFERENCES:**



1. T.K.ManicavachagamPillay&S.Narayanan, Differential Equations, S.Viswanathan Publishers Pvt.Ltd., 1996.
2. Arumugam& Isaac, Differential Equations, New Gamma Publishing House, Palayamkottai, 2003.

UNIT – I : Chapter II – Sections 1,2,3,4,5,6 of [1]

UNIT – II : Chapter IV – Sections 1,2& 3 of [1]

UNIT – III : Chapter V – Sections 1,2,3,4 & 5, Chapter VIII – Section 4 of [1]

UNIT – IV : Chapter XII – Sections 1 – 6 of [1]

UNIT – V : Chapter V of [2]

3. M.D.Raisinghania , Ordinary and Partial Differential Equations, S.Chand& Co.
4. M.K. Venkatraman, Engineering Mathematics, S.V. Publications, 1985 Revised Edition.

### **COURSE OUTCOMES:**

After completing this course, the students will be able to:

- Solve first-order ordinary differential equations.
- Solve higher order differential equations.
- Solve the Higher order differential equations using methods of variation of parameter.
- Solve partial differential equations using Lagrange's Method.

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**First Year**

**CORE COURSE IV  
ANALYTICAL GEOMETRY 3D  
(Theory)**

**Semester II**

**Code:**

**Credit: 5**

**COURSE OBJECTIVES:**

- To study three dimensional Cartesian Co-ordinates system.
- To enable the students to develop their skill in three dimensions

**UNIT – I:**

Symmetrical form of equation of a straight line – Equation of a straight line passing through two given points – Condition for a line to be parallel to a plane – Angle between a plane and a line – Condition for two straight lines to be coplanar – Shortest Distance between two given lines.

**UNIT – II:**

Sphere – Equation of a sphere when the centre and radius are given – Plane section of a sphere – Equation of a circle – Intersection of two spheres – The equation of a tangent plane to a sphere.

**UNIT – III:**

Equation of a surface – Cone – Right Circular cone – Intersection of a straight line and quadric cone – Tangent plane and normal.

**UNIT – IV:**

Condition for a plane to touch a quadric cone - angle between lines in which a plane cuts a cone – Condition that a cone has three mutually perpendicular generators.

**UNIT – V:**

Central quadrics – intersection of a line and a quadric – tangents and tangent planes – condition for a plane to touch a conicoid.

**UNIT – VI CURRENT CONTOUR (For Continuous Internal Assessment Only):**

An Introduction to Geo Gebra software.

**REFERENCES:**

1. TManickavasagamPillay, T.K. and Natarajan. T, A Text of Analytical Geometry– Part II – Three dimensions, S.Viswanathan (Printers & Publishers) Pvt. Ltd. 2005,

UNIT – I : Chapter III – Sections 1 to 8

UNIT – II : Chapter IV – Sections 1 to 8

UNIT – III : Chapter V – Sections 1 to 4

UNIT – IV : Chapter V – Sections 5 to 7

UNIT – V : Chapter V – Sections 9 to 12

2. Shanthi Narayanan and Mittal P.K, Analytical Solid Geometry, 16<sup>th</sup> Edition  
S.Chand & Co., New Delhi.

### **COURSE OUTCOMES:**

After completing this course, the students will be able to:

- Gain knowledge about the regular geometrical figures and their properties.
- Analyze condition of tangency and find the tangent plane to the sphere.
- Examine the condition for the general equation of the cone.
- Understand the concept of quadric cone and its properties.
- Acquire the basic knowledge of tangents and conicoid.

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