

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.Sc. DEGREE : BRANCH I - MATHEMATICS

COURSES OF STUDY OFFERED

(Effective from the academic year 2011 - 2012)

CHOICE BASED CREDIT SYSTEM

Subject Code	Title of Course	Credits	Total Hours			Exam Hours	Marks		
			Lecture Hours (L)	Tutorial Hours (T)	Practical Hours (P)		Continuous Assessment	End Semester	Maximum
Semester - I									
11MT/MC/DC14	Differential Calculus	4	4	1	0	3	50	50	100
11MT/MC/AT14	Algebra and Trigonometry	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Physics									
11MT/AC/MP14	Mathematics for Physics - I	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Chemistry									
11MT/AC/MC14	Mathematics for Chemistry - I	4	4	1	0	3	50	50	100
Semester - II									
11MT/MC/IC24	Integral Calculus	4	4	1	0	3	50	50	100
11MT/MC/AG24	Analytical Geometry	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Physics									
11MT/AC/MP24	Mathematics for Physics - II	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Chemistry									
11MT/AC/MC24	Mathematics for Chemistry - II	4	4	1	0	3	50	50	100
11MT/GC/ES22	Environmental Studies	2	2	0	0	-	50	-	100
11MT/SA/CW22	Child Welfare	2	2	0	0	-	50	-	100
Semester - III									
11MT/MC/OD34	Ordinary Differential Equations	4	4	1	0	3	50	50	100
11MT/MC/VA34	Vector Analysis	4	4	1	0	3	50	50	100
11MT/AC/CP34	C - Programming and its Applications	4	3	0	2	3	50	50	100
Allied Core Offered to the Department of Commerce									
11MT/AC/MT34	Mathematics for Commerce	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Computer Science									
11MT/AC/MS34	Mathematics for Computer Science - I	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Commerce (CS)									
11MT/AC/BM34	Business Mathematics	4	4	1	0	3	50	50	100
Semester - IV									
11MT/MC/LD44	Laplace Transforms and Partial Differential Equations	4	4	1	0	3	50	50	100
11MT/MC/SF44	Sequences, Series and Fourier Series	4	4	1	0	3	50	50	100
11MT/AC/OR44	Operations Research	4	4	1	0	3	50	50	100
Allied Core Offered to the Department of Computer Science									
11MT/AC/MS44	Mathematics for Computer Science - II	4	4	1	0	3	50	50	100

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			Lecture Hours (L)	Tutorial Hours (T)	Practical Hours (P)		Continuous Assessment	End Semester	Maximum
Semester - V									
11MT/MC/AS54	Algebraic Structures	4	4	1	0	3	50	50	100
11MT/MC/RA54	Real Analysis	4	4	1	0	3	50	50	100
11MT/MC/PT54	Probability Theory	4	4	1	0	3	50	50	100
11MT/MC/ME54	Mechanics	4	4	1	0	3	50	50	100
11MT/ME/NA53	Numerical Analysis	3	3	1	0	3	50	50	100
OR									
11MT/ME/OT53	Optimization Techniques (Skill Development Course)	3	3	1	0	3	50	50	100
Semester - VI									
11MT/MC/GC64	Graph Theory and Combinatorics	4	4	1	0	3	50	50	100
11MT/MC/VL64	Vector Spaces and Linear Transformations	4	4	1	0	3	50	50	100
11MT/MC/CA64	Complex Analysis	4	4	1	0	3	50	50	100
11MT/MC/MS64	Mathematical Statistics	4	4	1	0	3	50	50	100
11MT/ME/FM63	Financial Mathematics	3	3	1	0	3	50	50	100
OR									
11MT/ME/SM63	Special Topics in Mechanics	3	3	1	0	3	50	50	100
General Elective Courses									
11MT/GE/BM24	Basic Mathematics	4	4	0	0	3	50	50	100
11MT/GE/OR32	Operations Research	2	2	0	0	-	50	-	100
11MT/GE/GT32	Graph Theory and its Applications	2	2	0	0	-	50	-	100
11MT/GE/AS44	Applied Statistics	4	4	0	0	3	50	50	100
11MT/GE/DM44	Discrete Mathematics	4	4	0	0	3	50	50	100
11MT/GE/CE44	Mathematics for Competitive Examinations	4	4	0	0	3	50	50	100
Independent Elective Courses									
11MT/UI/PA23	Popular Astronomy	3	-	-	-	3	-	50	100

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Course Offered by the Department of Mathematics
to students of Chemistry**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR CHEMISTRY – I

CODE : 11MT/AC/MC14

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

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

Unit 1 (12Hrs)

Algebra

Matrices : characteristic equation of a square matrix - evaluation of eigen values and eigen vectors - diagonalisation of matrices possessing distinct eigen values - Cayley Hamilton theorem.

Unit 2 (15 Hrs)

Algebra (continued)

Theory of equations - Relation between roots and coefficients - solution of equations under simple given conditions - Formation and solution of equations with imaginary and surd roots.

Unit 3 (12 Hrs)

Differential Calculus

Differentiation of Hyperbolic and Inverse Hyperbolic functions - Differentiation of equation in parametric form - Differentiation of implicit functions - Higher Derivatives - n^{th} derivative – standard results, trigonometric transformations, formation of equations involving derivatives.

Unit 4 (10 Hrs)

Differential Calculus(continued)

Partial Differentiation.-Successive partial derivatives-Function of function rule-special case- implicit functions- partial derivatives of a function of functions

Unit 5 (16 Hrs)

Integral Calculus

Indefinite integral, methods of integration, integrals of functions containing linear functions of x , Integrals of functions involving $a^2 \pm x^2$, integrals of functions of the following forms: $\int f(x^n) x^{n-1} dx$; $\int [f(x)]^n f'(x) dx$; $\int F\{f(x)\}f'(x) dx$.

Integration of functions of the following types: $\frac{px+q}{ax^2+bx+c}$; $\frac{px+q}{\sqrt{ax^2+bx+c}}$; $\sqrt{ax^2+bx+c}$; $(px+q)\sqrt{ax^2+bx+c}$; $\frac{1}{(x+p)\sqrt{ax^2+bx+c}}$. Definite Integrals - properties.

BOOKS FOR STUDY

Narayanan, S. and T.K. Manicavachagam Pillai. Calculus Volume – I. Madras: Viswanathan S., Printers and publishers,. (2000).
 Chapter 2: Sections 3.11- 3.14, 5, 6
 Chapter 3: Sections 1.1 – 1.6

Narayanan, S. and T.K. Manicavachagam Pillai, Ancillary. Mathematics – Book – II. Madras.: Viswanathan, S., Printers and publishers, (1999).
 Chapter 1: Sections 1 – 6.
 Chapter 1: Sections 1-7.2, 8(cases 1 – 5), 11.

Vittal P.R, Allied Mathematics. Chennai: Margham Publications, 1998.
 Chapter 5: Sections 5.50 - 5.85.
 Chapter 6: Sections 6.1 – 6.30

BOOKS FOR REFERENCE

Balakrishnan, R., and N. Ramabhadran. A Text Book of Modern Algebra. Thanjavur: Gemini Printing House, (1976).

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

Shanti Narayan. A Text Book of Calculus - Part I and II, New Delhi: Shyam Lal Charitable Trust, (1983).

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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
to students of Physics

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR PHYSICS - I

CODE :11MT/AC/MP 14

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

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

Unit 1 (10 Hrs)

Algebra

Characteristic equation of a square matrix - Cayley Hamilton theorem - evaluation of eigen values and eigen vectors - diagonalisation of matrices possessing distinct eigen values

Unit 2 (17Hrs)

Differential Calculus

Differentiation - Higher derivatives - n^{th} derivative of standard function - Leibnitz's theorem (statement only) application to simple problems. Partial differentiation - Euler's theorem - simple problems.

Unit 3 (14 Hrs)

Integral Calculus

Integration – Methods of Integration – integrals of functions containing linear functions of x Integrals of functions involving $a^2 \pm x^2$ integrals of functions of the following forms: $\int f(x^n) x^{n-1} dx$; $\int [f(x)]^n f'(x) dx$; $\int F\{f(x)\}f'(x) dx$.

Unit 4 (10Hrs)

Special Integrals

Integration of functions of the following types: $\frac{px + q}{ax^2 + bx + c}$; $\frac{px + q}{\sqrt{ax^2 + bx + c}}$; $\sqrt{ax^2 + bx + c}$; $(px + q)\sqrt{ax^2 + bx + c}$; $\frac{1}{(x + p)\sqrt{ax^2 + bx + c}}$.

Unit 5**(14Hrs)****Integral Calculus (continues)**

Integration of functions of the following types:

$$\int \sqrt{(x-a)(b-x)} dx; \int \frac{1}{\sqrt{(x-a)(b-x)}} dx; \int \frac{(x-a)}{(b-x)} dx;$$

Definite integrals and their general properties - evaluation of integrals of the type:
 $e^{ax} \cos bx$; $e^{ax} \sin bx$ Bernoulli's formula for integration by parts**BOOKS FOR STUDY**Narayanan, S. and T.K. Manicavachagam Pillai. Ancillary Mathematics – Book - II, Madras: Viswanathan, S., Printers and publishers, (1993).

Integral Calculus: Chapter 1: Sections 1.1 – 7.2, 8 (cases: 1 – 5, 8), 11, 12, 14, 15.

Vittal P.R.. Allied Mathematics. Chennai.: Margham Publications, 1998.

Chapter 5: Sections 5.50 – 5.82

Chapter 8: Sections 8.11 – 8.42.

Chapter 9: Sections 9.1 – 9.30

BOOKS FOR REFERENCEJoseph, Edwards. An Elementary Treatise on the Differential Calculus. London: Macmillan & Co. Ltd., 1948.Rajagopal, R. V., V.R. Srinivasan, R. Albert Victor, and M. William, A Text Book of II B.Sc. Mathematics. Trichy : United Printers., 1972.Shanti Narayan. A Text Book of Calculus - Part I and II, New Delhi: Shyam Lal Charitable Trust., 1983.**PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)**Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

B.A. / B.Sc. / B.Com / B.C.A. / B.V.A. / B.S.W. DEGREE

SYLLABUS

(Effective from the Academic Year 2011 – 2012)

ENVIRONMENTAL STUDIES

CODE : 11MT/GC/ES 12

CREDIT : 2

L T P : 2 0 0

TOTAL TEACHING HOUR : 26

OBJECTIVES OF THE COURSE

- To create an awareness about Current environmental issues
- To educate the students about conservation and management of natural resources
- To make the students ecosensitive and ecofriendly.

Unit 1 (6 Hrs)

Introduction

- 1.1 Components of the environment – Classification and characteristics of resources – Renewable and non – renewable resources
- 1.2 Need for Public awareness in conservation of natural resources
- 1.3 Energy Flow in ecosystems – aquatic and terrestrial – food chain and food web.

Unit 2 (10 Hrs)

Pollution and Socio Economic Aspects of the Environment

- 2.1. Types of pollution – Air, Water, Solid Waste, Noise
- 2.2. Problems - green house effect – depletion of the ozone layer – climate change
- 2.3. Bio diversity - Definition - Loss of bio diversity – Threats to biodiversity and Conservation of biodiversity.
- 2.4. Human behaviour: - Population – urbanization – poverty (as cause and result of pollution and degradation)
- 2.5. Technology: - Agriculture and industry – deforestation. Use, Misuse and Abuse of the resources
- 2.6. Effects and consequences of environmental problems.

Unit 3 (10 Hrs)

Sustainable Development, Remedies and Policy Implications

- 3.1 Environmental disasters natural and human made – Bhopal gas Tragedy – Chernobyl Accident – Fukushima Nuclear Crisis - Gulf War – Love Canal Episode – Tsunami – Volcanic eruptions.
- 3.2 Methods evolved to measure and check environmental degradation and pollution – carbon footprint, carbon credit, ecological footprint, and ecological shadow.
- 3.3 Environmental movements in India – Chipko movement, Narmada bachao Andolan, Sethu Samudram Project
- 3.4 Environmental Acts – Policy measures with respect to India.
- 3.5 International environmental agreement – Stockholm Conference – Montreal protocol – RIO Meet – Kyoto Conference – UN conference on Climate change (Copenhagen)

Field visit

Eco initiatives at the campus : Garbage segregation and Vermicomposting – Graywater recycling – Rainwater harvesting – Solar powered lights – Bio diversity.

TEXT BOOK

Bharucha, E., Textbook of Environmental Studies, (1st edition), Hyderabad, Universities Press, 2005.

BOOKS FOR REFERENCE

Ignacimuthu, S. Environmental Awareness and Protection, New Delhi., Phoenix Publishing House, 1997.

Jadhav, H and V. M. Bhosale. Environmental Protection and Laws, New Delhi, Himalaya Publication House, 1995.

Odum, E.P. Fundamentals of Ecology, W.B. Saunders Co., U.S.A. 1971.

Mies, M. and V. Shiva. Ecofeminism, London. Zed Books, 1989.

Singh, H.R., Environmental Biology, (1st edition), New Delhi, S.Chand and Co., Ltd., 2005.

PATTERN OF EVALUATION (Totally Internal)

CONTINUOUS ASSESSMENT (CA): One Hour Test – 25 Marks
One Component – 25 Marks

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B.SC. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2011-2012)

ALGEBRA AND TRIGONOMETRY

CODE: 11MT/MC/AT14

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To inculcate the knowledge of solving various type of equations.
- To expose trigonometry as a tool in solving problems.

Unit 1 (12 Hrs)

Theory of Equations

Polynomial equations – Imaginary and irrational roots – Symmetric function of roots in terms of coefficients - Transformation of equations

Unit 2 (14 Hrs)

Theory of Equations (contd.,)

Reciprocal equations – Increase or decrease the roots of a given equation - Formation of equations – Transformations in general – Descartes’ rule of signs.

Unit 3 (11 Hrs)

Matrices

Rank of matrix and consistency of equations - Eigen values and matrices – Cayley Hamilton theorem – Similar matrices – Diagonalization of a Matrix

Unit 4 (15 Hrs)

Trigonometry

Expansions – Expansions of $\cos n\theta$ and $\sin n\theta$ – Expansion of $\tan n\theta$ – Expansion of $\cos^n \theta$ and $\sin^n \theta$ in a series of sines and cosines of multiples of θ - Expansion of $\sin \theta$ and $\cos \theta$ in powers of θ . Hyperbolic functions – Euler’s formula for $e^{i\theta}$ – 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 .

Unit 5 (13 Hrs)

Trigonometry (contd.,)

Inverse hyperbolic functions in terms of logarithmic functions – Separation into real and imaginary parts of $\sin(x + iy)$, $\cos(x + iy)$, $\tan(x + iy)$, $\sinh(x + iy)$, $\cosh(x + iy)$, $\tanh(x + iy)$ - Logarithm of a complex number

BOOKS FOR STUDY

Manicavachagam Pillay T. K., T. Natarajan, & K.S. Ganapathy, Algebra -Vol I, Madras: S. Viswanathan Printers & Publishers , 2006.

Chapter 6 Exercise : 42, 44, 46, 47, 48, 50, 51, 52

Manicavachagam Pillay T. K., T. Natarajan, & K.S. Ganapathy, Algebra- Vol. II, Madras: S. Viswanathan Printers & Publishers and Vijay Nicole imprints private Ltd, 2006.

Chapter 2 Exercise : 12, 13, 14.

Narayanan. S, Trigonometry, Madras: Viswanathan Printers & Publishers, 2007.

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

Chapter 4 : Section 1-2.2

Chapter 4 : Section 2.3

Chapter 5 : Section 5

BOOKS FOR REFERENCE

Arya, S. P., College Trigonometry, ., New Delhi Rastogi & Co., New Delhi, 1986.

Gunadhar Paria, . Classical Algebra, Calcutta, Books And Allied (P) Ltd., 1999

Shanthi Narayanan & P.K. Mittal A Text Book of Matrices, New-Delhi S. Chand & Company Ltd.,1953.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

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B.S.C. DEGREE: BRANCH – I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2011-2012)

DIFFERENTIAL CALCULUS

CODE : 11MT/MC/DC14

CREDIT: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

- To understand the concepts of successive and partial differentiation in depth.
- To enhance understanding of differential geometry.
- To give a strong foundation for higher mathematics

Unit 1 (13 Hrs)

Successive Differentiation

The n^{th} derivative – Standard results- Differentiation of fractional expressions - Trigonometrical transformations - Formation of Equations involving derivatives - Leibnitz theorem.

Unit 2 (13 Hrs)

Partial Differentiation

Successive partial derivatives - Function of function rule - Total differential coefficient – Implicit functions - Homogeneous functions – Euler’s theorem - Partial derivatives of a function of two functions.

Unit 3 (16 Hrs)

Curvature of plane curves

Curvature – Circle, radius and center of curvature – Cartesian formula for radius and center of curvature – Coordinates of the center of curvature - Evolute and Involute - Radius of curvature when the curve is given in polar coordinates - Pedal equation of a curve – Chord of curvature.

Unit 4 (10 Hrs)

Maxima and Minima

Maxima and minima of functions of two variables- Lagrange’s method of undetermined multipliers

Unit 5 (13 Hrs)

Tracing of curves

Tracing the curves in Cartesian coordinates - polar equation - well known curves.

BOOKS FOR STUDY

Narayanan. S. and Manicavachagam Pillay,T. K. Calculus - Vol. I. Madras: S.Viswanathan Printers and Publishers,1993.

Chapter 3 – Sec 1.1 - 1.6, 2.1 & 2.2	Exercises: 13, 14, 15
Chapter 8 – Sec 1.1 - 1.7, 4,5	Exercises: 32, 33, 35.
Chapter 10 – Sec 2.1 - 2.8 & 3.1	Exercises: 43, 44, 45
Chapter 13 – Sec 1.1, 1.2	Exercises: 49, 50

BOOKS FOR REFERENCE

Joseph Edwards. An Elementary Treatise on the Differential Calculus. London: Macmillan and Co. Ltd., 1948.

Narayan, Shanti. A Text Book of Calculus - Part I. New Delhi: Shyamal Charitable Trust.

Rajagopal R. V., V.R. Srinivasan, R. Albert Victor, and M. William. A Text Book of II B.Sc. Mathematics. Trichy: United Printers, 1972.

Singaravelu A. and R. Ramaa. Calculus and Coordinate Geometry of 2 Dimensions PaperII. Chennai: Meenakshi Publications, 2003.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

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B.SC DEGREE: BRANCH I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2011-2012)

POPULAR ASTRONOMY

CODE: 11MT/UI/PA23

CREDITS: 3

OBJECTIVE OF THE COURSE

- To gain basic knowledge in the history of Astronomy
- To introduce the important features of the Solar system
- To bring to light important features of stellar universe
- To expose to the latest Astronomical discoveries

Unit 1

Celestial sphere and Diurnal motion (Concepts Only)

Celestial sphere – Celestial co-ordinates – Trace of changes in the co-ordinates of the sun in the course of a year – Sidereal time – latitude of a place – morning and evening stars – circumpolar stars, twilight, refraction, parallax, dip of a horizon.

Unit 2

Moon: Elongation, age and phase of the moon, successive phases of moon – Lunar Librations - position of moon at rising and setting – Surface structure – tides – Tsunami waves – Space probes.

Eclipses: Lunar and Solar eclipses - Types of lunar and solar eclipses – Importance of total solar eclipse – Number of eclipses in a year (Derivations not required) - Comparison of solar & lunar eclipses.

Unit 3

Laws of Motion

Kepler's law (statement only). Planetary Phenomena - Bode's law, Heliocentric motion of a planet, Direct and Retrograde motion - stationary points. Seasons (derivation of length not expected) – Causes. Calendar - different types (including solar and lunar calendar).

Unit 4

Solar System

Galaxies – Our Galaxy : the Milky Way Galaxy ; Neighbour: Andromeda Galaxy
Solar System: Sun: Sun as a Star - radius, mass, luminosity, rotation, sunspots, magnetic field, prominences, photo sphere, chromospheres, corona, solar wind – Planets - Asteroids – Comets – Meteors.

Unit 5

Stellar Universe

Stellar motion - Colour & size of stars - double & multiple stars - variable stars.

Constellations: Zodiacal constellations, Winter constellations : Orion, Canis Major, anis minor and Gemini, spring constellations : Ursa Major, Leo, Summer Constellations : Libra, Sagittarius, Autumn constellations: Aquarius, Aries.

OBSERVATION

Sun spots, planets, meteors, constellations, Nebulae, Moon and its craters, comets (if any).

BOOK FOR STUDY AND REFERENCE

Kumaravelu S. and N. Susheela Kumaravelu. Astronomy. Nagercoil : Diocesan Press, 1996.

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

Mathew K.C. and et al. A Text Book of Astronomy. New Delhi : Chand & Co., 1972.

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

Smart W.M. Stellar Dynamics. London : Cambridge University Press, 1938.

Smart W.M. Some famous stars. London : Orient Longman, 1956.

Baker R.H. and W. Fredrick i. Astronomy ii. Hamlyn Guide to Astronomy. New York : Van Nostrand Reinhold Co., 1964.

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

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**Allied Core Course Offered by the Department of Mathematics
to students of Chemistry**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR CHEMISTRY – II

CODE: 11MT/AC/MC 24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

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

Unit 1 (15 Hrs)

Differential Equations

Ordinary differential equations : Linear equations of second and third order with constant co-efficients - Evaluation of the particular integral of the equation for the following types: e^{ax} , $\sin ax$ or $\cos ax$, where 'a' is a constant, x^k , where 'k' is a positive integer, Xe^{ax} , where 'X' is any function of x.

Unit 2 (13 Hrs)

Laplace transform

Definition - Transforms of $f'(t)$ & $f''(t)$ - Transformation of function e^{-at} , $\cos at$, $\sin at$ and t^n , where 'n' is a positive integer - first shifting theorem - Laplace transforms of $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} t^n$.

Unit 3 (12 Hrs)

Inverse Laplace transform

Inverse Laplace transforms of functions relating to $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} t^n$
- applications to solutions of ordinary differential equations with constant
- coefficients involving the above transforms.

Unit 4 (13 Hrs)

Fourier Series

Fourier Series : Definition, finding Fourier coefficients for a given periodic function with period 2π - odd and even functions - half - range series.

Unit 5 (12 Hrs)

Statistics

Correlation and Regression : Scatter diagram and its uses - correlation coefficient and computation for raw data - limits of coefficient of correlation - Rank correlation coefficient - equation of two regression lines and linear prediction of x for a given y and of y for given x. Curve Fitting(Simple problems only).

BOOKS FOR STUDY

Narayanan , S. & T.K. Manicavachagam Pillay, Ancillary Mathematics vol II
Madras:S. Viswanathan Printers & Publishers, 1999.

Differential Equations: Chapter 3: Sections 1- 4.

Differential Equations: Chapter 4: Sections 1-7.

Integral calculus: Chapter 4: Sections 1-5.

Vital, P.R., Mathematical Statistics, Chennai: Margham Publications, 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 Publishing House, 1999.

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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
to students of Physics**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR PHYSICS – II

CODE : 11MT/AC/MP 24

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

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

Unit 1 (13 Hrs)

Differential Equations

Partial differential equation : Formation of equations by elimination of constants and an arbitrary function - Definition of General, Particular Complete and Singular integral - Solutions of first order equations in their standard forms : $F(p, q) = 0$; $F(z, p, q) = 0$; $F_1(x, p) = F_2(y, q)$; $z = px + qy + f(p, q)$. Lagrange's method of solving of linear equations $Pp + Qq = R$.

Unit 2 (13Hrs)

Laplace transform

Definition - Transforms of $f'(t)$ & $f''(t)$ - Transformation of function e^{-at} , $\cos at$, $\sin at$ and t^n , where 'n' is a positive integer - first shifting theorem - Laplace transforms of $e^{-at} \cos bt$, $e^{-at} \sin bt$ and $e^{-at} t^n$ - inverse transforms relating to the above standard forms. Solving second order differential equations with constant coefficients using Laplace transforms.

Unit 3 (10Hrs)

Fourier Series

Definition, finding Fourier coefficients for a given periodic function with period 2π - odd and even functions - half - range series.

Unit 4 (14Hrs)

Complex differentiation and Complex Integration

Functions of a complex variable – Limits - Continuous functions – Conformal mapping (Theorems Statement only) – Elementary Transformation - Mapping by elementary Functions – the Mapping $w = z^2$ - the Mapping $w = \sin z$.

Complex differentiation: Differentiability - Cauchy Riemann equations (statement only) – analytic functions – Harmonic functions - simple problems -

Complex Integration: Cauchy's theorem (statement only) - Cauchy's Integral formula (statement only) - Cauchy's formula Higher Derivatives (statement only) - simple problems.

Unit 5 **(15Hrs)**
Complex variables

Infinite Series: Series of functions – Taylor's Series (statement only) - Laurent's Series (statement only) - Singular points – Residues at poles - simple problems.

BOOKS FOR STUDY

Arumugam S., A.T. Issac, & A. Somasundaram, Complex Analysis, SCITECH Publications (India) Pvt., Ltd., Chennai, (2002).

Chapter 2: Sections - 2.1,2.2,2.4–2.9 (Statements of Theorems only)
Chapter 3: Section - 3.1
Chapter 5: Sections - 5.2, 5.4.
Chapter 6: Section - 6.2 – 6.4 (Statements of mentioned Theorems only).
Chapter 7:Section- 7.1, 7.2, 7.4.(Statements of mentioned Theorems only).
Chapter 8: Section - 8.1

Narayanan, S. and T.K. Manicavachagam Pillay, Ancillary Mathematics Book - II
S. Viswanathan Printers & Publishers, Madras, 2002.

Differential Equations: Chapter 4: Sections 1-5
Chapter 6: Secions 1-3, 5, 6
Integral Calculus: Chapter 4: Sections 1-5.

BOOKS FOR REFERENCE

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

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

Shanti Naryan, Theory of Functions of a Complex Variable, New Delhi :S. Chand and Co., (Pvt) Ltd., 1973.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

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

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

BASIC MATHEMATICS

CODE : 11MT/GE/BM 24

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

*Offered to those who had not studied Mathematics or Business mathematics in their secondary level of Education.

- Unit 1 (10 Hrs)**
Matrices
Matrices-Elementary Concepts- Evaluation of Determinant of a square matrix - Types of Matrices-Sum and product of Matrices-Inverse of a square matrix of order 2 and order 3 –Rank of Matrix.
- Unit 2 (11 Hrs)**
Theory of Equations
Relation between roots and coefficients - solution of equations under simple given conditions - Formation and solution of equations with imaginary and surd roots.
- Unit 3 (10 Hrs)**
Application of Matrices
Consistency of a system of linear non-homogeneous equations (statement only)- simple problems characteristic equation of a square matrix - evaluation of eigen values – Cayley Hamilton Theorem (statement only) – verification and computing inverse using Cayley Hamilton Theorem
- Unit 4 (11 Hrs)**
Differential Calculus
Differential coefficient of $f(x)$ with respect to x - rules for differentiation - Differential coefficient of standard functions – Trigonometric and Inverse trigonometric functions.
- Unit 5 (10 Hrs)**
Differential Calculus (continued)
Logarithmic differentiation - Differentiation of one function with respect to another.

Integral Calculus

Integration as the inverse process of differentiation - integration of standard functions.

BOOKS FOR STUDY

Manicavachgam Pillay, T.K., T. Natarajan, and K.S. Ganapathy. Algebra Vol. II. Chennai : S. Vishwanthan printers and publishers Pvt. Ltd., 2006.

Chapter 2 Sections: 1-5, 7, 8, 11, 16.

Manicavachgam Pillay, T.K., T. Natarajan, and K.S. Ganapathy. Algebra Vol. I. Chennai : S. Vishwanthan printers and publishers Pvt. Ltd., 2006.

Chapter 6 Sections: 1, 9, 10, and 11

Narayanan S., and T.K. Manicavachgam Pillay. Calculus Vol. I. Chennai : S. Vishwanthan printers and publishers Pvt. Ltd., 2004.

Chapter 7 Sections: 1- 3.10, 4.1, 4.2, and 7

Narayanan S., and T.K. Manicavachgam Pillay, Ancillary Mathematics: Book II. Chennai : S. Vishwanthan printers and publishers Pvt. Ltd., 2004 .

Chapter 1 Sections: 1.1- 6.1

BOOKS FOR REFERENCE

Vittal, P.R. Allied Mathematics. Chennai : Margham Publications, 2002.

Narayanan S., R. Hanumantha Rao, T.K. Manicavachgam Pillay, and P. Kandaswamy. Ancillary Mathematics Vol. I. Chennai : S. Vishwanthan printers and publishers Pvt. Ltd., 2007.

Vittal, P.R., Business Mathematics. Chennai : Margham Publications, 1999.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

ANALYTICAL GEOMETRY

CODE: 11MT/MC/AG24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the concepts of two dimensional Coordinate Geometry in depth.
- To introduce the concept of three dimensional geometry.
- To give a strong foundation for higher mathematics
- To improve the analytical skills.

Unit 1 (10 Hrs)

General second degree equation

Condition for a general second degree equation to represent a conic - Centre of the conic given by the general second degree equation (concept only)- Lengths and positions of the axes of the central conic $ax^2+2hxy+by^2=1$ (concept only).

Unit 2 (15 Hrs)

Ellipse

Ellipse - Conjugate diameters and its properties – Equi-conjugate diameters.

Hyperbola

Hyperbola - Asymptotes - Conjugate hyperbola - Relation between the equation of a hyperbola, its asymptotes and conjugate hyperbola - Rectangular hyperbola.

Unit 3 (10 Hrs)

Plane

Plane - General equation - Intercept form - Normal form - Angle between two planes - Equation of plane through the line of intersection of two given planes - Length of perpendicular from a given point to a plane.

Unit 4 (15 Hrs)

Straight Line

Straight line - Symmetrical form - Line through two points - Reduction of the unsymmetrical form to the symmetrical form - Condition for a line to lie on a plane - Plane through a given line - Condition for two lines to be coplanar - Equation of the plane containing the two lines - Shortest distance between two skew lines and equation of the line containing the shortest distance .

Unit 5**(15 Hrs)****Sphere & Cone**

Sphere - Equation of a sphere with given centre and radius - General form of the equation of a sphere – plane section of a sphere – Intersection of two spheres – Equation of a circle on a sphere – Equation of sphere passing through given circle. Tangent plane to a sphere - Necessary condition for a general equation of second degree to represent a cone – Equation of a circular cone with given vertex, axis and semi-vertical angle

BOOKS FOR STUDY

Manicavachagam Pillay T. K, and T. Natarajan. A Text book of Analytical Geometry Part I - Two dimensions. S. Viswanathan Printers and Publishers, 1999.

Chapter 7 Sections 16.1 - 16.4

Chapter 8 Sections 4 - 13

Chapter 10 Sections 3 – 6.

Manickavachagam Pillay , T. K & T. Natrajan, A Text Book of Analytical Geometry - Part II (Three Dimensions) Madras S. Viswanathan Printers & Publishers, 2001.

Chapter 2 Section 1-10

Chapter 3 Section 1-8

Chapter 4 Section 1-8

Chapter 5 Section 2.1

BOOKS FOR REFERENCE

Duraipandian, P., Laxmi Duraipandian and D. Muhilan. Analytical Geometry -Two Dimensions. Madras: Emerald Publishers, 1985.

Duraipandian, P. & Laxmi Duraipandian, Analytical Geometry (Three Dimensions), Madras, The National Publishing Co., 1986.

George F. Simmons. Calculus with Analytic Geometry. 2nd ed. International Edition .New York :Mc Graw-Hill Company Inc, 1996.

Mathur, S. M., A New Text Book of Analytical Solid Geometry, Vol. I., New Delhi, Oxford & IBH Publishing Co., 1969.

Narayan, Shanti P.K. Mittal Analytical Solid Geometry, New Delhi S. Chand & Co., 2006.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

INTEGRAL CALCULUS

CODE: 11MT/MC/ IC24

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To understand the concepts of integration
- To improve the problem solving skill which forms a foundation for other courses in Mathematics.

Unit 1 (13 Hrs)

Integration

Methods of integration - Integration of rational algebraic functions.

Unit 2 (16 Hrs)

Integration (continued)

Integration of irrational algebraic functions.-Properties of definite integrals.
Integration by parts - Bernoulli's formula for integration by parts.

Unit 3 (10 Hrs)

Multiple Integrals

Definitions of double and triple integrals - change of order of integration for two variables - Double integrals and triple integrals in Cartesian (2D) coordinates.

Unit 4 (13 Hrs)

Multiple Integrals (continued)

Double integrals and triple integrals in polar coordinates- Change of variables and Jacobian for two variables.

Unit 5 (13 Hrs)

Improper Integrals

Definitions of Beta and Gamma integrals – recurrence formula for Gamma functions – properties of Beta functions – relation between Beta and Gamma functions.

BOOK FOR STUDY

Narayanan, S., and T. K. Manicavachagam Pillay. Calculus - Vol II. Chennai : S. Viswanathan Printers & Publishers, 1995.

Chapter 1	Sections 7-12, 14, and 15.1	Exercises: 7 to 17, 20&21
Chapter 5	Sections 2.1, 2.2, 3.1, 3.2 and 4	Exercises: 39, 40, 41.
Chapter 6	Sections 1.1, 1.2, 2.1, 2.3;	Exercise: 45.
Chapter 7	Sections 2.1, 2.3, 3 and 4;	Exercise: 47.

BOOKS FOR REFERENCE

Rajagopal, R. V., V.R. Srinivasan, R. Albert Victor and M. William. A Text Book of II B.Sc. Mathematics, Trichy : United Printers, 1972.

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

Vittal, P.R.. Allied Mathematics, Chennai, Printed and published by Margham publications, 2007.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI-86.

B.Sc DEGREE: BRANCH I – MATHEMATICS

SYLLABUS

(Effective from the academic year 2011-2012)

**C – PROGRAMMING AND APPLICATIONS
(Theory & Practical)**

CODE: 11MT/AC/CP 34

CREDITS: 4

L T P : 3 0 2

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To develop logical thinking and programming skill.
- To train the students in compiling, debugging and executing programs.

Unit 1 (4 Hrs)

Introductory Concepts

Introduction to Computers – Block Diagram of Computer – Computer Characteristics – Hardware Vs. Software – How to develop a program – Modes of operation – Types of programming Languages.

Unit 2 (8 Hrs)

Introduction to C Programming:

The C character set – Identifiers and Keywords – Entering the Program into the computer – Compiling and Executing the Program – Data types – Constants – Variables and Arrays – Declarations – Expressions – Statements – Symbolic constants.

Operators and Expressions:

Arithmetic – Unary – Relational & Logical – Assignment – Conditional Operators– Library Functions.

Data Input and Output:

getchar() – putchar() – scanf() – printf() – gets() – puts() – Interactive Programming.

Unit 3 (9 Hrs)

Preparing & Running a Complete C Program:

Planning & Writing a C program – Error Diagnostics – Debugging Techniques.

Control Statements:

Branching: The if – else statement – Looping: while – do..while – for statements– Nested Loops – switch – Break – Continue – Comma Operator – goto Statement.

Processing a Programme: Compiling – Running – Debugging – Syntax errors – Run-time errors – Logical errors – Testing a programme.

Functions:

Defining a function – Accessing a function – Function prototypes – Passing arguments to functions – Recursion

Unit 4 (9 Hrs)**Arrays:**

Defining an Array – Processing an Array – Passing arrays to functions – Multidimensional Array – Arrays and Strings.

Pointers:

Pointer declaration – Passing Pointers to function – Pointers and One dimensional Arrays – Dynamic memory allocation.

Unit 5 (9 Hrs)**Structures And Unions:**

Defining a Structure – Processing a Structure – User defined data types – Structures and Pointers – Passing structures to functions – Unions.

Data Files:

Data files – Opening and Closing a data files – Creating and Processing data files.

Practicals (26 Hrs)

Basic programming techniques - simple programs for obtaining solutions with the help of formulas-programs using arrays - programs with function and recursion – programs using pointers - programs for solving problems using structure and union -creating a data file – reading an existing data file.

BOOK FOR STUDY

Gottfried, Byron S. Programming With C – Schaum's Outline Series 2nd ed., New Delhi: Tata McGraw-Hill Publishing Company Limited, 2006.

Chapter	1	Section 1.1 – 1.8
Chapter	2	Section 2.1 – 2.13
Chapter	3	Section 3.1 – 3.6
Chapter	4	Section 4.1 – 4.9
Chapter	5	Section 5.1 – 5.4
Chapter	6	Section 6.1 – 6.11
Chapter	7	Section 7.1 – 7.6
Chapter	9	Section 9.1 – 9.5
Chapter	10	Section 10.1 – 10.5
Chapter	11	Section 11.1 – 11.5, 11.7
Chapter	12	Section 12.1 – 12.3

BOOKS FOR REFERENCE

Kanetkar, Yashawant. Working with C. New Delhi: BPB Pub., 1994.

Kernighan Brian W. C programming language. New Delhi : Prentice-hall of India, 1998

Ravishankar S., Computer concepts and C programming, Mumbai : Himalaya,1999.

Rajaram, R. C Programming made easy. Chennai : Scitech Pub., 1998.

END SEMESTER EXAMINATION : (Duration : 3 hours)

PATTERN OF EVALUATION

Section A : Theory $20 \times 1 = 20$

$5 \times 8 = 40$ (Seven questions to be set without omitting any unit).

Section B : Practical $1 \times 15 = 15$ (Two questions to be set).

$1 \times 25 = 25$ (Two questions to be set)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Course Offered by the Department of Mathematics
to students of Commerce (CS)**

SYLLABUS

(Effective from the academic year 2011-2012)

BUSINESS MATHEMATICS

CODE : 11MT/AC/BM 34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

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

Unit 1 (13Hrs)

Matrices

Matrices – Elementary Concepts – Evaluation of Determinant of a square matrix – Types of Matrices – Sum and product of Matrices – Inverse of a square matrix of order 2 and order 3 – simple problems – Elementary transformation of a matrix – consistency of a system of linear equations – Cramer’s rule – Input – Output Analysis – simple problems.

Unit 2 (12 Hrs)

Functions, Graphs and Limits

The concept of function – Graph of function – linear function – demand function – supply function – cost function – revenue function – profit function.
Straight line – slope of a line – equation of a straight line in different forms.
Definition of a limit – Rate of change and limits – Rules for finding limits – simple problems.

Unit 3 (12 Hrs)

Quantitative Mathematics

Ratio and Proportion – Partnership and Share – Mixtures – Chain rule – Time and work – Compound Interest – Nominal rate and effective rate – Annuities.

Unit 4 (14Hrs)

Differentiation

Continuity – Tangent lines – Derivative of a function – Velocity and Rates of change – Differentiation Rules – The Chain Rule – Maxima and Minima – global and local – criteria for obtaining maxima and minima using second derivative test only.

- Applications of Differentiation**
Elasticity of functions – Application of Maxima and Minima – Inventory control.
Unit 5 (14 Hrs)
- Integration**
Integrals of function – Methods of Integration – Integration by substitution – Standard forms – Integration by parts – definite integrals.
- Applications of Integration**
The cost function and average cost function from marginal cost function – The revenue function and demand function from marginal revenue function – demand function from elasticity of demand. Consumer's Surplus – Producer's Surplus.

BOOKS FOR STUDY AND REFERENCE

- George F. Simmons, Calculus with Analytic Geometry (Second edition), McGraw-hill, Compaines.
- Geroge B. Thomas,Jr. & Ross L. Finney, Calculus and Analytical Geometry New York: Addison – Wesley, 1998.
- Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw-hill Publishing Company Limited , New Delhi.
- P.R. Vittal, Business Mathematics,Chennai: Margham Publications, 2001.
- Seymour Lipschutz, Theory and Problems of Computer Mathematics Schaum's outline series, McGraw-hill Book Company
- Geroge B. Thomas,Jr. & Ross L. Finney, Calculus and Analytical Geometry, Addison – Wesley, New York.

PATTERN OF EVALUATION (End Semester Examination - 3 Hours)

- Section A: $10 \times 2 = 20$ (Ten questions to be set selecting at least two from each)
- Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)
- Section C: $2 \times 20 = 40$ (Three questions to be set selecting one question per unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**Allied Core Course Offered by the Department of Mathematics
to students of Computer Science**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR COMPUTER SCIENCE - I

CODE : 11MT/AC/MS34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To provide the essential mathematics required for various computer applications.

Unit 1 (13 Hrs)

Discrete Mathematics

Conditional and bi-conditional statements – Arguments – Logical Implication – Propositional functions, quantifiers – Negation of quantified statements.

Unit 2 (16 Hrs)

Boolean Algebra

Ordered sets – Hasse diagram – consistent enumeration – supremum and infimum – Isomorphic ordered sets – well ordered sets – Lattices - bounded lattices – distributive lattices - Definitions – Duality – Basic Theorems - Boolean Algebra as Lattices- Representation Theorem – sum of product forms for Boolean Algebras – Minimal Boolean Expressions, Prime implicants - logic gates and circuits.

Unit 3 (10 Hrs)

The Fundamental Theorem of Arithmetic

Divisibility – Greatest Common divisor – Prime numbers – The fundamental theorem of Arithmetic – The Euclidean algorithm. The möbius function $\mu(n)$ – The Euler totient function $\varphi(n)$.

Unit 4 (13 Hrs)

Graph Theory

Data Structures - Graphs and Multigraphs - Subgraphs, Isomorphic and Homeomorphic graphs - Paths, connectivity - The Bridges of Königsberg, Traversable Multi graphs – Labeled and weighted graphs – Complete, Regular and bipartite graphs – Tree graphs – Planar graphs – Graph colorings.

Unit 5 (13 Hrs)

Probability Theory

Probability – Classical definition – Addition Theorem – Multiplication Theorem – Axioms of Probability - Theorem 5 for two events only - Boole's inequality(statement only) – Conditional Probability–Theorem on Total probability – Baye's Theorem – Independent events.
Sample Correlation – Rank Correlation – Regression.

BOOKS FOR STUDY

Lipson, Marc. and Lipschutz Seymour. Discrete Mathematics . 2nd ed. New Delhi: Schaum's outlines, Tata McGraw-hill Publishing Company Limited , 1999.

Chapter 4 Section 4.8 – 4.12
Chapter 8 Section 8.1 – 8.10
Chapter 14 Section 14.1 – 14.10
Chapter 15 Section 15.1 – 15.10

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

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

Vittal. P.R. Mathematical Statistics. Chennai: Margham Publications, 2002.

Chapter 1 Pages 1.1 – 1.11.
Chapter 8 Pages 8.16 – 8.45
Chapter 9 Pages 9.1 – 9.24

BOOKS FOR REFERENCE

Arumugam, S., and S. Ramachandran. Invitation to Graph Theory. Palayamkottai: New Gamma Publishing House, 1994.

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

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

Sharma. Discrete Mathematics. Chennai: Macmillan India Ltd., 2003

Solai Raju, Chandrasekar, Krishnamoorthy and Ganesh. Discrete Mathematical Structures. Kumbakonam: Anuradha Agencies, 2003.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)
Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)
Section C: $2 \times 20 = 40$ (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
to students of Commerce**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR COMMERCE

CODE: 11MT/AC/MT 34

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVES OF THE COURSE

- To provide the essential necessary mathematics for commerce.
- To inculcate problem solving skills.
- To introduce quantitative analysis.

Unit 1 (13 Hrs)

Matrices

Matrices – Definition – Types of Matrices – Characteristic Equation of a matrix – Cayley-Hamilton theorem (without proof) – Eigen values and Eigen vectors – Diagonalizable matrix.

Unit 2 (13 Hrs)

Theory of Equations

Fundamental theorem (statement only) - Relation between roots and coefficients – Imaginary and irrational roots – Symmetric functions of the roots of an equation in terms of its coefficients - Reciprocal equation.

Unit 3 (13 Hrs)

Finite Differences

Finite differences – Forward difference table – Interpolation methods: Newton's forward formula – Newton's backward formula – Binomial method – Lagrange's formula – Central Difference Interpolation formula: Gauss forward interpolation formula and Gauss backward interpolation formula.

Unit 4 (12 Hrs)

Differential Calculus

Differential coefficient of standard functions (without proof) – Inverse functions – Hyperbolic and inverse hyperbolic functions – Differentiation of hyperbolic and inverse hyperbolic functions – Logarithmic differentiation – Differentiation of implicit functions – Parametric differentiation – successive differentiation (concepts only).

Unit 5

Integral Calculus

(14 Hrs)

Indefinite Integral – integrals of functions containing linear functions of x – integrals of functions involving $a^2 \pm x^2$, Integrals of functions of the following forms: $\int f(x^n)x^{n-1}dx$; $\int [f(x)]^n f'(x)dx$, $\int F[f(x)]f'(x)dx$ – Integration of rational algebraic functions – Integration of irrational functions-Integration by parts.

BOOKS FOR STUDY

Narayanan S. and T.K. Manicavachagom Pillay Calculus Volume– I. Chennai: S.Viswanathan Printers and Publishers Pvt. Ltd., 2004.

Chapter 2 : Section 3.9 – 4.2; 5; 6

Chapter 3 : Section 1.1

Narayanan S. and T.K. Manicavachagom Pillay. Ancillary Mathematics Book – II. Chennai.:S.Viswanathan Printers and Publishers Pvt. Ltd., 2002

Integral Calculus Chapter 1: Section 1.1 – 7.2; 8(omitting case iv,v & vi) ;12.

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

Chapter 5: Pages 5.1 – 5.24, 5.50 – 5.75, 5.77 – 5.82

Chapter 6: Pages 6.1 – 6.37

Chapter 7: Pages 7.1 – 7.30

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

Chapter 7 : Section 7.2

BOOKS FOR REFERENCE

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

Narayanan S. and T.K. Manicavachagom Pillay. Calculus Volume– II. Chennai: S.Viswanathan Printers and Publishers Pvt. Ltd., 2006.

Singaravelu A. Allied Mathematics. Chennai: Meenakshi Traders, 2001.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

OPERATIONS RESEARCH

CODE : 11MT/GE/OR32

CREDITS : 2

L T P: 2 0 0

TOTAL TEACHING HOURS : 26

* Offered to ALL except Mathematics students.

OBJECTIVE OF THE COURSE

- To provide few simple mathematical models and hence to develop a methodical approach to solving real life problems
- To give an introduction to Network computations to plan and review any project.

Unit 1

(9 hours)

Introduction to OR

Introduction – Role of OR in Business & Management – Role of OR in Engineering – Classification of Models – Some Characteristic of a good Model – Principles of Modeling – General Methods for solving OR models – Main Phases of OR – Limitation.

Linear Programming Problem

Introduction – Requirements for employing LPP technique – Mathematical formulation of LPP – Graphical method of the solution of a LPP – Some more cases – Advantages of LPP – Limitations of LPP.

Simplex Method

General LPP – Canonical and Standard forms of LPP – The Simplex method – The Simplex Algorithm.

Unit 2

(9 hours)

Transportation Model

Introduction – Mathematical Formulation – Methods for finding initial basic feasible solution – MODI method – Unbalanced Transportation Problem – Maximization Case in Transportation Problem.

Assignment Problem

Introduction – Mathematical formulation – Comparison with Transportation Model- Difference between the transportation Problem & Assignment Problem – Hungarian Method – Unbalanced Assignment Models – Maximization case in Assignment Problem – Restrictions in Assignment – Traveling Salesman Problem.

Unit 3

(8 hours)

PERT and CPM

Introduction – Basic Terminologies – Rules for constructing a project network – Network Computations – Floats – Programme Evaluation Review Techniques – Difference between PERT and CPM.

BOOK FOR STUDY

Sundaresan, V., K.S. Ganapathy Subramanian, K. Ganesan. Resource Management Techniques. 4th ed. Arapakkam: A.R. Publications, 2007.

Chapter 1	Section 1.1 – 1.9
Chapter 2	Section 2.1 – 2.3, 2.5 – 2.8
Chapter 3	Section 3.1.1 – 3.1.4
Chapter 7	Section 7.1, 7.2, 7.4, 7.5
Chapter 8	Section 8.1 – 8.9
Chapter 15	Section 15.1 – 15.7

BOOKS FOR REFERENCE

Gupta Premkumar and Hira, D.S., Operations Research. New Delhi: S.Chand & Company Pvt., Ltd., 2007

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

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

PATTERN OF EVALUATION: (Totally Internal)

Continuous Assessment (CA) - 25 marks

Section A : $3 \times 5 = 15$ marks (Choose three from four questions)

Section B : $1 \times 10 = 10$ marks (Choose one from two questions)

Third Component – 25 marks.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

GRAPH THEORY AND ITS APPLICATIONS

CODE: 11MT/GE/GT 32

CREDITS : 2

L T P : 2 0 0

TOTAL TEACHING HOURS : 26

ELIGIBILITY CRITERION

- Not Offered to B.Sc. Mathematics and B.C.A. students.

OBJECTIVE OF THE COURSE

- To introduce the basic concepts of graph theory
- To translate real life situations to diagrammatic representation
- To teach the applications of graph theory

Unit 1 (10 Hrs)

Definition of a graph and examples – degrees – subgraphs – Isomorphism – Paths and cycles – Matrix representation.

Unit 2 (8 Hrs)

Trees – bridges – connectivity – Eulerian graphs – Hamiltonian graphs – Matching – colouring (Concepts only).

Unit 3 (8 Hrs)

Graphs as models – Chinese Postman problem – Travelling Salesman problem – Marriage problem – Personnel Assignment problem – Applications of colouring – Interconnection Network.

BOOKS FOR STUDY AND REFERENCE

Arumugam, S., and S. Ramachandran, Invitation to Graph Theory, Palayamkottai: New Gamma Publishing House, 1994.

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

Clark John, Derek Allan Holton, A First Look at Graph Theory, New Delhi: Allied Publishers Limited, 1995.

Harary F., Graph Theory, U.S.A.: Addison – Wesley Publishing Co., 1969.

Xu Junming, Topological Structure and Analysis of Interconnection Networks,
Kluwer Academic Publishers, 2001.

PATTERN OF EVALUATION: (Totally Internal)

Continuous Assessment (CA) - 25 marks

Section A : $5 \times 2 = 10$ marks (Choose five from six questions)

Section B : $3 \times 5 = 15$ marks (Choose three from five questions)

Third Component- 25 marks.

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

B.SC DEGREE BRANCH I - MATHEMATICS

SYLLABUS

(Effective from the academic year 2011-2012)

ORDINARY DIFFERENTIAL EQUATIONS

CODE : 11MT/MC/OD 34

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To expose differential equations, as a powerful tool in problem solving, in Physical, Social and Managerial Sciences.

Unit 1 (16 Hrs)

Ordinary Differential Equations

Exact differential equations – Rules for finding integrating factors – Differential equation of first order but of higher degree – Clairaut's form – Orthogonal trajectories.

Unit 2 (16 Hrs)

Second order differential equations

Second order differential equations with constant coefficients – Particular integral of the form $e^{ax} V$ where V is a function of x – Differential equations of second order with variable coefficients – Equations reducible to the homogeneous equation – Variation of Parameters.

Unit 3 (15 Hrs)

Simultaneous differential equations

Simultaneous equations of the first order and first degree – Solutions of $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ – Simultaneous linear differential equations with constant coefficients – Total Differential Equations.

Unit 4 (9 Hrs)

Modeling and Analysis of Real World Systems using Higher Order Differential Equations

Series Electrical Circuit – Falling Bodies – The Shape of a Hanging Cable – Diabetes and Glucose Tolerance Test – Rocket Motion – Undamped and Damped Motion.

Unit 5 **(9 Hrs)**

Applications of System of Linear Differential Equations

Electrical Circuits – Coupled Springs – Mixture Problems – Arms Race.

BOOKS FOR STUDY

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

Chapter 1	:	Section 3 – 8
Chapter 2	:	Section 4(d), 8 – 10
Chapter 3	:	Sections 1 – 7

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

Chapter 4	:	Section 4.1 – 4.12
Chapter 7	:	Section 7.1 – 7.6
Chapter 8	:	Section 8.7

BOOKS FOR REFERENCE

Dym, Clive L. Principles of Mathematical Modeling. 2nd ed. USA: Academic Press, 2006.

Narayan S. and T.K. Manicavachagam Pillay. Differential Equations and its Applications. Chennai: S.Viswanathan Printers & Publishers Pvt. Ltd., 2001.

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

Singaravelu, A. Differential Equations Fourier Series and Laplace Transforms. Chennai: Meenakshi Traders, 2002

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

- Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)
- Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)
- Section C: $2 \times 20 = 40$ (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 2011-2012)

VECTOR ANALYSIS AND ITS APPLICATIONS

CODE: 11MT/MC/VA34

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

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

Unit 1 (15 Hrs)

Vector Differentiation

Scalar point function - Vector point function - Derivative of a vector - Derivative of sum of vectors - Derivative of the product of a scalar and a vector function - Derivative of a scalar product - Derivative of a vector product function. Vector differential operator *del* - Gradient of a scalar point function – Geometrical interpretation - Unit normal vector to given surfaces – Problems.

Unit 2 (12 Hrs)

Vector Differentiation (continued)

Divergence of a vector point function – Curl of a vector point function - Vector identities involving differential operators - Solenoidal and irrotational vectors - Formulae involving *del* operator and *Laplacian* operator – Problems.

Unit 3 (10 Hrs)

Vector Integration

Integration of vector functions – displacement – velocity – acceleration – Definite integrals - Line integral - Surface integral - Volume integral – Problems.

Unit 4 (13 Hrs)

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

Unit tangent vector – Principal normal - equation to tangent and normal plane – rectifying plane & osculating plane to a curve – Frenet – Serret formulae – Physical significance of Div and Curl of a vector point function - Velocity and Acceleration vectors relative to fixed and moving system – Angular momentum – Continuity Equation for an incompressible fluid.

Curvilinear Coordinates: Transformation – Orthogonal curvilinear coordinates – unit vectors in curvilinear systems – Arc length and volume elements – Gradient,

divergence and curl – special orthogonal coordinate systems – simple problems only.

Unit 5 (15 Hrs)

Vector Integration (continued)

Relation between the Line integral and Surface integral: Stokes' theorem -
Relation between the Surface integral and Volume integral: Gauss divergence
theorem – A special case of Stokes' theorem: Green's theorem in two dimensions -
Verification of the theorems – Problems.

BOOK FOR STUDY

Raisinghania M.D., Vector Calculus, S. Chand & Company Ltd., New Delhi, 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, Tata McGraw
Hill Education Private Limited, New Delhi, 2009.

Chapter 3 : Pages: 44 – 64

Chapter 4 : Pages: 69 – 94

Chapter 5 : Pages: 97 – 121

Chapter 6 : Pages: 126 – 153

Chapter 7 : Pages: 157 – 179

BOOKS FOR REFERENCE

Absos Ali Shaikh & Sanjib Kumar Jana, Vector Analysis with Applications, New
Delhi: Narosa Publishing House, 2009.

Duraipandian, P.& Laxmi Duraipandian, Vector Analysis, Madras, Emerald
Publishers, 1987.

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

Narayanan, S. & Manicavachagam Pillay, T. K., Vector Algebra & Analysis,
Madras: S. Viswanathan Printers & Publishers, 1980.

Raisinghania M.D., Vector Analysis, New Delhi: S. Chand & Company Ltd., 1985.

Shanti Narayan and P.K. Mittal, A textbook of Vector Analysis with Applications,
New Delhi: S. Chand & Company Ltd., 1955 - Reprint 2006.

Viswanathan.K. & Selvaraj,.S, Vector Analysis, Madras: Emerald Publishers, 1993.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

APPLIED STATISTICS

CODE :11MT/GE/AS44

CREDITS : 4

L T P: 4 0 0

TOTAL TEACHING HOURS : 52

* Offered to all the Sciences and Mathematics students.

OBJECTIVE OF THE COURSE

To introduce the basic statistical tools to observe and analyze data

Unit 1 (15 Hrs)

Presentation and Diagrammatic representation of Data

Statistical data - classification and tabulation for qualitative and quantitative data - bar diagrams - Simple, component and multiple - Pie diagrams - Simple and Component; Histograms - frequency polygon - frequency curve - Ogives.

Unit 2 (9 Hrs)

Measures of Central Tendency

Arithmetic mean, Geometric mean, Harmonic mean, Median, Mode, Weighted Arithmetic mean (Concept only).

Measures of Dispersion,: Range, quartile deviation, mean deviation, standard deviation, Relative measures of dispersion, mean and variance of a pooled sample – simple problems.

Unit 3 (8 Hrs)

Moments, skewness and kurtosis Definition- Raw moments and central moments, Relations between the two; definition Pearson's β_1 , coefficient of skewness based on quartiles; coefficient of Kurtosis – simple problems.

Unit 4 (10 Hrs)

Correlation, Regression, Curve fitting and ANOVA

Concept of correlation - direct and inverse, Scatter diagram, correlation coefficient -Pearson's Product moment and Spearman's Rank Correlation; linear regression - definition, regression lines of y on x and x on y - linear prediction – simple problems. Curve fitting: Straight line and parabola-simple problems.

Unit 5**(10 Hrs)****Analysis of variance**

Analysis of variance (ANOVA)-One-way classification – Two-way classification- ANOVA table-Additive Property- Pearson's Statistics Procedure for testing the signification of the difference between the observed and expected frequencies-Test of Independence of attributes.

BOOK FOR STUDY

Vittal, P.R. Mathematical Statistics. Chennai: Margham Publications, 2002

Part II Chapter 3: Pages 3.1-3.13

Chapter 4: Pages 4.1 – 4.20

Part II Chapter 5: Pages 5.1-5.31

Chapter 6: Pages 6.1-6.46

Part II Chapter 7: Pages 7.1-7.37

Part I Chapter 5: Pages 5.1 – 5.6

Part I Chapter 8: Pages 8.16-8.48

Chapter 9: Pages 9.1-9.30

Chapter 10: Pages 10.1-10.14

Part I Chapter 26: Pages 26.14-26.29

Chapter 27: Pages 27.1-27.4

BOOKS FOR REFERENCE

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

Chandekar A.R, and V.D. Deshpande., Descriptive Statistics. New Delhi: S. Chand and Company Ltd., 1994.

Elhance D.N. Fundamentals of Statistics. Allahabad :Kitab Mahal, 1972

Gupta S.P. Practical Statistics. Eighth Edition .New Delhi: S. Chand and Company Ltd., 1998.

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

Marcello Pagano., and Kimberlee Gauvreau. Principles of Biostatistics. Second Edition. U.K :Duxbury Thomson Learning, 2007

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (Three questions to be set without omitting any unit).

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR COMPETITIVE EXAMINATIONS

CODE : 11MT/GE/CE 44

CREDITS : 4

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

ELIGIBILITY CRITERION

Offered to those who had not studied Mathematics or Business mathematics in their Secondary level of Education.

OBJECTIVES OF THE COURSE

- To develop analytical skills and the ability to work in a problem solving environment.
- To equip with the skills required to succeed in any competitive examination.

Unit 1 (10Hrs)
Set Theory

Sets – Operations - Venn diagram representation. Relations – Composition of relation - Graph of Relations - Problems.

Number Theory

Numbers - H.C.F. and L.C.M. of numbers – Fractions – Percentage.

Unit 2 (10 Hrs)
Quantitative Mathematics

Simple Interest – Compound Interest – Partnership and Share.

Unit 3 (11 Hrs)
Quantitative Mathematics(cont.)

Average - Ratio and Proportion – Profit Loss and discount.

Unit 4 (10 Hrs)
Time work and wages

Time work and wages – Time and distance – Clocks.

Unit 5 (11 Hrs)
Classification and Diagrammatic representation of Data

Statistical data - Classification and tabulation for qualitative and quantitative data - bar diagrams - Simple, component and multiple Pie diagrams - Simple and Component; Histograms - Arithmetic mean, Median, Mode – simple problems.

BOOKS FOR STUDY

Guha Abhijit. Quantitative Aptitude for Competitive Examinations, Fourth Edition, New Delhi : Tata McGraw-hill Publishing Company Limited, 2011.

Chapters : 1 – 3, 5 – 8, 11, 13 – 15, 17, 21.

Lipschutz, Seymour, and Marc Lipson. Discrete Mathematics, Schaum's outlines. New Delhi: Tata McGraw-hill Publishing Company Limited , Indian Edition 2006.

Chapter 1: Sections 1.2 – 1.6, 1.9, 2.1 - 2.5

Vittal, P.R, Mathematical Statistics Part II, Chennai : Margham Publications, (2002).

Chapter 3: Pages 3.1-3.13

Chapter 4: Pages 4.1 – 4.14(Omit frequency polygon & curve and related problems)

Chapter 5: Pages 5.1 – 5.31

BOOKS FOR REFERENCE

Aggarwal R.S., Quantitative Aptitude, New Delhi: S.Chand & Company Ltd., (1989).

Khattar Dinesh, The Peareson Guide to Quantitative Aptitude, Pearson Education Singapore: 2005.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A : $25 \times 2 = 50$ (Five objective type questions to be set from each unit.)

Section B : $8 \times 5 = 40$ (Twelve questions to be set without omitting any unit)

Section C : $1 \times 10 = 10$ (Two questions to be set from unit 5 only)

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. / B.Com. / B.C.A. / B.S.W. / B.V.A. Degree Programmes**

SYLLABUS

(Effective from the academic year 2011-2012)

DISCRETE MATHEMATICS

CODE : 11MT/GE/DM 44

CREDITS: 4

L T P : 4 0 0

TOTAL TEACHING HOURS : 52

ELIGIBILITY CRITERION

- Offered to those who studied Mathematics or Business mathematics in their secondary level of Education.
- For the others, completion of Basic Mathematics (MT/GE/BM24) offered at the general elective level.
- Not offered to the B.C.A. students.

OBJECTIVES OF THE COURSE

- To augment knowledge in mathematical structures that are functionally discrete
- To introduce automata theory.

Unit 1 (10 Hrs)

Logic and Propositional Calculus

Introduction to Logic and Algebra of Propositions – Arguments – Logical Implication – Propositional Functions, Quantifiers – Negation of Quantified Statements.

Unit 2 (10 Hrs)

Ordered Sets

Introduction – Ordered sets – Hasse diagrams of Partially ordered sets – Consistent enumeration – Supremum and Infimum – Isomorphic ordered sets – Well ordered sets.

Unit 3 (10 Hrs)

Lattices

Lattices – Bounded lattices – Distributive lattices – Complements, Complemented lattices.

Unit 4 (11 Hrs)

Boolean Algebra

Introduction – Basic definitions – Duality – Basic theorems – Boolean Algebras as Lattices – Representation theorem – Sum-of-Products form for sets – Sum-of-Products form for Boolean Algebras – Minimal Boolean expression, Prime Implicants – Logic gates and circuits – Truth tables, Boolean functions.

Unit 5**(11 Hrs)****Languages, Grammars, Machines**

Introduction – Alphabet, Words, Free semigroup – Languages – Regular expressions, regular languages – Finite state automata – Grammers – Finite state machines – Godel numbers – Turing Machines – Computable functions.

BOOK FOR STUDY

Lipschutz Seymour, Marc Lars Lipson, Schaum's outline of Theory and Problems of Discrete Mathematics, Second edition, Eleventh reprint 2002, New Delhi: Tata McGraw-Hill Publishing Company Limited, 1999.

Chapter 4	Sections 4.9 – 4.12
Chapter 14	Sections 14.1 – 14.11
Chapter 15	Sections 15.1 – 15.11
Chapter 13	Sections 13.1 – 13.10

BOOKS FOR REFERENCE

Norman, L.Biggs, Discrete Mathematics, second edition, India: Oxford University Press, 2003.

Raju Solai, Chandrasekar, Krishnamoorthy and Ganesh, Discrete Mathematical Structures, Kumbakonam: Anuradha Agencies, 2003

Sharma, Discrete Mathematics, Chennai: Macmillan India Ltd., 2003

Norman, L.Biggs, Discrete Mathematics, second edition, India: Oxford University Press, 2003

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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
to students of Computer Science**

SYLLABUS

(Effective from the academic year 2011-2012)

MATHEMATICS FOR COMPUTER SCIENCE - II

CODE : 11MT/AC/MS44

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To introduce statistical and numerical techniques to enhance problem solving skill.

Unit 1 (10 Hrs)

Presentation and Diagrammatic representation of Data

Collection of statistical data – Classification and tabulation for qualitative and quantitative data – Bar diagram: Simple, component and multiple – Pie diagram – Graphical representation: Histogram – Frequency polygon – Frequency curve – Ogives – Lorenz Curve.

Lab session: Practical session in lab. To represent diagrammatic data using excel.

Unit 2 (15 Hrs)

Distribution and Testing

Distribution: Binomial, Poisson, Normal – Definition – Derivation of mean and variance – simple problems involving mean and variance only.

Sampling

Large and small samples – Definition: Level of significance, critical region – Testing for single mean if standard deviation of the population σ is known, test for equality of means if standard deviation of the population σ is known – simple problems.

Unit 3 (12 Hrs)

Algebraic and Transcendental Equations

Bisection Method – Newton-Raphson Method

Simultaneous Equations

Gauss Elimination Method – Gauss-Jordan Elimination Method - Gauss Jacobi Iteration Method – Gauss Seidel Iteration Method – simple problems.

Unit 4 (14hrs)

Interpolation

Newton's Interpolation Formulae (statement only) – Central Difference Interpolation Formulae: Gauss forward interpolation formula, Gauss backward

interpolation formula, Stirling's formula – Lagrange's Interpolation Formula – simple problems.

Numerical Differentiation

Derivatives using Newton's Interpolation formulae – Maxima and minima.

Unit 5 **(14hrs)**

Cryptography

Some simple cryptosystems- Enciphering matrices.

Public Key

The idea of public key cryptography, RSA.

BOOKS FOR STUDY

Arumugam., S., A.Thangapandi Issac. and A. Somasundaram. Numerical Methods. Chennai: Scitech Publications (India) Pvt. Ltd., 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 10.0-10.4

Arumugam S. and A. Thangapandi Issac. Statistics. Palayamkottai: New Gamma Puglishing house, 1999.

Chapter 13:13.1, 13.2 & 13.3 (Excluding Theorems)
Chapter 14:14.1 – 14.5 (include II : A(i), B(i) only)

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

Vittal P.R. Mathematical Statistics. Chennai: Margham Publications, 2002.

Part II: Chapter 2: Pages 2.1 – 2.7
Chapter 3: Pages 3.1 – 3.13
Chapter 4: Pages 4.1 – 4.20

BOOKS FOR REFERENCE

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

Gupta S.P. Practical Statistics. 8th ed. New Delhi: S.Chand & Company Ltd., 1998.

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

Pillai, R.S.N., and V. Bagavathi. Statistics. New Delhi: S.Chand & Company Ltd., 2000.

Stummel F., and K. Hainel. Introduction to Numerical Analysis. Scottish Academic Press, 1980.

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

OPERATIONS RESEARCH

CODE: 11MT/AC/OR44

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

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

Unit 1 (15 Hrs)

Basics of Operations Research

Development of OR – Definition of OR – Characteristics of OR - Scientific Method in OR – Necessity of OR in Industry – Scope of OR – Operations Research and Decision Making – Scope of OR in: Management, Financial Management – Application of various OR techniques – Objectives of OR – Phases of OR – Models in OR – Classification Schemes of models – Characteristics of a good model – Advantage and limitations of a model – Limitations of OR.

Linear Programming

Introduction – Application of linear programming – Formulation – Advantages and limitation of linear programming models – Graphical method of solution – Canonical and standard form – Simplex method- Artificial Variable Technique: Big-M method.

Unit 2 (15 Hrs)

Transportation Model: Introduction to the Model – Assumptions in the Transportation Model – Definition of the transportation Model – Matrix Terminology – Formulation and Solution of Transportation Models (excluding Stepping Stone method) – Variants in Transportation problems.

Assignment Model: Definition of Assignment Model – Mathematical Representation of Assignment Model – Comparison with Transportation Model — Hungarian Method for Solution of the Assignment Problems Formulation and Solution of the Assignment Models – Variations of the Assignment Problem - The Travelling Salesman Problem.

Unit 3 (12Hrs)

Sequencing Models and Related Problems

Sequencing Problems – Assumptions in Sequencing Problems – Processing n jobs through one Machine(SPT rule only) – Processing n jobs through two Machines – Processing n jobs through three Machines – Processing two jobs through m Machines – Processing n jobs through m Machines.

Unit 4 **(11 Hrs)**

Theory of Games

Theory of Games – Characteristics of Games – Game Models – Definitions – Rules for Game Theory – Rule 1: Look for a pure strategy – Rule 2: Reduce Game by Dominance – Rule 3: Solve for a mixed Strategy – Mixed Strategies(2×2 Games) – Mixed Strategies (2×n Games or m×2 Games) – Limitations of Game Theory and Concluding remarks.

Unit 5 **(12 Hrs)**

Network Analysis In Project Planning

Project – Project Planning – Project Scheduling – Project Controlling –W.B.S – Basic Tools and techniques of Project Management – Role of Network Techniques in Project Management – Network logic-numbering the events – Activity on Node Diagram – Merits and Demerits of AON diagram – Critical Path Method: Measure of Activity – Time Units – Critical Path Analysis – The Three Floats. PERT: Time Estimates – Frequency Distribution Curve for PERT – Probability of completing the whole project by a given time.

BOOK FOR STUDY

Gupta, Premkumar and Hira D.S. Operations Research, New Delhi: S.Chand & Company Pvt., Ltd., 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 Publishers, 1984

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

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

PATTERN OF EVALUATION: (End Semester Examination - 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 2011-2012)

LAPLACE TRANSFORMS & PARTIAL DIFFERENTIAL EQUATIONS

CODE : 11MT/MC/LD 44

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To introduce the Laplace transformation as a tool in problem solving.
- To expose differential equations as a powerful tool in problem solving.

Unit 1 (16 Hrs)

Laplace Transforms

Definition of Laplace transform – Laplace transform of e^{-at} , $\cos at$, $\sin at$ and t^n , where a is a positive integer – Laplace transform of periodic functions – Some General Theorems – Evaluation of integrals using Laplace Equations.

Unit 2 (16 Hrs)

Inverse Laplace Transforms & Its Applications to Solving ODE

The Inverse Transforms – Solving Ordinary Differential Equations using Laplace Equations – Solving system of differential equations using Laplace Equations.

Unit 3 (12 Hrs)

Partial Differential Equations of the First Order

Introduction – Derivation of Partial Differential Equation – Definitions – Linear partial differential equation of order one – Lagrange's Linear equation – Lagrange's solution of the linear equation – Geometrical Interpretation of Lagrange's linear equation – The linear equation with n -independent variables – Special types of equations – Standard I: Equations involving only p and q and no x, y, z .

Unit 4 (11 Hrs)

Partial Differential Equations of the First Order(Contd.)

Standard II: Equations involving only p, q and z . Standard III: Equations of the form $f(x, p) = F(y, q)$ - Standard IV: Clairaut's equation – Finding the integral surface passing through a curve and satisfying the given PDE.

Unit 5**(10 Hrs)****Partial Differential Equations with Constant Coefficients**

Homogeneous Linear Equations with Constant Coefficients – Solutions of linear Partial Differential Equations – Finding the Complementary Function – The Particular Integral.

BOOKS FOR STUDY

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

Chapter 5 Section 1 – 9

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

Chapter 7 Section 7.1 – 7.13

Chapter 8 Section 8.1 – 8.5

BOOKS FOR REFERENCE

Narayan S. and T.K. Manicavachagom Pillay. Differential Equations and its Applications. Chennai: S.Viswanathan Printers & Publishers Pvt. Ltd., 2001.

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

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

Singaravelu, A. Differential Equations Fourier Series and Laplace Transforms. Chennai: Meenakshi Traders, 2002

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

SEQUENCES AND SERIES, FOURIER SERIES

CODE: 11MT/MC/SF 44

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To understand the basic principles of Analysis in particular the limits, convergence of sequences and infinite series of real numbers.

- Unit 1 (15 Hrs)**
Sets and Functions
Functions - Real valued functions - Equivalence, Countability - Real numbers - Least upper bounds.
- Unit 2 (10 Hrs)**
Sequences of Real Numbers
Definition of sequence and subsequence – Limit of a sequence – Convergent and Divergent sequences – Bounded sequences
- Unit 3 (10 Hrs)**
Sequences of Real Numbers(continued)
Monotone sequences – Operations on convergent and divergent sequences- Concepts of Limit superior and Limit inferior - Cauchy sequences.
Sequences of real valued functions
Concepts of point wise convergence and uniform convergence of sequences of functions on the real line
- Unit 4 (16 Hrs)**
Series of Real Numbers
Convergence and divergence – Series with non-negative terms – Alternating series – Conditional convergence and absolute convergence – Tests for absolute convergence – Series whose terms form a non-increasing sequence.
- Unit 5 (14 Hrs)**
Fourier Series
Fourier series expansions of periodic functions with period 2π - odd and even functions - half-range series – development in cosine and sine series .

BOOKS FOR STUDY

Goldberg Richard.R. Real Analysis. New Delhi: Indian Edition. Oxford and IBH Publishers Co. Pvt Ltd,1970.

Chapter I	: Section 3-7
Chapter II	: Sections 2.1 – 2.8, 2.9 (Definitions only), 2.10
Chapter III	: Sections 3.1 – 3.4, 3.6, 3.7
Chapter IX	: Section 9.1 and 9.2 (Definition and Examples only)

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

Chapter 6	: Sections 1 – 5
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BOOKS FOR REFERENCE

Das G., S. Pattanayak. Fundamentals of Mathematical Analysis. New Delhi:Tata McGraw Hill Publishing Company Ltd, 1987.

Naik V. Real Analysis. Madras:Revised edition. Emerald Publishers.

Singal M.K. and Asha Rani Singal, A first course in Real Analysis. New Delhi: R.Chand and Co Publishers, 1996.

Singaravelu A. Differential Equations Fourier Series and Laplace Transforms, Chennai: Meenakshi Traders, 2002.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

ALGEBRAIC STRUCTURES

CODE: 11MT/MC/AS54

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

Intended to develop an understanding of some abstract fundamental algebraic structures.

Unit 1 (12 Hrs)

Group Theory

Equivalence relation and equivalence classes - Definition of a group, Examples - Subgroups, Examples of subgroups - Cyclic groups – Cosets.

Unit 2 (12 Hrs)

Group Theory (Continued)

Lagrange's theorem and its Corollaries - a counting principle - Normal subgroups and Quotient groups - Homomorphism - Isomorphism of groups - Theorems on homomorphism

Unit 3 (12 Hrs)

Group Theory (Continued)

Automorphism of groups - Cayley's, theorem - Permutation groups.

Unit 4 (14 Hrs)

Ring Theory

Definitions of rings - division rings - fields and integral domains, Examples - Some special classes of rings - Homomorphism of rings.

Unit 5 (15 Hrs)

Ring Theory (Continued)

Ideals and quotient rings - maximal, principal and prime ideals - field of quotients of an integral domain - polynomial rings.

BOOKS FOR STUDY

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

Chapter 1	:	Section 1
Chapter 2	:	Sections 1 to 10 (exclude applications 1& 2 in 2.7)
Chapter 3	:	Sections 1 to 6 and section 9 up to lemma 3.9.2.

BOOKS FOR REFERENCE

Balakrishnan, R., and N. Ramabhadran. A Text Book of Modern Algebra. New Delhi : Vikas Publishing House Pvt. Ltd., 1979.

Santiago, M. L. Modern Algebra. New Delhi : Tata McGraw-Hill Publishing company Limited, 2001.

Fraleigh, J.B. A First Course in Abstract Algebra. New York : Addison Wesley Publishing Co., 1968.

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

MECHANICS

CODE: 11MT/MC/ME 54

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

- To understand the concept of different forces and moments and their equilibrium with reference to a coordinate system.
- To develop the practical knowledge of dynamics and use it in real life situation.

Unit 1 (12Hrs)

Forces acting on a Particle

Forces – Types of forces – Parallelogram law of addition of forces – Triangle law of forces – Polygon law of forces - Lami's theorem - Conditions of equilibrium of any number of forces acting on a particle. Moment of a force about a point and a line - Parallel forces, Varignon's theorem. Problems related to the given topics.

Unit 2 (10Hrs)

Friction

Laws of static friction - Coefficient of friction - Angle of friction - Cone of friction - Laws of kinetic friction – Equilibrium of a particle on an inclined plane- Condition for sliding and toppling

Unit 3 (18Hrs)

Linear Motion in a resisting medium

Particle falling under gravity in a resisting medium under law of resistance mkv , mkv^2 ; limiting velocity - equations of motion

Simple Harmonic Motion

Definition - period - amplitude - velocity at any position - composition of two simple harmonic motions of same period along the same straight line and along two perpendicular lines - simple pendulum and seconds pendulum.

Unit 4 (10Hrs)

Plane Motion – Projectiles : Projectiles - path of projectile in vacuum - time of flight - maximum height reached - range on a horizontal plane - range on an inclined plane.

Unit 5**(15Hrs)**

Plane Motion – Polar Coordinates : Velocity and acceleration components along and perpendicular to the radius vector - angular momentum - areal velocity - central force - central orbit - differential equations in polar co-ordinates and (p, r) co-ordinates - inverse square law.

BOOK FOR STUDY

Dharmapadam A.V. Statics . Chennai: S. Viswanathan Printers and Publishers Pvd. Ltd., 2006

Chapter 1 Sections 1.1 – 1.3
Chapter 2 Sections 2.1 – 2.4, 2.9(Problems related to moments only)
Chapter 3 Sections 3.1 – 3.7

Dharmapadam A.V. Dynamics Madras: Viswanathan. S., Printers and Publishers Pvt. Ltd., 2006.

Chapter 4 Section 4.1 – 4.4, 4.7 – 4.9
Chapter 5 Section 5.1 – 5.6
Chapter 6 Section 6.1 – 6.10
Appendix II and Appendix III

BOOKS FOR REFERENCE

Duraipandian P. Mechanics. New Delhi: S. Chand & Co., 1996.

Naik K.V. and M.S. Kasi. Mechanics. Chennai: Emerald Publishers, 1992.

Synge J.L. and B.A.Griffith.Principles of Mechanics. New York: McGraw Hill Book Co., 1970.

Venkataraman M.K. Text Book of Statics. Trichi: Agasthiar Publications, Tiruchi., 1971.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

PROBABILITY THEORY

CODE :11 MT/MC/PT 54

CREDITS: 4

L T P: 4 1 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

Axiomatic definition of probability - Independence of events - Addition theorem - Conditional probability - Multiplication theorem of probability (Concept only) Baye's theorem - Simple problems.

Unit 2 (18 Hrs)

Random variables and distribution functions

Distribution function – Discrete random variables - continuous random variables – two dimensional random variables – Joint probability mass function – marginal probability function – conditional probability function – two dimensional distribution function – marginal distribution function – the conditional distribution function and conditional probability density function – Transformation of one – dimensional random variable (concepts only).

Unit 3 (13 Hrs)

Mathematical Expectation

Mathematical expectation or expected value of a random variable – expected value of function of a random variable- properties of expectation- addition and multiplication theorem of expectation –properties of variance- covariance – M.G.F and Characteristic function – Uniqueness theorem (statement only)- Tchebychev's Inequality- Simple Problems.

Unit 4 (10 Hrs)

Special discrete Distributions

Definition – Properties of moments - Recurrence relations- Mode- M.G.F - Additive property of Binomial and Poisson Distributions – Simple Problems.

Unit 5**(10 Hrs)****Continuous Distributions**

Normal distribution – Limiting form – Properties – Mode-Median – M.G.F – Moments – Points of inflexion – Mean deviation about the mean – Area property – Simple problems .

BOOK FOR STUDY

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

- Chapter 3 : Sections 3.8(3.8.1, 3.8.2, 3.8.5)
3.9(3.9.1, 3.9.2- statement only, 3.9.3)
3.10 – 3.13, 3.14 - statement only
- Chapter 4 : Section 4.2 (Theorem 4.2 only)
- Chapter 5 : Sections 5.2 - 5.4, 5.5(5.5.1 - 5.5.5),
5.6 (statements of Theorem 5.4)
5.7 (statements of Theorem 5.5 & 5.6)
- Chapter 6 : Sections: 6.2- 6.6
- Chapter 7 : Sections 7.1(7.1.1. – 7.1.3), 7.3 (7.3.1),
7.5 (Tchebychev's Inequality only).
- Chapter 8 : Sections: 8.4(8.4.1, 8.4.2, 8.4.4 – 8.4.8, 8.4.12),
8.5.(8.5.2 -8.5.6, 8.5.8,8.5.10)
- Chapter 9 : Sections: 9.2.(9.2.1 – 9.2.5, 9.2.7 ,9.2.9 – 9.2.11).

BOOKS FOR REFERENCE

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

Kapur, J. N. and Saxena, H. C. Mathematical Statistics. New Delhi: S. Chand & Co., 1976

Mood A. M., Graybill ,F. A. and Boes, D. C. Introduction of Theory of Statistics. London: Mc Graw Hill, Inc., 1963.

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

REAL ANALYSIS

CODE : 11MT/MC/RA54

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To introduce the concepts that provide a strong base to understand and analyse abstract mathematics.

- Unit 1** (10 Hrs)
Limits and Continuity on \mathbb{R}^1
Limit of a function on the real line - Functions continuous at a point on the real line - Reformulation
- Unit 2** (10 Hrs)
Metric spaces, Open sets, Closed sets
Definition of metric space- Open sets- closed sets
- Unit 3** (13 Hrs)
Limits and continuity on metric spaces
Convergent sequences in a metric space - Cauchy sequences - Complete metric spaces - Limit of a function - Continuous functions –Functions continuous on compact sets.
- Unit 4** (12 Hrs)
Limits and continuity on metric spaces (continued)
Connectedness - Fixed point theorem for Contractions- Discontinuities of real – valued functions .
- Unit 5** (20 Hrs)
Riemann Integration
Definition of the Riemann integral – Properties - Derivatives - Rolles’ theorem - The law of mean - Fundamental theorem of Calculus - Improper integral (concept only)

BOOKS FOR STUDY

Apostol T.M. Mathematical Analysis. Second Edition. Chennai: Narosa Publishing House, 2002.

Chapter 3 – Sections:3.13, 3.15(Definitions and theorem statements only)

Chapter 4 – Sections: 4.1 – 4.5, 4.8, 4.13, 4.16, 4.21 – 4.22.

Goldberg Richard R. Real Analysis. Indian Edition. New Delhi: Oxford and IBH Publishers Co. Pvt., Ltd., 1970.

Chapter 4 – Section: 4.1

Chapter 5 – Sections: 5.1, 5.2,5.4,5.5

Chapter 7 – Sections: 7.2, 7.4 - 7.9

BOOKS FOR REFERENCE

Arumugam S., and A. Thangapandi Isaac. Modern Analysis. Palyamkottai: New Gamma Publishing House, 2002.

Chandrasekhara Rao. K., and K.S. Narayanan. Real Analysis Vol. II. S. Viswanathan Chennai, Printer and Publishers Pvt. Ltd., 1995.

Naik. V., Real Analysis. Revised Edition. Madras: Emerald Publishers, 1988.

Rudin Walter. Principles of Mathematical Analysis. Third edition. Japan: McGraw- Hill international Book Company, 1976.

Shanti Narayan. Mathematical Analysis. Eleventh Edition. Delhi:S. Chand And Co., Ltd., 1976.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

NUMERICAL ANALYSIS

CODE : 11MT/ME/NA53

CREDITS : 3

L T P: 3 1 0

TOTAL TEACHING HOURS: 52

OBJECTIVE OF THE COURSE

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

Unit 1 (10 hrs)

Solution of Algebraic equations

The bisection method – Newton Raphson method – Criteria of order of convergence of Newton's method.

Solution of a System of Linear Equations

Gaussian elimination method – Iterative methods – Jacobi method Gauss Seidal method.

Unit 2 (12 hrs)

Interpolation

Finite differences: Forward, Backward, Central and Divided differences – Symbolic relations and Separation of Symbols (Only relations). Difference table with equal intervals – Newton Gregory Formula for Forward and backward interpolation - Terms missing –Gauss Central difference formula - Stirling's formula - Interpolation with unequal intervals – Lagrange's interpolation formula

Unit 3 (10 hrs)

Numerical Differentiation

First and second order derivatives of $f(x)$ using Newton's formulae - maximum and minimum value of $f(x)$.

Unit 4 (10 hrs)

Numerical Integration

General quadrature formula - Trapezoidal Rule - Simpson's one third rule - Simpson's three eighth rule.

Unit 5 (10 hrs)

Solution of Ordinary Differential Equations

Taylor's series method - Picard's method of successive approximations - Euler's method with its modifications - Runge Kutta method.

BOOK FOR STUDY

Sastry S.S. Introductory Methods of Numerical Analysis. New Delhi: Prentice - Hall of India Private Limited, 2000.

Chapter 2	Section 2.2, 2.5.
Chapter 6	Section 6.3.2, 6.4.
Chapter 3	Section 3.3.1- 3.3.4, 3.6, 3.7.1, 3.7.2, 3.9.1.
Chapter 5	Section 5.2 (omit 5.2.1, 5.2.2.) 5.3, 5.4, 5.4.1 - 5.4.3)
Chapter 7	Section 7.2 - 7.4, 7.4.2, 7.5.

BOOKS FOR REFERENCE

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

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

Kandasamy, P., K, K. Thilgavathy and Gunavathy, Numerical methods. S. Chand & Company Ltd, 2006.

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

OPTIMIZATION TECHNIQUES

(Skill Development Course)

CODE: 11MT/ME/OT53

CREDITS: 3

L T P: 3 1 0

TOTAL TEACHING HOURS : 52

OBJECTIVE OF THE COURSE

To introduce and develop the Non linear Programming and probabilistic methods in Optimization Technique

- Unit 1 (10 Hrs)**
Single-Variable Optimization: Local and global optima – Results from calculus – Sequential_Search techniques – Three point interval search – Fibonacci search – Golden_Mean search – Convex functions.
- Unit 2 (10 Hrs)**
Multivariable Optimization without constraints: Local and global maxima – Gradient vector and Hessian matrix – Results from calculus – The method of steepest ascent – The Newton Rapson method – The Fletcher Powell method.
- Unit 3 (12 Hrs)**
Multivariable Optimization without constraints (contd.): Hooke_Jeeves' pattern search – A modified pattern search – Choice of an initial approximation – Concave functions.
Quadratic Programming: Standard forms – A Kuhn Tucker system – The method of Frank and Wolfe – An application to portfolio analysis.
- Unit 4 (10 Hrs)**
Stochastic Dynamic Programming: Stochastic multistage decision processes – Policy tables.
Finite Markov Chains: Markov processes – Powers of stochastic matrices – Ergodic matrices – Regular matrices.

Unit 5**(10 Hrs)**

Queuing Systems: Introduction – Queue characteristics – Arrival patterns – Service patterns – System capacity – Queue disciplines – Kendall’s notation.

M/M/1 Systems: System characteristics – The Markovian model – Steady-state solutions – Measures of effectiveness.

BOOK FOR STUDY

Richard Bronson, Schaums Outline Series – Theory and Problems of Operations Research. New Delhi: McGraw Hill,

Chapters: 10 , 11, 13, 18, 19, 22 & 23

BOOKS FOR REFERENCE

Adby P.R. Introduction to Optimization Methods. U.K.: Chapman & Hall Publishing company, 1982.

Beclor. Principles of Optimization Theory. Narosa Publishing House, 2005

Charles Berghler. Foundation of Optimization. New Jersey: Prentice Hall Publishing Company, 1982.

Joshi, Mohan C. Optimization Theory and Practice. Narosa Publishing House, 2004.

Roa S.S. (1989), Optimization Theory and Applications. New Delhi: Wiley Eastern Publishing company, 1989.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

FINANCIAL MATHEMATICS

(Skill Development Course)

CODE : 11MT/ME/FM63

CREDITS : 3

L T P : 3 1 0

TOTAL TEACHING HOURS : 52

OBJECTIVE OF THE COURSE

To introduce mathematical models to enhance the understanding of mathematics of finance and financial markets.

- Unit 1 (10hrs)**
Geometric Brownian Motion: Geometric Brownian Motion - Geometric Brownian Motion as a limit of simpler Models- Brownian Motion-simple problems
- Unit 2 (10hrs)**
Interest Rates and Present Value Analysis: Interest rates - Present value analysis - Rate of return - Continuously varying interest rates - simple problems
- Unit 3 (11hrs)**
Pricing Contracts via Arbitrage
An example in options pricing - Other examples of pricing via Arbitrage
The Arbitrage theorem
The Arbitrage theorem - The Multiperiod Binomial Theorem – Proof of the Arbitrage theorem - simple problems
- Unit 4 (11 hrs)**
The Black-Scholes Formula
The Black-Scholes Formula – Properties of Black-Scholes option cost – The Delta Hedging Arbitrage Strategy – Some deviations: The Black-Scholes Formula - The partial derivatives - simple problems
- Unit 5 (10 hrs)**
Valuing by Expected Utility
Limitations of Arbitrage Pricing – Valuing Investments by Expected Utility – The Portfolio selection Problem – Value at risk and Conditional Value at risk – The capital assets pricing model – Mean Variance Analysis of Risk-Neutral-Priced Call Options – Rates of Return - simple problems

BOOK FOR STUDY

Sheldon M. Ross. An Elementary Introduction To Mathematical Finance 2nd ed.
Cambridge university press. 2005

Chapter 3	Sections 3.1 – 3.3
Chapter 4	Sections 4.1 – 4.4
Chapter 5	Sections 5.1 – 5.2
Chapter 6	Sections 6.1 – 6.3
Chapter 7	Sections 7.1 – 7.5
Chapter 9	Sections 9.1 – 9.7

BOOKS FOR REFERENCE

Joseph. Stampfli, and Victor Goodman, The Mathematics of Finance Modelling and Hedging, Thomson publishers

Steven Roman, Introduction to Mathematics of Finance, Springer

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

SPECIAL TOPICS IN MECHANICS

CODE: 11MT/ME/SM63

CREDITS : 3

L T P : 3 1 0

TOTAL TEACHING HOURS : 52

OBJECTIVE OF THE COURSE

- To understand the concept of centre of gravity with reference to a coordinate system.
- To develop the practical knowledge of dynamics and use it in real life situation.

Unit 1 (10Hrs)

Centre of Gravity

Centre of gravity of a compound body and that of a body obtained by the removal of a part of the body - Location of centre of gravity of standard bodies by the methods of symmetry and integration .

Unit 2 (8 Hrs)

Equilibrium of Strings and Chains

Equilibrium of strings and chains - Common catenary - Suspension bridge.

Unit 3 (16 Hrs)

Impulse and Impact

Impulsive force - Equation of motion for impulsive forces - motion of shot and gun. Impact of elastic bodies - laws of impact - direct and oblique impact of two smooth elastic spheres - impact of an elastic sphere with a smooth fixed plane - loss in kinetic energy due to direct impact of two smooth spheres.

Unit 4 (9Hrs)

Moment of inertia

Moment of inertia - definition - theorem of parallel and perpendicular axes (statements only) - moments of inertia of simple standard bodies

Unit 5 (9Hrs)

Motion of a rigid body

Motion of a rigid body - rotation about a fixed axis - expressions for kinetic energy - angular momentum - equation of motion - compound pendulum - centres of oscillation and suspension.

BOOK FOR STUDY

Dharmapadam A.V. Statics. Chennai: S. Viswanathan Printers and Publishers Pvd. Ltd., 2006

Chapter 4 Sections 4.1 – 4.5

Chapter 5 Sections 5.1 – 5.3

Dharmapadam A.V. Dynamics. Chennai: Viswanathan. S., Printers and Publishers Pvt. Ltd., 2006.

Chapter 7 Section 7.1 – 7.10

Chapter 8 Section 8.1 - 8.7

Appendix III

BOOKS FOR REFERENCE:

Duraipandian P. Mechanics. New Delhi: S. Chand & Co., 1996.

Naik K.V. and M.S. Kasi. Mechanics. Chennai: Emerald Publishers, 1992.

Synge J.L. and B.A.Griffith.Principles of Mechanics. New York: McGraw Hill Book Co., 1970.

Venkataraman M.K. Text Book of Statics. Trichi: Agasthiar Publications, Tiruchi., 1971.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

GRAPH THEORY AND COMBINATORICS

CODE : 11MT/MC/GC64

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVES OF THE COURSE

- To introduce some basic concepts of graph theory.
- To develop theoretical aspects of graph theory.
- To inculcate the problem solving skills using graph theory.
- To nurture the intrinsic interest in number theory and combinatorics

- Unit 1** (12 Hrs)
Definition of a graph - examples - Degrees - Subgraphs- Isomorphism - Matrices - Operations on graphs.
- Unit 2** (14 Hrs)
Walks, trails and paths - connectedness and components - Trees- Characterisation of trees - Centre of a tree - Eulerian graphs - Konigsberg Bridge problem - Hamiltonian graphs
- Unit 3** (14 Hrs)
Planarity – Definition and Properties - Colourability - Chromatic number and Chromatic index - Five colour theorem - Four colour problem- Directed Graphs : Definitions and Basic Properties - Indegree and outdegree of a vertex
- Unit 4** (13 Hrs)
The sum and the product rules – Permutations and combinations- The Pigeon – hole principle- Generalised Permutations and combinations- The Inclusion Exclusion principle - Simple Problems only.
- Unit 5** (12 Hrs)
The multinomial Theorem – Derangements and other constrained arrangements. Ordinary and Exponential Generating Functions – Recurrence Relations – Simple Problems only.

BOOK FOR STUDY

Arumugam S. and S. Ramachandran. Invitation to Graph Theory. Chennai: Scitech Publications India Pvt. Ltd., 2001.

Chapter 2 - Sections 2.1, 2.2 2.3 (exclude Theorem 2.3), 2.4, 2.8, 2.9
(exclude Theorem 2.11).

Chapter 4 - Sections 4.1 ,4.2 (exclude Theorems 4.9 to 4.12).

Chapter 5 - Sections 5.1, 5.2 (exclude Theorems 5.4, 5.5, 5.7 - 5.10)

Chapter 6 - Sections 6.1, 6.2.

Chapter 8 - Sections 8.1 (Exclude Theorems 8.2 - 8.5)

Chapter 9 - Sections 9.1 (Concepts only), 9.2, 9.3 (Concepts only).

Chapter 10- Section 10.1 (Concepts only).

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

Chapter 1- Sections 1.1 -1.3, Problems :1.1 – 1.6, 1.28 – 1.68,

Chapter 2- Sections 2.1, 2.3, Problems : 2.1 – 2.7, 2.20 , 2.21, 2.25 – 2.33

Chapter 3- Sections 3.1, 3.3 Problems :3.1 – 3.6, 3.38, 3.60 – 3.64

BOOKS FOR REFERENCE

Bondy J.A, and U.S.R. Murty. Graph Theory with Applications. London: The Macmillan Press Ltd., 1976.

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

Cohen Daniel J.A. Basic Techniques of Combinatorial Theory. New York : North-eastern University. John Wiley, 1978.

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

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

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (Seven questions to be set without omitting any unit)

Section C: $2 \times 20 = 40$ (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 2011-2012)

MATHEMATICAL STATISTICS

CODE : 11MT/MC/MS 64

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

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

Unit 1 (16 Hrs)

Exact Sampling Distribution

Definition – Density function (derivations not included) and simple properties of Chi-square χ^2 , Students 't', and Snedecor's 'F' distributions - Relation between t, χ^2 and F distributions.

Unit 2 (10 Hrs)

Exact Sampling Distribution (continued)

Simple random sample from a theoretical population - Parameter - Statistic - Standard error – sample mean, sample variance. Sampling distribution - Expectation of sample mean and sample variance - Sampling distribution of \bar{X} for samples from a normal distribution - Central limit theorem (statement only).

Unit 3 (10 Hrs)

Estimation

Estimator and estimates - Properties of estimators – Point Estimation - Unbiasedness - Consistency - Efficiency – Sufficiency - Rao -Cramer Inequality - Operational aspects of the method of moments and the method of maximum likelihood. - Properties - Illustrations and simple problems.

Unit 4 (10 Hrs)

Interval Estimation

Interval Estimation :Concept of setting confidence intervals to population parameters - Confidence interval for mean, difference in means, variance, ratio of variances - based on normal, t, χ^2 and F distributions - Simple problems.

Unit 5 (19 Hrs)

Tests of Significance

Definitions of statistical hypothesis - null and alternate hypothesis – critical region – two types of errors – size and power of a test - level of significance -

tests of significance for large and small samples based on normal, t, χ^2 and F distributions with regard to mean, variance and coefficient of correlation - χ^2 test of goodness of fit - Contingency tables - χ^2 test for independence of two attributes - problems.

BOOKS FOR STUDY

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

Chapter 22 : Pages: 22.3 – 22.41

Chapter 22 : Pages 22.1 – 22.3

Chapter 24: Page 24.3

Chapter 23

Gupta, S.C. and V.K. Kapoor. Fundamentals of Mathematical Statistics. New Delhi : Sultan Chand & Sons, 1979

Chapter 16: Sections 16.7, 16.8

Chapter 14: Sections 1 – 3

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

Chapter 14: Sections 14.3 -14. 4, 14.5 (Methods II and IV)

Chapter 15: Sections 15.1 – 15.3

Chapter 16: Sections 16.1, 16. 2, 16.3 (Method III only)

BOOKS FOR REFERENCE

Kapur J. N. and H.C. Saxena. Mathematical Statistics. New Delhi : S. Chand & Co., 1976

Mood A.M., F.A. Graybill and D.C.Boes. Introduction of Theory of Statistics. London : Mc Graw Hill Inc., 1963.

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

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

Richard I. Levin and David S. Rubin. Statistics For Management. New Delhi : Prentice Hall of India Private Ltd., 2000.

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (Ten questions to be set selecting two from each unit)

Section B: $5 \times 8 = 40$ (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 2011-2012)

VECTOR SPACES AND LINEAR TRANSFORMATIONS

CODE : 11MT/MC/VL64

CREDITS : 4

L T P : 4 1 0

TOTAL TEACHING HOURS : 65

OBJECTIVE OF THE COURSE

To enable understanding of the concept of vector spaces, linear transformations and their representation using matrix theory.

Unit 1 (13 Hrs)

Vector Spaces

Definition – examples – subspace - quotient space - internal and external direct sums

Unit 2 (13 Hrs)

Vector Spaces

Linear independence - basis of a vector space - dimension of a vector space - $\text{Hom}(V, W)$, $\text{Hom}(V, V)$ and $\text{Hom}(V, F)$.

Unit 3 (13 Hrs)

Inner product spaces

Definition and examples - norm of a vector - Schwarz inequality - orthogonal complement – Gram Schmidt orthogonalisation process.

Unit 4 (13 Hrs)

Linear Transformations

Algebra of linear transformations – regular, singular linear transformations - rank - Characteristic roots and characteristic vectors of a linear transformation.

Unit 5 (13 Hrs)

Linear Transformations (continued)

Matrix representations of linear transformations – relations between matrix representations – diagonalization of matrices – diagonalization of symmetric matrices – orthogonal diagonalization – diagonal matrix representation of a linear operator.

BOOK FOR STUDY

Herstein, I. N. Topics in Algebra. 2nd ed. New Delhi : Wiley Eastern Limited, 2007.
Chapter 4 Sections 1, 2, 3 (excluding 3.2 & 3.3) and 4 (exclude lemma 4.3.2 to theorem 4.3.3)
Chapter 6 Sections 1 and 2.

Williams Gareth. Linear Algebra with Applications. 6th ed. New Delhi: Narosa Publishing House Pvt. Ltd., 2008.
Chapter 5 Sections 5.2 and 5.3.

BOOKS FOR REFERENCE

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

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

Narayanan, K.S., and T.K. Manicavachagom Pillai. Modern Algebra Vol. II. Chennai : Viswanathan, S. Printers and Publishers Pvt. Ltd., 1996.

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

Santiago M.L., Modern Algebra, New Delhi : Tata McGraw-Hill Publishing Company Limited, 2002.

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

PATTERN OF EVALUATION: (End Semester Examination - 3 Hours)

Section A: $10 \times 2 = 20$ (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 2011-2012)

COMPLEX ANALYSIS

CODE : 11MT/MC/CA 64

CREDITS: 4

L T P: 4 1 0

TOTAL TEACHING HOURS: 65

OBJECTIVE OF THE COURSE

To expose a fertile area of pure mathematics as a source of powerful techniques that is widely applied in sciences and Engineering.

Unit 1 (16 Hrs)

Analytic Functions

Functions of a complex variable - Continuous functions - Differentiability - Cauchy Riemann's equations - Analytic functions - Harmonic functions

Unit 2 (18 Hrs)

Mapping

Mapping by Elementary Functions: The mapping $w = z^2$, the mapping $w = e^z$, the mapping $w = \sin z$, the mapping $w = \cos z$. Power Series: Elementary functions
Bilinear Transformations: Elementary transformations – Bilinear transformations – Cross ratio. Conformal mapping: Basic properties. Applications of conformal mapping : Steady Temperatures – Steady Temperatures in a Half plane.

Unit 3 (16 Hrs)

Complex Integration

Cauchy's Theorem (Statement only) - Cauchy's Integral formula - Higher Derivatives .

Unit 4 (7 Hrs)

Series Expansions

Taylor's series - Laurent's series - Zeros of an Analytic function – Three types of Singularities with examples.

Unit 5 (8 Hrs)

Calculus of Residues

Residues - Cauchy's Residue theorem - Evaluation of Definite integrals of the type

(i) $\int_0^{2\pi} f(\cos \eta, \sin \eta) d\eta$ 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 having no poles on the real axis.

BOOKS FOR STUDY

Arumugam S., A.T. Issac, and A. Somasundaram. Complex Analysis. Chennai: Scitech Publications (India) Pvt. Ltd., 2002.

Chapter 2 – Sections 2.1, 2.4 to 2.8.

Chapter 3 – Sections 3.1 to 3.3.

Chapter 4 – Section 4.4.

Chapter 5 – Sections 5.1, 5.3 to 5.5

Chapter 6 – Sections 6.2 to 6.4

Chapter 7 – Sections 7.1 to 7.3, 7.4(excluding theorems 7.5 - 7.8)

Chapter 8 – Sections 8.1, 8.2 ,8.3 (Type I, Type II(case i))

Churchill R.V., and J.W. Brown. Complex Variables and Applications. 5th edition. New York: McGraw Hill Publishing Company, 1990.

Chapter 8 – Section 74

Chapter 9 – Sections 79, 80

BOOKS FOR REFERENCE

Narayanan S., and T.K. Manicavachagom Pillai. Complex Analysis. Chennai: Viswanathan Printer and Publishers Pvt. Ltd., 1994.

Shanti Naryan. Theory of Functions of a Complex Variable. New Delhi: S. Chand and Co. (Pvt.) Ltd., 1973.

Sharma J.N. Functions of Complex Variable. Meerut: Krishna Prakashan Mandir., 1990.

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