STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

DIFFERENTIAL CALCULUS

CODE: 15MT/MC/DC14 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 5 2

OBJECTIVE OF THE COURSE

- To understand the concepts of differential calculus in depth

PRE-REQUISITE

Knowledge of basic concepts on limits, continuity and differentiation of a function of one or more variables

Unit 1 **(13 hrs.)**

Successive Differentiation

1.1 The n^{th} Derivative and Standard Results
1.2 Differentiation of Fractional Expressions
1.3 Trigonometric Transformations
1.4 Formation of Equations Involving Derivatives
1.5 Leibnitz Theorem

Unit 2 **(9 hrs.)**

Envelopes

2.1 Introduction to Envelopes
2.2 Method of Finding the Envelope
2.3 Definition of Envelope of a Family of Curves
2.4 Equation of Envelope where $f(x, y, t) = 0$ is Quadratic in t
2.5 Equation of Family of Curves Containing Only One Parameter

Unit 3 **(9 hrs.)**

Curvature of Plane Curves

3.1 Introduction to Curvature
3.2 Circle, Radius and Centre of Curvature
3.3 Cartesian Formula for the Radius of Curvature
3.4 Coordinates of the Centre of Curvature

Unit 4 **(9 hrs.)**

Evolute

4.1 Evolute and Involute

4.2 Radius of Curvature When the Curve is Given in Polar Coordinates
4.3 Pedal Equation of a Curve
4.4 Chord of Curvature

Unit 5 **(12 hrs.)**

Maxima and Minima

5.1 Maxima and Minima of Functions of Two Variables
5.2 Lagrange's Method of Undetermined Multipliers

Tracing of Curves

5.3 Cartesian Coordinates
5.4 Polar Equation
5.5 Well-known Curves

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TEXT BOOK

Narayanan S. and Manicavachagam Pillay T.K. *Calculus - Vol. I.* Madras: S.Viswanathan, Reprint 2012.

Chapter III – Sec 1.1 - 1.6, 2.1 & 2.2
Chapter VIII – Sec 4,5
Chapter X – Sec 1.1 – 1.4, 2.1 - 2.8 & 3.1
Chapter XIII – Sec 1 & 2

BOOKS FOR REFERENCE

James Stewart. *Calculus Concepts and Contexts*. United States of America: Brooks Thomeon Learning, 2001.

Singh U.P. Srivastava R.J. and N.H. Siddiqui, *A Textbook of Differential Calculus*, New Delhi: Wisdom, 2011.

G.C. Chaubey. S.K.D Dubey, M.U Khan, D.S Pandey, *A Textbook of Advanced Calculus*, New Delhi: Wisdom, 2012.

Maity K.C., R.K Ghosh, *Differential Calculus*, Kolkata: New Central Book, 2001.

WEB RESOURCES

http://sydney.edu.au/stuserv/documents/maths_learning_centre/differentialcalculus.pdf
http://www.mathsisfun.com/calculus/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 Mins.

Section A: 3 × 2 = 06 (Three questions to be set)
Section B: 3 × 8 = 24 (Four questions to be set)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:

List of evaluation modes:
Quiz
Open book tests
Group discussion
Assignments
Project
Problem solving

End Semester Examination:

Total Marks: 100 Duration: 3 Hours

Section A: 10 × 2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.Sc. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2015-2016)

ALGEBRA AND TRIGONOMETRY

CODE: 15MT/MC/AT14 **CREDITS: 4**

L T P: 4 0 0

TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

- To impart knowledge of solving algebraic, transcendental and matrix equations

PRE REQUISITES:

Basic knowledge of polynomial equations, trigonometry, matrices and determinants

Unit 1 **(10 hrs.)**

Theory of Equations

1.1 Polynomial Equations
1.2 Symmetric Function of Roots in Terms of Coefficients
1.3 Transformation of Equations
1.4 Reciprocal Equations

Unit 2 **(10 hrs.)**

Theory of Equations (contd.)

2.1 Increase or Decrease the Roots of a Given Equation
2.2 Formation of Equations
2.3 Transformations in General
2.4 Descarte's Rule of Signs
2.5 Horner's Method

Unit 3 **(10 hrs.)**

Matrices

3.1 Types of Matrices- Unitary and Orthogonal Matrices
3.2 Eigenvalues and Eigenvectors
3.3 Cayley Hamilton Theorem
3.4 Similar Matrices
3.5 Diagonalization of a Matrix

Unit 4 **(12 hrs.)**

Trigonometry

4.1 Expansions of $\cos n\theta$, $\sin n\theta$ and $\tan n\theta$

4.2 Expansion of $\cos^n \theta$ and $\sin^n \theta$ in a Series of sines and cosines of Multiples of θ

4.3 Expansion of $\sin\theta$ and $\cos\theta$ in Powers of θ.

4.4 Hyperbolic Functions

4.5 Euler's Formula for $e^{i\theta}$

4.6 Definition of Hyperbolic Functions – Relations Between Circular and Hyperbolic Functions – Formulae Involving Hyperbolic Functions – Expansions of $\sinh x$ and $\cosh x$ in Powers of x

4.7 Solution of Trigonometric Equations

Unit 5 **(10 hrs.)**

Trigonometry (contd.)

5.1 Inverse Hyperbolic Functions in Terms of Logarithmic Functions

5.2 Separation into Real and Imaginary Parts of

$\sin(x+iy), \cos(x+iy), \tan(x+iy), \sinh(x+iy), \cosh(x+iy), \tanh(x+iy)$

5.3 Logarithm of a Complex Number

TEXT BOOKS

Manicavachagam Pillay T.K., Natarajan T. and K.S Ganapathy. *Algebra –Vol I.* Madras: S. Viswanathan, 2006.

Chapter 6 Exercise : 43,44, 46, 47, 48, 50, 51, 52, 57

Manicavachagam Pillay T. K., Natarajan T. and K.S. Ganapathy, *Algebra- Vol. II.* Madras: S. Viswanathan, and Vijay Nicole, 2006.

Chapter 2 Exercise : 14.

Narayanan. S, *Trigonometry*. Madras: Viswanathan, 2007.

Chapter 1 Section 1- 4
Chapter 3 Section 1-5 (excluding formation of equations)
Chapter 4 Section 1-2.3
Chapter 5 Section 5

BOOKS FOR REFERENCE

Harikishnan, *Trigonometry*. New Delhi: Atlantic, 2005.

Hazra A. K. *Algebra, Calculus and Generalized Inverse (Part I).* New Delhi: Viva Books, 2009.

Hazra A.K., *Algebra, Calculus and Generalized Inverse (Part II).* New Delhi: Viva Books, 2009.

Veerarajan T., *Trigonometry, Algebra and Calculus*. New Delhi: Tata McGraw Hill, 2003.

William L. Hosch(Edt.), *The Britannica Guide to Algebra and Trigonometry*. New York:

Britannica, 2011.

Venkataraman M.K., Manorama Sridhar, *Classical Algebra and Trigonometry*. Chennai: Sivasankar, 2001.

WEB RESOURCES

http://www.edurite.com/kbase/application-of-matrices-in-real-life
http://www.decodedscience.com/practical-uses-matrix-mathematics/40494
http://malini-math.blogspot.in/2011/08/applications-of-trigonometry-in-real.html
http://www.intmath.com/help/useoftrig.php

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 Duration: 90 Mins.

Section A: 3×2 = 6 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Test
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 Duration: 3 Hours

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Course Offered by the Department of Mathematics for B.Sc. (Physics) Degree Programme

SYLLABUS

(Effective from the academic year 2015-2016)

MATHEMATICS FOR PHYSICS - I

CODE : 15MT/AC/MP15 **CREDITS : 5**

L T P : 5 0 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

- To provide basic mathematical concepts required for students pursuing Physics

PRE-REQUISITES

Knowledge of matrices, concepts of limits, continuity, differentiation, integration

Unit 1 **(12 hrs.)**

Algebra

1.1 Characteristic Equation of a Square Matrix
1.2 Cayley Hamilton Theorem
1.3 Evaluation of Eigenvalues and Eigenvectors
1.4 Diagonalisation of Matrices Possessing Distinct Eigenvalues

Unit 2 **(15 hrs.)**

Differential Calculus

2.1 Differentiation of Hyperbolic and Inverse Hyperbolic Functions
2.2 Higher Derivatives - n^{th} derivative – Standard Results
2.3 Trigonometric Transformations
2.4 Formation of Equations Involving Derivatives

Integral Calculus

2.5 Methods of Integration of Functions of the Following Types:

$$\frac{1}{(x+p)\sqrt{ax^2+bx+c}}; \int\sqrt{(x-a)(b-x)}dx; \int\frac{1}{\sqrt{(x-a)(b-x)}}dx; \int\frac{(x-a)}{(b-x)}dx$$

Unit 3 **(12 hrs.)**

Improper Integrals

3.1 Definitions of Beta and Gamma Integrals
3.2 Recurrence Formula for Gamma Functions
3.3 Properties of Beta Functions
3.4 Relation between Beta and Gamma Functions

Unit 4 **(13 hrs.)**

Differential Equations

4.1 Partial Differential Equation
4.2 Formation of Equations by Elimination of Constants and an Arbitrary Function
4.3 Definition of General, Particular, Complete and Singular Integral
4.4 Solutions of First Order Equations in their Standard Forms
4.5 Lagrange's Method of Solving of Linear Equations $Pp + Qq = R$

Unit 5 **(13 hrs.)**

Fourier Series

5.1 Definition of Fourier Series
5.2 Finding Fourier Coefficients for a given Periodic Function with Period 2π
5.3 Odd and Even Functions
5.4 Half - Range Series

TEXT BOOKS

Narayanan, S. and T.K. Manicavachagam Pillai. *Calculus Volume – I.* Madras: Viswanathan S, 2000.

Chapter 2: Sections 3.11- 3.14
Chapter 3: Sections 1.1 – 1.6

Narayanan S.and T.K.Manicavachagam Pillai, *Calculus-Vol II***.** Chennai: S. Viswanathan, 2012.

Chapter 7 Sec. 2.1, 2.3, 3 and 4 Exercise: 47

Narayanan, S., Hanumantha Rao and T.K. Manicavachagam Pillai, Ancillary *Mathematics – Volume - I.* Madras.:Viswanathan, S, 2012.

Chapter 3: Sections 3.4, 3.5

Narayanan, S. and T.K. Manicavachagam Pillai, Ancillary *Mathematics – Book – II.* Madras.:Viswanathan, S, 1999.

Integral Calculus- Chapter 1: Sections 8(cases 5-8)
Chapter 4: Sections 1-5.
Differential Equations – Chapter 6: Sections 1-3, 5, 6.

BOOKS FOR REFERENCE

Joseph, Edwards, *An Elementary Treatise on the Differential Calculus*. London: Macmillan, 1948.

Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume I.* Madras.:Viswanathan, S., 2006.

Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume II.* Madras.:Viswanathan, S., 2004.

Singaravelu A., Allied *Mathematics. Chennai*: Meenakshi, 2010.

Singaravelu A., Ramaa R., *Calculus of Finite Differences & Numerical Analysis (Allied Paper I*). Chennai: Meenakshi, 2003.

WEB RESOURCES

http://sydney.edu.au/stuserv/documents/maths_learning_centre/differentialcalculus.pdf
http://www.mathsisfun.com/calculus/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
Allied Core Course Offered by the Department of Mathematics for
B.Sc. (Chemistry) Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICS FOR CHEMISTRY – I

CODE : 15MT/AC/MC15 **CREDITS : 5**
L T P : 5 0 0
TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

- To provide basic mathematical concepts required for students pursuing Chemistry

PRE REQUISITES

Knowledge of basic concepts on matrices, determinants, limits, continuity and differentiation of a function of one or more variables

Unit 1 **(12 hrs.)**

Algebra

1.1 Characteristic Equation of a Square Matrix
1.2 Evaluation of Eigenvalues and Eigenvectors
1.3 Cayley Hamilton Theorem
1.4 Diagonalisation of Matrices possessing Distinct Eigenvalues

Unit 2 **(13 hrs.)**

Theory of Equations

2.1 Relation Between Roots and Coefficients
2.2 Solution of Equations under given Conditions On Roots
2.3 Transformation of Equations
2.4 Reciprocal Equations

Unit 3 **(15 hrs.)**

Differential Calculus

3.1 Differentiation of Hyperbolic and Inverse Hyperbolic Functions
3.2 Higher Derivatives - n^{th} derivative – Standard Results
3.3 Trigonometric Transformations
3.4 Formation of Equations Involving Derivatives

Integral Calculus

3.5 Methods of Integration of Functions of the Following Types:

$$\frac{1}{(x+p)\sqrt{ax^2+bx+c}}; \int\sqrt{(x-a)(b-x)}dx; \int\frac{1}{\sqrt{(x-a)(b-x)}}dx; \int\frac{(x-a)}{(b-x)}dx$$

Unit 4 **(13 hrs.)**

Differential Equations

4.1 Partial Differential Equation
4.2 Formation of Equations by Elimination of Constants and an Arbitrary Function
4.3 Definition of General, Particular, Complete and Singular Integral
4.4 Solutions of First Order Equations in their Standard Forms
4.5 Lagrange's Method of Solving of Linear Equations $Pp + Qq = R$

Unit 5 **(12 hrs.)**

Finite Differences

5.1 Finite Differences
5.2 Forward Difference Table
5.3 Interpolation Methods
5.4 Newton's Forward Formula
5.5 Newton's Backward Formula
5.6 Binomial Method
5.7 Lagrange's Formula

TEXT BOOKS

Narayanan, S. and T.K. Manicavachagam Pillai. *Calculus Volume–I.* Madras: Viswanathan S., 2000.

Chapter 2: Sections 3.11- 3.14
Chapter 3: Sections 1.1 – 1.6

Narayanan, S., Hanumantha Rao and T.K. Manicavachagam Pillai, *Ancillary. Mathematics–Volume - I.* Madras.:Viswanathan, S., 2012.

Chapter 2: Sections 2.2 -2.4
Chapter 3: Sections 3.4, 3.5
Chapter 4: Sections 4, 4.1 - 4.3

Narayanan, S. and T.K. Manicavachagam Pillai,Ancillary. *Mathematics – Book – II.* Madras.:Viswanathan, S., 1999.

Integral Calculus- Chapter 1: Sections 8(cases 5-8)
Differential Equations – Chapter 6: Sections 1-3, 5, 6.

BOOKS FOR REFERENCE

Joseph, Edwards, *An Elementary Treatise on the Differential Calculus*. London: Macmillan, 1948.

Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume I.* Madras.:Viswanathan, S., 2006.

Manicavachagam Pillai T.K., Natarajan T. and Ganapathy K. S, *Algebra Volume II.* Madras:Viswanathan, S., 2004.

Singaravelu A., *Allied Mathematics*. Chennai: Meenakshi, 2010.

Singaravelu A., Ramaa R., *Calculus of Finite Differences & Numerical Analysis (Allied Paper I).* Chennai: Meenakshi, 2003.

WEB RESOURCES

http://sydney.edu.au/stuserv/documents/maths_learning_centre/differentialcalculus.pdf
http://www.mathsisfun.com/calculus/

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:

List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

MULTIPLE INTEGRAL AND LAPLACE TRANSFORMS

CODE: 15MT/MC/ML24 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

- To understand the concepts of multiple integration and to introduce Laplace transformation as a tool in problem solving

PRE-REQUISITE

Knowledge of basic concepts on integration of one variable, definite integral and applications of definite integrals

Unit 1 **(10 hrs.)**

Multiple Integrals

1.1 Definitions of Double and Triple Integrals
1.2 Change of Order of Integration for Two Variables
1.3 Double Integrals and Triple Integrals in Cartesian Coordinates

Unit 2 **(10 hrs.)**

Multiple Integrals (contd.)

2.1 Double Integrals and Triple Integrals in Polar Coordinates
2.2 Change of Variables and Jacobian

Unit 3 **(10 hrs.)**

Improper Integrals

3.1 Definitions of Beta and Gamma Integrals
3.2 Recurrence Formula for Gamma Functions
3.3 Properties of Beta Functions
3.4 Relation between Beta and Gamma Functions

Unit 4 **(10 hrs.)**

Laplace Transform

4.1 Definition of Laplace Transform
4.2 Laplace Transform of $e^{-at}, \cos at$, $\sin at$ and t^n, where a is a Positive Integer
4.3 Laplace Transform of Periodic Functions

Unit 5 **(12 hrs.)**

Laplace Transform (contd.)

5.1 Some General Theorems
5.2 Evaluation of Integrals using Laplace Equations
5.3 Inverse Laplace Transform
5.4 Laplace Transform to Solve Ordinary Differential Equations with Constant Coefficients and Differential Equations Involving Integrals
5.5 Laplace Transform to Evaluate Certain Integrals

TEXT BOOKS

Narayanan S. and Manicavachagam Pillay T.K. *Calculus - Vol II***.** Chennai: S. Viswanathan, 2012.

Chapter 5	Sec. 2.1, 2.2, 3.1, 3.2 and 4	Exercises: 39, 40, 41
Chapter 6	Sec. 1.1, 1.2, 2.1, 2.3	Exercise: 45
Chapter 7	Sec. 2.1, 2.3, 3 and 4	Exercise: 47

Narayanan, S. and Manicavachagam Pillay T. K., *Calculus - Vol. III.* Chennai: S. Viswanathan, 2012.

Chapter 5 Section 1 – 8, 11 & 12

BOOKS FOR REFERENCE

Singaravelu A, *Differential equations, Fourier series and Laplace transforms*, Chennai: Meenakshi, 2002.

Alan Jeffrey, *Handbook of Mathematical formulas and Integrals*, United States: Academic, 2004.

Vittal, P.R., *Allied Mathematics*, Chennai: Margham, 2007.

Singh U.P, Siddiqui N.H, Srivastava R.J, *Integral Calculus*, New Delhi: Dominant, 2000.

WEB RESOURCES

http://sydney.edu.au/stuserv/documents/maths_learning_centre/differentialcalculus.pdf
http://www.mathsisfun.com/calculus/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3 × 2 = 06 (Three questions to be set)
Section B: 3 × 8 = 24 (Four questions to be set)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10 × 2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

ANALYTICAL GEOMETRY

CODE: 15MT/MC/AG25 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

- To understand the concepts of two dimensional Coordinate Geometry in depth and to introduce the concept of three dimensional geometry

PRE-REQUISITE

Knowledge of basic concepts on straight lines, circles and conics

Unit 1 **(10 hrs.)**

General Second Degree Equation

1.1 Condition for a General Second Degree Equation to Represent a Conic
1.2 Centre of the Conic given by the General Second Degree Equation (concept only)
1.3 Lengths and Positions of the Axes of the Central Conic $ax^2 + 2hxy + by^2 = 1$(concept only)

Unit 2 **(15 hrs.)**

Ellipse

2.1 Conjugate Diameters and its Properties
2.2 Equi-Conjugate Diameters

Hyperbola

2.3 Asymptotes
2.4 Conjugate Hyperbola
2.5 Relation between the Equation of a Hyperbola, its Asymptotes and Conjugate Hyperbola
2.6 Rectangular Hyperbola

Unit 3 **(10 hrs.)**

Plane

3.1 General Equation
3.2 Intercept Form
3.3 Normal Form
3.4 Angle Between Two Planes
3.5 Equation of Plane through the Line of Intersection of Two Given Planes
3.6 Length of Perpendicular from a given Point to a Plane

Unit 4 **(15 hrs.)**

Straight Line

4.1 Symmetrical Form
4.2 Line through Two Points
4.3 Reduction of the Unsymmetrical Form to the Symmetrical Form
4.4 Condition for a Line to Lie on a Plane
4.5 Plane Through a Given Line
4.6 Condition for Two Lines to be Coplanar
4.7 Equation of the Plane Containing the Two Lines
4.8 Shortest Distance between Two Skew Lines and Equation of the Line Containing the Shortest Distance

Unit 5 **(15 hrs.)**

Sphere and Cone

5.1 Equation of a Sphere with given Centre and Radius
5.2 General Form of the Equation of a Sphere
5.3 Plane Section of a Sphere
5.4 Intersection of Two Spheres
5.5 Equation of a Circle on a Sphere
5.6 Equation of Sphere Passing through given Circle
5.7 Tangent Plane to a Sphere
5.8 Necessary Condition for a General Equation of Second Degree to Represent a Cone
5.9 Equation of a Circular Cone with given Vertex, Axis and Semi-Vertical Angle

TEXT BOOKS

Manicavachagam Pillay T.K, and Natarajan T., *A Text book of Analytical Geometry Part I - Two dimensions*. Madras: S. Viswanathan, 2012.

Chapter 7 Sec. 16.1 - 16.4
Chapter 8 Sec. 4 - 13
Chapter 10 Sec. 3 – 6

Manickavachagam Pillay T.K. and Natarajan T., *A Text Book of Analytical Geometry - Part II* (Three Dimensions) Madras: S. Viswanathan, 2012.

Chapter 2 Sec. 1-10
Chapter 3 Sec. 1-8
Chapter 4 Sec. 1-8
Chapter 5 Sec. 2.1

BOOKS FOR REFERENCE

Singh, Shalini. *Two Dimensional Geometry*. New Delhi: Sarup, 2000.

Hari Krishnan. *Coordinate Geometry of Two Dimensions*. New Delhi: Atlantic, 2006.

Arup Mukherjee. *Analytical Geometry of two and three Dimensions*. Kolkata: Arunabha Sen Books and Allied, 2010.

Narayan, Shanti P.K., *Mittal Analytical Solid Geometry***,** New Delhi: S Chand, 2006.

WEB RESOURCE

http://acascipub.com

PATTERN OF EVALUATION

Continuous Assessment:
Total Marks: 50 **Duration: 90 Mins.**

Section A: 3 × 2 = 06 (Three questions to be set)
Section B: 3 × 8 = 24 (Four questions to be set)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10 × 2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
Allied Core Course Offered by the Department of Mathematics for
B.Sc. (Physics) Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICS FOR PHYSICS – II

CODE : 15MT/AC/MP25 **CREDITS : 5**
L T P : 5 0 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To provide basic mathematical concepts required for students pursuing Physics
- To inculcate problem solving skills

PRE-REQUISITES

Knowledge of limits, continuity, integration, complex numbers

Unit 1 **(10 hrs.)**

Multiple Integrals

1.1 Definitions of Double and Triple Integrals
1.2 Change of Order of Integration for Two Variables
1.3 Double Integrals and Triple Integrals in Cartesian Coordinates

Unit 2 **(10 hrs.)**

Multiple Integrals (contd.)

2.1 Double Integrals and Triple Integrals in Polar Coordinates
2.2 Change of Variables and Jacobian

Unit 3 **(15 hrs.)**

Laplace Transform

3.1 Definition and Transform of $f'(t)$ & $f''(t)$
3.2 Laplace Transform of Functions e^{-at}, *cos at, sin at, sinh at, cosh at* and t^n where '*n*' is a Positive Integer
3.3 First Shifting Theorem - Laplace Transform of $e^{-at}\cos bt$, $e^{-at}\sin bt$ and $e^{-at}t^n$
3.4 Inverse Laplace Transform
3.5 Solving Second Order Differential Equations with Constant Coefficients using Laplace Transform

Unit 4 **(16 hrs.)**

Complex Variables

4.1 Functions of a Complex Variable
4.2 Conformal Mapping (definitions and concepts only)
4.3 Elementary Transformation
4.4 Mapping by Elementary Functions - The Mappings $w = z^2$, $w = \sin z$

4.5 Taylor's Series (statement only)
4.6 Laurent's Series (statement only)
4.7 Singular Points
4.8 Residues at Poles

Unit 5 **(14 hrs.)**

Special Functions

5.1 Power Series
5.2 Legendre Differential Equations
5.3 Rodrigue's Formula for Legendre Polynomials
5.4 Explicit Expressions for Legendre Polynomials using Rodrigue's Formula
5.5 Graphical Representation of Legendre Polynomials
5.6 Transformations

TEXT BOOKS

Narayanan S. and Manicavachagam Pillay T.K., *Calculus-Vol II***.** Chennai: S.Viswanathan, 2012.

Chapter 5	Sec. 2.1, 2.2, 3.1, 3.2 and 4	Exercises: 39, 40, 41
Chapter 6	Sec. 1.1, 1.2, 2.1, 2.3	Exercise: 45

Narayanan , S. & T.K. Manicavachagam Pillay, *Ancillary Mathematics Book II* Madras: S. Viswanathan, 1999.

Differential Equations: Chapter 4: Sections 1-7.

A.B.Gupta, Fundamentals of Mathematical Physics, Books and Allied, 2012.
Chapter 8: Sections - 8.1-8.4

Arumugam S., A.T. Issac, & A. Somasundaram, *Complex Analysis***,** Chennai: SCITECH, 2002.

Chapter 2: Sections - 2.1, 2.9 (statements of theorems only)
Chapter 3: Sections – 3.1
Chapter 5: 5.1, 5.4
Chapter 7: Sections- 7.1, 7.2, 7.4. (statements of theorems only).
Chapter 8: Section - 8.1

WEB RESOURCES

http://www.javaquant.net/papers/Laplacetransform.pdf
http://www.intmath.com/laplace-transformation/10-applications.php

BOOKS FOR REFERENCE

Alan Jeffrey, *Handbook of Mathematical formulas and Integrals*, United States: Academic, 2004.

Murray R. Spiegel, *Theory and problems of Complex Variables*, Schaum's outline series, Singapore: McGraw, 1981.

Narayanan S. & T.K. *Manicavachagam Pillay*, *Calculus-Vol III***,** Madras: S. Viswanathan, 1997.

Shanti Naryan, *Theory of Functions of a Complex Variable***,** New Delhi :S Chand, 1973.

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
Allied Core Course Offered by the Department of Mathematics for
B.Sc. (Chemistry) Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICS FOR CHEMISTRY – II

CODE: 15MT/AC/MC25 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide basic mathematical concepts required for Chemistry
- To inculcate problem solving skills

Unit 1 **(14 hrs.)**

Group Theory

1.1 Groups –Definitions and Examples
1.2 Elementary Properties of a Group
1.3 Equivalent Definitions of a Group
1.4 Permutation Groups – Subgroups
1.5 Cyclic Groups
1.6 Order of an Element
1.7 Cosets and Lagrange's Theorem
1.8 Normal Subgroups and Quotient Groups

Unit 2 **(13 hrs.)**

Laplace Transform

2.1 Definition
2.2 Transforms of $f'(t)$ & $f''(t)$
2.3 Transformation of Function e^{-at}, $\cos at$, $\sin at$ and t^n, where 'n' is a Positive Integer
2.4 First Shifting Theorem - Laplace Transforms of $e^{-at}\cos bt$, $e^{-at}\sin bt$ and $e^{-at}t^n$

Unit 3 **(13 hrs.)**

Inverse Laplace Transform

3.1 Inverse Laplace Transforms of Functions Relating to $e^{-at}\cos bt$, $e^{-at}\sin bt$ and $e^{-at}t^n$
3.2 Applications to Solutions of Ordinary Differential Equations with Constant Coefficients

Unit 4 **(13 hrs.)**

Fourier Series

4.1 Fourier Series : Definition
4.2 Finding Fourier Coefficients for a given Periodic Function with Period 2π
4.3 Odd and Even Functions
4.4 Half - Range Series

Unit 5 **(12 hrs.)**

Statistics

5.1 Correlation
5.2 Scatter Diagram and its Uses
5.3 Karl Pearson's Coefficient of Correlation
5.4 Limits for Correlation Coefficient
5.5 Correlation Coefficient for a Bivariate Frequency Distribution
5.6 Probable Error of Correlation Coefficient
5.7 Spearman's Rank Correlation Coefficient
5.8 Limits for the Rank Correlation Coefficient

TEXT BOOKS

Arumugam.S and Issac.A.T , *Modern Algebra*, Chennai: SCITECH, 2002.

Chapter 3: Section - 3.1 – 3.9

Narayanan , S. & T.K. Manicavachagam Pillay, *Ancillary Mathematics* Book II Madras:S. Viswanathan, 1999.

Differential Equations: Chapter 4: Sections 1-7.
Integral calculus: Chapter 4: Sections 1-5.

Gupta S C. and V.K. Kapoor, *Fundamentals of Mathematical Statistics*, New Delhi: Sultan Chand, 2002.

Chapter 8 : 8.16 – 8.31
Chapter 9 : 9.1 – 9.8
Chapter 10: 10.1 – 10.9

BOOKS FOR REFERENCE

Arumugam, S., and Issac, *Statistics,* Palayamkottai: New Gamma, 1999.

Joseph, Edwards, (1948), *An Elementary Treatise on the Differential Calculus.* London: Macmillan, 1948.

Narayan, Shanti. *A Text Book of Calculus - Part I and II.* New Delhi: Shyamlal, 1983.

WEB RESOURCES

http://www.iasri.res.in/ebook/EB_SMAR/e-book_pdf%20files/Manual%20II/7-correlation_and_regression.pdf
http://www.iasri.res.in/ebook/fet/Chap%202_Correlation%20and%20Regression.pdf

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

VECTOR ANALYSIS AND APPLICATIONS

CODE: 15MT/MC/VA34 **CREDITS: 4**
L T P: 4 0 0
TOTAL TEACHING HOURS : 5 2

OBJECTIVE OF THE COURSE

- To familiarize the concept of magnitude and direction also to introduce the concepts and applications of line, surface and volume integral

PRE-REQUISITE

Knowledge of vector algebra

Unit 1 **(10 hrs.)**

Vector Differentiation

1.1 Scalar Point Function and Vector Point Function
1.2 Derivative of Vector Valued Functions
1.3 Gradient of a Scalar Point Function
1.4 Continuity and Differentiability
1.5 Partial Derivative of Vectors
1.6 Directional Derivatives

Unit 2 **(10 hrs.)**

Vector Differentiation (contd.)

2.1 Divergence of a Vector Point Function
2.2 Curl of a Vector Point Function
2.3 Vector Identities Involving Differential Operators
2.4 Solenoidal and Irrotational Vectors
2.5 Laplacian Operator

Unit 3 **(12 hrs.)**

Vector Integration

3.1 Integration of Vector Functions
3.2 Displacement, Velocity, Acceleration
3.3 Definite Integrals
3.4 Line Integral, Surface Integral, Volume Integral

Unit 4 **(10 hrs.)**

Application of Vector Differentiation and Vector Integration to Differential Geometry and Mechanics

4.1 Unit Tangent Vector
4.2 Unit Normal Vector to Given Surfaces - Principal Normal
4.3 Equation to Tangent Plane and Normal
4.4 Rectifying Plane and Osculating Plane to a Curve
4.5 Frenet-Serret Formulae
4.6 Physical Significance of Gradient, Divergence and Curl of a Vector Point Function
4.7 Velocity and Acceleration Vectors Relative to Fixed and Moving System
4.8 Angular Momentum, Continuity Equation for an Incompressible Fluid
4.9 Curvilinear Coordinates: Transformation, Orthogonal Curvilinear Coordinates
4.10 Unit Vectors in Curvilinear Systems
4.11 Arc Length and Volume Elements, Gradient, Divergence and Curl
4.12 Special Orthogonal Coordinate Systems (Cylindrical and Spherical Coordinates and Related Problems only)

Unit 5 **(10 hrs.)**

Vector Integration (contd.)

5.1 Relation between the Line Integral and Surface Integral: Stokes' Theorem (statement only)
5.2 Relation between the Surface Integral and Volume Integral: Gauss Divergence Theorem (statement only)
5.3 A Special Case of Stokes' Theorem: Green's Theorem in Two Dimensions (statement only)
5.4 Verification of the Theorems

TEXT BOOKS

Raisinghania M.D., *Vector Calculus*, New Delhi: S Chand, 1997.

Chapter 3: Pages: 123 – 125

Seymour Lipschutz, Dennis Spellman, Murray R. Spiegel, *Vector Analysis and an Introduction to Tensor Analysis* (Second Edition)**,** Schaum's Outline Series, New Delhi: Tata McGraw Hill, 2009.

Chapter 3: Pages: 44 – 64 (excluding Differential Geometry)
Chapter 4: Pages: 69 – 94 (excluding 4.6)
Chapter 5: Pages: 97 – 121
Chapter 6: Pages: 126 – 153
Chapter 7: Pages: 157 – 179

BOOKS FOR REFERENCE

Absos Ali Shaikh and Sanjib Kumar Jana, *Vector Analysis with Applications***,** New Delhi: Narosa, 2009.

Duraipandian P. and Laxmi Duraipandian, *Vector Analysis*, Madras: Emerald, 1987.

Iyengar N.CH.S.N., *Vector Analysis*, New Delhi: Anmol, 1997.

Narayanan S. and Manicavachagam Pillay T.K., *Vector Algebra and Analysis*, Madras: S. Viswanathan, 1980.

Raisinghania M.D., *Vector Analysis* , New Delhi: S Chand, 1985.

Shanti Narayan and Mittal P.K., *A textbook of Vector Analysis with Applications*, New Delhi: S Chand, 1955.

Viswanathan K. and Selvaraj S., *Vector Analysis*, Madras: Emerald, 1993.

WEB RESOURCES

http://web.mit.edu/8.02t/www/materials/modules/ReviewA.pdf
https://archive.org/details/117714283
http://www.geophysics.ut.ac.ir/Fa/teach/ashtari/Data/em-2-tahlil-bordari.pdf

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3 × 2 = 06 (Three questions to be set)
Section B: 3 × 8 = 24 (Four questions to be set)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:

List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10 × 2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH I - MATHEMATICS

SYLLABUS

(Effective from the academic year 2015-2016)

INTRODUCTION TO GRAPH THEORY

CODE : 15MT/MC/GT34 **CREDITS : 4**

LT P : 4 0 0

TOTAL TEACHING HOURS : 52

OBJECTIVES OF THE COURSE

- To introduce some basic concepts of graph theory
- To develop theoretical aspects of graph theory

Unit 1 **(12 hrs.)**

Basic Concepts of Graph theory

1.1 Definition and Examples
1.2 Degrees
1.3 Subgraphs
1.4 Isomorphism
1.5 Ramsey Numbers
1.6 Intersection Graphs and Line Graphs
1.7 Matrices
1.8 Operations on Graphs

Unit 2 **(10 hrs.)**

Degree Sequences

2.1 Degree Sequences
2.2 Graphic Sequences

Connectedness

2.3 Walks, Trails and Paths
2.4 Connectedness and Components
2.5 Blocks

Unit 3 **(8 hrs.)**

Eulerian and Hamiltonian Graphs

3.1 Eulerian Graphs
3.2 Hamiltonian Graphs

Unit 4 **(10 hrs.)**

Planarity

4.1 Definition and Properties
4.2 Characterization of Planar Graphs
4.3 Thickness, Crossing and Outer Planarity

Unit 5 **(12 hrs.)**

Trees

5.1 Characterisation of Trees

5.2 Centre of a Tree

Directed Graphs

5.3 Definitions and Basic Properties

5.4 Paths and Connections

5.5 Digraphs and Matrices

TEXT BOOK

Arumugam S. & Ramachandran S., Invitation to Graph Theory. Chennai: Scitech, 2013.

Chapter 2 Sections 2.1, 2.2 - 2.4, 2.5, 2.7- 2.9
Chapter 3 Sections 3.1, 3.2.
Chapter 4 Sections 4.1 - 4.3
Chapter 5 Sections 5.1, 5.2
Chapter 6 Sections 6.1, 6.2.
Chapter 7 Sections 7.1,7.2
Chapter 8 Sections 8.1 - 8.3
Chapter 10 Sections 10.1 - 10.3.

BOOKS FOR REFERENCE

Balakrishnan V. K., *Schaum's Outline of Graph Theory,* Chennai: Mcgraw, 1997.

Bondy J.A & U.S.R. Murty, *Graph Theory with Applications*. London: The Macmillan, 1982.

Choudum S.A., *A First Course in Graph Theory* Madras: Macmillan, 1987.

Harary F., *Graph Theory*. U.S.A.: Addison - Wesley, 1969.

John Clark G.T. & Derek Allan Holton, *A First Look at Graph Theory*, World Scientific 1995.

Narsingh Deo. *Graph Theory with Applications to Engineering and Computer Science*. New Delhi: Prentice - Hall, 1994.

JOURNALS

Journal of Graph Theory
Arcs Combinatorial
Journal of Combinatorics
SIAM Journal on Discrete Mathematics
Information Processing Letters
Discrete Mathematics
Journal of Discrete Algorithms
Graphs and Combinatorics
Advances in computational mathematics

WEB RESOURCES

http://world.mathigon.org/GraphTheory
http://press.princeton.edu/titles/10314.html
http://www.open-graphtheory.org/
http://www.math.nsysu.edu.tw/~zhu/papers.html
http://mathforum.org/library/topics/graph_theory/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving.

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICAL STATISTICS – I

CODE: 15MT/AC/ST35 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

- To develop the statistical concepts and introduce the tools required for making Statistical Inferences

Unit 1 **(14 hrs.)**

Probability

1.1 Random Experiments - Sample Spaces – Events
1.2 The Concept of Probability – The Axioms of Probability
1.3 Some Important Theorems on Probability
1.4 Assignment of Probabilities
1.5 Conditional Probability – Theorems of Conditional Probability
1.6 Independent Events
1.7 Baye's Theorem or Rule

Unit 2 **(18 hrs.)**

Random Variables and Distribution Functions

2.1 Random Variables – Discrete Probability Distributions
2.2 Distribution Functions for Random Variables - Distribution Functions for Discrete Random Variables – Continuous Random Variables
2.3 Graphical Interpretations – Joint Distributions – Independent Random Variables

Unit 3 **(13 hrs.)**

Mathematical Expectation

3.1 Definition of Mathematical Expectation
3.2 Functions of Random Variables – Some Theorems on Expectation
3.3 The Variance and Standard Deviation – Some Theorems on Variance
3.4 Standardized Random Variables
3.5 Moments – Moment Generating Functions -Some Theorems on Moment Generating Functions
3.6 Characteristic Functions
3.7 Variance for Joint Distributions-Covariance – Correlating Coefficient
3.8 Conditional Expectation, Variance and Moments
3.9 Chebyshev's Inequality

Unit 4 **(10 hrs.)**

Special Discrete Distributions

4.1 Binomial Distribution – Definition – Mean and Variance
4.2 Conditions for Application Binomial Distribution – Expected or Theoretical Frequencies of Binomial Distribution
4.3 Mode – Characteristics of Binomial Distribution
4.4 Recursion Formula for Probability Function
4.5 Fitting of a Binomial Distribution
4.6 Poisson Distribution – Definition – Some Examples – Conditions under which Poisson Distribution is Used
4.7 Characteristics of Poisson Distribution –Binomial Approximation
4.8 Mean and Variance – Recurrence Relation for Probability Function
4.9 Fitting of a Poisson Distribution – Mode

Unit 5 **(10 hrs.)**

Continuous Distributions

5.1 Normal Distribution – Standard Normal Distribution – Definition
5.2 Properties of a Normal Curve
5.3 Uses of Normal Distribution
5.4 Fitting a Normal Distribution

TEXT BOOKS

Murray R Spiegel, John J Schiller, R Alu Srinivasan, *Schaum's outlines Probability And Statistics*, Third edition, New Delhi: McGraw, 2014.

Chapter 1: Sections 1.1 – 1.11
Chapter 2: Sections 2.1 – 2.8
Chapter 3: Sections 3.1 – 3.14

Arora, P N., S. Arora. *Statistics for Management*, New Delhi: S Chand, 2003.

Chapter 1: Sections 1.3 – 1.20

REFERENCE BOOKS

Arumugam, S. and Issac. *Statistics*, Palayamkottai: New Gamma, 1999.

David Freedman, Robert Pisani, Roger Purves, *Statistics 4th Edition* New Delhi: Vinod Vaistha for Viva Books, 2009.

Gupta S C and V. Kapoor, *Fundamentals of Mathematical Statistics***.** New Delhi: Sultan Chand, 2002.

Pillai, R.S.N. and V. Bagavathi. *Statistics.* New Delhi: S Chand, 2000.

Vital P.R. *Mathematical Statistics*. Chennai: Margam, 2002.

JOURNALS

The Annals of Statistics
Journal of Computional and Graphical Statistics

WEB RESOURCES

http://projecteuclid.org/euclid.aos
http://www.tandfonline.com/toc/ucgs20/current#.VO6PrCcas6Yk

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
Allied Core Course Offered by the Department of Mathematics for
B.Com. (Commerce) Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICS FOR COMMERCE

CODE: 15MT/AC/MT35 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To inculcate problem solving skills
- To introduce quantitative analysis
- To enhance concentration in mathematics as it provides a valuable background for many different careers

PRE REQUISITES

Basic Knowledge of operations on matrices

Unit 1 **(13 hrs.)**

Matrices

1.1 Matrices
1.2 Types of Matrices
1.3 Eigen Values and Eigen Vectors
1.4 Cayley-Hamilton Theorem (without proof)
1.5 Similar Matrices

Unit 2 **(15 hrs.)**

Theory of Equations

2.1 Formation and Solution of Equation with Imaginary and Irrational Roots
2.2 Relation between Roots and Coefficients
2.3 Solution of Equations under given Conditions
2.4 Symmetric Functions of the Roots of an Equation in terms of its Coefficients Reciprocal equations

Unit 3 **(12 hrs.)**

Numerical Analysis

3.1 The Bisection Method
3.2 Newton Raphson Method
3.3 Gaussian Jordan Elimination
3.4 Gaussian Elimination
3.5 Iterative Methods
3.6 Jacobi Method
3.7 Gauss Seidal Method

Unit 4 **(11 hrs.)**

Graph Theory

4.1 Definition of a Graph, Examples
4.2 Degrees
4.3 Subgraphs
4.4 Isomorphism
4.5 Matrices
4.6 Walks, Trails and Paths
4.7 Connectedness and Components
4.8 Eulerian Graphs
4.9 Konigsberg Bridge Problem
4.10 Hamiltonian Graphs
4.11 Trees
4.12 Related Problems

Unit 5 **(14 hrs.)**

Combinatorics

5.1 The Rules of Sum and Product
5.2 Permutations
5.3 Combinations
5.4 Binomial Theorems
5.5 Ramsey Numbers
5.6 The Pigeonhole Principle

TEXT BOOKS

Arumugam S., A. Thangapandi Isaac and A. Somasundaram. *Numerical Methods*, Chennai: Scitech, 2002.

Chapter 3: Section 3.3, 3.5
Chapter 4: Section 4.3, 4.4, 4.7, 4.8

Arumugam S. and Ramachandran S. *Invitation to Graph Theory*. Chennai: Scitech, 2001.

Chapter 2: Sections 2.1, 2.2, 2.3 (exclude Theorem 2.3), 2.4 (exclude Ulam's conjecture), 2.8
Chapter 4: Sections 4.1, 4.2 (concepts only)
Chapter 5: Sections 5.1, 5.2 (concepts only)
Chapter 6: Sections 6.1(concepts only)

Chandrasekharaiah D.S. *Graph Theory and Combinatorics*, Chennai: Prism, 2005.

Chapter 5: Sections 5.1, 5.2, 5.3, 5.3.1(Only Binomial theorem), 5.5
Chapter 6: Sections 6.1

Manicavachagam Pillay T.K., Natarajan T. and Ganapathy K.S., *Algebra –Vol I.* Madras: S. Viswanathan, 2006.

Chapter 6 Sections 1, 9, 10, 11, 12, 16, 16.1, 16.2

Narayanan.S., Hanumantha Rao.R & Manicavachagam Pillay T.K., *Ancillary Mathematics*. S.Viswanathan, 2012.

Chapter 3 Pages 120 – 136, 151 – 160 (Exclude inverse of a matrix)

Singaravelu A., *Allied Mathematics*. Chennai: Meenakshi, 2010.

Chapter 2 Pages 2.1 – 2.24, 2.61 – 2.76, 2.83 – 2.89

BOOKS FOR REFERENCE

Kandasamy and Thilagavathy. *Mathematics.* New Delhi: S Chand, 2004.

Lipson, Marc. and Lipschutz Seymour. *Discrete Mathematics***.** New Delhi: Schaum's Tata McGraw, 2010.

WEB RESOURCES

http://www.mathsisfun.com/calculus/
http://libgen.org/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 6 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

Allied Core Course Offered by the Department of Mathematics for B.C.A Degree Programme

SYLLABUS

(Effective from the academic year 2015-2016)

MATHEMATICS FOR COMPUTER SCIENCE - I

CODE : 15MT/AC/MS35 **CREDITS : 5**

L T P : 5 0 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

- To provide the essential mathematics required for various computer applications

PRE-REQUISITE

Knowledge of Logic and Tautology

Unit 1 **(12 hrs.)**

Mathematical Logic

1.1 Introduction to Logic
1.2 Replacement Process
1.3 Functionally Complete Sets of Connectives and Duality Law
1.4 Normal Forms
1.5 Principal Normal Forms

Unit 2 **(13 hrs.)**

Lattices

2.1 Lattices
2.2 Hasse Diagrams
2.3 Some Properties of Lattices
2.4 Duality Principle
2.5 Lattice through Algebraic Operations
2.6 New Lattices
2.7 Lattice Homomorphisms
2.8 Product Lattice of Two Lattices

Unit 3 **(12 hrs.)**

The Fundamental Theorem of Arithmetic

3.1 Divisibility
3.2 Greatest Common Divisor
3.3 Prime Numbers
3.4 The Fundamental Theorem of Arithmetic

3.5 The Euclidean Algorithm
3.6 The Möbius Function $\mu(n)$
3.7 The Euler Totient Function $\varphi(n)$

Unit 4 **(14 hrs.)**

Cryptography

4.1 Some Simple Cryptosystems
4.2 Enciphering Matrices

Public Key

4.3 The Idea of Public Key Cryptography, RSA

Unit 5 **(14 hrs.)**

Combinatorics

5.1 The Rules of Sum and Product
5.2 Permutations
5.3 Combinations
5.4 Binomial Theorems
5.5 Ramsey Numbers
5.6 The Pigeonhole Principle

TEXT BOOKS

Apostol, Tom M. *Introduction to Analytic Number Theory*. New Delhi: Narosa, 1998.

Chapter 1 Sections 1.1 – 1.5, 1.7.
Chapter 2 Sections 2.1 – 2.3.

Chandrasekharaiah. D.S. *Graph Theory and Combinatorics*, Prism books, 2005.

Chapter 5 Sections 5.1, 5.2, 5.3, 5.3.1(Only Binomial theorem),5.5
Chapter 6 Sections 6.1

Koblitz, Neal. *A Course in Number Theory and Cryptography* 2nd ed. New York: Springer–Verlag, 2002.

Chapter 3 Sections 1, 2
Chapter 4 Sections 1, 2

Venkataraman.M.K, Sridharan. N & Chandrasekaran.N, *Discrete Mathematics*, Chennai: The National, 2003.

Chapter 9 Sections 9 – 11, 12.
Chapter 10 Sections 1 (Omit Example 15, pp No. 10.6), 2, 3 (Omit Remark, pp. 10.14).

BOOKS FOR REFERENCE

Balakrishnan V.K. *Combinatorics, Schaum's Ouline Series*. New York: McGraw Hill, 1995.

Hardy, G.H & Wright.E.M. *An Introduction to the theory of Numbers*. Great Britain: Oxford University, 1979.

Hua Loo Keng. *Introduction to Number Theory***.** Germany: Springer – Verlag, 1982.

Krishnamurthy. V. *Combinatorics – Theory and Applications***,** New Delhi: Affiliated East West, 1989.

Sharma. *Discrete Mathematics*. Chennai: Macmillan, 2003.

Solai Raju, Chandrasekar, Krishnamoorthy & Ganesh. *Discrete Mathematical Structures*, Kumbakonam: Anuradha, 2003.

WEB RESOURCES

http://libgen.org/
http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511809088
http://www.math.ucsd.edu/~ebender/DiscreteText1/Lo.pdf
http://www.cse.iitd.ernet.in/~bagchi/courses/discrete-book/fullbook.pdf
http://www.maths.tcd.ie/pub/coursework/374/Primality.pdf
http://www.crypto-textbook.com/
http://www.whitman.edu/mathematics/cgt_online/cgt.pdf

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

III Component Tests:

List of Evaluation Modes:
Seminars
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Open Book Test
Group Discussion
Assignments/Problem Solving

End Semester Examination:

Total Marks: 100 Duration: 3 Hours

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
Allied Core Course Offered by the Department of Mathematics for
B.Com.(Corporate Secretaryship) Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

BUSINESS MATHEMATICS

CODE : 15MT/AC/BM 35 **CREDITS : 5**

L T P : 5 0 0
TOTAL TEACHING HOURS : 65

ELIGIBILITY CRITERION

Offered to students who have not undergone a course in Mathematics or Business Mathematics at the Higher Secondary Level

OBJECTIVE OF THE COURSE

- To develop basic mathematical skill and the ability to work in a problem solving environment

Unit 1 **(13 hrs.)**

Matrices

1.1 Matrices – Elementary Concepts
1.2 Types of Matrices
1.3 Evaluation of Determinant of a Square Matrix
1.4 Sum and Product of Matrices
1.5 Inverse of a Square Matrix of Order 2 and Order 3 – Simple Problems
1.6 Solution of the System of Linear Equations – Matrix Inversion Method – Cramer's Rule

Unit 2 **(12 hrs.)**

Functions, Limits and Continuity

2.1 The Concept of Function – Types of Function – Special Type of a Function: Linear Function
2.2 Definition of a Limit – Left Hand and Right Hand Limits – Rules for Finding Limits – Simple Problems
2.3 Continuity
2.4 Straight line – Slope of a Line – Equations of the Coordinate Axes – Equation of Lines Parallel to Coordinate Axes

Unit 3 **(12 hrs.)**

Quantitative Mathematics

3.1 Ratio and Proportion
3.2 Partnership and Share

3.3 Mixtures
3.4 Chain Rule
3.5 Time and Work

Unit 4 **(14 hrs.)**

Differentiation

4.1 Derivative of a Function
4.2 Differentiation Rules

Applications

4.4 Elasticity of Functions – Market Equilibrium – Cost Function – Revenue Function – Profit Function – Break Even Point
4.5 Maxima and Minima of a Function

Unit 5 **(14 hrs.)**

Integration

5.1 Indefinite Integral
5.2 Methods of Integration – Integration by Substitution
5.3 Partial Fraction
5.4 Integration by Parts
5.5 Definite Integral

Applications of Integration

5.6 Marginal Cost and Cost Function
5.7 Marginal Revenue and Revenue Function

TEXT BOOKS

Abhijit Guha, *Quantitative Aptitude for Competitive Examinations*. New Delhi: Tata McGraw-hill, 2011.
Chapters 7-11

Sharma.J.K., *Buisness Mathematics Theory & Applications.* Ane Books India, 2007.
Chapter 15 Pages: 519 – 522

Soma Garg., Arun Jukla, *Business Mathematics and Statistic. Taxmann*, Second edition, 2011.
Chapter 1.1 Pages 1.3 – 1.27, 1.27 – 1.37
Chapter 1.2 Pages 1.61 – 1.67, 1.71 – 1.88
Chapter 1.4 Pages 1.89 – 1.101
Chapter 1.5 Pages 1.114 – 1.130
Chapter 1.6 Pages 1.131 – 1.135, 1.137 – 1.141, 1.151 - 1.173

BOOKS FOR REFERENCE

Abdul Rasheed. A. *Allied Mathematics.* Chennai: Vijay Nicole Imprints, 2008.

George F. Simmons. *Calculus with Analytic Geometry* (Second edition), McGraw-hill,

Geroge B. Thomas,Jr. & Ross L. Finney, *Calculus and Analytical Geometry* New York: Addison – Wesley, 1998.

Manicavachagom Pillay, T.K., and S. Narayanan, *Calculus Volume– I*, S. Viswanathan Chennai, 2012.

Seymour Lipschutz, *Theory and Problems of Computer Mathematics Schaum's outline series*, McGraw-hill,

Verma.A.P., *Business Mathematics and Statistics*, Asian Books Private Limited, 2002.

WEB RESOURCES

http://www.mathsisfun.com/calculus/
http://libgen.org/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins**
Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Test
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE: BRANCH I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2015-2016)

SEQUENCE, SERIES AND FOURIER SERIES

CODE: 15MT/MC/SF45 **CREDITS: 5**

L T P: 5 0 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the concept of convergence of a real sequence
- To discuss the techniques of testing the behavior of infinite series of real Numbers
- To express periodic functions as infinite series

Unit 1 **(12 hrs.)**

Sets and Functions

1.1 Functions – Real Valued Functions
1.2 Equivalence, Countability
1.3 Real Numbers
1.4 Least Upper Bounds

Unit 2 **(13 hrs.)**

Sequences of Real Numbers

2.1 Definition of Sequence and Subsequence
2.2 Limit of a Sequence
2.3 Convergent and Divergent Sequences
2.4 Bounded Sequences
2.5 Monotone Sequences
2.6 Operations on Convergent and Divergent Sequences

Unit 3 **(14 hrs.)**

Sequences of Real Numbers

3.1 Limit Superior and Limit Inferior
3.2 Cauchy Sequences

Series of Real Numbers

3.3 Convergence and Divergence
3.4 Series with Non-negative Terms
3.5 Alternating Series
3.6 Conditional Convergence and Absolute Convergence

Unit 4 **(14 hrs.)**

Tests for Convergence of a Series of Real Numbers

4.1 Tests for Absolute Convergence
4.2 Series whose Terms form a Non-increasing Sequence
4.3 Summation by Parts

Unit 5 **(12 hrs.)**

Fourier Series

5.1 Definition of Fourier Series
5.2 Expansions of Periodic Functions with Period 2π
5.3 Odd and Even Functions
5.4 Half-range Fourier Series
5.5 Development in cosine and sine Series

TEXT BOOKS

Goldberg Richard.R. *Real Analysis*. New Delhi: Indian Edition. Oxford, 1970.

Chapter 1 : Section 1.3 – 1.7
Chapter 2 : Sections 2.1 – 2.10
Chapter 3 : Sections 3.1 – 3.4, 3.6 – 3.8
Chapter 12 : Section 12.1

Narayanan S. and T.K. Manicavachagam Pillay T. K., *Calculus -Volume III*. Madras: S. Viswanathan, 2006.

Chapter 6 : Sections 1 – 5

BOOKS FOR REFERENCE

Bhat V. K , Jarol Scott, *Introduction to Real Analysis*, New Delhi: Narosa, 2012.

Karunakaran V. *Real Analysis*. Chennai: Pearson, 2012.

Terrance J Quinn, *Pathways to Real analysis*, New Delhi: Narosa, 2009.

WEB RESOURCES

http://www.flashandmath.com/mathlets/calc/sequences/sequences.html

http://www.personal.psu.edu/dpl14/java/calculus/sequences.html

http://www.maa.org/sites/default/files/images/upload_library/47/StemkoskiStorm/SequenceConv.html

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

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Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICAL STATISTICS – II

CODE: 15MT/AC/ST45 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

- To understand the applicability and use of statistical methods in various fields

Unit 1 **(13 hrs.)**

Sampling Theory

1.1 Introduction: Parameter and Statistic
1.2 Sampling Distribution, Standard Error
1.3 Types of Sampling.
1.4 Sampling Distribution of Sample Mean

Unit 2 **(13 Hrs.)**

Exact Sampling of χ^2, t, F Distributions

2.1 The χ^2 distribution – Moment Generating Function of χ^2 Distribution
2.2 Cumulant Generating Function of χ^2 Distribution
2.3 Sampling Distribution of Mean and Variance
2.4 Distribution of Sum and Ratio of Two Independent χ^2 Variates
2.5 Student's *t*-Distribution – Properties of *t*-Distribution
2.6 Snedecor's *F* Distribution – Properties of *F*-Distribution
2.7 Fisher's *z*-Distribution
2.8 Relation between *t*, χ^2 and *F* Distributions

Unit 3 **(16 hrs.)**

Point Estimation

3.1 Introduction – Point Estimation
3.2 Unbiasedness
3.3 Consistency - Efficiency - Sufficiency
3.6 Methods of Point Estimation– Method of Maximum Likelihood
3.7 Method of Moments

Unit 4 **(8 hrs.)**

Interval Estimation

4.1 Interval Estimation: Concept of Setting Confidence Intervals to Population Parameters
4.2 Confidence Interval for Mean, Difference in Means,
4.3 Confidence Interval for Variance, Ratio of Variances - Based on Normal, T, χ^2 and F Distributions - Simple Problems

Unit 5 **(15 hrs.)**

Tests of Significance for Large Samples

5.1 Test for the Significant Difference between Sample Mean and Population Mean

5.2 Test for the Significant Difference between Two Sample Means

Tests of Significance Based on Normal, t and F Distributions

5.3 Student's *t* Distribution – Assumptions for Student's *t* Test – Properties of *t* Distribution – Application of *t* Distribution

5.4 Difference between Sample Mean and Population Mean, *t*-Test for Difference of Means

5.5 Paired t-Test for Difference of Means

5.6 t-Test for Significance of an Observed Correlation Coefficient

5.7 F- distribution – Application of F-Distribution

5.8 F-test for Significance of the Ratio of Two Independent Estimates of the Population Variance

Tests of Significance Based on Chi-Square Distribution

5.9 Introduction – Application of χ^2 Distribution

5.10 Test for Goodness of Fit

5.11 Test for Independence of Attributes

5.12 Test for Population Variance

TEXT BOOKS

Gupta, K R. *Mathematical Statistics*, Volume-2, New Delhi, Atlantic, 2015.

Chapter 14: Section 1.1 – 1.3, 3.1 – 3.8
Chapter 15: Section 2.1, 2.2, 2.3, 3.1, 4, 4.1, 5, 5.1, 6, 7
Chapter 16: Section 2, 2.1, 2.2, 3, 3.1, 3.3, 3.4, 4, 5, 5.1
Chapter 17: Section 1, 2, 2.1, 2.2, 2.4
Chapter 18: Section 1, 2, 2.1 - 2.4, 3, 3.1, 3.2

Purna Chandra Biswal, *Probability and Statistics*, New Delhi: Printice Hall, 2007.

Chapter 6: Sections6.1, 6.2, 6.5, 6.6

Siva Ramakrishna Das P, C. Vijayakumari, *Statistics Part II*, Chennai: Viji's Academy, 2007.

Chapter 5: Sections 5.3, 5.4

BOOKS FOR REFERENCE

Gupta, S C. and V. Kapoor, *Fundamentals of Mathematical Statistics*, New Delhi Sultan Chand, 2002.

Arumugam, S., and Issac. *Statistics*, Palayamkottai: New Gamma, 1999.

Pillai R.S.N., and V. Bagavathi. *Statistics***.** New Delhi : S Chand, 2000.

Subramaniam N. *Probability and Statistics*. Erode : SCM, 2005.

Richard I. Levin and David S. Rubin. *Statistics For Management***.** New Delhi : Prentice Hall, 2000.

JOURNALS

The Annals of Statistics
Journal of Computional and Graphical Statistics

WEB RESOURCES

http://projecteuclid.org/euclid.aos
http://www.tandfonline.com/toc/ucgs20/current#.VO6PrCcas6Yk

PATTERN OF EVALUATION

Continuous Assessment:
Total Marks: 50 **Duration: 90 Mins.**

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Third Component:
List of Evaluation Modes:
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Open Book Tests
Group Discussion
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Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
(Allied Core Course Offered by the Department of Mathematics for B.C.A Degree Programme)

SYLLABUS
(Effective from the academic year 2015-2016)

MATHEMATICS FOR COMPUTER SCIENCE - II

CODE : 15MT/AC/MS45 **CREDITS : 5**
L T P : 5 0 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To introduce statistical and numerical techniques to enhance problem solving skill
- To introduce the concept of graph theory for better understanding of networks

PRE-REQUISITE

Knowledge of Differentiation and Integration

Unit 1 (14 hrs.)

Graph Theory

1.1 Graphs and Multigraphs
1.2 Subgraphs, Isomorphic and Homeomorphic Graphs
1.3 Paths, Connectivity
1.4 Traversable Multi Graphs
1.5 Labeled and Weighted Graphs
1.6 Complete, Regular and Bipartite Graphs
1.7 Tree Graphs
1.8 Planar Graphs
1.9 Graph Colorings
1.10 Interconnection Networks

Unit 2 (12 hrs.)

Algebraic and Transcendental Equations

2.1 Bisection Method
2.2 Newton-Raphson Method

Simultaneous Equations

2.3 Gauss Elimination Method
2.4 Gauss-Jordan Elimination Method
2.5 Gauss Jacobi Iteration Method
2.6 Gauss Seidel Iteration Method

Unit 3 (12 hrs.)

Interpolation

3.1 Newton's Interpolation Formulae (statement only)
3.2 Central Difference Interpolation Formulae: Gauss forward interpolation formula, Gauss backward interpolation formula, Stirling's formula
3.3 Lagrange's Interpolation Formula

Unit 4 **(16 hrs.)**

Numerical Differentiation

4.1 Derivatives using Newton's Interpolation Formulae

4.2 Maxima and Minima.

Numerical Integration

4.3 Trapezoidal Rule

4.4 Simpson's One Third Rule

4.5 Simpson's Three Eight Rule

Numerical Solutions of Ordinary Differential Equations

4.6 Taylor's Series Method

4.7 Picards's Method

Unit 5 **(11 hrs.)**

Correlation and Regression

5.1 Definition of Correlation

5.2 Significance of Study of Correlation

5.3 Types of Correlation

5.4 Graphical Method

5.4.1 Scatter Diagram

5.5 Mathematical Method

5.5.1 Karl Pearson's Coefficient of Correlation

5.5.2 Spearman's Rank Coefficient of Correlation

5.6 Properties of Coefficient of Correlation

5.7 Merits and Demerits of Coefficient of Correlation

5.8 Definition of Regression

5.9 Uses of Regression Analysis

5.10 Significance of Regression Study

5.11 Differences between Correlation and Regression

5.12 Algebraic method: Regression Equation of Y on X and X on Y

TEXT BOOKS

Arumugam S., Thangapandi Issac. A and Somasundaram. A *Numerical Methods***.** Chennai**:** Scitech, 2002**.**

Chapter 3: Sections 3.3 & 3.4
Chapter 4: Sections 4.3, 4.4, 4.7 & 4.8
Chapter 7: Sections 7.0 7.1– 7.3
Chapter 8: Sections 8.0, 8.1, 8.2, 8.4, 8.5
Chapter 10: Sections 10.0 – 10.2
Formulae and problems

Lipson, Marc & Lipschutz Seymour. *Discrete Mathematics* . 3rd ed. New Delhi: Schaum's outlines**,** Tata McGraw-hill, 2010**.**

Chapter 8 Section 8.2-8.10

Pillai.R.S.N & Bagavathi *Statistics*. New Delhi: S Chand, Reprint, 2009.

Chapter 12 Pages 396 – 414, 417 – 420
Chapter 13 Pages 465 – 472

Xu Junming, *Topological Structure and Analysis of Interconnection Networks*. U.S.A.: Kluwer Academic, 2001.

Chapter 1 Section 1.1.2

BOOKS FOR REFERENCE

Arumugam, S & Ramachandran.S *Invitation to Graph Theory***.** Palayamkottai: New Gamma 1994.

Devi Prasad. *Introduction to Numerical Analysis.* 3rd ed. New Delhi: Narosa, 2006.

Gupta S.P. Practical *Statistics.* 8th ed. New Delhi: S Chand, 1998.

Kendall Atkinson & Weimin Han. *Elementary Numerical Analysis***.** 2nd ed. India: John Wiley, 2004.

Pillai, R.S.N & Bagavathi.V *Statistics*. New Delhi: S Chand, 2000.

Stummel F & Hainel.K *Introduction to Numerical Analysis.* Scottish Academic, 1980.

Subramaniam.N *Numerical Methods.* Erode: SCM, 2005.

WEBSITES

http://libgen.org/
http://www.iro.umontreal.ca/~hahn/IFT3545/GTWA.pdf
http://www.techtud.com/sites/default/files/public/share/Numerical%20Methods.pdf
http://www.iasri.res.in/ebook/EB_SMAR/e-book_pdf%20files/Manual%20II/7-correlation_and_regression.pdf
http://www.iasri.res.in/ebook/fet/Chap%202_Correlation%20and%20Regression.pdf

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins**

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Third Component:
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End Semester Examination : Duration – 3 hours
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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
Allied Elective Course Offered by the Department of Mathematics to the students of B.A. (Economics) and B.Com. Degree Programme

SYLLABUS
(Effective from the academic year 2015-2016)

OPERATIONS RESEARCH

CODE: 15MT/AE/OR45 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

.

- To provide few simple mathematical models
- To develop a methodical approach to problem solving in the field of industries, marketing, finance and so on

Unit 1 **(14 hrs.)**

Introduction to Operations Research

1.1 Introduction to OR
1.2 Definition of OR
1.3 Formulation of LPP
1.4 Graphical Solution
1.5 Simplex Method

Duality in LPP

2.1 Introduction
2.2 Formulation of Dual LPP
2.3 Rules for Constructing the Dual from Primal
2.4 Characteristics of the Dual Problem – Advantages of Duality
2.5 Primal-Dual Optimal Solutions

Unit 2 **(12 hrs.)**

Transportation Problem

2.1 Introduction
2.2 Mathematical Formulation – Unbalanced
2.3 Maximization – Northwest Corner Rule, Least Cost Method and Vogel's Approximation Method
2.4 Optimality Test: MODI Method

Unit 3 **(10 hrs.)**

Assignment problem

3.1 Assignment Problem
3.2 Mathematical Formulation of an Assignment Problem
3.3 Difference between Transportation and Assignment Problem
3.4 Hungarian Method
3.5 Unbalanced Assignment Problem

Unit 4 **(14 hrs.)**

Game Theory

4.1 Introduction – Basic Terminology
4.2 Solution Methods of Pure Strategy Games with Saddle Point
4.3 Principle of Dominance
4.4 Solution Methods of Mixed Strategy Games
4.5 The Two Person Non-zero Sum Games

Unit 5 **(15 hrs.)**

Project Network Analysis: CPM - PERT

5.1 Introduction
5.2 Development of Network Analysis Concept
5.3 Developing the Project Network
5.4 Critical Path Analysis
5.5 Critical Path Method
5.6 Programme Evaluation and Review Technique

TEXT BOOK

Kapoor, V K. *Operations Research (Quantitative Techniques for Management).* New Delhi: Sultan Chand, 2013.

Chapter 1	Section 1.1 , 1.3
Chapter 2	Section 2.9, 2.10(omit theorems)
Chapter 3	Section 3.1 – 3.4
Chapter 4	Section 4.1 – 4.6
Chapter 5	Section 5.1 – 5.5(omit 5.5.1 and 5.5.2)
Chapter 6	Section 6.1 – 6.5(omit 6.5.4 and 6.5.5)
Chapter 11	Section 11.1 – 11.6
Chapter 13	Section 13.1 –13.6

BOOKS FOR REFERENCE

Gupta Premkumar and Hira, D.S., *Operations Research*. New Delhi: S Chand, 2001.

Panneerselvam, R. *Operations Research*. New Delhi : Prentice-hall, 2002.

Richard Bronson, Govindaswami Naadimuthu, *Schaum's Outlines Operations Research New Delhi*: Tata McGraw Hill, 2011.

Sharma S.D, *Operations Research*. Sixteenth Revised Edition, Kedar Nath Ram Nath, New Delhi. 2009.

Sundaresan V., K.S. Ganapathy Subramanian, K. Ganesan. *Resource Management*

Techniques. Arapakkam: A.R., 2007.

Swarup Kanti, P.K. Gupta and Man Mohan. *Operations Research*. New Delhi: Sultan Chand, 2009.

JOURNALS

International Journal of Operations Research
International Journal of Mathematics in Operational Research
Journal of the Operational Research Society
Advances in Operations Research

WEB RESOURCES

http://www.inderscience.com/jhome.php
http://www.hindawi.com/
http://journals.indexcopericus.com

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

ALGEBRAIC STRUCTURES

CODE: 15MT/MC/AS55 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To introduce the concept of abstract Algebra
- To develop an understanding of fundamental algebraic structures

PRE-REQUISITE
Knowledge of set theory

Unit 1 **(12 hrs.)**
Group Theory
1.1 Equivalence Relation and Equivalence Classes
1.2 Definition of a Group, Examples
1.3 Subgroups, Examples of Subgroups
1.4 Cyclic Groups
1.5 Cosets

Unit 2 **(12 hrs.)**
Group Theory (contd.)
2.1 Lagrange's Theorem and its Corollaries
2.2 Counting Principle
2.3 Normal Subgroups and Quotient Groups
2.4 Homomorphism - Isomorphism of Groups – Theorems on Homomorphism

Unit 3 **(12 hrs.)**
Group Theory (contd.)
3.1 Automorphism of Groups
3.2 Cayley's, Theorem
3.3 Permutation Groups

Unit 4
Ring Theory **(14 hrs.)**
4.1 Definition of Rings
4.2 Division Rings - Fields and Integral Domains, Examples
4.3 Some Special Classes of Rings
4.4 Homomorphism of Rings

Unit 5 **(15 hrs.)**

Ring Theory (contd.)

5.1 Ideals and Quotient Rings
5.2 Maximal, Principal and Prime Ideals
5.3 Field of Quotients of an Integral Domain

TEXT BOOK

Herstein, I.N. *Topics in Algebra***.** New York : John Wiley, 2007.

Chapter 1	:	Section 1.1
Chapter 2	:	Sections 2.1 - 2.10 (exclude applications 1& 2 in 2.7)
Chapter 3	:	Sections 3.1 - 3.6

BOOKS FOR REFEREENCE

Balakrishnan, R., and N. Ramabhadran. *A Text Book of Modern Algebra***.** New Delhi: Vikas, 1979.

Fraleigh, J.B. *A First Course in Abstract Algebra***.** New York **:** Addision Wesley, 1968.

Naik, K.V. *Modern Algebra***.** Chennai **:** Emerald, 1986.

Santiago, M. L. *Modern Algebra.* New Delhi : Tata McGraw-Hill, 2001.

Vasishtha, A.R. *Modern Algebra***.** Meerut : Krishna Prakash Mandir, 1971.

WEB RESOURCES

http://faculty.salisbury.edu/~despickler/pascgalois/classroom/PascGaloisJELabs_html/Lab09_html/Lab09.html

http://extras.springer.com/1999/978-3-540-65368-4/ida-win/c6s5ja.html

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

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Assignments
Problem Solving
Theorem Writing Technique

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STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

PRINCIPLES OF REAL ANALYSIS

CODE : 15MT/MC/RA55 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To enhance the knowledge of abstract mathematics on the real line
- To introduce the concepts for understanding and analyzing abstract mathematics on the metric space

Unit 1 **(12 hrs.)**

Limits and Continuity on $\mathbb{R}^1$

1.1 Limit of a Function on the Real Line
1.2 Functions Continuous at a Point on the Real Line - Reformulation

Unit 2

Metric Spaces, Open Sets, Closed Sets **(14 hrs.)**

2.1 Definition of Metric Space
2.2 Limits in Metric Spaces
2.3 Functions Continuous on a Metric Space
2.4 Open Sets - Closed Sets

Unit 3

Connectedness and Completeness on Metric Spaces **(12 hrs.)**

3.1 Connected Sets
3.2 Bounded Sets and Totally Bounded Sets
3.3 Complete Metric Spaces

Unit 4 **(12 hrs.)**

Compactness on Metric Spaces

4.1 Compact Metric Spaces
4.2 Continuous Functions on a Compact Metric Space
4.3 Uniform Continuity

Unit 5 **(15 hrs.)**

Riemann Integration

5.1 Definition of the Riemann Integral
5.2 Properties of the Riemann Integral
5.3 Derivatives
5.4 Rolles' Theorem

5.5 The Law of the Mean
5.6 Fundamental Theorem of Calculus
5.7 Improper Integral (concept only)

TEXT BOOK

Goldberg Richard R. *Real Analysis*. Indian Edition. New Delhi: Oxford, 1970.

Chapter 4 – Section: 4.1 – 4.3
Chapter 5 – Sections: 5.1 – 5.5
Chapter 6 – Sections: 6.1 – 6.6, 6.8
Chapter 7 – Sections: 7.2, 7.4 - 7.10

BOOKS FOR REFERENCE

Arumugam S., and A. Thangapandi Isaac. *Modern Analysis*. Palyamkottai: New Gamma, 2002.
Mainak Mukherjee, *Course in Real Analysis*, New Delhi: Narosa, 2011.
Malik S C, *Principles of Real Analysis* Third edition. New Delhi; New Age, 2011.
Nader Vakil, *Real Analysis Through Modern Infinitesimals*, Cambridge, 2011.

WEB RESOURCES

http://faculty.gvsu.edu/schlicks/HausdorffGeometry/H2.htm

http://www.personal.psu.edu/dpl14/java/calculus/limits.html

http://www.maa.org/sites/default/files/images/upload_library/47/StemkoskiStorm/Continuity.html

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:

List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving
Theorem Writing Technique

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE BRANCH I - MATHEMATICS
SYLLABUS
(Effective from the academic year 2015 – 2016)

ELEMENTS OF DIFFERENTIAL EQUATIONS

CODE: 15MT/MC/ED55 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To gain logical skills in the formulation of differential equation
- Expose students to use differential equation as a powerful tool in problem solving

Unit 1 **(16 hrs.)**

Linear Second Order Differential Equations

1.1 Method of Undetermined Coefficient
1.2 Reduction of Order
1.3 Variation of Parameters

Unit 2 **(13 hrs.)**

Application of Linear Second Order Differential Equation

2.1 Spring Problems

Series Solution of Linear Second Order Differential Equation

2.2 Series Solution near an Ordinary Point

Unit 3 **(13 hrs.)**

Series Solution of Linear Second Order Differential Equation (contd.)

3.1 Regular Singular Points: Euler Equations
3.2 The Method of Frobenius

Linear System of Differential Equations

3.3 Solution of Linear System of Differential Equations

Unit 4 **(12 hrs.)**

Partial Differential Equations of the First Order

4.1 Introduction
4.2 Formulation of Partial Differential Equation by Eliminating Arbitrary Constants and Arbitrary Functions
4.3 Complete Integral, Particular Integral and Singular Integral of Partial Differential Equation
4.4 Special Types of Equations – Standards I - IV

Unit 5 **(11 hrs.)**

Partial Differential Equations of the First Order (contd.)

5.1 Equations Reducible to the Standard Forms

5.2 Lagrange's Equation

Partial Differential Equations of Higher Order with Constant Coefficients

5.3 Homogeneous Linear Equations with Constant Coefficients

5.4 Solutions of Linear Partial Differential Equations

5.5 Complementary Function

5.6 Particular Integral

TEXT BOOKS

Trench F William, *Elementary Differential Equations*, USA: Bob Pirtle, 2000.

Chapter 5 Sections 5.4 – 5.7
Chapter 6 Section 6.2
Chapter 7 Sections 7.2, 7.4, 7.5
Chapter 10 Section 10.2

Sharma, J.N. and R.K.Gupta. *Differential Equations*. Meerut: Krishna Prakashan Mandir, 1992.

Chapter 8 Section 8.1 – 8.5

BOOKS FOR REFERENCE

Amarnath.T *An Elementary Course in Partial Differential Equation* New Delhi: Narosa, 2004.

Narayanan, S. and Manicavachagam Pillay, T.K. *Calculus-Vol. III*. Chennai: S Viswanathan, 2006.

Narayan S. and T.K. Manicavachagom Pillay. *Differential Equations and its Applications*. Chennai: S.Viswanathan, 2001.

Rai, B., D.P. Choudhury, and H.I. Freedman. *A Course in Ordinary Differential Equations*. New Delhi: Narosa, 2004.

Sharma J.N. and Kehar Singh. *Partial Differential Equations for Engineers and Scientists.* New Delhi: Narosa, 2000.

Siddiqi, A.H. and P. Manchanda. *A First Course In Differential Equations With Applications*. New Delhi: Macmillan, 2006.

WEB RESOURCES

www.ncl.ac.uk/students/mathsaid/resources/.../ode_homogeneous.htm
www.ugrad.math.ubc.ca/coursedoc/math100/notes/.../intro.html

PATTERN OF EVALUATION

Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

OPTIMIZATION TECHNIQUES

CODE: 15MT/ME/OT55 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide few simple mathematical models
- To develop a methodical approach to problem solving in the field of industries, marketing, finance and so on

Unit 1 (15 hrs.)

Basics of Operations Research

1.1 Development of OR – Definition, Characteristics , Scientific Method in OR
1.2 Necessity of OR in Industry – Scope of OR
1.3 Operations Research and Decision Making
1.4 Scope of OR in: Management, Financial Management
1.5 Application of Various OR Techniques
1.6 Objectives of OR – Phases of OR – Models in OR
1.7 Classification Schemes of Models , Characteristics of a Good Model
1.8 Advantage and Limitations of a Model – Limitations of OR

Linear Programming

1.9 Introduction – Application of Linear Programming-Formulation
1.10 Advantages and Limitation of Linear Programming Models
1.11 Graphical Method of Solution
1.12 Canonical and Standard Form
1.13 Simplex Method
1.14 Artificial Variable Technique: Big-M Method

Unit 2 (15 hrs.)

Transportation Model

2.1 Introduction to the Model
2.2 Assumptions in the Transportation Model
2.3 Definition of the Transportation Model
2.4 Matrix Terminology
2.5 Formulation and Solution of Transportation Models (excluding Stepping Stone method)
2.6 Variants in Transportation Problems

Assignment Model

2.7 Definition of Assignment Model
2.8 Mathematical Representation of Assignment Model

2.9 Comparison with Transportation Model
2.10 Hungarian Method for Solution of the Assignment Problems
2.11 Formulation and Solution of the Assignment Models
2.12 Variations of the Assignment Problem
2.13 The Travelling Salesman Problem

Unit 3 **(12 hrs.)**

Sequencing Models and Related Problems

3.1 Sequencing Problems – Assumptions in Sequencing Problems
3.2 Processing *n* Jobs through One Machine (SPT rule only)
3.3 Processing *n* Jobs through Two Machines
3.5 Processing *n* Jobs through Three Machines
3.6 Processing Two Jobs through *m* Machines
3.7 Processing *n* Jobs through *m* Machines

Unit 4 **(11 hrs.)**

Theory of Games

4.1Theory of Games
4.2 Characteristics of Games
4.3 Game Models – Definitions
4.4 Rules for Game Theory
4.4.1 Rule 1: Look for a Pure Strategy
4.4.2 Rule 2: Reduce Game by Dominance
4.4.3 Rule 3: Solve for a Mixed Strategy
4.5 Mixed Strategies (2×2 Games) – Mixed Strategies (2 × *n* games or *m* × 2 games)
4.6 Limitations of Game Theory and Concluding Remarks

Unit 5 **(12 hrs.)**

Network Analysis in Project Planning

5.1 Project – Project Planning – Project Scheduling – Project Controlling
5.2 W.B.S. – Basic Tools and Techniques of Project Management
5.3 Role of Network Techniques in Project Management
5.4 Network Logic-Numbering the Events
5.5 Activity on Node Diagram
5.6 Merits and Demerits of AON Diagram
5.7 Critical Path Method: Measure of Activity – Time Units
5.8 Critical Path Analysis
5.9 The Three Floats. PERT: Time Estimates
5.10 Frequency Distribution Curve for PERT – Probability of Completing the Whole Project by a given Time

TEXT BOOK

Gupta, Premkumar and Hira D.S. *Operations Research***,** New Delhi**:** S.Chand, 2007.

Chapter 1 Section 1.1 – 1.17, 1.23

Chapter 2	Section 2.1 – 2.14, 2.16 – 2.17.1
Chapter 3	Section 3.1 – 3.6
Chapter 4	Section 4.1 – 4.3, 4.5 – 4.7, 4.10
Chapter 9	Section 9.10 – 9.19, 9.22
Chapter 14	Section 14.1 – 14.13

BOOKS FOR REFERENCE

Ackoh R.L, *Fundamentals of Operations Research*, New Delhi: Vikas, 1984.

Panneerselvam, R. *Operations Research*. New Delhi : Prentice-hall, 2002.

Ravindran, A., Don. T. Phillips, and James J. Solberg. *Operations Research-Principles and Practice.* 2nd ed. New York: John Wiley, 1987.

Richard Bronson, Govindaswami Naadimuthu, *Schaum's Outlines Operations Research* New Delhi : Tata McGraw Hill, 2011.

Swarup Kanti, Gupta P.K., Man Mohan, *Operations Research*, New Delhi: Sultan Chand, 2009.

JOURNALS

International Journal of Operations Research
International Journal of Mathematics in Operational Research
Journal of the Operational Research Society
Advances in Operations Research

WEB RESOURCES

http://www.inderscience.com/jhome.php
http://www.britannica.com
http://journals.indexcopericus.com

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars

Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086
B.Sc. DEGREE : BRANCH I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015 – 2016)

PROJECT

CODE :15MT/ME/PR55 **CREDIT : 5**

Preparation of Project

The Project shall contain at least 25 pages and shall be typed with double spacing. The format for the thesis is as follows:

1. Cover page shall contain
   a) Title of the Project
   b) Project submitted at the major level for the B.Sc. degree course in the V semester.
   c) Name of the Candidate
   d) Department of Mathematics
      Stella Maris College (Autonomous), Chennai – 86
   e) Month, Year
2. The dissertation shall contain
   a) Contents page
   b) i. Certificate page
      ii. Acknowledgement page
   c) At least 3 Chapters including an introductory chapter (comprising motivation, basic concepts needed / used in the thesis and outline of the thesis)
   d) Conclusions / interpretations arrived at may be given at the end of each problem / each chapter concerned.
   e) List of figures / list of abbreviations (if needed) shall be given as an appendix
   f) Bibliography shall be given in alphabetical / chronological order at the end.
3. Each candidate may prepare 3 copies of the thesis using a Scientific Word or Word, one copy for her and submit 2 copies to the Head of the department 15 days before the commencement of the fifth semester examination.
4. The candidate may be advised that the dissertation will be valued and given credit on the criteria of
   a) Motivation towards the chosen area / formulation of the problem
   b) Methodology, Analysis, logic and reasoning
   c) Capacity to interpret the results obtained
5. The Controller of Examination is requested to arrange for the valuation of the Dissertation as well as the conduct of the Viva – Voce at the college where the candidates take examinations, within two weeks of the last date of examination for B.Sc.. Degree. The panel of examiners will consist of an external examiner and the guide. The guidelines for the Viva-Voce examiners would be that a) They

will satisfy themselves that this is a work of the candidate as certified by the department b) The thesis is in the given form and c) The candidate has clear understanding of the concepts, discussed in the thesis.

The Department should certify as follows :
This is to certify that the dissertation in the broad area _____ titled _____ is submitted by _____- at the major elective level for the degree of Bachelor of Science (Mathematics) during the year_____

sd/ sd/
Head of the Department Guide

6. A) Guidelines for evaluation

The maximum mark for the dissertation is 75 divided into four components

i.	Style, format and neatness in presentation	10
ii	Chapterisation, logic and reasoning	10
iii	Methodology – Analysis and interpretation	30
iv	Viva	25

B) There will be double valuation for the dissertation by the guide and an External examiner who will conduct the viva – voce. The norms for evaluation will be same as applicable for theory papers.

Evaluation:

External Testing :

Dissertation : 75 marks
Viva : 25 marks

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

ELEMENTS OF SPACE SCIENCE

CODE : 15MT/ME/ES55 **CREDITS : 5**
L T P : 4 1 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To explore the new vistas of the universe governed by mathematics
- To visualize application of mathematics in space science

Unit 1
Spherical Trigonometry **(10 hrs.)**
1.1 Spherical Trigonometry - Definition of Great Circle, Small Circle
1.2 Secondaries - Angular Radius
1.3 Properties of Spherical Triangle
1.4 Relation between Sides and Angles of a Spherical Triangle
1.5 Cosine, sine and cotangent Formula - Supplemental cosine Formula, Five Parts Formula, Napier's Formula (statements only)

Unit 2 **(10 hrs.)**
Celestial Coordinates
2.1 To Represent the Different System of Coordinates in the Same Figure
2.2 To find the Relation between Right Ascension and Longitude of the Sun
2.3 To find the Longitude of Sun on any Day
2.4 To find the Right Ascension and Declination of the Body
2.5 To find the Hour Angle of a Body at Rising or Setting
2.6 Diagram of Celestial Sphere

Unit 3 **(15 hrs.)**
The Earth
3.1 Dip of Horizon (concept only)
3.2 Duration of Twilight – Civil, Nautical and Astronomical Twilight
Refraction
3.3 To find the Effects of Refraction on the Right Ascension and Declination of a Star
3.4 Horizontal Refraction – Effects of Refraction on Dip and Distance of Visible Horizon, Influence of Temperature and Pressure of Atmosphere on Refraction
Geocentric parallax
3.5 Geocentric Parallax - Changes in Right Ascension and Declination of a Body due to Geocentric Parallax, Effects of Geocentric Parallax on the Rising and Setting of a Celestial Body
3.6 Angular Diameter

3.7 Geocentric Parallax and Refraction compared - Equatorial Horizontal Parallax

Heliocentric parallax

3.8 Heliocentric Parallax (concept only)

Aberration

3.1 Aberration of a Star - Comparison of Aberration and Stellar Parallax, Kinds of Aberration

Unit 4 **(15 hrs.)**

Conversion of Time

4.1Relation between Sidereal Time and Mean Time

4.2 Conversion of Sidereal Time into Mean Solar Time and Vice versa

4.3 Standard times

Unit 5 **(15 hrs.)**

Kepler's Laws

5.1 To Calculate the Eccentricity of the Earth's Orbit around the Sun

5.2 Verification of Kepler's law - Newton's deduction from Kepler's laws, Kepler's law from Newton's

5.3 To find the mass of the planet

Eclipse

5.4 Condition for the Occurrence of Lunar and Solar Eclipse

5.5 Ecliptic Limits - Maximum and Minimum Number of Eclipses near the Node of Lunar Orbit, Maximum Number of Eclipses in a Year

5.6 Eclipse Seasons - Effect of Refraction on a Lunar Eclipse

5.7 Occultations

Planetary Phenomena

5.8 Direct and Retrograde Motion(Geocentric motion of planets)

5.9 To find Positions of Two Planets when they are Stationery as seen from each other

TEXT BOOK

Kumaravelu S. , Susheela Kumaravelu, *Astronomy***,** Sivakasi: A.Bhaskara Selvan, 2005.

Chapter 1 Sections 3, 7, 8, 13, 17, 20 – 25, 29
Chapter 2 Sections 64, 66, 68, 75, 76, 86
Chapter 3 Sections 106,112,116
Chapter 4 Sections 124,131,133,134
Chapter 5 Sections 135,137,138,141,144.145
Chapter 6 Sections 149,150,153-155
Chapter 7 Sections 180-186 (worked examples only)
Chapter 8 Section 190
Chapter 9 Sections 195, 202, 203
Chapter 13 Sections 262, 267 - 269, 272, 273, 276, 279, 284
Chapter 14 Sections 300, 301

BOOKS FOR REFERENCE

Bhatia, V.B., *Text Book of Astronomy and Astrophysics with elements of Cosmology***,** New Delhi: Narosa, 2001.

Ramachandran, G.V., *A Text Book of Astronomy***,** Madurai: Denobili, 1972.

Sidwick, *Introducing Astronomy***,** London : Faber & Faber, 1957.

Smart, W.M., *Stellar Dynamics,* London : Cambridge, 1938.

Smart, W.M., *Some Famous Stars,* London : Orient Longman, 1956.

Smart, W.M., *A Text Book on Spherical Astronomy,* London : Cambridge, 1997.

JOURNALS

International Journal of Astronomy and Astrophysics
New Astronomy Elsevier Journal
The astronomical journal IOP science
Archive for History of Exact Sciences
Astronomy Letters
Astronomy Reports
Astrophysical Bulletin

WEB RESOURCES

Sky and Telescope's. The Essential guide to astronomy, Important new happenings in astronomy and latest space events. Newsletter.
http://www.skyandtelescope.com
https://twitter.com/skyandtelescope/
National Aeronautics and Space administration. News and features about NASA research. Newsletter
http://www.ndtv.com/topic/national-aeronautics-and-space-administration.
http://www.nasa.gov/news/index.html
http://science.nasa.gov/
http://www.livescience.com/space/
http://www.universetoday.com/
http://abcnews.go.com/Technology/Space
http://www.sciencedaily.com/news/space_time/astronomy/

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 6 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Component – 25 marks.
List of Evaluation Modes:
Quiz
Assignments
Presentation

END SEMESTER EXAMINATION :

Total Marks: 100 **Duration: 3 hours**

Section A: 10×2 =20 (Ten questions to be set selecting at least two from each)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set selecting not more than one question per unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

NUMERICAL ANALYSIS

CODE: 15MT/ME/NA55 **CREDITS: 5**
L T P: 4 1 0
TOTAL TEACHING HOURS: 6 5

OBJECTIVE OF THE COURSE

- To expose the standard numerical techniques as a powerful tool in scientific computing

Unit 1 **(13 hrs.)**

Numerical Solutions of Algebraic Equations
1.1 Bolzano's Bisection Method
1.2 Newton Raphson Method
S**imultaneous Equation**
1.3 Introduction of Simultaneous Equations, Back Substitution
1.4 Gauss Elimination Method
1.5 Gauss-Jordan Elimination Method
1.6 Iterative Method – Gauss Jacobi's Method
1.7 Gauss-Seidal Iteration Method

Unit 2 **(13 hrs.)**

Finite Differences
2.1 Introduction
2.2 Difference Operator
2.3 Other Difference Operators
Interpolation
2.4 Newton's Interpolation Formulae
2.5 Central Difference Interpolation Formulae
2.6 Lagrange's Interpolation Formulae
2.7 Divided Differences
2.8 Newton's Divided Difference Formula

Unit 3 **(13 hrs.)**

Numerical Differentiation and Integration
3.1 Introduction
3.2 Derivatives using Newton's Forward Difference Formula
3.3 Derivatives using Newton's Backward Difference Formula
3.4 Maxima and Minima of the Interpolating Polynomial
3.5 Numerical Integration

Unit 4 **(13 hrs.)**

Numerical Solutions of Ordinary Differential Equations

4.1 Introduction
4.2 Taylor's Series Method
4.3 Picard's Method
4.4 Euler's Method
4.5 Runge-Kutta Methods

Unit 5 **(13 hrs.)**

Numerical Solutions of Partial Differential Equations

5.1 Introduction
5.2 Classification of Partial Differential Equations of Second Order
5.3 Finite Difference Approximation to Derivatives
5.4 Laplace Equation
5.5 Poisson's Equation

TEXT BOOK

Arumugam S., Thangapandi Isaac A. and Somasundaram A., *Numerical Methods,* Chennai: SCITECH, 2001.

Chapter 3 Sections 3.3, 3.5
Chapter 4 Sections 4.0 – 4.4, 4.7, 4.8
Chapter 6 Sections 6.0 – 6.2
Chapter 7 Sections 7.0 – 7.5
Chapter 8 Sections 8.0 – 8.2, 8.4, 8.5
Chapter 10 Sections 10.0 – 10.4
Chapter 11 Sections 11.0 – 11.4

BOOKS FOR REFERENCE

Gupta B.D., *Numerical Analysis*, New Delhi **:** Konark, 2000.

Kandasamy P.K., Thilgavathy K., Gunavathy, *Numerical methods***,** New Delhi: S Chand 2006.

Kamala R.S., Solairaj A., Ganesh S., Jansi Rani P.G., *Numerical Method,* Kumbakonam : Anuradha, 2003.

Saxena H.C., *Examples in Finite Differences and Numerical Analysis*, New Delhi: S. Chand, 1981.

Venkatachalapathy S.G., *Calculus of Finite Differences and Numerical Analysis***,** Chennai: Margham, 2003.

JOURNALS

International Journal for Numerical Methods in Engineering
International Journal of Numerical Methods and Applications
International Journal of Numerical Methods for Heat and Fluid flow
Journal of Numerical Mathematics

WEB RESOURCES

http://www2.le.ac.uk/departments/physics/people/mervynroy/lectures/numc.pdf

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3 × 2 = 6 (Three questions to be set)
Section B: 3 × 8 = 24 (Four questions to be set)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving

End Semester Examination:
Total Marks: 100 **Duration: 3 hours**

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Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2 × 20 = 40 (Three questions to be set without omitting any unit)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

NUMERICAL METHODS WITH PROGRAM IN C
(Theory and Practical)

CODE : 15MT/ME/NM55 **CREDITS: 5**
L T P: 4 0 2
TOTAL TEACHING HOURS: 78

OBJECTIVES OF THE COURSE

- To expose the standard numerical techniques as a powerful tool in scientific computing
- To enhance the abilities of students to solve problems with the aid of computer

PRE-REQUISITES

Knowledge of C Programming

Unit 1 **(10 hrs.)**

Numerical Solutions of Algebraic Equations
1.1 Bolzano's Bisection Method
1.2 Newton Raphson Metod
1.3 Solution of Simultaneous Linear Algebraic Equations
Iterative Methods of Solving Simultaneous Equations
1.4 Jacobi's Method
1.5 Gauss Seidal Iteration Method
Practical **(6 hrs.)**
1.6 C program to find the Smallest Positive Root / the Largest Negative Root of the Equation $f(x) = 0$ by using the Bisection Method and Newton Raphson Method
1.7 C program to Solve a System of Linear Algebraic Equations using Gauss Jacobi's Iteration Methods and Gauss Siedel Method

Unit 2 **(12 hrs.)**

Finite Differences
2.1 Forward Differences
2.2 Backward Differences
2.3 Central Differences
Interpolation with Equal Intervals
2.4 Gregory Newton Forward and Backward Formulas
2.5 Central Difference Interpolation Formula – Gauss Forward and Backward Interpolation Formula
Interpolation with Unequal Intervals

2.6 Divided Differences
2.7 Lagrange's Interpolation Formula for Unequal Intervals

Practical **(5 hrs.)**

2.8 C program to Interpolate and Extrapolate using the given Pairs of Values of *x* and *y* by Newton's Forward and Backward Interpolation Formula
2.9 C program to Interpolate y using the given Pairs of Values of *x* and *y* by Lagrange's Interpolation Formula

Unit 3 **(10 hrs.)**

Numerical Differentiation

3.1 Values of the Derivatives of *y* based on Newton Forward and Backward Interpolation Formula
3.2 Derivatives by Method of Undetermined Coefficients Second Order Derivatives of *f(x)* using Newton's Formulae - Maximum and Minimum Value of *f(x)*

Practical **(5 hrs.)**

3.3 C program to find the Derivative at the Initial Point of a Tabulated Function by Newton Forward and Backward Interpolation Formula

Unit 4 **(10 hrs.)**

Numerical Integration

4.1 Newton Corle's Quadratic Formula
4.2 Trapezoidal Rule
4.3 Simpson's One Third Rule -Simpson's Three Eighth Rule

Practical **(5 hrs.)**

4.4 C program to Evaluate $\int_a^b f(x)dx$ Numerically using Trapezoidal and Simpson's rule

Unit 5 **(10 hrs.)**

Application

5.1 Numerical Solution to Ordinary Differential Equations
5.2 Euler's Method
5.3 Runge Kutta Method

Practical **(5 hrs.)**

5.4 C program to Solve the Differential Equation $\frac{dy}{dx} = f(x, y)$; $y(x_0) = y_0$ at the Pivotal Points by Euler's Method
5.5 C program to Solve Simultaneous Differential Equations $\frac{dy}{dx} = f(x, y, z)$; $\frac{dz}{dx} = g(x, y, z)$; $y(x_0) = y_0$, $z(x_0) = z_0$ at the Specified Pivotal Points by using Runge Kutta Method of the Fourth Order

TEXT BOOKS

Veerarajan T. and Ramachandran T., *Numerical methods with programs in C*, New Delhi: McGraw Hill, 2013.

Chapter 3 : Sec. 3.2, 3.4

Chapter 4 : Sec. 4.5
Chapter 5 : Sec. 5.1 – 5.3
Chapter 6 : Sec. 6.1 – 6.6
Chapter 7 : Sec. 7.1, 7.6
Chapter 8 : Sec. 8.1, 8.2, 8.4, 8.28, 8.29, 8.31
Chapter 10: Sec. 10.16

Arumugam S., Thangapandi Isaac A., and Somasundaram A., *Numerical Methods*, Chennai: SCITECH, 2001.
Chapter 8: Sec. 8.0 – 8.4

BOOKS FOR REFERENCE

Gupta B.D., *Numerical Analysis*, New Delhi **:** Konark Publishers Pvt. Ltd, 2000.

Kamala R.S., Solairaj A., Ganesh S., Jansi Rani P.G., *Numerical Method***,** Kumbakonam : Anuradha, 2003.

Kandasamy P.K., Thilgavathy K., Gunavathy, *Numerical methods***,** New Delhi: S. Chand 2006.

Saxena H.C., *Examples in Finite Differences and Numerical Analysis*, New Delhi: S. Chand, 1981.

Venkatachalapathy S.G., *Calculus of Finite Differences and Numerical Analysis***,** Chennai: Margham, 2003.

JOURNALS
International Journal for Numerical Methods in Engineering
International Journal of Numerical Methods and Applications
International Journal of Numerical Methods for Heat and Fluid flow
Journal of Numerical Mathematics

C Programming

Code journal

WEB RESOURCES

http://www2.le.ac.uk/departments/physics/people/mervynroy/lectures/numc.pdf

PATTERN OF EVALUATION
Continuous Assessment:
Total Marks: 50 **Duration: 90 Mins.**
Theory: (45 Mins.)
Section A: 3 × 2 = 06 (Three questions to be set)

Section B: 3 × 8 = 24 (Four questions to be set)
Practical: (45 Mins.)
Section C: 1 × 20 = 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving
Project

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Theory: (90 Mins..)

Section A: 10 × 2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5 × 8 = 40 (Seven questions to be set without omitting any unit)

Practical: (90 Mins..)

Section C: 2 × 20 = 40 (Three questions to be set)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086
B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

VECTOR SPACES AND LINEAR TRANSFORMATIONS

CODE : 15MT/MC/VL65 **CREDITS : 5**
L T P : 5 0 0
TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- Intended to develop an understanding of linear algebraic structures
- To enable understanding of the concept of linear transformations and their matrix representation

Unit 1 **(13 hrs.)**

Vector Spaces

1.1 Definition – Examples – Subspace
1.2 Quotient Space
1.3 Internal and External Direct Sums

Unit 2 **(13 hrs.)**

Vector Spaces (contd.)

2.1 Linear Independence - Basis of a Vector Space - Dimension of a Vector Space
2.2 Hom (V, W), Hom (V, V) and Hom (V, F)

Unit 3 **(13 hrs.)**

Inner Product Spaces

3.1 Definition and Examples
3.2 Norm of a Vector
3.3 Schwarz Inequality
3.4 Orthogonal Complement
3.5 Gram Schmidt Orthogonalisation Process

Unit 4 **(13 hrs.)**

Linear Transformations

4.1 Algebra of Linear Transformations
4.2 Regular, Singular Linear Transformations - Rank
4.4 Characteristic Roots and Characteristic Vectors of a Linear Transformation
4.5 Coordinate Vectors – Change of Basis

Unit 5 **(13 hrs.)**

Matrix Representation of Linear Transformations

5.1 Matrix Representations of Linear Transformations
5.2 Relations between Matrix Representations
5.3 Diagonalization of Matrices
5.4 Diagonalization of Symmetric Matrices - Orthogonal Diagonalization
5.5 Diagonal Matrix Representation of a Linear Operator

TEXT BOOKS

Herstein, I. N. Topics in Algebra. 2nd ed. New Delhi : Wiley, 2007.
Chapter 4: Sections 4.1 - 4.4
Chapter 6: Sections 6.1 – 6.2

Williams Gareth. Linear Algebra with Applications. 6th ed. New Delhi: Narosa, 2008.

Chapter 5: Sections 5.1 - 5.3

BOOKS FOR REFERENCE

Lang, Serge. *Modern Algebra***.** 7th ed. New York : Addison Wesley, 1977.

Naik, K.V. *Modern Algebra***.** Chennai : Emerald, 1986.

Narayanan, K.S, and T.K. Manicavachagom Pillai. *Modern Algebra Vol. II.* Chennai: Viswanathan, S. 1996.

Sahai Vivek, and Vikas Bist. *Linear Algebra*. New Delhi : Narosa, 2002.

Santiago M.L., *Modern Algebra*, New Delhi : Tata McGraw-Hill, 2002.

Stroud, K.A., and Dexter J. Booth. *Linear Algebra*. New York: Industrial, 2008.

WEB RESOURCES

http://www.math.ucla.edu/~tao/resource/general/115a.3.02f/GramSchmidt.html
http://www.math.ucla.edu/~tao/resource/general/115a.3.02f/EigenMap.html

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
Section C: 1×20= 20 (Two questions to be set)

Third Component:
List of Evaluation Modes:
Seminars
Quiz
Open Book Tests
Group Discussion
Assignments
Problem Solving
Theorem Writing Technique

End Semester Examination:

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
Section B: 5×8 = 40 (Seven questions to be set without omitting any unit)
Section C: 2×20= 40 (Three questions to be set without omitting any unit)

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B.Sc. DEGREE: BRANCH I - MATHEMATICS

SYLLABUS
(Effective from the academic year 2015-2016)

PRINCIPLES OF COMPLEX ANALYSIS

CODE : 15MT/MC/CA65 **CREDITS: 5**
L T P: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To introduce the analysis of complex numbers
- To expose a fertile area of pure mathematics as a source of powerful techniques that are widely applied in sciences and Engineering

Unit 1 **(15 hrs.)**

Analytic Functions

1.1 Functions of a Complex Variable
1.2 Continuous Functions
1.3 Differentiability
1.4 Cauchy Riemann's Equations
1.5 Analytic Functions
1.6 Harmonic Functions

Unit 2 **(9 hrs.)**

Mapping

2.1 Conformal Mapping - Elementary Transformations
2.2 Applications of Conformal Mapping: Steady Temperatures – Steady Temperatures in a Half Plane
2.3 Mapping by Elementary Functions: The mapping $w = z^2$, The Mapping $w = e^z$, The Mapping $w = \sin z$, The Mapping $w = \cos z$, The Mapping $w = \cos hz$

Unit 3 **(13 hrs.)**

Series Expansions

3.1 Series Expansion of Elementary Functions: Logarithmic Function
3.2 Bilinear Transformations: Bilinear Transformations – Cross Ratio – Fixed Points of Bilinear Transformations
3.3 Taylor's Series - Laurent's Series

Unit 4 **(14 hrs.)**

Complex Integration

4.1 Cauchy's Theorem
4.2 Cauchy's Integral Formula
4.3 Higher Derivatives

Unit 5 **(14 hrs.)**

Calculus of Residues

5.1 Zeros of an Analytic Function

5.2 Singularities - Residues

5.3 Cauchy's Residue Theorem

5.4 Evaluation of Definite Integrals of the Type

(i) $\int_{\circ}^{2\Pi} f(\cos\eta, \sin\eta)\, d\eta$ where f is a Rational Function of $\cos\eta$ and $\sin\eta$,

(ii) $\int_{-\infty}^{\infty} f(x)\, dx$ where $f(x)$ is a Rational Function

TEXT BOOKS

Arumugam S., A.T. Issac, and A. Somasundaram. *Complex Analysis*. Chennai: Scitech, 2002.

Chapter 2	Sections 2.1, 2.4 – 2.9.
Chapter 3	Sections 3.1 – 3.5.
Chapter 4	Section 4.4
Chapter 5	Sections 5.1, 5.3 – 5.6
Chapter 6	Sections 6.2 – 6.4
Chapter 7	Sections 7.1 – 7.3, 7.4(exclude proofs of theorems 7.5 - 7.8)
Chapter 8	Sections 8.1, 8.2 (exclude theorems 8.2- 8.4), 8.3 (exclude Type III)

Churchill R.V, and J.W. Brown. *Complex Variables and Applications*. New York: McGraw, 1990.

Chapter 9 – Sections 79, 80

BOOKS FOR REFERENCE

Dennis G Zill, *First Course in Complex Analysis With Applications*, Ed. 2 Jones and Bartlett, 2010.

John H Mathews, *Complex Analysis for Mathematics and Engineering*, New Delhi : Narosa, 2006.

Karunakaran,V , Desai A.R, *Complex analysis*, New Delhi : Narosa, New Delhi, 2005.

Narasimhan, Raghavan, *Complex Analysis in one Variable*, New Delhi: Springer, 2001.

WEB RESOURCE

http://www.malinc.se/math/geogebra/complex_numbersen.php

PATTERN OF EVALUATION
Continuous Assessment:
Total Marks: 50 **Duration: 90 Mins.**

Section A: 3×2 = 06 (Three questions to be set)
Section B: 3×8 = 24 (Four questions to be set)
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Third Component:
List of Evaluation Modes:
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Open Book Tests
Group Discussion
Assignments
Problem Solving
Theorem Writing Technique

End Semester Examination

Total Marks: 100 **Duration: 3 Hours**

Section A: 10×2 = 20 (Ten questions to be set selecting two from each unit)
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SYLLABUS
(Effective from the academic year 2015-2016)

PRINCIPLES OF MECHANICS

CODE: 15MT/MC/PM65 **CREDITS: 5**
L TP: 5 0 0
TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To widen appreciation of the variety of phenomena covered by mechanics and the techniques available to handle them
- To understand the concept of different forces and moments and their equilibrium with reference to a coordinate system
- To provide an adequate foundation for further self-study

Unit 1 **(10 hrs.)**

Forces acting on a Particle – Concurrent Forces

1.1 Forces
1.2 Types of Forces
1.3 Parallelogram Law of Forces
1.4 Triangle Law of Forces
1.5 Polygon Law of Forces
1.6 Lami's Theorem
1.7 Conditions of Equilibrium of any Number of Forces Acting on a Particle

Unit 2 **(18 hrs.)**

Non-Concurrent Coplanar Forces

5.1 Moment of a Force about a Point and a Line
5.2 Parallel Forces
5.3 Varignon's Theorem
5.4 Couples
5.5 Properties of Couples
5.6 Coplanar Forces
5.7 Reduction of any Coplanar System of Forces
5.8 Conditions of Equilibrium
5.9 Equilibrium of Three Forces Acting on a Rigid Body

Unit 3 **(10 hrs.)**

Friction

3.2 Laws of Statical Friction
3.3 Coefficient of Friction
3.4 Angle of Friction
3.5 Cone of Friction

3.6 Law of Kinetic Friction
3.7 Equilibrium of a Particle on an Inclined Plane
3.8 Condition for Sliding and Toppling

Unit 4 **(15 hrs.)**

Equilibrium of Strings and Chains

4.1 Equilibrium of Strings and Chains
4.2 Common Catenary
4.3 Suspension Bridge

Linear Motion in a Resisting Medium

4.4 Equations of Motion of a Particle Falling under Gravity in a Resisting Medium under Law of Resistance mkv, mkv^2
4.5 Limiting Velocity

Unit 5 **(12 hrs.)**

Rigid Body Dynamics

5.1 Moment of Inertia
5.2 Theorem of Parallel and Perpendicular Axes (statements only)
5.3 Moment of Inertia of Simple Standard Bodies
5.4 Motion of a Rigid Body
5.5 Rotation about a Fixed Axis
5.6 Expressions for Kinetic Energy
5.7 Angular Momentum
5.8 Equation of Motion

TEXT BOOKS

Dharmapadam A.V. *Statics.* Chennai: S. Viswanathan, 2006.

Chapter 1 Sections 1.1 – 1.3
Chapter 2 Sections 2.1 – 2.10, 2.12 – 2.14
Chapter 3 Sections 3.1 – 3.8
Chapter 5 Section 5.1 – 5.3

Dharmapadam A.V. *Dynamics.* Chennai: S. Viswanathan, 2006.

Appendix II and Appendix III

BOOKS FOR REFERENCE

Pandit Ashok S. *Mechanics.* New Delhi: Narosa, 2001.

Venkatachalapathy,S.G., *Mechanics. Statics and dynamics for B.Sc. mathematics major*. Chennai**:** Margham, 2002.

Duraipandian P, *Mechanics*, New Delhi: S. Chand, 2005.

Kakani,S.L, *Mechanics,* New Delhi: Viva, 2005.

Hans H.S, *Mechanics,* New Delhi: Tata McGraw, 2003.

JOURNAL

Journal of Mechanics, Editor K. N. Chiang, National Tsing Hua University, Taiwan
International Journal of Mechanics and Applications, Editor-in-chief: Thibault Lemaire
Journal of Applied Mechanics, Editor: Yonggang Huang

WEB RESOURCES

http://hyperphysics.phy-astr.gsu.edu/hbase/mi.html
https://www.iit.edu/arc/workshops/pdfs/Moment_Inertia.pdf
http://www.physicsclassroom.com/class/newtlaws/Lesson-2/Types-of-Forces

PATTERN OF EVALUATION
Continuous Assessment:

Total Marks: 50 **Duration: 90 Mins.**

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