# B.Sc. MATHEMATICS

| SEM | COURSE CODE | PART | COURSE | COURSE TITLE | HRS / WEEK | CREDIT | CIA MARKS | SE MARKS | TOTAL MARKS |
|---|---|---|---|---|---|---|---|---|---|
| I | 14 U1LT1/LA1/LF1/LH1/LU1 | I | Language-I | | 6 | 3 | 40 | 60 | 100 |
| | 14 UCN1E1 | II | English-I | | 6 | 3 | 40 | 60 | 100 |
| | 14 UPH1A1 | III | Allied I | Properties of Matter and Sound | 5 | 2 | 20 | 30 | 50 |
| | 14 UPH1A1P | III | Allied I | Properties of Matter - Practical | 3 | 2 | 20 | 30 | 50 |
| | 14 UMA1C1 | III | Core I | Foundations of Mathematics | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA1M1 | III | Major Based Elective – I | Inequalities and Theory of Equations | 3 | 3 | 40 | 60 | 100 |
| | 14 UCN1VE | IV | Value Education | Value Education | 3 | 3 | 40 | 60 | 100 |
| | **TOTAL** | | | | **30** | **20** | **240** | **360** | **600** |
| II | 14 U1LT2/LA2/LF2/LH2/LU2 | I | Language – II | | 6 | 3 | 40 | 60 | 100 |
| | 14 UCN2E2 | II | English – II | | 6 | 3 | 40 | 60 | 100 |
| | 14 UPH2A2 | III | Allied II | Modern Physics | 4 | 2 | 20 | 30 | 50 |
| | 14 UPH2A2P | III | Allied II | Optical, Thermal and Electricity Practical | 3 | 2 | 20 | 30 | 50 |
| | 14 UMA2C2 | III | Core II | Calculus | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA2M2 | III | Major Based Elective – II | Laplace Transforms and Fourier Series | 3 | 3 | 40 | 60 | 100 |
| | 14 UMA2N1# | IV | Non-Major Elective – I# | | 2 | 2 | 40 | 60 | 100 |
| | 14 UCN2ES | IV | Environmental Studies | Environmental Studies | 2 | 2 | 40 | 60 | 100 |
| | **TOTAL** | | | | **30** | **21** | **280** | **420** | **700** |
| III | 14 U1LT3/LA3/LF3/LH3/LU3 | I | Language - III | | 6 | 3 | 40 | 60 | 100 |
| | 14 UCN3E3 | II | English – III | | 6 | 3 | 40 | 60 | 100 |
| | 14 UMA 3A3:1 | III | Allied III | Mathematical Statistics - I | 7 | 4 | 40 | 60 | 100 |
| | 14 UMA3C3 | III | Core III | Differential Equations | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA3M3 | III | Major Based Elective - III | Analytical Geometry – 3D | 3 | 3 | 40 | 60 | 100 |
| | 14 UMA3N2# | IV | Non-Major Elective – II# | | 2 | 2 | 40 | 60 | 100 |
| | 14 UCN3S1 | IV | Skill Based Elective - I | Soft Skills | 2 | 2 | 40 | 60 | 100 |
| | **TOTAL** | | | | **30** | **21** | **280** | **420** | **700** |
| IV | 14 U1LT4/LA4/LF4/LH4/LU4 | I | Language - IV | | 6 | 3 | 40 | 60 | 100 |
| | 14 UCN4E4 | II | English - IV | | 6 | 3 | 40 | 60 | 100 |
| | 14 UMA4A4:1 | III | Allied IV | Mathematical Statistics - II | 8 | 4 | 40 | 60 | 100 |
| | 14 UMA4C4 | III | Core IV | Sequence and Series | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA4C5 | III | Core V | Vector Calculus | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA4S2P | IV | Skill Based Elective - II | SPSS Lab | 2 | 2 | 40 | 60 | 100 |
| | 14 UCN4EA | V | Extension Activities | NCC, NSS, etc. | - | 2 | - | - | - |
| | 14 UMA4EC1 | | Extra Credit-I | Astronomy | - | 4* | - | 100* | 100* |
| | 14 UMA4EC2 | | Extra Credit-II | Formal Languages and Automata Theory | - | 4* | - | 100* | 100* |
| | **TOTAL** | | | | **30** | **22** | **240** | **360** | **600** |
| V | 14 UMA5C6 | III | Core VI | Algebra | 5 | 4 | 40 | 60 | 100 |
| | 14 UMA5C7 | III | Core VII | Real Analysis I | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA5C8 | III | Core VIII | Discrete Mathematics | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA5C9 | III | Core IX | Numerical Methods | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA5C10 | III | Core X | Statics | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA5C11 | III | Core XI | Operations Research | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA5M4 | III | Major Based Elective - IV | Number Theory | 3 | 3 | 40 | 60 | 100 |
| | 14 UMA5S3P | IV | Skill Based Elective - III | MATLAB | 2 | 2 | 40 | 60 | 100 |
| | 14 UMA5EC3 | | Extra Credit-III | Mathematics for Competitive Examinations | - | 4* | - | 100* | 100* |
| | **TOTAL** | | | | **30** | **29** | **320** | **480** | **800** |
| VI | 14 UMA6C12 | III | Core XII | Complex Analysis | 5 | 4 | 40 | 60 | 100 |
| | 14 UMA6C13 | III | Core XIII | Graph Theory | 5 | 4 | 40 | 60 | 100 |
| | 14 UMA6C14 | III | Core XIV | Programming in C | 5 | 4 | 40 | 60 | 100 |
| | 14 UMA6C15 | III | Core XV | Linear Algebra | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA6C16 | III | Core XVI | Real Analysis II | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA6C17 | III | Core XVII | Dynamics | 4 | 4 | 40 | 60 | 100 |
| | 14 UMA6S4P | IV | Skill Based Elective - IV | C Programming Lab | 2 | 2 | 40 | 60 | 100 |
| | 14 UCN6GS | V | Gender Studies | Gender Studies | 1 | 1 | 40 | 60 | 100 |
| | 14 UMA6EC4 | | Extra Credit-IV | Coding Theory | - | 4* | - | 100* | 100* |
| | **TOTAL** | | | | **30** | **27** | **320** | **480** | **800** |
| | **GRAND TOTAL** | | | | **180** | **140** | **1680** | **2520** | **4200** |

# Non Major Elective Courses offered to the other Departments:

| SEM | COURSE TITLE |
|---|---|
| II | Mathematics for Competitive Examinations - I |
| III | Mathematics for Competitive Examinations - II |

* Not considered for Grand Total and CGPA

**SEMESTER I: CORE-I**
**FOUNDATIONS OF MATHEMATICS**

| | |
|---|---|
| **Course Code** : 14UMA1C1 | **Max. Marks** : 100 |
| **Hours/Week** : 4 | **Internal Marks:** 40 |
| **Credit** : 4 | **External Marks:** 60 |

**Objective:**
     To get the basic knowledge about sets and relations and to solve simple problems in calculus.

**UNIT I**                                                                                              **12 hours**
     Cartesian product of sets – Relations - Equivalence relations - Functions.

**UNIT II**                                                                                             **12 hours**
     Binomial theorem for a rational index-some important particular cases of the binomial expansion-application of the binomial theorem to the summation of series - Exponential theorem (statement only) – Summation - #Logarithmic series# - Modification of the logarithmic series - Series which can be summed up by the logarithmic series.

**UNIT III**                                                                                            **12 hours**
     Expansion of $\cos n\theta$ and $\sin n\theta$ -Powers of sines and cosines of $\theta$ in terms of functions of multiples of $\theta$ - Expansions of $\cos^n\theta$, $\sin^n\theta$ - Expansions of $\sin\theta$ and $\cos\theta$ in a series of ascending powers of $\theta$.

**UNIT IV**                                                                                             **12 hours**
     Differentiation – Definition-Differential coefficient of some standard forms - #Differentiation using transformations# - Differentiation of implicit functions - Differentiation of one function with respect to another.

**UNIT V**                                                                                              **12 hours**
     Integrals of functions involving $a^2 \pm x^2$ - Integrals of functions of the form $\int f(x)^n x^{n-1} dx$ - Integration of rational algebraic functions - Integrals of the form $\int (dx/ax^2+bx+c)$, $\int (lx+m/ax^2+bx+c) dx$ (Only) - Integration of irrational functions of the form $\int 1/(ax^2+bx+c)^{1/2} dx$, $\int (px+q)/(ax^2+bx+c)^{1/2} dx$, $\int (ax^2+bx+c)^{1/2} dx$, $\int (px+q)(ax^2+bx+c)^{1/2} dx$ (Only).

**#        # Self-study portion.**

**Text Books:**
**T.B-1**. S. Arumugam, A. Thangapandi Isaac, Modern Algebra, New Gamma Publishing House (1997).
**T.B-2**. T.K. Manicavachagam Pilay, T. Natarajan, K.S. Ganapathy, Algebra Volume 1, S. Viswanathan (Printers & Publishers) Pvt. Ltd. (2009).
**T.B-3**. S. Narayanan, T.K. Manicavachagam Pillay, Trignometry, S. Viswanathan (Printers & Publishers) Pvt. Ltd., (2009).
**T.B-4**. S. Narayanan, T.K. Manicavachagam Pillay, Calculus Volume 1, S. Viswanathan (Printers & Publishers) Pvt. Ltd. (2006).
**T.B-5**. S. Narayanan, T.K. Manicavachagam Pillay, Calculus Volume 2, S. Viswanathan (Printers & Publishers) Pvt. Ltd. (2009).

| **UNIT I** | Chapter 1 | Section 1.8 | and | Chapter 2 | Sections 2.1, 2.2, 2.4 | **T.B-1** |
| **UNIT II** | Chapter 3 | Sections 5,6,10 | and | Chapter 4 | Sections 2, 3, 5, 6, 9 | **T.B-2** |
| **UNIT III** | Chapter 3 | Sections 1 - 5 | | | | **T.B-3** |
| **UNIT IV** | Chapter 2 | Sections 1 - 7 | | | | **T.B-4** |
| **UNIT V** | Chapter 1 | Sections 6.3, 6.4, 7.1, 7.3, 8 | | | | **T.B-5** |

**Books for Reference:**

1. G.B. Thomas and R.L. Finney, Calculus and Analytic Geometry, Narosa Pvt. Ltd., Sixth Edition (2000).
2. S.L. Loney, Plane Trigonometry (Part II), G.K. Publishers (P) Ltd. (2008).

**SEMESTER I: MAJOR BASED ELECTIVE - I**
**INEQUALITIES AND THEORY OF EQUATIONS**

| | | |
|---|---|---|
| **Course Code** : 14UMA1M1 | | **Max. Marks** : 100 |
| **Hours/Week** : 3 | | **Internal Marks** : 40 |
| **Credits** : 3 | | **External Marks**: 60 |

**Objective:**
 To attain the basic knowledge about inequalities and to solve equations in different methods.

**UNIT I** 9 hours
 Inequalities - Triangle inequalities - Arithmetic, Geometric and Harmonic means.

**UNIT II** 9 hours
 Cauchy - Schwarz inequality - Some more inequalities and related problems.

**UNIT III** 9 hours
 Relation between the roots and coefficients of equations - Symmetric functions of the roots - Sum of the powers of the roots of an equation.

**UNIT IV** 9 hours
 Transformation of equation - Roots with sign changed, Roots Multiplied by a given number, #Reciprocal roots# - Reciprocal equation - Diminishing, Increasing the roots of a given equation by a given quantity.

**UNIT V** 9 hours
 Graphical solutions of numerical equations: Cubic equations - #Biquadratic equations# - General solution of the cubic equations:  Cardon's method (only).

**#      # Self-study portion.**

**Text Books:**
**T.B-1:** S. Arumugam and A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House (1991).
**T.B-2:** T.K. Manicavachagom Pillai, T. Natarajan, and K.S. Ganapathy, Algebra, Volume-I, S. Viswanathan Publishers, Pvt. Ltd. (2004).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 2 | Sections 2.1 – 2.3 | **T.B-1** |
| **UNIT II** | Chapter 2 | Sections 2.4 – 2.6 | **T.B-1** |
| **UNIT III** | Chapter 6 | Sections 11, 12, 13 | **T.B-2** |
| **UNIT IV** | Chapter 6 | Sections 15, 16, 17 | **T.B-2** |
| **UNIT V** | Chapter 6 | Sections 31, 32, 33, 34.1 | **T.B-2** |

**Books for Reference:**
1. S. Arumugam, A. Thangapandi Isaac, Algebra (Theory of Equations, Inequalities and Theory of numbers), New Gamma Publishing House (2006).
2. T.K. Manicavachagom Pillai, T. Natarajan, and K.S. Ganapathy, Algebra, Volume-II, S.Viswanathan Publishers, Pvt. Ltd. (2008).

## SEMESTER II: CORE-II
## CALCULUS

| | | |
|---|---|---|
| **Course Code** : 14UMA2C2 | **Max. Marks** : 100 | |
| **Hours/Week** : 4 | **Internal Marks** : 40 | |
| **Credits** : 4 | **External Marks** : 60 | |

**Objective:**

To get the knowledge about Differentiation and Integration and to acquire the knowledge of problem solving ability.

**UNIT I** 12 hours

Successive Differentiation: The nth derivatives of Standard result - Trigonometrical transformation of functions - #Formation of equations involving derivatives# - Leibnitz formula for the nth derivative of a product - Related problems.

**UNIT II** 12 hours

#Homogeneous functions# - Partial derivatives of a function of two functions - Maxima and Minima of function of two variables - Lagrange's Method of undetermined Multipliers.

**UNIT III** 12 hours

Curvature: Circle, Radius and Center of Curvature - Cartesian Formula for the Radius of Curvature - Coordinates of the Center of Curvature.

**UNIT IV** 12 hours

Evolute and Involute - Radius of Curvature when the curve is given in Polar Co-ordinates. Multiple Integrals – Evaluation - Illustrative Examples.

**UNIT V** 12 hours

Double Integrals in Cartesian coordinates and Polar coordinates - Change the order of Integration - Triple Integrals - Examples.

**#      # Self-study portion.**

**Text Books:**

**T.B-1** T.K.Manicavachagom Pillay and Others, Calculus Volume-I, S. Viswanathan Publishers Pvt. Ltd. (2004).
**T.B-2** T.K.Manicavachagom Pillay and Others, Calculus Volume-II, S. Viswanathan Publishers Pvt. Ltd. (2004).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter III | | **T.B- 1** |
| **UNIT II** | Chapter VIII | Sections 1.6, 1.7, 4, 5 | **T.B- 1** |
| **UNIT III** | Chapter X | Sections 2.1 – 2.4 | **T.B- 1** |
| **UNIT IV** | Chapter X | Sections 2.5, 2.6 | **T.B- 1** |
| | Chapter 5 | Sections 2 | **T.B- 2** |
| **UNIT V** | Chapter 5 | Sections 3, 4 | **T.B- 2** |

**Books for Reference:**

1. S. Arumugam and A. Thangapandi Isaac, Calculus, New Gamma Publishing House (2008).
2. Devi Prasad, Advanced Calculus, Prentice Hall of India Learning Pvt. Ltd. (2009).

**SEMESTER II: MAJOR BASED ELECTIVE - II**
**LAPLACE TRANSFORMS AND FOURIER SERIES**

| | |
|---|---|
| **Course Code : 14UMA2M2** | **Max. Marks    : 100** |
| **Hours/Week: 3** | **Internal Marks :  40** |
| **Credits     : 3** | **External Marks :  60** |

**Objective:**
      To get the knowledge about Laplace Transforms and Fourier series and to acquire the knowledge of problem solving ability.

**UNIT I**                                                                                      **9 hours**
      Laplace transforms – Sufficient condition for the existence of the Laplace transforms – Properties of Laplace transforms – Laplace transforms of periodic function – Some general theorems - #Evaluation of integrals#.

**UNIT II**                                                                                     **9 hours**
      The inverse Laplace transforms -Inverse transforms of functions – Related problems.

**UNIT III**                                                                                    **9 hours**
      Application of Laplace transforms - Solution of ODE with constant coefficients – Solution of Systems of Differential equations - Solution of differential equations with variable coefficients.

**UNIT IV**                                                                                     **9 hours**
      Fourier series: Definition of Fourier series - Finding Fourier expansion of a periodic function with period $2\pi$.

**UNIT V**                                                                                      **9  hours**
      Odd and Even function – Half range Fourier series – Development in cosine and sine series.

**#        # Self-study portion.**

**Text Books:**
**T.B-1:** S. Narayanan and T.K. Manicavachagom Pillai, Differential Equations and its applications, S. Viswanathan (Printers and Publishers) Pvt., Ltd. (2006).
**T.B-2:** T.K Manicavachagom Pillai and S. Narayanan, Calculus Volume - III, S. Viswanathan Publishers Pvt., Ltd. (2008).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter IX | Sections 1 - 5 | **T.B-1** |
| **UNIT II** | Chapter IX | Sections 6, 7 | **T.B-1** |
| **UNIT III** | Chapter IX | Sections 8 - 11 | **T.B-1** |
| **UNIT IV** | Chapter VI | Sections 1, 2 | **T.B-2** |
| **UNIT V** | Chapter VI | Sections 3, 4, 5 | **T.B-2** |

**Books for Reference:**
1. Murray R. Spiegel, Schaum's Outline of Theory and Problems of Laplace Transforms, McGraw Hill, (1965).
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, INC, 9th Edition, (2006).

**SEMESTER II: NON MAJOR ELECTIVE -I**
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS – I**

| | |
|---|---|
| **Course Code** : 14UMA2N1 | **Max. Marks** : 100 |
| **Hours/Week** : 2 | **Internal Marks :** 40 |
| **Credit** : 2 | **External Marks :** 60 |

**Objective:**
To enable the students to appear competitive examinations confidently.

**UNIT I** **6 hours**
Numbers: Problems on Addition, Subtraction, Multiplication and Division (Shortcut Methods) – Various tests for Divisibility – Prime and Composite numbers – #Various types of numbers#.

**UNIT II** **6 hours**
HCF and LCM of numbers - Decimal fractions: Addition, Subtraction, Multiplication and Division of Decimal fractions - #H.C.F and L.C.M of Decimals# – Rule for converting Pure and Mixed Recurring Decimals into a Vulgar Fractions.

**UNIT III** **6 hours**
Simplification - Square Root- Square Root by means of Factors – General Method – Square Root of Decimal Fractions - Square Root of Vulgar Fractions - #Cube Root#.

**UNIT IV** **6 hours**
Percentage: Shortcut Method – Problems based on Population, #Average#, Ratio and Proportion.

**UNIT V** **6 hours**
Partnership, Chain rule - Direct proportion – Indirect Proportion.

**#** **# Self-study portion.**

**Text Book:**
R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd. (2007).

**Books for Reference:**
1. R.S. Aggarwal, Arithmetic (Subjective and Objective) For Competitive Examinations, S. Chand and Company Ltd. (2004).
2. R.S. Aggarwal, Objective Arithmetic, S. Chand & Company Ltd. (2004).

**Note:**
**60 Multiple choice questions only. 12 Questions from each unit.**

## SEMESTER-III: ALLIED – III
## MATHEMATICAL STATISTICS – I

| | | | |
|---|---|---|---|
| **Course Code** : 14UMA3A3:1 | | **Max. Marks** : 100 | |
| **Hours/Week** : 7 | | **Internal Marks** : 40 | |
| **Credit** : 4 | | **External Marks** : 60 | |

**Objective:**
    To impart the students with knowledge in Basic Mathematical Statistics.

**UNIT I**                                       **21 hours**
    Arithmetic Mean - Properties of Arithmetic Mean - Weighted mean – Median – Mode - Geometric mean - Harmonic mean. Graphical Location of the Partition values. #Merits and Demerits of Mean, Median, Mode, Geometric Mean and Harmonic Mean#.

**UNIT II**                                         **21 hours**
    Dispersion-characteristics for ideal measure of dispersion - Measures of Dispersion - Range - Q.D - M.D - S.D, coefficient of dispersion - #Coefficient of variation#. Moments - Pearson's $\beta$ and $\gamma$ Co-efficient - Skewness - Kurtosis - simple problems.

**UNIT III**                                       **21 hours**
    Classical probability-empirical probability - #Sets and elements of sets - Operation on sets – Algebra of sets# - Axiomatic approach towards probability - Addition and Multiplication theorems - Conditional probability - Baye's theorem - Simple problems.

**UNIT IV**                                       **21 hours**
    Random variable - Distribution function – Properties - Probability mass function - Probability density function - Joint probability mass function - #Joint probability density function# - Marginal and Conditional distribution – Mathematical Expectation - Addition theorem of Expectation - Multiplication theorem of Expectation - Moment Generating Function - Cumulant Generating Function and cumulants - #Additive Property of Cumulants# – Simple problems.

**UNIT V**                                         **21 hours**
    Fitting of a Straight Line - Fitting of second Degree Parabola – Fitting of Polynomial of $K^{th}$ Degree – Change of Origin – Most Plausible Solution of a system of Linear Equations - Conversion of Data to Linear Form – Fitting of a power curve – #Fitting of Exponential curves# - Simple problems.

**#**         **# Self-study portion.**

**Text Book:**
S.C. Gupta & V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons Publication, Third edition, (2010).

| | | |
|---|---|---|
| **UNIT I** | Chapter 2 | Sections 2.3 - 2.9.1 & 2.11.1 |
| **UNIT II** | Chapter 3 | Sections 3.1 – 3.7, 3.7.3, 3.8, 3.8.1, 3.9, 3.10 - 3.12 |
| **UNIT III** | Chapter 4 | Sections 4.1, 4.3.1, 4.3.2, 4.5, 4.6.2 – 4.8 |
| **UNIT IV** | Chapter 5 | Sections 5.1 – 5.4.1, 5.5.1 – 5.5.5-6.1- 6.4, 6.9, 6.10, 6.10.1 |
| **UNIT V** | Chapter 9 | Sections 9.1 – 9.1.1- 9.1.4 - 9.2 – 9.3 |

**Books for Reference:**

1. Murray R. Speigel, John Jschiller, R. Alu Srinivasan Probability and Statistics, Third Edition, Shaum's Outline Series (2010).
2. S. C. Gupta and V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons Publication, Eleventh Edition (2013).

**SEMESTER-III: CORE - III**
**DIFFERENTIAL EQUATIONS**

**Course Code** : 14UMA3C3         **Max. Marks** : 100
**Hours/Week** : 4         **Internal Marks** : 40
**Credit** : 4         **External Marks** : 60

**Objective:**
     To study the methods used to solve differential equations of first order and second order and to solve the partial differential equations of first order.

**UNIT I**             **12 hours**
     Linear equation – Bernoulli's equation – Exact differential equations.

**UNIT II**             **12 hours**
     Equations of the first order but of higher degree - Equations solvable for dy/dx - Equations solvable for y - #Equations solvable for x# – Clairaut's form – Equations that do not contain x explicitly - Equations that do not contain y explicitly - Equations homogeneous in x and y.

**UNIT III**             **12 hours**
     Linear Equations with constant coefficients - The operator D - Complementary function of a linear equation with constant coefficients – Particular integrals.

**UNIT IV**             **12 hours**
     Linear equations with variable co-efficients – Equations reducible to the linear equations – Variation of parameters.

**UNIT V**             **12 hours**
     Partial Differential Equations of the first order - Classification of integrals - Derivation of PDE by elimination of constants and functions - Lagrange's method of solving the linear equation - Special methods - Standard forms I, II, #III and IV (Clairaut's form)#.

**#**       **# Self-study portion.**

**Text Book:**
S. Narayanan and T. K. Manicavachagom Pillay, Differential Equation and its Application,
S. Viswanathan Publishers Pvt. Ltd., Ninth edition (1996).

**UNIT I**    Chapter  II    Sections 4, 5, 6.1 – 6.4
**UNIT II**    Chapter IV    Sections 1 – 4
**UNIT II**    Chapter V    Sections 1 – 4
**UNIT III**    Chapter V    Sections 5, 6
            Chapter VIII   Section 4
**UNIT IV**    Chapter XII    Sections 1 – 5

**Books for Reference:**
     1. M.D. Raisinghania, Ordinary and Partial Differential Equations, S. Chand & Co. (2010).
     2. M.L. Khanna, Differential Equations, Jai Prakash Nath and Co. (2004).

## SEMESTER III: MAJOR BASED ELECTIVE-III
## ANALYTICAL GEOMETRY – 3D

**Course Code** : 14UMA3M3             **Max. Marks** : 100
**Hours/Week** : 3                           **Internal Marks:** 40
**Credits** : 3                               **External Marks:** 60

**Objective:**
      To promote knowledge in the field of analytical geometry.

**UNIT I**                                                        **9 hours**
      Direction cosines - Direction ratios - General equation of the plane - Intercept form - #Normal Form# - Angle between two planes.

**UNIT II**                                                     **9 hours**
      Length of the perpendicular - Equation of the planes bisecting the angle between two planes - #Straight line as the intersection of two planes# - Symmetrical form.

**UNIT III**                                                **9 hours**
      Equation of a straight line passing through two given points - Condition for a line to be parallel to a plane - Coplanar lines - Shortest distance between two given lines - Simple problems.

**UNIT IV**                                               **9 hours**
      #Equation of a sphere# - Finding centre and radius - Length of the tangent to a sphere - Plane section of a sphere.

**UNIT V**                                                   **9 hours**
      Equation of a circle on a sphere - Intersection of two spheres - Tangent plane to a sphere - Simple problems.

**Text Book:**
T.K. Manicavachagom Pillay, T. Natarajan, Analytical Geometry, Part II -Three Dimensions, S. Viswanathan Publishers Pvt. Ltd. (2009).

**UNIT I**         Chapter I    Sections 7, 8 and Chapter II Sections 1, 2, 3, 7
**UNIT II**        Chapter II   Sections 10, 11 and Chapter III Sections 1, 2, 3
**UNIT III**       Chapter III  Sections 4, 5, 7 & 8
**UNIT IV**       Chapter IV  Sections 2 - 5
**UNIT V**        Chapter IV  Sections 6 - 8

**Books for Reference:**
1. Shanti Narayanan, Analytical Solid Geometry, S. Chand & Company Ltd, New Delhi (2007).
2. M.L. Khanna, Solid Geometry, Jai Prakash Nath & Co, Educational Publishers, 25th Edition (2005).

**SEMESTER III: NON MAJOR ELECTIVE - II**
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS - II**

| | |
|---|---|
| **Course Code** : 14UMA3N2 | **Max. Marks** : 100 |
| **Hours/Week** : 2 | **Internal Marks :** 40 |
| **Credit** : 2 | **External Marks :** 60 |

**Objective:**
    To enable the students to appear competitive examinations confidently.

**UNIT I**          **6 hours**
    Time and work - Pipes and Cisterns.

**UNIT II**          **6 hours**
    Time and Distance – Trains - Boats and Streams.

**UNIT III**          **6 hours**
    #Profit and Loss# - Mixture.

**UNIT IV**          **6 hours**
    #Simple interest# and Compound interest - Calendar.

**UNIT V**          **6 hours**
    Volume and Area of Solid figures.

**Text Book:**
R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd. (2007).

**Books for Reference:**
    1. R.S. Aggarwal, Arithmetic (Subjective and Objective) For Competitive Examinations,
       S. Chand and Company Ltd. (2004).
    2. R.S. Aggarwal, Objective Arithmetic, S. Chand & Company Ltd. (2004).

**Note:**
**60 Multiple choice questions only. 12 Questions from each unit**

## SEMESTER IV: ALLIED - IV
## MATHEMATICAL STATISTICS – II

| | |
|---|---|
| **Course Code** : 14UMA4A4:1 | **Max. Marks** : 100 |
| **Hours/Week** : 8 | **Internal Marks :** 40 |
| **Credit** : 4 | **External Marks:** 60 |

**Objective:**

To understand the concepts of various discrete and continuous probability distributions, the concepts of correlation and regression, Sampling and applications of chi-square, t-test and F-test.

**UNIT I**                                                                                                    **24 hours**

Theoretical discrete distribution – Binomial distribution: Moments, Recurrence relation Moment generating Function Characteristic Function and Cumulants. Poisson distribution: Moments, Recurrence relation, Moment generating Function, Characteristic Function and #Cumulants# - Simple Problems.

**UNIT II**                                                                                                   **24 hours**

Theoretical continuous distribution - Rectangular (or) Uniform distribution, Normal distribution, Moment generating Function, Cumulant Generating Function, Moments; #Area Property#, Fitting of Normal Distribution.

**UNIT III**                                                                                                 **24 hours**

Theoretical continuous distribution - Gamma Distribution, Moment generating Function, Cumulant Generating Function, Additive property, Beta Distribution of first kind, Exponential Distribution - Simple Problems. Bivariate distribution, Correlation, Scatter diagram, Pearson's Coefficient of Correlation, Properties, Rank correlation, Regression - Lines of Regression, #Regression Coefficient and its properties# - Simple Problems.

**UNIT IV**                                                                                                 **24 hours**

Sampling Introduction - Types of sampling parameter and statistic - #Sampling distribution Standard Error# - Tests of significance - Null Hypothesis. Test for single proportion - Test for difference of proportions-Test of significance of single mean - Test of significance of Difference of means.

**UNIT V**                                                                                                  **24 hours**

Chi-Square variate - Application of Chi-square - Chi-square test for population variance and independence of attributes. Student's t definition - Application of t-distribution test for single mean - Difference of means - #Test for correlation Coefficient# - F-Statistic definition - Application of F-distribution - F-test for equality of population Variance.

**#      # Self-study portion.**

**Text Book:**

S.C. Gupta and V.K. Kapoor, Elements of Mathematical Statistics, Sultan Chand & Sons Publication, Third Edition, (2010).

**Unit I**   Chapter 7      Sections 7.2,7.2.1,7.2.2,7.2.4,7.2.6 to 7.2.9,7.3.1,7.3.2 and 7.3.4 to 7.3.8
**Unit II**  Chapter 8       Sections 8.1,8.2,8.2.3 to 8.2.8,8.2.10,8.2.11 and 8.2.14
**Unit III** Chapter 8       Sections 8.3,8.4 and 8.6
             Chapter 10    Sections 10.1 to 10.3,10.6,10.7 to 10.7.1 and 10.7.3 to 10.7.4 (Except Properties)
**Unit IV** Chapter 12    Sections 12.1 to 12.5, 12.9.1, 12.9.2, 12.13 and 12.14
**Unit V** Chapter 13    Sections 13.1, 13.5 and 13.5.1 to 13.5.3,
             Chapter 14    Sections 14.2, 14.2.5 to 14.2.8, 14.3, 14.3.1 and 14.3.2

**Books for Reference:**

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons Publication, Eleventh Edition (2013).
2. H.C. Saxena and P.U. Surendran, Statistical Inference, S. Chand & Co. (1967).
3. Marek Fisz, Probability and Mathematical Statistics, John Wiley & Sons (1963).

**SEMESTER IV: CORE – IV**
**SEQUENCES AND SERIES**

| | |
|---|---|
| **Course Code** : 14UMA4C4 | **Max. Marks** : 100 |
| **Hours/Week** : 4 | **Internal Marks :** 40 |
| **Credit** : 4 | **External Marks :** 60 |

**Objective:**
To get the knowledge of some simple techniques for testing the convergence of sequences and series and to be familiar with variety of well-known sequences and series with a developing intuition about the behaviour of new ones.

**UNIT I**                                                                                   **12 hours**
Intervals in R - Bounded sets - lub and glb - Bounded functions - Sequences - Bounded sequences - #Monotonic sequences# - Convergent sequences - Divergent and oscillating sequences - Algebra of limits.

**UNIT II**                                                                                 **12 hours**
Behaviour of monotonic sequences - Some theorems on limits – #Subsequences#.

**UNIT III**                                                                               **12 hours**
Limit points - Cauchy sequences - Upper and lower limits of a sequence - Infinite series – Comparison Test.

**UNIT IV**                                                                               **12 hours**
Kummer's test – D'Alembert's ratio test – Raabe's test – De Morgan and Bertrand's test – Gauss' test.

**UNIT V**                                                                                 **12 hours**
Cauchy's root test - Cauchy's condensation test - #Alternating series# – Leibnitz's test - Absolute convergence.

**#        # Self-study portion.**

**Text Book:**
S. Arumugam and A. Thangapandi Isaac, Sequences and series, New Gamma Publishing House (1991).

| | | |
|---|---|---|
| **UNIT I** | Chapter I | Sections 1.2 - 1.5  and Chapter III  Sections  3.1 – 3.6 |
| **UNIT II** | Chapter III | Sections 3.7 – 3.9 |
| **UNIT III** | Chapter III | Sections 3.10-3.12 and Chapter IV Sections 4.1, 4.2 |
| **UNIT IV** | Chapter IV | Section 4.3 |
| **UNIT V** | Chapter IV | Section 4.4  and Chapter V Sections 5.1, 5.2 |

**Books for Reference:**
1. Richard R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing Co. & Pvt. Ltd. (1970).
2. M.K. Singal and Asha Rani Singal, A first course in Real Analysis, R. Chand & Co. (1999).

## SEMESTER IV: CORE - V
## VECTOR CALCULUS

| | | | |
|---|---|---|---|
| **Course Code** | : 14UMA4C5 | **Max. Marks** : | 100 |
| **Hours/Week** | : 4 | **Internal Marks:** | 40 |
| **Credit** | : 4 | **External Marks:** | 60 |

**Objective:**

   To attain the basic knowledge on vector calculus.

**UNIT I** 12 hours

   Vector differentiation – Differentiation of vectors – #A few results on differentiation of Vectors# – Meaning of the derivative of position vector - Physical applications - #Level surfaces# – Vector differential operator - Gradient - Direction and magnitude of gradient – Simple problems.

**UNIT II** 12 hours

   Divergence and curl - Formula involving operator $\nabla$, operators involving $\nabla$ twice – Simple problems.

**UNIT III** 12 hours

   Vector integration - Line integral – Surface integral – Volume integral – Simple problems.

**UNIT IV** 12 hours

   Gauss divergence theorem – Green's theorem (in space) (Statement only) – Simple problems using theorems.

**UNIT V** 12 hours

   Stoke's theorem - Green's theorem (in plane) (Statement only) – Simple problems using theorems.

**#    # Self-study portion.**

**Text Book:**

S.  Narayanan and T.K. Manicavachagom Pillai, Vector Algebra and Analysis, S.Viswanathan Pvt. Ltd. (1995).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 4 | Sections | 1 - 8 |
| **UNIT II** | Chapter 4 | Sections | 9 - 12 |
| **UNIT III** | Chapter 6 | Sections | 1 - 5 |
| **UNIT IV** | Chapter 6 | Sections | 6 - 8 |
| **UNIT V** | Chapter 6 | Sections | 9, 10 |

**Books for Reference:**

   1. M.L. Khanna, Vector Calculus, Jai Prakash Nath and Co., Eighth Edition (1986).
   2. P.R. Vittal, Vector analysis, Analytical Geometry & sequences and series, Margham Publications, Chennai (2004).

**SEMESTER IV: SKILL BASED ELECTIVE – II**
**SPSS LAB**

| | | |
|---|---|---|
| **Course Code** : 14UMA4S2P | **Max. Marks** : | 100 |
| **Hours/Week** : 2 | **Internal Marks** : | 40 |
| **Credit** : 2 | **External Marks** : | 60 |

**Objective:**
   To provide concepts used in routines in SPSS on the following problems.

**List of Practical:**

1. Mean, Standard deviation, Variance.

2. Bar diagram, Line diagram, Pie chart and Histogram.

3. Co efficient of correlation.

4.  Regression equation of X on Y.

5. Regression equation of Y on X.

6. Application of t-test for one sample problem.

7. Application of t-test for two sample problems.

8. Application of t-test for testing the significance of Correlation Coefficient.

9. One-tailed and Two-tailed tests.

10. Application of analysis of variance.

**SEMESTER IV: EXTRA CREDIT – I**
**ASTRONOMY**

| | |
|---|---|
| **Course Code : 14UMA4EC1** | **Max. Marks    : 100*** |
| **Hours/Week:  -** | **Internal Marks :   -** |
| **Credit        : 4*** | **External Marks : 100*** |

**Objective:**

　　To provide knowledge about the universe, scientific thinking to problems in astronomy, the observational foundations of astronomy's greatest discoveries and the nature of galaxy.

**UNIT I**

　　Celestial sphere and diurnal motion – Celestial coordinates – Sidereal time.

**UNIT II**

　　Morning and evening stars – Circumpolar stars - Zones of earth - Perpetual day -Twilight.

**UNIT III**

　　Refraction – Laws of refraction – Tangent formula - Horizontal refraction - Geocentric parallax – Horizontal parallax.

**UNIT IV**

　　Kepler's laws - Anomalies – Kepler's equation - Calendar.

**UNIT V**

　　Moon - Sidereal and synodic months – Elongation – Phase of moon – Eclipses - Umbra and penumbra – Lunar and solar eclipses – Maximum and minimum number of eclipses in a year.

**Text Book:**

S. Kumaravel and Susheela Kumaravel, Astronomy, Prentice-Hall (2000).

| | | |
|---|---|---|
| **UNIT I** | Chapter II | Sections 39 – 76 |
| **UNIT II** | Chapter III | Sections 80 – 83, 87 – 89, 111 - 116 |
| **UNIT III** | Chapter IV | Sections 117 – 128 |
| | Chapter V | Sections 135 – 144 |
| **UNIT IV** | Chapter VI | Sections 146 – 149, 156 – 159 |
| | Chapter VII | Sections 175 – 179 |
| **UNIT V** | Chapter XII | Sections 229 – 241 |
| | Chapter XIII | Sections 256 – 263, 267, 268, 271 - 275 |

**Books for Reference:**

1. W.M. Smart, Textbook on Spherical Astronomy, Cambridge University Press (1999).
2. Barlow, Elementary Mathematical Astronomy, Barlow Prentice-Hall (1983).

**SEMESTER IV: EXTRA CREDIT- II**
**FORMAL LANGUAGES AND AUTOMATA THEORY**

Course Code   : 14UMA4EC2                                   Max. Marks   : 100*
Hours/Week  : -                                             Internal Marks:  -
Credit         : 4*                                         External Marks: 100*

**Objective:**
      To provide an insight to the theoretical computer science and get across the notion of effective computability, using mathematical models.

**UNIT I**
      Finite Automata - Deterministic Finite Automata - Nondeterministic Finite Automata - An Application.

**UNIT II**
      Regular Expressions - Finite Automata and Regular Expressions - Applications of Regular Expressions - Algebraic Laws for Regular Expressions.

**UNIT III**
      Pumping lemma for regular sets – Closure properties of regular sets – Decision algorithms for regular sets – Equivalence and Minimization of Automata.

**UNIT IV**
      Context-free grammars – Parse trees – Applications of Context-free grammars – Ambiguity in grammars and languages.

**UNIT V**
      Pushdown automata – Languages of a PDA – Equivalence of PDA's and CFG's – Deterministic PDA.

**Text Book:**
John E. Hopcroft and Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi, (1995).

| UNIT I | Chapter 2 | Sections 2.1 - 2.4 |
| UNIT II | Chapter 3 | Sections 3.1 - 3.4 |
| UNIT III | Chapter 4 | Sections 4.1 - 4.4 |
| UNIT IV | Chapter 5 | Sections 5.1 - 5.4 |
| UNIT V | Chapter 6 | Sections 6.1 - 6.4 |

**Books for Reference:**
1. Ravi Siromoney, Formal Languages and Automata, The Christian Literature Society, Madras (1984).
2. Bernard Kolman, Robert C. Busby and Sharon Cutler Ross, Discrete Mathematical Structures, Prentice-Hall of India Learning Private Ltd, New Delhi, Sixth Edition, (2009).
3. Kamala Krithivasan, Introduction to Formal Languages, Automata Theory and Computation, Dorling Kindersley (India) Pvt. Ltd. (2011).

**SEMESTER V: CORE VI**
**ALGEBRA**

| | |
|---|---|
| **Course Code** : 14UMA5C6 | **Max. Marks** : 100 |
| **Hours/Week** : 5 | **Internal Marks** : 40 |
| **Credits** : 4 | **External Marks** : 60 |

**Objective:**
     To introduce the concepts of Group, Ring, Ideals, polynomial rings and their properties.

**UNIT I**                                                 **15 hours**
     Groups – #Elementary Properties of a Group# - Equivalent definitions of a group – Permutations - Subgroups.

**UNIT II**                                             **15 hours**
     Cyclic Group - Order of an Element - Cosets - Lagrange's Theorem - Normal Subgroups - Quotient group.

**UNIT III**                                        **15 hours**
     Rings – #Elementary properties of rings# - Isomorphism - Types of rings - Characteristic of a ring -  Subrings.

**UNIT IV**                                      **15 hours**
     Ideals - Quotient rings - Maximal and prime ideals - Homomorphism of rings - Field of quotients of an integral domain - Ordered integral domain.

**UNIT V**                                         **15 hours**
     Unique Factorization Domain - Euclidean domain – Principle Ideal Domain - Polynomial rings - Polynomial rings over U.F.D.

**#**       # Self-study portion.

**Text Book:**
S. Arumugam and A. Thangapandi Isaac, Modern Algebra, Scitech Publications (India) Pvt. Ltd. (2003).

**UNIT I**     Chapter III   Sections 3.0 – 3.5
**UNIT II**    Chapter III   Sections 3.6 – 3.9
**UNIT III**   Chapter IV   Sections 4.1 – 4.6
**UNIT IV**   Chapter IV   Sections 4.7 – 4.12
**UNIT V**    Chapter IV   Sections 4.13 – 4.17

**Books for Reference:**
1. M.L. Santiago, Modern Algebra, Arul Publications (1993).
2. S.G. Venkatachalapathy, Modern Algebra, Maragham Publications (2003).

**SEMESTER V: CORE - VII**
**REAL ANALYSIS - I**

| | | | |
|---|---|---|---|
| **Course Code** | : 14UMA5C7 | **Max. Marks** | : 100 |
| **Hours/Week** | : 4 | **Internal Marks** | : 40 |
| **Credits** | : 4 | **External Marks** | : 60 |

**Objective:**
  To describe and prove continuity, differentiability and integrability conditions for real functions with the help of limiting properties and to prove mean value theorems.

**UNIT I**                                                                                              **12 hours**
  Order relation in R - Absolute value – Completeness - #Intervals# – Countable & uncountable sets.

**UNIT II**                                                                                             **12 hours**
  Limits – Continuous functions – Types of discontinuities – #Uniform continuity#.

**UNIT III**                                                                                            **12 hours**
  Derivability of a function - Derivability and Continuity – Algebra of derivatives – Daurboux's Theorem on derivatives.

**UNIT IV**                                                                                             **12 hours**
  Rolle's Theorem – Lagrange's Mean Value Theorem - Cauchy's Theorem – Taylor's Theorem - #Taylor's series# - Power series expansion.

**UNIT V**                                                                                              **12 hours**
  Riemann integration – Daurboux's theorem – Conditions for integrability – Integrability of continuous and monotonic functions – The First Mean Value Theorem - Fundamental Theorem of Calculus.

**Text Books:**
**T.B-1.** M.K. Singhal and Asha Rani Singhal, A First Course in Real Analysis, R. Chand & Co. (1997).
**T.B-2.** Shanthi Narayan, A Course of Mathematical Analysis, S. Chand & Co. (1995).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 3 | Sections 4 – 6,9,10 | **T.B-1** |
| **UNIT II** | Chapter 7 | Sections 1-3, 8 | **T.B-1** |
| **UNIT III** | Chapter 8 | Sections 1-3, 5 | **T.B-1** |
| **UNIT IV** | Chapter 9 | Sections 1- 6 | **T.B-1** |
| **UNIT V** | Chapter 6 | Sections 6.2, 6.3, 6.5, 6.6, 6.8, 6.8.3, 6.9.1 | **T.B-2** |

**Books for Reference:**
  1. Richard R. Goldberg, Methods of Real Analysis, Oxford & IBHP Publishing Co., New Delhi (1970).
  2. Robert G. Bartle and Donald R. Sherbert, Introduction to Real Analysis, Wiley India Pvt., Ltd. Third Edition (2007).

**SEMESTER V: CORE - VIII**
**DISCRETE MATHEMATICS**

| | |
|---|---|
| **Course Code : 14UMA5C8** | **Max. Marks   : 100** |
| **Hours/Week : 4** | **Internal Marks  : 40** |
| **Credit       : 4** | **External Marks : 60** |

**Objective:**

To enrich the knowledge in the field of functions, Boolean algebra and the normal forms.

**UNIT I**                                                                                                   **12 hours**

Statement and notation – Connectives  – Negative – Conjunctive – Disjunctive – Statement Formulae and Truth tables – Conditional and Bi-conditional statements – Well defined formulae – #Tautologies# – Contradictions – Other connectives.

**UNIT II**                                                                                                 **12 hours**

Normal forms – Disjunctive Normal forms – Conjunctive Normal forms – Principal Conjunctive Normal forms - Ordering and uniqueness of Normal forms.

**UNIT III**                                                                                               **12 hours**

Predicate calculus – Inference theory of the predicate calculus - Binary and n-ary operations – Characteristic function of a set – Hashing functions – Recursive functions.

**UNIT IV**                                                                                               **12 hours**

Lattice as partially ordered set – Some properties of lattices – Lattices as algebraic systems – Sub lattice, Direct product and homomorphism  – #Some special lattices#.

**UNIT V**                                                                                                 **12 hours**

Boolean algebra – Boolean functions – Boolean forms and free Boolean algebras – Values of Boolean expressions and Boolean functions.

**#        # Self-study portion.**

**Text Book:**
J.P. Tremblay and R. Manohar, Discrete mathematical Structures with applications to computer science, Tata McGraw Hill, Thirty-ninth reprint (2011).

| | | |
|---|---|---|
| **UNIT I** | Chapter I | Sections 1.1 - 1.2.14 |
| **UNIT II** | Chapter I | Section  1.3 |
| **UNIT III** | Chapter I | Sections 1.5, 1.6  and Chapter II Sections 2.4.4 - 2.4.6, 2.6.1 |
| **UNIT IV** | Chapter IV | Section  4.1 |
| **UNIT V** | Chapter IV | Sections 4.2 and 4.3 |

**Books for Reference:**
1. Rakesh Dube, Adesh Pandey and Ritu Gupta, Discrete Structures and Automata Theory, Narosa Publishing House (2000).
2. John E. Hopcroft, Jeffery D. Ullman, Introduction to  Automata Theory, Languages and Computation, Narosa Publishing House, New Delhi (1995).

**SEMESTER V: CORE - IX**
**NUMERICAL   METHODS**

**Course Code : 14UMA5C9**                                 **Max. Marks      : 100**
**Hours/Week : 4**                                           **Internal  Marks : 40**
**Credit        : 4**                                        **External  Marks : 60**

**Objective:**
        To solve the numerical problem in efficiency with various methods.

**UNIT I**                                                                                    **12 hours**
            Solution of Algebraic and Transcendental equation – Bisection Method - #Iteration Method# - Method of false position - Newton-Raphson Method.

**UNIT II**                                                                                   **12 hours**
        **I**nterpolation: Finite differences – Forward differences - #Backward differences# - Central differences - Symbolic relations - Newton's formula for interpolation. Interpolation with unevenly spaced points – Lagrange's interpolation formula.

**UNIT III**                                                                                  **12 hours**
        Numerical differentiation and integration – Numerical differentiation (Excluding cubic spline Method, Maximum and Minimum values of a tabulated function) - Numerical integration: Trapezoidal Rule - Simpson's Rule**.**

**UNIT IV**                                                                                   **12 hours**
        Matrices and linear system of equation: Gaussian Elimination Method - Method of Factorization - Iterative Method – Gauss Jacobi - Gauss Seidel Methods**.**

**UNIT V**                                                                                    **12 hours**
        Numerical solution of ordinary differential equations – Solution by Taylor series - Picard's method of   successive approximations - Euler method - #Modified Euler Method# - Runge–Kutta Methods of second order and fourth order.

**#        # Self-study portion.**

**Text Book:**
S.S. Sastry, Introductory Methods of Numerical Analysis, Fourth Edition (2009).

| | | |
|---|---|---|
| **UNIT I** | Chapter 2 | Sections 2.1 - 2.5 |
| **UNIT II** | Chapter 3 | Sections 3.3, 3.6, 3.9.1 |
| **UNIT III** | Chapter 5 | Sections 5.1, 5.2(Excluding 5.2.1 and 5.2.2), 5.4, 5.4.1, 5.4.2 |
| **UNIT IV** | Chapter 6 | Sections 6.3.2, 6.3.4, 6.4 |
| **UNIT V** | Chapter 7 | Sections 7.2 - 7.4, 7.4.2, 7.5 |

**Book for Reference:**
    1. F.B. Hildebrand, Introduction to Numerical Analysis, Second Edition, Tata McGraw Hill
       (1987).
    2. A. Singaravelu, Numerical Methods, Meenachi Agency (2000)**.**

**SEMESTER V: CORE-X**
**STATICS**

**Course Code : 14UMA5C10**                                      **Max. Marks     : 100**
**Hours/Week   : 4**                                                     **Internal Marks : 40**
**Credits        : 4**                                                       **External Marks : 60**

**Objective:**
        To acquire knowledge about the equilibrium of forces.

**UNIT I**                                                                                                  **12 hours**
        Forces acting at a point - Parallelogram of forces – Triangle of forces – Lami's Theorem – Extended form of the parallelogram of law of forces – #Resultant of any number of coplanar forces acting at a point#.

**UNIT II**                                                                                                 **12 hours**
        Resultant of two like and unlike parallel forces acting on a rigid body – Moments of a force – Varignon's Theorem of moments – Couple – Equilibrium of two couples.

**UNIT  III**                                                                                               **12 hours**
        Equilibrium of three forces acting on a rigid body – Three coplanar forces – Two trigonometrical theorems – Coplanar forces – Reduction of any number of coplanar forces – Conditions for a system of forces to reduce to a single force or to a couple – Equation to the line of action of the resultant.

**UNIT IV**                                                                                                **12 hours**
        Friction – Laws of friction – Co-efficient of friction, angle and cone of friction – Equilibrium of a particle on a rough inclined plane under any forces – Problems on friction.

**UNIT  V**                                                                                                **12 hours**
        Uniform string under the action of gravity - Equilibrium of strings and chain under gravity – Equation of common catenary – #Tension at any point# – Geometrical properties of the common catenaries – Problems.

**#        # Self-study portion.**

**Text Book:**
M.K. Venkatraman, Statics, Agasthiar Publication (1999).

**UNIT I**    Chapter 2  Sections  3 - 5, 9, 10 and 15
**UNIT II**   Chapter 3  Sections  1 - 4, 7, 8, 12 and  Chapter 4  Sections  1, 2
**UNIT III**  Chapter 5  Sections  1, 2, 5 and  Chapter 6  Sections  1, 2, 3, 5 and 8
**UNIT IV**  Chapter 7  Sections  1 - 8, 10 and 13
**UNIT V**   Chapter 11 Sections  1 - 6

**Books for Reference:**
        1.  A.V. Dharmapadam, Statics, S.Viswanathan Printers & Publishers Pvt. Ltd. (2009).
        2. P. Duraipandian, Laxmi Duraipandian, Muthamizh Jayapragasam, Mechanics, S. Chand & Company Ltd. (2010).

**SEMESTER V: CORE - XI**
**OPERATIONS RESEARCH**

| | | |
|---|---|---|
| **Course Code** : 14UMA5C11 | | **Max. Marks** : 100 |
| **Hours/Week** : 4 | | **Internal Marks :** 40 |
| **Credit** : 4 | | **External Marks:** 60 |

**Objective:**

To understand and identify the need of using Operations Research and situations in which Linear Programming technique, Transportation problem, assignment problem and Sequencing problem.

**UNIT I** **12 hours**

Basics of Operations Research – #Applications# - General Linear Programming Problem - Mathematical formulation - Graphical Method - Alternative optimal solution - Unbounded solution - Infeasible solution.

**UNIT II** **12 hours**

Canonical and Standard form of LPP - Basic Solution - Basic Feasible and Infeasible solution - Degenerate solution - The Simplex Algorithm - Artificial variable Techniques: Two-phase method.

**UNIT III** **12 hours**

Artificial variable Techniques: Big M method. Primal Dual pair – Formulating a Dual problem – #Primal dual pair in matrix form# - Duality and Simplex method.

**UNIT IV** **12 hours**

Dual simplex method - General Transportation Problem - Finding an Initial Basic Feasible Solution using North-West Corner Rule - #Least Cost Entry Method# and VAM - MODI method.

**UNIT V** **12 hours**

Assignment problem (AP) – #Mathematical formulation of AP# - The Assignment method. Network scheduling by CPM - Networks basic components - Logical sequencing - Rules of Network constructions - Critical Path Analysis.

**Note:** Theoretical proof not expected.

**#      # Self-study portion.**

**Text Book**:
Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand & Sons Pvt. Ltd., Twelfth Edition (2004).

| | |
|---|---|
| **UNIT I** | Sections 1.1, 1.2, 1.7, 2.1, 3.4, 2.2, 3.1 to 3.3, |
| **UNIT II** | Sections 3.5, 4.1, 4.3 and 4.4(part). |
| **UNIT III** | Sections 4.4(part), 5.1, 5.2, 5.3, 5.4, 5.7 |
| **UNIT IV** | Sections 5.9, 10.1, 10.2, 10.9, 10.12. |
| **UNIT V** | Sections 11.1, 11.2, 11.3, 21.1 to 21.5 |

**Books for Reference**:
1. P. Prem Kumar Gupta and D.S. Hira, Operations research, S. Chand (2000).
2. J.K. Sharma, Operations Research Theory and Applications, Macmillan India Ltd. (2000).

**SEMESTER V: MAJOR BASED ELECTIVE-IV**
**NUMBER THEORY**

| | |
|---|---|
| **Course Code** : 14UMA5M4 | **Max. Marks** : 100 |
| **Hours/Week** : 3 | **Internal Marks** : 40 |
| **Credits** : 3 | **External Marks** : 60 |

**Objective:**
 To promote the basic ideas of elementary theory of numbers and basic concepts of Computational Mathematics.

**UNIT I** 9 hours
 Divisibility Theory in the Integers: Division algorithm - Greatest common divisor - Euclidean algorithm.

**UNIT II** 9 hours
 Primes and Their Distribution: Fundamental Theorem of Arithmetic - Sieve of Eratosthenes - #Goldbach Conjecture#.

**UNIT III** 9 hours
 Theory of Congruences: #Carl Friedrich Gauss# - Basic properties of congruence - Binary and Decimal representation of Integers.

**UNIT IV** 9 hours
 Diophantine Equation $ax + by = c$ - Linear Congruences and Chinese Remainder Theorem.

**UNIT V** 9 hours
 Fermat's Theorem: #Pierre de Fermat#– Fermat's little theorem and Pseudoprimes - Wilson's theorem – Fermat-Kraitchik Factorization Method.

**#** **# Self-study portion.**

**Text Book**:
David M. Burton, Elementary Number Theory, Sixth Edition, Tata McGraw Hill (2010).

| | |
|---|---|
| **UNIT I** | Chapter II Sections 2.2, 2.3, 2.4 |
| **UNIT II** | Chapter III Sections 3.1, 3.2, 3.3 |
| **UNIT III** | Chapter IV Sections 4.1, 4.2, 4.3 |
| **UNIT IV** | Chapter II Section 2.5 and Chapter IV Section 4.4 |
| **UNIT V** | Chapter V Sections 5.1, 5.2, 5.3, 5.4 |

**Books for Reference:**
1. Ivan Niven and Herbert S. Zuckerman, An introduction to the Theory of Numbers, Wiley Eastern Ltd, Third Edition (1972).
2. George E. Andrews, Number Theory, Dover publications, INC, New York (1994).

**SEMESTER V: SKILL BASED ELECTIVE – III**
**MATLAB**

| | |
|---|---|
| Course Code : 14UMA5S3P | Max. Marks : 100 |
| Hours/Week : 2 | Internal Marks: 40 |
| Credit : 2 | External Marks: 60 |

**Objective:**
To provide concepts used in routines in MATLAB on the following problems.

**List of Practical:**

1. Bisection Method.

2. False-Position Method.

3. Lagrange's Method.

4. Newton's Interpolation Method.

5. Trapezoidal Rule.

6. Simpsons Rule.

7. Gauss Jordan Method.

8. Gauss Jacobi Iteration Method.

9. Euler's Method.

10. Runge-Kutta Fourth Order Method.

**Text Book:**
Rizwan Butt, Introduction to Numerical Analysis Using MATLAB, Infinity Science Press LLC, Published by Firewall Media, New Delhi (2008).

**SEMESTER V: EXTRA CREDIT - III**
**MATHEMATICS FOR COMPETITIVE EXAMINATIONS**

Course Code   : 14UMA5EC3                                        Max. Marks    :  100*
Hours/Week  : -                                                  Internal Marks:    -
Credit          : 4*                                             External Marks: 100*

**Objective:**
To enable the students to appear competitive examinations confidently.

**UNIT I**
Numbers – HCF and LCM of numbers – Decimal fractions – Simplification – Square Roots & Cube Roots – Permutations & Combinations – Probability - Series completion.

**UNIT II**
Average - Problems on ages. Percentage: Problems based on Population - Profit and loss – Mixture - Ratio and Proportion – Races & Games of Skill – Partnership - Chain rule.

**UNIT III**
Time and work - Pipes and Cisterns - Time and Distance - Trains, Boats and Streams – Calendar - Clocks - Heights & Distances.

**UNIT IV**
Mensuration – Lines, Circles and Tangents in two dimension.
**UNIT V**
Simple interest and Compound interest - Data interpretation: Bar graphs - Pie charts - Line graphs.

**Text Books:**
**T.B-1**. R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company Ltd. (2007).
**T.B-2**. T.K. Manicavachagom Pillay, T. Natarajan, Analytical Geometry, Part I - Two Dimensions (2009).

**Books for Reference:**
1. R.S. Aggarwal, Arithmetic (Subjective and Objective) For Competitive Examinations, S. Chand & Company Ltd. (2004).
2. R.S. Aggarwal, Objective Arithmetic, S. Chand & Company Ltd. (2004).

**Note:**
**100 Multiple choice questions only.  20 Questions from each unit.**

**SEMESTER VI: CORE - XII**
**COMPLEX ANALYSIS**

| | |
|---|---|
| **Course Code** : 14UMA6C12 | **Max. Marks** : 100 |
| **Hours/Week** : 5 | **Internal Marks:** 40 |
| **Credit** : 4 | **External Marks:** 60 |

**Objective:**

To introduce concepts of the fundamentals of complex analysis and to know the foundations of complex number system.

**UNIT I**                                                                                   **15 hours**

Functions of a Complex variable - #Limits - Theorems on Limits# - Continuous functions – Differentiability -  Cauchy-Riemann equations - Analytic functions - Harmonic functions.

**UNIT II**                                                                                  **15 hours**

Conformal Mapping - Elementary transformations - Bilinear transformations - Cross ratio - #Fixed points of Bilinear Transformation# - Some special bilinear transformations.

**UNIT III**                                                                                **15 hours**

#Definite integral# - Cauchy's Theorem - Cauchy's integral formula - Higher derivatives.

**UNIT IV**                                                                                 **15 hours**

Taylor's series - Laurent's Series - Zeroes of analytic functions - Singularities.

**UNIT V**                                                                                  **15 hours**

Residues - Cauchy's Residue Theorem - Evaluation of definite integrals.

**#        # Self-study portion.**

**Text  Book:**

S. Arumugam, A. Thangapandi Isaac and A. Somasundaram, Complex Analysis, New Scitech Publications (India) Pvt. Ltd. 10$^{th}$ Reprint (2009).

**UNIT I**     Chapter 2  Sections 2.1 - 2.8
**UNIT II**    Chapter 2  Section 2.9 and Chapter 3   Sections 3.1 - 3.5
**UNIT III**   Chapter 6  Sections 6.1 - 6.4
**UNIT IV**    Chapter 7  Sections 7.1 - 7.4
**UNIT V**     Chapter 8  Sections 8.1 - 8.3

**Books for Reference:**

1. J.N. Sharma, Functions of a Complex variable, Krishna Prakasan Media (P) Ltd, 13th Edition (1996-97).
2. T.K. Manicavachagom Pillai, Complex Analysis, S. Viswanathan Publishers Pvt. Ltd. (1994).

**SEMESTER VI: CORE XIII**
**GRAPH THEORY**

Course Code   : 14UMA6C13                               Max. Marks    : 100
Hours/Week  : 5                                         Internal Marks: 40
Credits      : 4                                        External Marks: 60

**Objective:**
       To introduce some of the most important notions of Graph Theory and develop their skills and solving basic exercises.

**UNIT I**                                                                    **15 hours**
       Graph – #Applications of Graphs# – Finite and Infinite graphs – Incidence and Degree – Isolated vertex, pendant vertex and Null graphs.  Paths and Circuits: Isomorphism – Sub-graphs – Walks, Paths and Circuits – Connected and disconnected graphs – Euler graphs.

**UNIT II**                                                                   **15 hours**
       Operations on Graphs – More on Euler Graphs – Hamiltonian Paths and circuits - #Travelling Salesman Problem#. Trees and fundamental circuits: Trees – Properties of Trees – Pendant vertices in a Tree – Distance and centers in a Tree.

**UNIT III**                                                                  **15 hours**
       Spanning Trees – Fundamental circuits – #Finding all spanning trees of graph# – Spanning trees in a weighted graph - Cut sets and cut vertices: Cut sets – Properties of a cut set – All cut sets in a graph.

**UNIT IV**                                                                   **15 hours**
       Fundamental circuits and cut sets – Connectivity and Separability. Planar and dual graphs: Planar graphs – Kuratowski's two graphs – Representation of a planar graph.

**UNIT V**                                                                    **15 hours**
       Matrix Representation of graphs: Incidence Matrix – Circuit matrix – Fundamental circuit matrix and Rank of circuit matrix – Cut set matrix – Relationship among $A_f$, $B_f$ and $C_f$ – #Path matrix#.

**#**       **# Self-study portion.**

**Text Book:**
Narsingh Deo, Graph theory with application to Engineering and Computer Science, Prentice Hall of India Pvt. Ltd. (2005).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 1 | Sections 1.1 – 1.5. | Chapter 2 Sections 2.1, 2.2, 2.4 – 2.6 |
| **UNIT II** | Chapter 2 | Sections 2.7 – 2.10 | Chapter 3 Sections 3.1 – 3.4 |
| **UNIT III** | Chapter 3 | Sections 3.7 – 3.10 | Chapter 4 Sections 4.1 – 4.3 |
| **UNIT IV** | Chapter 4 | Sections  4.4, 4.5 | Chapter 5 Sections 5.2 – 5.4 |
| **UNIT V** | Chapter 7 | Sections  7.1 – 7.4, 7.6 – 7.8 | |

**Books for reference:**
       1. V.R. Kulli, College Graph Theory, Viswa International Publications, Gulbarga, India (2012).
       2. Gary Chartrand and Ping Zhang, Introduction to Graph Theory, Tata McGraw Hill Higher Education Private Limited, New Delhi, Eight reprint (2012).

**SEMESTER VI: CORE - XIV**
**PROGRAMMING IN C**

| | | | |
|---|---|---|---|
| **Course Code** | : 14UMA6C14 | **Max. Marks** : | 100 |
| **Hours/Week** | : 5 | **Internal Marks :** | 40 |
| **Credit** | : 4 | **External Marks :** | 60 |

**Objective:**
　　　　To develop the logical skills and to expose the students to understand the various tools in solving numerical problems.

**UNIT I**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**12 hours**
　　　　Constants, Variables and Data Types – Character set – C tokens – Keywords and identifiers – Constants – Variables – Data types –#Declaration of variables and storage class# – Assigning values to variables – Defining symbolic Constants – Operators and Expression – Arithmetic of operators – Relational operators – Logical operators – Assignment operators – Increment and decrement operators – Conditional operator – Bitwise operators – #Special operators# – Arithmetic expressions – Evaluation of expressions – Precedence of arithmetic operators – #Mathematical Functions# – Managing Input and Output Operators – Reading character – Writing a character – Formatted input – Formatted output.

**UNIT II**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**12 hours**
　　　　Decision Making and Branching – Decision making with IF statement – Simple IF statement – The IF ELSE statement – Nesting IF…ELSE statements – The ELSE IF ladder – The switch statement – The ?: operator – The GOTO statement - Decision Making and Looping – The WHILE, DO, FOR statement – #Jumps in loops#.

**UNIT III**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**12 hours**
　　　　Handling of Character String – Declaring and initializing string variables – Reading strings from terminal –strings to screen – Arithmetic operations on characters – Putting strings together – Comparisons of two strings – String – #Handling functions# – Table of strings – **Arrays** – One-dimensional, Two-dimensional arrays and Multi-dimensional arrays – **Pointers** – Understanding pointers – Accessing the address of a variable – Declaring and initializing pointers – Accessing a variable through its pointer – Pointer expressions – Pointer increments and scale factor –#Pointers and arrays# – Pointers and character strings.

**UNIT IV**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**12 hours**
　　　　User-Defined Functions – Need for user-defined functions – #A multi-function program# – The form of C functions – Return values and their types – Calling a function – Category of functions – No arguments and no return values – Arguments with return values – Handling of non-integer functions – Nesting of functions – Recursion.

**UNIT V**　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**12 hours**
　　　　File Management in C – Defining and opening a file – closing file – Input/Output operations on files – #Error handling during I/O operations# – Random access to files.

**#　　# Self-study portion.**

**Text Book:**
E. Balagurusamy, Programming in ANSI C, Tata McGraw Hill, Third Edition (2005).

| | | |
|---|---|---|
| **UNIT I** | Chapter 2 Sections 2.2 - 2.11; Chapter 3 Sections 3.2 - 3.16 | |
| | Chapter 4 Sections 4.2 - 4.5 | |
| **UNIT II** | Chapter 5 Sections 5.2 - 5.9; Chapter 6 Sections 6.2 - 6.5 | |
| **UNIT III** | Chapter 8 Sections 8.2 - 8.9; Chapter 7 Sections 7.2 - 7.7 | |
| | Chapter 11 Sections 11.2 - 11.11 | |
| **UNIT IV** | Chapter 9 Sections 9.2 - 9.16 | |
| **UNIT V** | Chapter 12 Sections 12.2 - 12.6 | |

**Books for reference:**

1. Yashvant Kanetkar, Let us C, Seventh Edition, BPB Publications, (2007).
2. Peter Van Der Linder, Expert C programming, Pearson (1994).

**SEMESTER VI: CORE - XV**
**LINEAR ALGEBRA**

**Course Code   : 14UMA6C15**                        **Max. Marks    : 100**
**Hours/Week  : 4**                                          **Internal Marks:  40**
**Credits        : 4**                                          **External Marks:  60**

**Objective:**
        To understand the concept of the algebraic properties of Vector space and Matrices.

**UNIT I**                                                                            **12 hours**
        Vector Spaces – Definition - #Examples# - Subspaces - Linear Transformations.

**UNIT II**                                                                          **12 hours**
        Span of a set - #Linear independence# - Basis and dimension - Rank and nullity - Matrix of a linear transformation.

**UNIT III**                                                                        **12 hours**
        Inner  Product  Spaces  –  Definition  -  #Examples#  -  Orthogonality  -  Orthogonal Complement.

**UNIT IV**                                                                        **12 hours**
        Theory of Matrices – Algebra of matrices - #Types of matrices# - Inverse of a matrix - Elementary transformations.

**UNIT V**                                                                          **12 hours**
        #Rank of matrix# - Simultaneous linear equations - Characteristic polynomial of a matrix.

**#        # Self-study portion.**

**Text Book:**
S. Arumugam and A. Thangapandi Isaac, Modern Algebra, Scitech Publications (India) Pvt. Ltd, (2003).

**UNIT I**    Chapter V    Sections 5.0 – 5.3
**UNIT II**   Chapter V    Sections 5.4 – 5.8
**UNIT III**  Chapter VI    Sections 6.0 – 6.3
**UNIT IV**  Chapter VII   Sections 7.0 – 7.4
**UNIT V**   Chapter VII   Sections 7.5 – 7.7

**Books for Reference:**
    1. P.B. Bhattacharya, S.K. Jain and S.R. Nagpaul, First Course in Linear Algebra, Wiley Eastern Limited (1985).
    2. K.S. Narayanan and T.K. Manicavachagom Pillay, Modern Algebra, Volume I, S.Viswanathan Pvt., Ltd. (1982).

**SEMESTER VI: CORE - XVI**
**REAL ANALYSIS - II**

| | |
|---|---|
| **Course Code** : 14UMA6C16 | **Max. Marks** : 100 |
| **Hours/Week** : 4 | **Internal Marks:** 40 |
| **Credits** : 4 | **External Marks:** 60 |

**Objective:**

To develop a sound knowledge and appreciation of the ideas and concepts related to metric spaces and to give a strong foundation to take up advanced level courses in analysis.

**UNIT I**                                           **12 hours**

Metric spaces – Definition - #Bounded sets# - Open ball - Open sets - Subspaces.

**UNIT II**                                      **12 hours**

Interior of a set - Closed sets - Closure - #Limit point of a set# - Dense Set.

**UNIT III**                                   **12 hours**

Complete metric space - Cantor's intersection theorem - Baire's category theorem.

**UNIT IV**                                   **12 Hours**

Connectedness – Definition - Connected subsets of R - Connectedness and continuity.

**UNIT V**                                      **12 hours**

Compact spaces - Compact subsets of R - Compactness and continuity.

**#**      **# Self-study portion.**

**Text Book:**

S. Arumugam and A. Thangapandi Isaac, Modern Analysis, New Gamma Publishing House (2007).

| | | |
|---|---|---|
| **UNIT I** | Chapter II | Sections 2.1 – 2.5 |
| **UNIT II** | Chapter II | Sections 2.6 – 2.10 |
| **UNIT III** | Chapter III | Sections 3.0, 3.1, 3.2 |
| **UNIT IV** | Chapter V | Sections 5.1 - 5.3 |
| **UNIT V** | Chapter VI | Sections 6.1, 6.2, 6.4 |

**Books for Reference:**

1. Richard R. Goldberg, Methods of Real Analysis, Oxford and IBH Publishing Co. & Pvt. Ltd. (1970).
2. Shanthi Narayan, A course of Mathematical Analysis, S. Chand & Co. (1995).

**SEMESTER VI: CORE - XVII**
**DYNAMICS**

| | | |
|---|---|---|
| **Course Code** : 14UMA6C17 | | **Max. Marks : 100** |
| **Hours/Week** : 4 | | **Internal Marks: 40** |
| **Credit** : 4 | | **External Marks: 60** |

**Objective:**

To introduce the basic concept of Dynamics and expose the practical applications of Mathematics.

**UNIT I** 12 hours

Kinematics - Speed, Displacement - Velocity – Composition of velocities - Triangle of velocities - Relative velocity – Angular velocity - Relative angular velocities – Accelerations – Motion in a straight line under uniform acceleration – Simple problems.

**UNIT II** 12 hours

Projectiles – Path of the projectile is a parabola – Characteristics of the motion of a projectile – Velocity of the projectile in magnitude and direction at the end of time – Range on an inclined Plane – Simple problems.

**UNIT III** 12 hours

Collision of elastic bodies – Newton's experimental law – Impact of a smooth sphere on a fixed smooth plane – Direct impact of two smooth spheres – Loss of Kinetic Energy - Oblique impact of two smooth spheres and loss of Kinetic Energy – Simple problems.

**UNIT IV** 12 hours

Simple harmonic motion - Simple harmonic motion in a straight line – General solution of a simple harmonic motion – Composition of two simple harmonic motions of the same period and in the same straight line – Composition of simple harmonic motions of the same period in two perpendicular directions – Simple problems.

**UNIT V** 12 hours

Motion under the action of central forces – Velocity and acceleration in polar coordinates – Differential equation of central orbits – Pedal equation of the central orbit – Law of the inverse square – Simple problems.

**#** **# Self-study portion.**

**Text Book:**
M. K. Venkatraman, A Text Book of Dynamics, Agasthiar Publications (1970).

| | | |
|---|---|---|
| **UNIT I** | Chapter III | Sections 3.1 to 3.4, 3.7, 3.10, 3.11, 3.15, 3.17 and 3.22 |
| **UNIT II** | Chapter IV | Sections 6.2, 6.4, 6.5, 6.9 and 6.12 |
| **UNIT III** | Chapter VIII | Sections 8.3 - 8.8 |
| **UNIT IV** | Chapter X | Sections 10.2, 10.3, 10.6 and 10.7 |
| **UNIT V** | Chapter XI | Sections 11.2, 11.4, 11.6, 11.8 |

**Books for reference:**
1. M.L. Khanna, Dynamics, Jai Prakash Nath and Company, Meerut, Tenth Edition (1975).
2. K. Visvanatha Naik and M.S. Kasi, Dynamics, Emerald Publishers, Chennai, (1992).

**SEMESTER VI: SKILL BASED ELECTIVE - IV**
**C PROGRAMMING LAB**

**Course Code   : 14UMA6S4P**              **Max. Marks   :   100**
**Hours/Week  : 2**                         **Internal Marks:   40**
**Credit        : 2**                           **External Marks   60**

**Objective:**
        To enable the students to apply Numerical Methods Computer Environment.

**List of Practical:**

1. Write a C program to find the positive root of an algebraic equation using Bisection Method.

2. Write a C program to find the positive root of an algebraic equation using Newton-Raphson Method.

3. Write a C program to solve the system of linear equations using Gauss Elimination Method.

4. Write a C program using Gauss-Jacobi Method.

5. Write a C program to solve the system of linear equations using Gauss-Seidal Method.

6. Write a C program to evaluate a definite integral using Trapezoidal rule.

7. Write a C program to evaluate a definite integral using Simpson's 1/3$^{rd}$ rule.

8. Write a C program to find the approximate value using Euler's Method.

9. Write a C program using Runge-Kutta second order Method.

**SEMESTER VI: EXTRA CREDIT - IV**
**CODING THEORY**

| | |
|---|---|
| Course Code   : 14UMA6EC4 | Max. Marks    : 100* |
| Hours/Week  :  - | Internal Marks: - |
| Credits         : 4* | External Marks: 100* |

**Objective:**
　　To introduce the fundamental concepts of Coding Theory and to enlighten the students with applications of the subject.

**UNIT I**
　　Error detection, correction and decoding: Communication channels – Maximum Likelihood decoding.

**UNIT II**
　　Hamming distance – Nearest neighbour / minimum distance decoding – Distance of a code.

**UNIT III**
　　Finite Fields: Finite fields – Polynomial rings – Structure of finite fields - Minimal Polynomials.

**UNIT IV**
　　Linear codes: Vector spaces over finite fields - Linear Codes - Hamming weight – Bases for linear codes.

**UNIT V**
　　Generator matrix and parity - Check matrix – Equivalence of linear codes – Encoding with a linear code – Decoding of linear codes – Cosets – Nearest neighbour decoding for linear codes – Syndrome decoding.

**Text Book:**
San Ling and Chaoping Xing, Coding Theory: A first course, Cambridge University Press (2004).

| | | |
|---|---|---|
| **UNIT I** | Chapter 1  and  Chapter 2  Sections 2.1 – 2.2 | |
| **UNIT II** | Chapter 2   Sections 2.3 – 2.5 | |
| **UNIT III** | Chapter 3 | |
| **UNIT IV** | Chapter 4   Sections 4.1 – 4.4 | |
| **UNIT V** | Chapter 4   Sections 4.5 – 4.8 | |

**Books for Reference:**
1. D.G. Hoffman et al, Coding Theory and Cryptography – The Essentials, Marcel Dekker INC., Second Edition, (2000).
2. J.H. Van Lint, Introduction to Coding Theory, Springer, (1998).

**SEMESTER III: ALLIED - III**
**CLASSICAL ALGEBRA**
**(For Physics and Chemistry Major)**

| | | |
|---|---|---|
| Course Code : 14UMA3A3:2 | | Max. Marks : 100 |
| Hours/Week : 7 | | Internal Marks: 40 |
| Credit : 4 | | External Marks: 60 |

**Objective:**
　　　To enhance the power of ideas for solving the problems in Algebra, Theory of equation, Matrices and Differentiation.

**UNIT I** 　　　　　　　　　　　　　　　　　　　　　　　　　　　　**21 hours**
　　　Algebra: Binomial Series - Exponential series.

**UNIT II** 　　　　　　　　　　　　　　　　　　　　　　　　　　　**21 hours**
　　　Theory of equations: Relation between the coefficients and the roots of an algebraic equation - Reciprocal equations.

**UNIT III** 　　　　　　　　　　　　　　　　　　　　　　　　　　**21 hours**
　　　Matrices: #Various types of Matrices# - Rank of a Matrix - Verification of Cayley-Hamilton theorem - Eigen values and Eigen vectors.

**UNIT IV** 　　　　　　　　　　　　　　　　　　　　　　　　　　**21 hours**
　　　Finite differences: #Interpolation# **-** Linear interpolation **-** Newton's (Forward and Backward) Interpolation formula - Lagrange's Interpolation formula.

**UNIT V** 　　　　　　　　　　　　　　　　　　　　　　　　　　　**21 hours**
　　　Higher Derivatives: The $n^{th}$ derivatives of standard functions - Formation of equations involving derivatives - Problems using Leibnitz theorem.

**#** 　　　 **# Self-study portion.**

**Text Book:**
S.Narayanan, R.Hanumantha Rao and T.K. Manicachagom Pillay, P. Kandasamy, Ancillary Mathematics, Volume I, S. Viswanathan Publishers Pvt. Ltd. Revised Edition (2007).

| | | |
|---|---|---|
| **UNIT I** | Chapter 1 | Sections 1.2, 1.3 |
| **UNIT II** | Chapter 2 | Sections 2.2, 2.4 |
| **UNIT III** | Chapter 3 | Sections 3.1 - 3.2,3.4 |
| **UNIT IV** | Chapter 4 | Sections 4.1, 4.3 |
| **UNIT V** | Chapter 6 | Section 6.1 |

**Books for Reference:**
　　　1. A. Abdul Rashid, Allied Mathematics, Vijay Nicole Publishing Company (2008).
　　　2. S. Arumugam and A. Thangapandi Isaac, Ancillary Mathematics, New Gamma
　　　　 Publishing house (2002).

**SEMESTER IV: ALLIED - IV**
**CALCULUS AND TRIGONOMETRY**
**(For Physics and Chemistry Major)**

| | |
|---|---|
| **Course Code** : 14UMA4A4:2 | **Max. Marks** : 100 |
| **Hours/week** : 8 | **Internal Marks** : 40 |
| **Credit** : 4 | **External Marks** : 60 |

**Objective:**
To enhance the power of ideas for solving the problems in Calculus, ODE &PDE, Laplace transforms, Vector analysis and Trigonometry.

**UNIT I** **24 hours**
Properties of definite Integrals – Integration by parts - Reduction Formulae for $\int x^n e^{ax} dx$, $\int \sin^n x \, dx$, $\int \cos^n x \, dx$.

**UNIT II** **24 hours**
Differential equations of the first order with higher degree - Equations solvable for p - Equations Solvable for y – #Equations Solvable for x# - Clairaut's form. Laplace transforms of the function $e^{at}$, $e^{-at}$, f'(t), f''(t), cos at, sin at, cosh at, sinh at, $t^n$, $e^{-at} f(t)$, where n is a positive integer – Inverse transforms relating to the above standard functions.

**UNIT III** **24 hours**
Solving ODE of order two with constant coefficients using Laplace transforms - Partial Differential Equations of the first order – #Formation of PDE by eliminating arbitrary constants# - Standard type of first order equations I, II, III and IV (Clairaut's form) - Lagrange's equations.

**UNIT IV** **24 hours**
Vector differential operator - Gradient – Direction and magnitude of gradient- Divergence and Curl – #Laplacian Operator#. Line Integral – Surface integral - Volume integral - Simple Problems.

**UNIT V** **24 hours**
Trigonometry: Hyperbolic functions – Inverse hyperbolic functions – Separation into real and imaginary parts, Logarithm of complex numbers. Fourier series – Even and Odd function and #Half range series#.

**#** **# Self-study portion.**

**Text Books:**
**T.B-1.** S. Narayanan, R. Hanumantha Rao and T.K. Manicavachagom Pillay, P. Kandasamy, Ancillary Mathematics, Volume II, S. Viswanathan Publishers Pvt. Ltd., Revised Edition (2007).
**T.B-2.** S. Narayanan, R. Hanumantha Rao and T.K.Manicavachagom Pillay, P. Kandasamy, Ancillary Mathematics, Volume I, S. Viswanathan Publishers Pvt. Ltd., Revised Edition (2007).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 1 | Sections 11 – 13 | **T.B-1** |
| **UNIT II** | Chapter 4 | Sections 6.5 and Chapter 7 Sections 1 – 5 | **T.B-1** |
| **UNIT III** | Chapter 6 | Sections 1 – 6 | **T.B-1** |
| **UNIT IV** | Chapter 8 | Sections 16 -19, 2 -5 | **T.B-1** |
| **UNIT V** | Chapter 5 | Sections 5.4, 5.5 **T.B-2** and Chapter 2 Sections 1 – 4 | **T.B-1** |

**Books for Reference:**
1. A. Abdul Rashid, Allied Mathematics, Vijay Nicole publishing Company (2008).
2. T.K. Manicavachagom Pillai, Calculus Volume-I, S. Viswanathan Publishers, Pvt., Ltd. (2004).

**SEMESTER I: ALLIED - I**
**CALCULUS AND NUMERICAL METHODS**
**(For Computer Science Major)**

| | |
|---|---|
| **Course Code** : 14UMA1A1 | **Max. Marks** : 100 |
| **Hours/Week** : 8 | **Internal Marks: 40** |
| **Credits** : 4 | **External Marks: 60** |

**Objective:**
     To enhance the power of ideas for solving the problems in Laplace & Fourier Transforms, Differential Equation and Numerical Analysis.

**UNIT I**                                                                                              **24 hours**
     #Linear Differential Equations with constant coefficients# - Complementary function - General methods of finding particular integrals - Special method for finding P.I.- Linear Equation with variable coefficients**.**

**UNIT II**                                                                                             **24 hours**
     Fourier series: Definition-Even and Odd function- Development in cosine series and sine series.   Laplace transforms of the function $e^{at}$, $e^{-at}$, f'(t), f"(t), cos at, sin at, cosh at, sinh at, $t^n$, $e^{-at}$ f(t), where n is a positive integer-Inverse transforms relating to the above standard functions.

**UNIT III**                                                                                            **24 hours**
     Vector differential operator - Vector and Scalar field – Gradient - Direction and magnitude of gradient - #Divergence and Curl# - Laplacian Operator - Formula involving operator $\nabla$ - Operators involving $\nabla$ twice.

**UNIT IV**                                                                                            **24 hours**
     Solving algebraic equations by Newton Raphson Method - Exact solutions to a set of linear equations using Gauss Elimination method and Gauss – Jordan Method.

**UNIT V**                                                                                             **24 hours**
     #Numerical Solution of Ordinary Differential Equations# - Numerical solutions to an Ordinary Differential Equation by Euler's Method - Runge-Kutta's second order and fourth order method.

**#        # Self-study Portion.**

**Text Books:**
**T.B-1.** S. Narayanan, T.K. Manicavachagom Pillay, Differential Equations and its Applications, S.Viswanathan Pvt. Ltd. (2006).
**T.B-2.** S. Narayanan, R. Hanumantha Rao, T.K. Manicavachagom Pillay, Ancillary Mathematics, Volume II, S.Viswanathan Pvt. Ltd., Revised Edition (2007).
**T.B-3.** S.S. Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Learning Private Limited, Fourth Edition (2009).

| **UNIT I** | Chapter 5  Sections 1- 5 | **T.B-1** |
| **UNIT II** | Chapter 2 Sections 1-3, 5 and  Chapter 7    Sections 1 - 5 | **T.B-2** |
| **UNIT III** | Chapter 8 Sections 1.16 -1.22 | **T.B-2** |
| **UNIT IV** | Chapter 2 Section 2.5   and  Chapter 6   Sections 6.3.2, 6.3.3 | **T.B-3** |
| **UNIT V** | Chapter 7 Sections 7.4 (Except 7.4.1, 7.4.2), 7.5 | **T.B-3** |

## Books for Reference:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company Ltd., Sixth Edition (2010).
2. S. Arumugam, A. Thangapandi Isaac, Allied Mathematics Paper II & Paper III, New Gamma Publishing House (2007).

**SEMESTER II: ALLIED – II**
**STATISTICS AND OPERATIONS RESEARCH**
**(For Computer Science Major)**

| | |
|---|---|
| **Course Code  : 14UMA2A2** | **Max. Marks  : 100** |
| **Hours/ week: 7** | **Internal Marks : 40** |
| **Credit   : 4** | **External Marks : 60** |

**Objective:**
 To enhance the power of ideas for solving the problems in statistics and OR.

**UNIT I** 21 hours
 Correlation and Regression: Bivariate distribution - Correlation – #Scatter diagram# – Karl Pearson coefficient of correlation – Rank correlation. Regression: Lines of regression – Regression Curves – Regression Coefficients - Properties of Regression Coefficients (Numerical Problems Only).

**UNIT II** 21 hours
 Theoretical discrete distributions: Binomial and Poisson distributions – Moments and moment generating function of these distributions – Theoretical continuous distribution: Normal distribution – Moments and moment generating function of normal distributions.

**UNIT III** 21 hours
 Operations Research: Formulation of Linear Programming Problem – Solving a LPP by Graphical method – General LPP – #Canonical and standard forms of LPP#.

**UNIT IV** 21 hours
 Transportation Problem: Finding Initial Basic Feasible Solution by North West Corner Rule, Least Cost Entry Method and Vogel's Approximation method for a given Transportation Problem (Balanced and Unbalanced) – Transportation Algorithm (MODI Method).

**UNIT V** 21 hours
 Assignment Problem (Balanced and #Unbalanced#) - Hungarian Method – Network Scheduling – Finding critical path.

**#  # Self-study Portion.**

**Text Books:**
**T.B-1.** S.C. Gupta and V.K. Kapoor, Elements of mathematical statistics, Sultan Chand and sons, Third Edition (2010).
**T.B-2.** Kanti Swarup, P.K. Gupta and Man Mohan, Operations Research, Sultan Chand and Sons (2002).

| | | | |
|---|---|---|---|
| **UNIT I** | Chapter 10 | Sections 10.1, 10.2, 10.3, 10.6, 10.7, 10.7.1 - 10.7.4 | **T.B-1** |
| **UNIT II** | Chapter 7 | Sections 7.2, 7.2.1, 7.2 .6, 7.3.1, 7.3.2, 7.3.5, | **T.B-1** |
| | Chapter 8 | Sections 8.2, 8.2.5, 8.2.7 | **T.B-1** |
| **UNIT III** | Chapter 2 | Sections 2.1, 2.2 and Chapter 3   Sections 3.1, 3.2, 3.4, 3.5 | **T.B-2** |
| **UNIT IV** | Chapter 10 | Sections 10.1 - 10.3, 10.8, 10.11 | **T.B-2** |
| **UNIT V** | Chapter 11 | Sections 11.1-11.3 and Chapter 21 Sections 21.1-21.5 | **T.B-2** |

**Books for Reference:**
1. S.C. Gupta, and V.K. Kapoor, Fundamentals of Mathematical Statistics, S. Chand and Sons, Eleventh Edition (2003).
2. P.R. Vittal and V. Malini, Operations Research, Marham Publications 2004.

# PROPERTIES OF MATTER AND SOUND

| | | |
|---|---|---|
| **Course Code : 14UPH1A1** | | **Max. Marks : 50** |
| **Hours / Week : 5** | | **Internal Marks : 20** |
| **Credit : 2** | | **External Marks : 30** |

**Objectives:**
- ➢ To understand the Properties of solid and liquid particles and its applications
- ➢ To study the concepts of heat, gravitation and their implications
- ➢ To learn the basicconcepts of osmosis and diffusion
  .

**UNIT I**                                                                                                                  **15 hours**
     **Elasticity:** Stress and strain – Hooke's law –Types of elastic constants – Young's modulus, Rigidity modulus & Bulk modulus –Poisson's ratio –Determination of Young's modulus by  non-uniform bending (Pin and Microscope) - #Surface tension:- Definition# –Molecular theory- Determination of surface tension by Jaeger's  method.
     **Viscosity:** Co-efficient of viscosity –Determination of  co-efficient of viscosity by Burette  method – comparison of viscosities.

**UNIT II**                                                                                                                 **15 hours**
     **Mechanics:** Newton's law of gravitation –- #Kepler's laws of Planetary motion#– Gravitation contstant G- Determination of G by Boy's method- Friction- Laws of friction – Centre of gravity -  centre of gravity of a solid hemisphere – Meta center – Meta centric height – Determination of the metacentric height of a ship.

**UNIT III**                                                                                                                **15 hours**
     **Sound:** Simple harmonic motion –Equation of simple harmonic motion – composition of two SHM's in a straight line – composition of two SHM's at right angles to each other –Lissajou's  Figures(Basic concept only) –Ultrasonic – Properties – Production by Piezo-electric method-Application of Ultrasonics– Reverberation and reverberation time--Conditions for a good auditorium.

**UNIT IV**                                                                                                               **15 hours**
     **Heat:** Newton's law of cooling -Determination of specific heat capacity of a liquid by cooling – Thermal conductivity – co-efficient of thermal conductivity – Determination of thermal conductivity of a bad conductor by Lee's disc method – - #solar constant# – Determination of solar constant by Angstrom's Pyrheliometer-Temperature of the sun-Joule-Kelvin effect- Porus Plug experiment.

**UNIT V**                                                                                                                 **15 hours**
     **Diffusion:**Diffusion of liquids – Graham's laws of diffusion in liquids –Ficks' law of diffusion – Analogy between liquid diffusion and heat conduction – Experimental determination of coefficient of diffusion.
**Osmosis:**Osmosis and osmotic pressure – Laws of osmotic pressure -Experimental determination of osmotic pressure (Berkeley and Hartley method)

#.........# **Self study portions**

**Text books:**

T.B 1   R. Murugesan, Properties of matter, S.Chand& Co,5$^{th}$ edition, 2007

T.B 2   R. Murugesan, Properties of matter, S.Chand& Co, 4$^{th}$ edition, 2005

T.B 3   Brijlal&Subramaniam, Heat & thermodynamics, S.Chand Publications, 7$^{th}$ edition,

2008**.**


**UNIT I:    Chapter 1 & 2          Section: 1.1 - 2.11                                        T.B 1**
**UNIT II:   Chapter 6,18,20&22 Section: 6.1-6.3,18.1-18.4,20.1-20.3&22.1-22     T.B 2**
**UNIT III:  Chapter 11                 Section: 11.1 - 11.17                                   T.B 1**
**UNIT IV:  Chapter 4 & 5            Section: 4.1- 5.5                                        T.B 3**
**UNIT V:   Chapter 2 & 8            Section: 2.21, 8.1-8.28                               T.B 2**


**Books for reference:**

1.        BrijLal&Subramaniam,Properties of Matter, S.Chand Publications, 4$^{th}$ edition,
2008**.**
2.        Mathur D.S,Elements of Properties of Matter ,Eleventhedition, Shyamlal
Charitable Trust, New Delhi, 1993.

**PROPERTIES OF MATTER - PRACTICAL**

Course Code   : 14UPH1A1P                    Max. Marks      : 50
Hours / Week : 3                             Internal Marks  : 20
Credit          : 2                          External Marks  : 30

**Objective:**

➢ To develop the experimentalskills and determination of the Physical coefficients of matters.

1. Young'sModulus – Non Uniform bending (Pin & Microscope)

2. Surface Tension – Capillary Rise Method.

3. Potentiometer – Low range Voltmeter calibration

4. Specificheatcapacity of a liquid – Newton'slaw of cooling.

5. Newton's rings – Radius of curvature.

6. Co-efficient of viscosity – Burette method.

7. Sonometerverification of I and II laws.

8. ZenerControlledrectifier.

**Books for reference:**

1. M.N. Srinivasan,S. Balasubramaniyan, R. Ranganathan, A text book of practicalphysics, S.Chand&Sons , reprint 2010.

2. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practicalphysics and electronics, S. Viswanathan, Pvt,Ltd,  First edition,2007.

## SEMESTER II: ALLIED –II
## MODERN PHYSICS

| | |
|---|---|
| Course Code : 14UPH2A2 | Max.Marks : 50 |
| Hours / Week : 4 | Internal Marks: 20 |
| Credit : 2 | External Marks: 30 |

**Objectives:**

➢ To study the fundamental concepts of light, electricity and atomic models

➢ To learn the spectral studies of IR, UV and Raman and understand the basics of semiconductors

**UNIT I**                                                             **12 hours**

Optics**:** Velocity of light – Michelson'smethod – Interference – **#Types of interference#**-Thickness of a thinwireusing by air wedge-– Measurement radius of curvaturewithNewton's rings – opticalactivity – Specificrotatory Power-Laurent'shalfshadePolarimeter.

**UNIT II**                                                             **12 hours**

Electricity: **#Coulomb'slaw#**–Principle of capacitor –Energystored in a chargedcapacitor – Loss of energy due to sharing of charges.

Kirchoff'slaw–Carey foster's bridge – Determination of specificresistance – Calibration of an ammeterusingPotentiometer.

**UNIT III**                                                    **12 hours**

Atomic&Nuclearproperties: Vectoratom model – Quantum numbers – Pauli's Exclusion Principle-L-S coupling – J-Jcoupling – Zeeman Effect.
Nuclear fission and fusion – Radioactivity – Construction and working of an Ionizationchamber- Construction and working of G.M Counter.

**UNIT IV**                                                    **12 hours**

Spectroscopy:UVSpectrum- Range- UV Spectroscopy-Instrumentation-Applications-IR Spectrum-Range-IR Spectroscopy-Instrumentation-Applications- Raman effect-Stokes and anti-stokes lines-Experimental set up of Raman Spectroscopy.

**UNIT V**                                                             **12 hours**

Electronics: Semiconductors-Types of Semiconductors–P-N Junction Diode and Zener diode - *V-I*Characteristics of PN Junction and Zener diodes-Conversion betweenBinary, Decimal and Hexadecimalsystems-Truth table of AND, OR, NOT gates–Laws of Booleanalgebra (Associative, Commutative and Distributive only) – De-Morgan'stheorems.

**#....................# self study portion**

**Text Books :**

1.  R. Murugesan, AlliedPhysics ,S.Chand& Co, Second Edition, New Delhi, 2010

2.  R. Murugesan, Optics&Spectroscopy, S.Chand& Co, Second Edition,

    New Delhi, 2010


| | | |
|---|---|---|
| **UNIT I** | **Chapter 6** | **Sections 6.1 - 6.20** |
| **UNIT II** | **Chapter 4** | **Sections 4.1 - 4.6** |
| **UNIT III** | **Chapter 7 & 8** | **Sections 7.1 - 8.15** |
| **UNIT IV** | **Chapter 5** | **Sections 5.1 - 5.8** |
| **UNIT V** | **Chapter 10** | **Sections 10.1 -10.27** |


**Book for reference:**

R. Murugeshan, Modern Physics, S.Chand&company, 13th edition, 2012

## SEMESTER II: ALLIED–II
## OPTICAL, THERMAL AND ELECTRICITY PRACTICAL

| | |
|---|---|
| **Course Code : 14UPH2A2P** | **Max. Marks : 50** |
| **Hours / Week : 3** | **Internal Marks : 20** |
| **Credit : 2** | **External Marks : 30** |

**Objectives:**

➢ To learn the measurements in Heat and opticalexperiments

➢ To study the characteristics of the semiconductor diodes**.**

➢ To learn the circuit construction in the electricity and electronicsexperiments

1. Young'smodulus (Scale and telescopemethod) Non Uniform bending.

2. Potentiometer – Ammeter calibration.

3. Comparison of viscosities – by capillary Burette method.

4. Meter Bridge – R & $\rho$.

5. Thermal conductivity of a badconductor – Lee's disc method.

6. Air wedge – Thickness of a thinwire.

7. Spectrometer Solid Prism - $\mu$

8. Basic logicgatesusingdiscrete components.

**Books for reference:**

1. M.N. Srinivasan,S. Balasubramaniyan, R. Ranganathan, A text book of PracticalPhysics, S.Chand&Sons , reprint 2010.

2. C.C. Ouseph, U.J. Rao& V. Vijayendran, Practicalphysics and electronics, S. Viswanathan, Pvt,Ltd,  First edition,2007.

# VALUE EDUCATION

| | |
|---|---|
| Sub. Code    : 14UCN1VE | Max. Marks    :    100 |
| Hours/Week   : 3 | Internal Marks :    40 |
| Credit       : 3 | External Marks :    60 |

**Objective:**

To educate the students on various concepts of Values and also to develop Ethics in them and build their personality.

**UNIT I**                                                                                                        **9 hours**

**Purpose and Philosophy of life:** Basic needs, safety measures, ethics, wisdom of perfection stages. Law of nature - unified force, cause and effect system. Education – nonviolence, five-fold moral culture. Protecting nature.

**UNIT II**                                                                                                       **9 hours**

**Greatness of life force and mine:** Maintaining youthfulness, bio-magnetism and body, food-transformation into seven minerals, reasons for hunger, circular movement of life force, mind-development of mind in ten stages, mental frequency, meditation – benefits.

**UNIT III**                                                                                                      **9 hours**

**Individual qualities:** Indian culture – four structures – spiritually guided young age, family life, introspection – analysis of thought, six roots for thoughts, introspection for analysis of thoughts, practical technique for analysis of thoughts, service.

Desire – moralization of desire, analysis of desire. Anger – definition, neutralization of anger – method of neutralization of anger. Benefits of blessings and Greatness of friendship. Love and compassion.

**UNIT IV**                                                                                                       **9 hours**

**Human Rights:** Introduction – definition of human rights and duties – nature of human rights – Characteristics of human rights – Functional Principles of human rights – Historical backgrounds of human rights – Classification of human rights – Theories of human rights – Theory of natural rights legal theory of rights, historical theory of rights, social theory of rights, economic theory of rights and human duties

**UNIT V**                                                                                                        **9 hours**

**Anti-Corruption:** Corruption – causes, anticorruption measures in India-CBI, Santhanam Committee's recommendations – CVC (Central Vigilence Commission) – functions – LOKPAL – salient features of LOKPAL bill 2001 – Lokayukta, Right to information Act – features and advantages.

**Recommended Text Book:**

Value Education, Jamal Mohamed College Publication.

**References:**

1. Value Education for Health, Happiness and Harmony, The world Community Service Centre, Vethathiri Publications.
2. Philosophy of Universal Magnetism (Bio-magnetism, Universal Magnetism), The world Community Service Centre, Vethathiri Publications.
3. Thirukkural with English Translation of Rev. Dr. G. U. Pope, Uma Publications 156, Serfoji Nagar, Medical College Road, Thanjavur 613 004.
4. Public Administration (2005) Vishnoo Bhaaqan Vidya Bhutan S. Chand and Company. Ltd.

# ENVIRONMENTAL STUDIES

**Sub. Code     : 14UCN2ES**                    **Max. Marks    :    100**
**Hours/Week  : 2**                              **Internal Marks :    40**
**Credit         : 2**                              **External Marks :   60**

**Objective:**
        To implement environmental studies in order to bring about awareness among the students

**UNIT I                                                     6 hours**
**Environment and Natural Resources:** Environment: Definition – Scope – Importance – awareness.  Natural Resources: Forest – Water – Mineral – Food – Energy – Land Resources.

**UNIT II                                                    6 hours**
**Eco- Systems:** Concepts – Types – Structure and Function – Producers,  Consumers and Decomposers – Energy Flow – Ecological Succession – Food Chains, Food webs and Ecological Pyramids.

**UNIT III                                                   6 hours**
**Biodiversity and its Conservation:** Introduction - Definition – Conservation value – Biodiversity levels – Hotspots – Threats – Endangered and Endemic Species of India – Conservation methods.

**UNIT IV                                                    6 hours**
**Environmental Pollution:** Definition – Causes, Effects and Control measures of Air pollution – Water pollution – Soil pollution – Marine pollution – Noise pollution – Thermal pollution – Nuclear Hazards – Global warming – Green House Effect.

**UNIT V                                                     6 hours**
**Human Population and Sustainable Development:** Population growth – explosion – Family Welfare programmes:  Family, women and child welfare, Human health – Human rights – Sustainable development – Water Conservation – Environmental ethics.

**Text books**
1. Odum, E.P. Fundamentals of Ecology, W.B. Saunder's Co. Philadelphia. 1971.
2. Sharma,P.D. Ecology and Environment VII edition,Rostogi publication.2005.

**Reference:**
1. Clarke, G.L. Elements of Ecology. John Wiley & Sons, N:y. 1954.
2. Kendeigh,S.C. Animal Ecology. Prentice Hall. 1961.
3.  N.Arumugam. Concepts of ecology. Saras publication. 114/35G. A.R.P.Comp road.periyevilar, kottar(post). Nagargovil. 1983.
4. Odum, E.P. and Barrett, G.W. Fundamental of Ecology. Thomson Brooks/ Cole
    (EWP)5th Ed. 2005.
5. Southwick,C.H. Ecology and the quality of Environment. D.Vas Nostrand Co. 1976.
6. Verma, P.S. and V.K. Agarwal, Principles of Ecology. S.Chand & Co. New     Delhi. 1996.

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|---|---|---|---|
| **Sub. Code** | **: 14UCN3S1** | **Max. Marks** | **: 100** |
| **Hours/Week** | **: 2** | **Internal Marks :** | **40** |
| **Credit** | **: 2** | **External Marks :** | **60** |

**Objective:**

1. To make the students understand soft skills

2. To help them understand and practice communication skills in every day life

3. To enable the students to develop their personality.

**UNIT I**                                                                                              **6 hours**

Importance of positive attitude - steps to build positive attitude – Goal setting.

**UNIT II**                                                                                             **6 hours**

Communication skills - Listening, Speaking, Reading and Writing. Vocabulary Enrichment - Oral

Presentation - Techniques and Tests.

**UNIT III**                                                                                           **6 hours**

Resume writing – covering Letter – Letter to the editors on matters of General interests.

**UNIT IV**                                                                                           **6 hours**

Group Discussion – Interview Skills – Qualities expected from participants – Body Language.

**UNIT V**                                                                                             **6 hours**

Time management – procrastination – Causes and Effects – Effective Time Management –

Leadership - Qualities of a successful leader.

**Text Book:**

Soft Skills, Jamal Mohamed College Publication.

**Books for References:**

1. Shiv Kera – You can Win, Macarillan, India Pvt Ltd.,

2. Dr. Alex – Soft Skills, S.Chand New Delhi.

3. Dr. Ravichandran and others – Success through Soft Skills.

4. Buhari S.A.W – Soft skills competencies for success -Sanjay Book House, Trichy

5. Buhari S.A.W – How to win a Job, Sanjay Book House, Trichy.

6. Andrews, Sudhor – "How to succeed in Interviews", Tata McGraw-Hill, New Delhi,

Sub. Code    : 14UCN6GS               Max. Marks   :  100

Hours/Week : 1                  Internal Marks :  40

Credit     : 1                   External Marks :  60

**Objective:**
        To make the students understand the needs of the gender studies.

**UNIT I**                                      **3 hours**
Concepts of Gender: Sex-Gender-Biological Determinism-Patriarchy-Feminism – Gender Discrimination -Gender Division of Labour - Gender Stereotyping-Gender Sensitivity - Gender Equity -Equality-Gender Mainstreaming -Empowerment.

**UNIT II**                                      **3 hours**
Women's Studies Vs Gender Studies: UGC's Guidelines - VII to XI - Plans- Gender Studies: Beijing Conference and CEDAW-Exclusiveness and Inclusiveness.

**UNIT III**                                    **3 hours**
Areas of Gender Discrimination: Family - Sex Ratio- Literacy - Hea1th -Governance - Religion Work Vs Employment - Market - Media - Poli1ics - Law - Domestic Violence. - Sexual Harassment - State Policies and Planning.

**UNIT IV**                                     **3 hours**
Women Development and Gender Empowerment : Initiatives - International Women's Decade - International Women's Year - National Policy for Empowerment of Women - Women Empowerment Year 2001- Main.s1reaming Global Policies.

**UNIT V**                                      **3 hours**
Women's Movements and Safeguarding Mechanism:- In India National / State Commission for Women (NCW) - All Women Police Station - Family Court - Domestic Violence Act - Prevention of Sexual Harassment at Work Place Supreme Court Guidelines - Maternity Benefit Act - PNDI Act - Hindu Succession Act 2000 - Eve Teasing Prevention Act - Self Help Groups - 73rd and 74th Amendment for PRIS.

**Reference:**
1. Bhasin Kamala, Understanding Gender: Gender Basics, New Delhi: Women Unlimited, 2004
2. Bhasin Kamala, Exploring Masculinity: Gender Basics, New Delhi: Women Unlimited, 2004