CENTRE FOR DISTANCE AND ONLINE EDUCATION

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI – 620 024.

B.Sc. Mathematics- CHOICE BASED CREDIT SYSTEM–
LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(Applicable to the candidates admitted form the academic year 2026-27 onwards)

Sem.	Part	Course	Title	Credit	Exam Hours	Marks		Total
						Int.	Ext.	
I	I	Language Course – I (LC) (Tamil*/Other Languages +#)		3	3	25	75	100
	II	English Course - I (ELC)		3	3	25	75	100
	III	Core Course – I (CC)	Differential Calculus and Trigonometry	5	3	25	75	100
		Core Course – II (CC)	Integral Calculus and Fourier Series	4	3	25	75	100
		First Allied Course – I (AC)	Allied Physics-I	4	3	25	75	100
		First Allied Practical (AP)	Physics Lab	-	-	-	-	-
	IV	Value Education		2	3	25	75	100
	TOTAL			**21**	**-**	**-**	**-**	**600**
II	I	Language Course - II (LC) (Tamil*/Other Languages +#)		3	3	25	75	100
	II	English Course - II (ELC)		3	3	25	75	100
	III	Core Course – III (CC)	Differential Equations	5	3	25	75	100
		Core Course – IV (CC)	Analytical Geometry 3D	4	3	25	75	100
		First Allied Course – II (AC)	Allied Physics-II	4	3	25	75	100
		First Allied Practical (AP)	Physics Lab	2	3	40	60	100
	IV	Environmental Studies		2	3	25	75	100
	TOTAL			**23**	**-**	**-**	**-**	**700**

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	65	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	8	200
8.		Project	1	7	100
9.	IV	Non Major Elective Courses	2	4	200
10.		Soft Skill Development	1	2	100
11.		Value Education	1	2	100
12.		Environmental Studies	1	2	100
13.	V	Gender Studies	1	2	100
	Total		**38**	**140**	**3800**

Note:

	Internal Marks	**External Marks**
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]
The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 40 marks [i.e. 16 marks]
The passing minimum for University Examinations shall be 40% out of 60 marks [i.e. 24 marks]

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Year: I		**Semester :** I
CORE COURSE I **DIFFERENTIAL CALCULUS AND TRIGONOMETRY**		
Code :		**Credit :** 5

Course Objectives:

1. 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.
2. 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.
3. 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.
4. To recognize and use the vocabulary of angles (including standard position, initial and terminal sides, quadrantal angles, acute, right, and obtuse angles)
5. To know the usage of right triangles to evaluate the six trigonometric functions
6. 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.

UNIT III

Curvature – Radius of curvature in Cartesian and Polar Coordinates – Centre of curvature – Radius of curvature.

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.

TEXT BOOK(S)

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

UNIT – I : Chapter I Sections 1 to 12 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]

REFERENCE(S)

1. S.Arumugam and Isaac, Calculus, Volume1, New Gamma Publishing House, 1991.
2. S. Narayanan, T.K. Manichavasagam Pillai, Trigonometry, S. Viswanathan Pvt Limited, and Vijay Nicole Imprints Pvt Ltd, 2004.

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

1. 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.
2. Compare and contrast the ideas of continuity and differentiability.
3. Find maxima, minima, critical points and inflection points of functions and to determine the concavity of curves.
4. Convert angles from degrees to radians and vice versa.
5. Compute the length of a circular arc given the radius and the interior angle.
6. 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.

Year : I		**Semester :** I

CORE COURSE II

INTEGRAL CALCULUS AND FOURIER SERIES

Objectives :

1. To get exposed to the concepts of reduction formulae and Fourier series.
2. To apply double and triple integral to find the area and volume.
3. 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.

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 2π – Use of odd & even functions in Fourier Series. Half-range Fourier Series.

TEXT BOOK(S)

1. S. Narayanan and T.K. Manicavachagam Pillai, 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.
3.

UNIT – I : Chapter 1 section 11, 12 & 13 of [1]
UNIT – II : Chapter 2 section 1.1, 1.2,1.3 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. Thangapandi Issac, Fourier series, New Gamma Publishing house.

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

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

Year : I		**Semester :** II

CORE COURSE III

DIFFERENTIAL EQUATIONS

Objectives :

1. To know the order and degree of the ODE's.
2. To study DEs and PDEs of first and second order.
3. To identify some specific methods and solve them.
4. To make difference between ODE and PDE.
5. 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 – 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 $e^{ax+by}.f(x,y)$.

TEXT BOOK(S)

1. T.K. Manicavachagam Pillay & 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]

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

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

Year : I		**Semester :** II

CORE COURSE IV

ANALYTICAL GEOMETRY 3D

Objectives :

1. To study three dimensional Cartesian Co-ordinates system.
2. 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.

TEXT BOOK(S)

1. T Manickavasagam Pillay, 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 1,2,5 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 11

REFERENCE(S)

1. Shanthi Narayanan and Mittal P.K, Analytical Solid Geometry, 16th Edition S. Chand & Co., New Delhi.

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

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