**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**
**General Elective Course Offered by Department of Mathematics to students of**
**B A. / B.Sc. / B.Com. Degree**

**SYLLABUS**
**(Effective from the academic year 2015-2016)**

**FASCINATING WORLD OF MATHEMATICS**

**CODE: 15MT/GE/WM22**                                         **CREDITS : 2**
                                                              **L T P : 2 0 0**
                                            **TOTAL TEACHING HOURS : 26**

**OBJECTIVES OF THE COURSE**

 ➢ To introduce some Indian Mathematicians and their contributions
 ➢ To understand Mathematics through puzzles and paradoxes
 ➢ To cite a few real life applications through Mathematical models

**Unit   1**                                                        **(10 hrs.)**
   **Insight into some Indian Contributors to Mathematics**
   1.1  Baudhayana
   1.2  Aryabhata
   1.3  Bhaskara I
   1.4  Shridhara
   1.5  Bhaskara II
   1.6  Srinivasa Ramanujan
   1.7  A.A. Krishnaswami Ayyangar
   1.8  P.C. Mahalanobis
   1.9  C. R. Rao
   1.10  Harish Chandra
   1.11  C. S. Seshadri
   1.12  Sakunthala Devi
   1.13  S. R. Srinivasa Varadhan
   1.14  R. Parimala
   1.15  Other Contemporary Mathematicians

**Unit   2**                                                        **(9 hrs.)**
   **Mathematical Puzzles and Paradoxes**
   2.1  Magic Squares
   2.2  Sleeping Beauty Puzzle
   2.3  Monty Hall Probability Puzzle
   2.4  Crossword
   2.5  Number Puzzles by Shakuntala Devi
   2.6  Missing Square Paradox
   2.7  Potato Paradox
   2.8  Zeno's Paradox

2.9 Necktie Paradox
2.10 Three Prisoner Paradox
2.11 Boy or Girl Paradox
2.12 Sorites Paradox
2.13 Elevator Paradox
2.14 Barber's Paradox

**Unit 3** (7 hrs.)
**Project**
3.1 Mathematical Model – Application of Mathematics in real life


**TEXT BOOKS AND REFERENCE BOOKS**

Anne Rooney, *The Story of Mathematics*, China, Arcturus, 2008.

*The Britannica Guide to The History of Mathematics*, USA, Britannica, 2011.

George Gheverghese Joseph, *The Crest of the Peacock Non-European Roots of Mathematics,* Chennai, East-West, 1990.

Kapur J.N., *IXOHOXI,* New Delhi, Mathematical Sciences Trust Society, 1998.

Kapur J.N., *Mathematical Games for All*, New Delhi, Mathematical Sciences Trust Society, 1998.

Kapur J.N., *Some Eminent Indian Mathematicians of Twentieth Century*, New Delhi, Mathematical Sciences Trust Society, 1994.

Ye.I.P. Perelman, *Mathematics can be Fun*, Mir Publishers Moscow1973, English Translation, 1985.

Shakuntala Devi, *Puzzle to puzzle you*, New Delhi, Orient Paperbacks, 1976, 45th Edition, 2014.

Shakuntala Devi, *Figuring – The Joy of Numbers*, New Delhi, Orient Paperbacks, 1986.

**WEB RESOURCE**

www.samloyd.com, Mathematical puzzles of Sam Loyd.

**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**
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**SYLLABUS**
**(Effective from the academic year 2015-2016)**

**BASIC MATHEMATICS**

**CODE : 15MT/GE/BM23**                                        **CREDITS : 3**
                                                               **L T P : 3 0 0**
                                           **TOTAL TEACHING HOURS : 39**

**ELIGIBILITY CRITERION**
   Offered to those who have not studied Mathematics or Business Mathematics in their secondary level of Education

**OBJECTIVE OF THE COURSE**
   ➢ To impart basic concepts of Mathematics

**Unit   1**                                                   **(8 hrs.)**
   **Matrices**
   1.1 Matrices – Elementary Concepts
   1.2 Evaluation of Determinant of a Square Matrix
   1.3 Types of Matrices – Sum and Product of Matrices - Inverse of a Square Matrix of Order 2 and Order 3
   1.4 Rank of a Matrix

**Unit   2**                                                   **(8 hrs.)**
   **Application of Matrices**
   2.1 Consistency of a System of Linear Non-homogeneous Equations (statement only) - Simple Problems
   2.2 Characteristic Equation of a Square Matrix - Evaluation of Eigen Values
   2.3 Cayley Hamilton Theorem (statement only) – Verification
   2.4 Computing Inverse using Cayley Hamilton Theorem

**Unit   3**                                                   **(8 hrs.)**
   **Differential Calculus**
   3.1 Differential Coefficient of $f(x)$ with respect to $x$
   3.2 Rules for Differentiation - Differential Coefficient of Standard Functions
   3.3 Trigonometric and Inverse Trigonometric Functions

**Unit   4**                                                   **(8 hrs.)**
   **Differential Calculus (contd.)**
   4.1 Logarithmic Differentiation
   4.2 Differentiation of One Function with respect to another

**Unit   5**                                                                                        **(7 hrs.)**
     **Integral Calculus**
     5.1 Integration as the Inverse Process of Differentiation
     5.2 Integration of Standard Functions

## TEXT BOOKS

Manicavachgam Pillay, T.K., T. Natarajan, and  K.S. Ganapathy. *Algebra Vol. II*. Chennai : S. Vishwanthan, 2006.

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

Narayanan S., and T.K. Manicavachgam Pillay. *Calculus Vol. I.*  Chennai : S. Vishwanthan, 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 , 2004 .

       Chapter 1     Sections: 1.1- 6.1

## BOOKS FOR REFERENCE

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

Iyengar N.Ch.S.N.*, Matrices.* New Delhi: Anmol, 1998.

## PATTERN OF EVALUATION
**No End Semester Examination**

**Continuous Assessment:**

Total Marks:  50                                                         Duration: 90 Mins.

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

One Component - Project - 50 marks

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**General Elective Course Offered by Department of Mathematics to students of
B A. / B.Sc. Degree**

**SYLLABUS**
**(Effective from the academic year 2015-2016)**

**ESSENTIALS OF LOGIC AND ITS APPLICATIONS**

**CODE: 15MT/GE/ EL23**                                     CREDITS : 3
                                                       **L T P : 3 0 0**
                                           **TOTAL TEACHING HOURS : 39**

**OBJECTIVES OF THE COURSE**
 ➢ To augment knowledge into mathematical logic
 ➢ To introduce basic concepts of Graph Theory
 ➢ To study the applications of Discrete Mathematics

**Unit   1**                                                    **(8 hrs.)**
  **Logics**
  1.1 Connectives
  1.2 Parsing Trees
  1.3 Truth Tables
  1.4 Tautology
  1.5 Tautological Implications
  1.6 Predicate Calculus
  1.7 Quantifiers

**Unit   2**                                                    **(9 hrs.)**
  **Lattice**
  2.1 Poset
  2.2 Hasse Diagram
  2.3 Lattices – Simple Examples
  2.4 Properties of Lattices (without proof)
  2.5 Duality Principle

**Unit   3**                                                    **(8 hrs.)**
  **Boolean Algebra and Logical Gates**
  3.1 Definition of Boolean Algebra
  3.2 Switching Circuits

**Unit   4**                                                    **(9 hrs.)**
  **Graph Theory**
   4.1 Basic Concepts
   4.2 Simple Graph – Multi-Graph

4.3 Digraph – Degree – Regular Graph
4.4 Incidence – Adjacency
4.5 Complete Graph – Bipartite
4.6 Subgraphs Spanning Subgraph
4.7 Some Special Classes of Graphs
4.8 Paths – Cycles – Connectedness

**Unit  5**                                                                                        **(5 hrs.)**
**Project**
5.1 Applications of Lattices and Boolean Algebra
5.2 Logical Circuits
5.3 Graph Theory

## TEXT BOOK AND REFERENCE BOOKS

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.
Norman, L.Biggs, *Discrete Mathematics***,** second edition**,** India: Oxford, 2003.
Raju Solai, Chandrasekar, Krishnamoorthy and Ganesh, *Discrete Mathematical Structures,* Kumbakonam: Anuradha Agencies, 2003.
Santha S., *Discrete Mathematics with Combinatorics and Graph Theory.* New Delhi: Cengage Learning India, 2010.
Sharma,  *Discrete Mathematics***,** Chennai: Macmillan, 2003.
Yadav S. K., *Discrete Mathematics with Graph Theory.* New Delhi: Ane Books, 2013.

## WEB RESOURCES
 http://world.mathigon.org/Graph_Theory.
http://press.princeton.edu/titles/10314.html
http://www.open-graphtheory.org/

## PATTERN OF EVALUATION
**No End Semester Examination**

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

**Component - 50 marks**
List of Evaluation Modes:
Seminars
Quiz
Assignments
Open Book Test

# STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086

## Offered to students of B.A. / B.Sc. Degree

## SYLLABUS
(Effective from the academic year 2015-2016)

## RESOURCE MANAGEMENT TECHNIQUES

**CODE : 15MT/GE/RT53**　　　　　　　　　　　　　　　　**CREDITS : 3**
　　　　　　　　　　　　　　　　　　　　　　　　　　　**L T P : 3 0 0**
　　　　　　　　　　　　　　　　　　　　　　**TOTAL TEACHING HOURS : 39**

**ELIGIBILITY CRITERION**
　　　Not offered to students who have done Allied Elective course 15MT/AE/OR45

**OBJECTIVE OF THE COURSE**

➢ To create awareness about optimization in utilization of resources

**Unit　1**　　　　　　　　　　　　　　　　　　　　　　　　　　　**(9 hrs.)**
　　**Introduction to Operations Research (OR)**
　　　1.1 Introduction
　　　1.2 Scope of OR
　　　1.3 Phases of OR
　　　1.4 Uses and Limitation of OR
　　**Linear Programming Problem**
　　　1.5 Introduction – Formulation of LPP
　　　1.6 General Formulation of LPP
　　　1.7 Matrix Form of LPP
　　　1.8 Graphical Method: Procedure for Solving of a LPP by Graphical Method

**Unit　2**　　　　　　　　　　　　　　　　　　　　　　　　　　　**(8 hrs.)**
　　**Transportation Problem**
　　　2.1 Introduction
　　　2.2 Mathematical Formulation – Unbalanced
　　　2.3 Maximization – Northwest Corner Rule, Least Cost Method and Vogel's
　　　　　Approximation Method
　　　2.4 Optimality Test: MODI Method

**Unit　3**　　　　　　　　　　　　　　　　　　　　　　　　　　　**(8 hrs.)**
　　**Assignment Problem**
　　　3.1 Assignment Problem
　　　3.2 Mathematical Formulation of an Assignment Problem
　　　3.3 Difference between Transportation and Assignment Problem
　　　3.4 Hungarian Method
　　　3.5 Unbalanced Assignment Problem
　　　3.6 Traveling Salesman Problem

**Unit   4**                                                                                              **(7 hrs.)**
      **Game Theory**
       4.1 Introduction – Basic Terminology
       4.2 Solution Methods of Pure Strategy Games with Saddle Point
       4.3 Principle of Dominance
       4.4 Solution Methods of Mixed Strategy Games
       4.5 Graphical Method

**Unit   5**                                                                                              **(7 hrs.)**
      **Project Network Analysis: CPM**
       5.1 Introduction
       5.2 Development of Network Analysis Concept
       5.3 Developing the Project Network
       5.4 Critical Path Analysis
       5.5 Critical Path Method

**TEXT BOOK**

Kalavathy . S, *Operations Research*. Fourth Edition, Vikas, 2013.

        Chapter 1: 1.1 – 1.4, 1.6
        Chapter 2: 2.1, 2.2
        Chapter 3: 3.1
        Chapter 8:  8.1 – 8.4, 8.5
        Chapter 9:  9.3 – 9.5, 9.6, 9.6.1
        Chapter 15: 15.1 – 15.7
        Chapter 19: 19.1-19.5

**BOOKS FOR REFERENCE**

Gupta Premkumar and Hira, D.S., *Operations Research*. New Delhi: S Chand, 2011.

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

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

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

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

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

**JOURNALS**

International Journal of mathematics in Operational Research
Journal of the Operational Research Society

**WEB RESOURCES**

http://www.worldscientific.com/worldscinet/apjor
http://www.scrip.org/journal/apjor/

**PATTERN OF EVALUATION**
**No End Semester Examination**

**Continuous Assessment:**

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

Section A:  $3\times2 = 06$ (Three questions to be set)
Section B:  $3\times8 = 24$ (Four questions to be set)
Section C: $1\times20= 20$ (Two questions to be set)
**One Component - 50 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. Degree**

**SYLLABUS**
**(Effective from the academic year 2015-2016)**

**CELESTIAL WONDERS**

**CODE: 15MT/GE/CW23**                                          CREDITS : 3
                                                          L T P : 3 0 0
                                          TOTAL TEACHING HOURS : 39

**OBJECTIVES OF THE COURSE**

 ➢ To give insight into astronomy
 ➢ To introduce feature of planet, sun, moon and stellar universe
 ➢ To explore and study the recent events in space

**Unit   1**                                                        **(8 hrs.)**
   **Celestial Sphere and Diurnal Motion**
   1.1 Celestial Sphere
   1.2 Diurnal Motion – Celestial Axis and Equator
   1.3 Celestial Horizon
   1.4 Zenith and Nadir - Celestial Meridian
   1.5 Cardinal Points - Different Hemispheres
   1.6 Visible and Invisible Hemispheres
   1.7 Declination Circles – Verticals, Due East, Due West, Due North, Due South,
        Parallactic Angle
   1.8  Rising and Setting
   1.9 Transit or Culmination
   1.10 Annual Motion of the Sun – First point of Aries, First point of Libra,
         Equinoxes and solstices
   1.11 Colures
   1.12 Circumpolar Stars

**Unit   2**                                                        **(9 hrs.)**
   **The Moon**
   2.1 Elongation - Conjunction, Opposition, Quadratures.
   2.2 Daily Motion of the Moon - Age of Moon
   2.3 Phase of Moon (definition only) - Successive Phases of Moon
   2.4 Moon Exhibits the Same Side to the Earth
   2.5 Lunar Librations - Definition and Kinds of Librations
   2.6 Position of Moon at Rising and Setting
   2.7 Surface Structure of Moon
   2.8 Earth Shine

2.9 The Tides - Tsunami.

**Eclipses**

2.1 Types of Eclipses – Lunar and Solar Eclipse (no derivations), Duration of a Solar Eclipse

2.11 Importance of Total Solar Eclipses

2.12 Comparison of Solar and Lunar Eclipses

2.13 Occultations

**Unit   3**                                                                            **(8 hrs.)**

**Planetary Phenomena**

3.1 Bode's Law

3.2 Direct Motion and Retrograde Motion

3.3 Stationary Points

3.4 Transit of an Inferior Planet - Concept only

3.5 Astronomical Instruments

**The Solar System**

3.6 Kepler's Laws of Planetary Motion, Comets, Meteors

3.7 Astronomical Seasons - Causes of Seasons

3.8 Calendar

**Unit   4**                                                                            **(7 hrs.)**

**The Stellar Universe**

4.1 The Colour and Size of Stars

4.2 Double and Multiple Stars

4.3 Variable Stars - Novae, Star Clusters, Nebulae

**Constellations**

4.4 Zodiacal Constellations

**Galaxies**

4.5 The Milky Way

**Unit   5**                                                                            **(7 hrs.)**

**Observation and Visit to Planetarium**

**Observation :** Sun spots, planets, meteors, constellations, moon and its craters, comets and eclipses

**Visit to Planetarium – Special show**

**TEXT BOOKS AND REFERENCE BOOKS**

Kumaravelu S., Susheela Kumaravelu, *Astronomy.* Sivakasi: A.Bhaskara Selvan, Revised and Enlarged Edition 2005, Reprint 2009.

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

## JOURNALS

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

## WEB RESOURCES

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

## PATTERN OF EVALUATION
## No End Semester Examination

**Continuous Assessment:**

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

Section A:  $3\times2 = 06$ (Three questions to be set)
Section B:  $3\times8 = 24$ (Four questions to be set)
Section C: $1\times20 = 20$ (Two questions to be set)

**Component – 50 marks**
List of Evaluation Modes:
Quiz
Assignments
Presentation

**STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI - 600 086**

**General Elective Course Offered by Department of Mathematics to students of
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**SYLLABUS**
(Effective from the academic year 2015-2016)

**APPLIED STATISTICS**

**CODE: 15MT/GE/AS23**                                                           **CREDITS :3**
**L T P : 3 0 0**
**TOTAL TEACHING HOURS : 39**

**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 statistical skills and the ability to apply the statistical tools in decision making
➢ To enable students to use tools learnt in planning and executing the project with control

**Unit   1**
   **Correlation**                                                                      **(9hrs.)**
   1.1 Scatter Diagram
   1.2 Karl Pearson's Correlation Coefficient, Properties of Correlation Coefficient
   1.3 Rank Correlation - Simple Examples

**Unit   2**
   **Probability**                                                                       **(8hrs.)**
   2.1 Introduction – Classical and Axiomatic Definition
   2.2 Experiment and Event, Various Types of Events
   2.3 Addition Theorem – Multiplication Theorem
   2.4 Condition Probability

**Unit   3**
   **Interpolation**                                                                     **(8hrs.)**
   3.1 Newton's Interpolation Formula Method
   3.2 Central  Difference Interpolation Formula
   3.3 Lagrange's Formula – Simple Problems

**Unit   4**
   **Curve Fitting**                                                                     **(6hrs.)**
   4.1 Introduction – Linear Law
   4.2 Method of Groups Averages
   4.3 Method of Least Squares

**Unit 5** (8hrs.)
**Project**
**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
**Measures of Central Tendency**
Arithmetic Mean, Median, Mode, Range, Quartile Deviation, Standard Deviation

**TEXT BOOKS**

Gupta.S.P. *Elementary Statistical Methods*, Sultan Chand & Sons: New Delhi, 2009.

>Chapter 7: Pages BS 7.3 – 7.7,7.9-7.14, 7.19 – 7.24
>Chapter 11: Pages BS 11.1 – 11.4 , 11.6-11.13,11.15-11.255
>Chapter 16: Page BS 16.6 – 16.14
>Chapter 3, 4

Arumugam.S, Thangapandi Isaac. A, Somasundaram. A, *Numerical Methods*, Scitech: Chennai ,
2001, Third edition ,Reprint 2003.

>Unit 4 : Chapter 2: Pages 2.0 – 2.2, 2.4

**BOOKS FOR REFERENCE**

Kandasamy P., Thilagavathy K. *Allied Mathematics* S. Chand, 2009.

Arumugam, Isaac, *Statistics*, New Gamma Publishing House, Palayamkottai, 2013.

Seemon Thomas, *Basic Statistics*, Narosa, 2014.

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

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

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

**PATTERN OF EVALUATION**
**No End Semester Examination**

**Continuous Assessment:**

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

Section A:  $3\times2 = 06$ (Three questions to be set)
Section B:  $3\times8 = 24$ (Four questions to be set)
Section C: $1\times20= 20$ (Two questions to be set)

**One Component - Project - 50 marks**