SRI KALISWARI COLLEGE,SIVAKASI

(An Autonomous Institution, Affliated to Madurai Kamaraj University,

Reaccredited with 'A' Grade by NAAC with CGPA 3.30)

DEPARTMENT OF MATHEMATICS

Programme Scheme of Examinations and Syllabi

(with effect from June, 2015)

UG Programme – B.Sc. (Mathematics)

Programme Outcome (PO) for Undergraduate Programme

Knowledge

PO 1: Well grounded knowledge in chosen subjects.

PO 2: Updated knowledge related to the subjects.

Skills

PO 1: Acquisition of cognitive skills

PO 2: Acquisition of Life Skills for Employment.

Attitude

PO 1: Holistic Personality Development through Self-directed and lifelong learning.

PO 2: Eco Sensitivity, inclusive culture, moral uprightless and social commitment.

Programme Specific Outcome :

- Solve complex problems by critical undrestanding, formulate and develop analysis and synthesis mathematical arguments in a logical manner.
- Develop students' ability in problem solving and in applying the mathematical knowledge acquired so that they will be able to function effectively and responsibly in their daily lives.
- Provide a systematic understanding of the concepts and theories of mathematics and enhance career prospects in a huge array of fields.
- Become successful professionals by demonstrating logical and analytical thinking.

Sri Kaliswari College (Autonomous)-Sivakasi
Department of Mathematics
Choice Base Credit System- Curriculum Pattern
UG Programme – B-Sc [Mathematics]
2015-2018

Part	Course code	Course Name	Hours	Credits
Semester I				
I	15UTAL11	Tamil/ Hindi – I	6	3
II	15UENL11	English – I	6	3
III	15UMAC11	**Core – I :** Foundation Course – Basic Mathematics	4	3
	15UMAC12	**Core – II :** Differential Calculus and its applications	4	3
	15UMAA11	**Allied Course - I** : Physics - I Theory Practical	4 2	3 -
IV	15UMAN11	**Non-Major Elective Course – I :** Fundamentals of Mathematics	2	1
	15UMAE11	**Enrichment Course – I :** MS-Office	2	1
		TOTAL	**30**	**18**
Semester II				
I	15UTAL21	Tamil / Hindi – II	6	3
II	15UENL21	English – II	6	3
III	15UMAC21	**Core - III :** Theory of Equations	4	4
	15UMAC22	**Core - IV:** Analytical Geometry – 3D	4	4
	15UMAA21	**Allied Course - II** Physics – II Theory Practical	4 2	3 2+2
IV	15UMAN21	**Non-Major Elective Course – II :** Statistical Methods	2	1
	15UMAE21	**Enrichment Course – II :** Integral Calculus	2	1
		TOTAL	**30**	**23**
Semester III				
I	15UTAL31	Tamil / Hindi – III	6	3
II	15UENL31	English – III	6	3
III	15UMAC31	**Core – V :** Sequences and Series	4	5
	15UMAC32	**Core – VI :** Numerical Methods	4	4
	15UMAA31	**Allied Course – III:** Programming in C	4	3
	15UMAA3P	**Allied Course – III :** Programming in C Lab	2	2
IV	15UMAS31	**Skill Based Course – I :** Theory of Numbers	2	2
	15UMAV31	**Value Based Course – I :** Data Interpretation	2	1
		TOTAL	**30**	**23**
Semester IV				
I	15UTAL41	Tamil / Hindi – IV	6	3
II	15UENL41	English - IV	6	3
III	15UMAC41	**Core – VII :** Mechanics	4	4
	15UMAC42	**Core – VIII :** Graph Theory	4	4
	15UMAA41	**Allied Course – IV:** Object Oriented Programming with C++ and Visual Basic	4	3
	15UMAA4P	**Allied Course – III :** Object Oriented Programming	2	2

		with C++ and Visual Basic Lab		
	Optional / Elective Course – I		4	3
	15UMAO41	1. Trigonometry		
	15UMAO42	2. Fourier Series and Laplace Transform		
	15UMAO43	3. Mathematical Modeling		
V		Extension Activities	-	1
		TOTAL	**30**	**23**
Semester V				
III	15UMAC51	**Core - IX :** Modern Algebra	6	5
	15UMAC52	**Core – X :** Real Analysis	5	5
	15UMAC53	**Core – XI :** Operations Research	5	5
	15UMAC54	**Core – XII :** Mathematical Statistics I	5	5
	Optional / Elective Course – II		4	3
	15UMAO51	1. History of Mathematics		
	15UMAO52	2. Vector Calculus		
	15UMAO53	3. Mathematical Methods in Social Sciences		
IV	15UMAS51	Skill Based Course –II : Lattices and Boolean Algebra	2	1
	15UMAS52	Skill Based Course – III : Quantitative Aptitude I	2	1
	15UVED51	Value Education	1	1
		TOTAL	**30**	**26**
Semester VI				
III	15UMAC61	**Core - XIII :** Linear Algebra	5	5
	15UMAC62	**Core – XIV :** Complex Analysis	5	5
	15UMAC63	**Core – XV :** Differential Equations and its Applications	5	5
	15UMAC64	**Core – XVI :** Mathematical Statistics II	5	5
	Optional / Elective Course – III		4	3
	15UMAO61	1. Fuzzy sets and Logic		
	15UMAO62	2. Stochastic Processes		
	15UMAO63	3. Optimization Techniques		
IV	15UMAS61	**Skill Based Course –IV :** Quantitative Aptitude II	2	2
	15UMAV61	**Value Based Course – II :** Astronomy	2	1
	15UESR61	Environmental Studies	2	1
		TOTAL	**30**	**27**

Semester	**I**	**II**	**III**	**IV**	**V**	**VI**	**Total**
Credits	**18**	**23**	**23**	**23**	**26**	**27**	**140**

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – I

Core – I : Basic Mathematics – 15UMAC11 **Duration: 60 Hrs**
Credits : 3

Aim and Objective:

- To create interest in Mathematics
- To introduce different branches needed for B.Sc. Mathematics.
- To prepare the students to successfully compete both for a career and for higher studies.

Course Outcome :

- Apply the rules of limits to calculate limits.
- Use the limit concept to determine the point of continuity of a function .
- Calculate derivatives of functions defined implicitly.
- Calculate a definite integral as a limit of approximating sums.
- Develop skill in 2 dimensional space
- Find the distance between two points.
- Find the centroid, incentre of the triangle.

Unit I **(15 Hrs)**

Differential Calculus – Limit of a function (Theorems without proof) – Left and Right limits – Continuous functions – Algebra of Derivatives – Derivatives of standard functions without proof – The chain Rule – Differentiation of Inverse Functions – Differentiation by Transformation – Logarithmic Differentiation – Parametric Differentiation – Differentiation of Function with respect to Functions – Differentiation of implicit functions.

Unit II **(15 Hrs)**

Integral Calculus – Evaluation of Integrals – Some simple integrals – Method of substitution– Integration of Rational Functions – Integration of Irrational Functions – Integration of Trigonometric Functions.

Unit III **(15 Hrs)**

Analytical Geometry 2D – Rectangular co-ordinates – Distance between two points – The co-ordinates of the point dividing the line joining two given points in a given ratio – The centroid of a triangle when the co-ordinates of the vertices of the triangle are known – The incentre of a triangle whose vertices are known – Area of triangle whose vertices are known.

Unit IV **(15 Hrs)**

Equation of the Straight line passing through two given points – Equation of a Straight line in terms of the intercepts it makes on the axes –The equation $Ax + By+C = 0$ will always represent a straight line – Several forms for the equation of a Straight line – Other forms of the equation of a Straight line – Point of intersection of two Straight lines – Angle between two Straight lines – Equation of a line through the point of intersection of two given lines.

Unit V **(15 Hrs)**

Solution of simple trigonometric equations – Inverse trigonometrical functions – Complex Numbers – Modulus, amplitude form of a complex number – De Moivre's Theorem.

Text Books:

1. Dr.S.Arumugam , Mr.A.Thangapandi Isaac , "Calculus" New Gamma Publishing House, Palayamkottai , July 2001.
2. T.K.Manicavachagom Pillay, T.Natarajan, " Analytical Geometry 2D" S.Viswanathan (Printers & Publishers), Pvt., Ltd., Chennai, July 2002.
3. S.Narayanan, T.K.Manicavachagom Pillay, "Trigonometry" S.Viswanathan (Printers & Publishers), Pvt., Ltd., Chennai, 2006.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – I

Core – II : Differential Calculus and its applications – 15UMAC12

Duration: 60 Hrs
Credits : 3

Aim and Objectives:

- To create interest in Mathematics.
- To know more about differentiation.
- To study application of differentiation such as finding asymptotes for a curve, tracing a curve.

Course Outcome :

- Understand the concept of differentiation.
- Find the higher derivatives.
- Gain an in-depth knowledge of partial differentiation using Euler's theorem.
- Find critical points, and use them to locate maxima and minima.
- Use the derivative to find tangent lines to curves.
- Demonstrate the method of curve tracing

Unit I **(12 Hrs)**

Higher Derivatives – n^{th} derivative of some standard functions – Leibnitz theorem - Partial differentiation – Homogeneous function and Euler's Theorem.

Unit II **(12 Hrs)**

Tangent and Normal – Polar Curves – p-r Equations – Curvature.

Unit III **(12 Hrs)**

Evolute – Envelope – Maxima and Minima of functions of two variables.

Unit IV **(12 Hrs)**

Asymptotes – Methods of finding asymptotes for the curve y = f(x) – Methods of finding asymptotes for the curve f(x, y) =0 – Asymptotes parallel to the axes for an algebraic curve f(x, y) = 0 of degree n.

Unit V **(12 Hrs)**

Curve tracing – Tracing of curves f(x, y) =0 (Cartesian co ordinates) – Tracing a curve f(r, θ) = 0(polar co ordinates) – Tracing a curve x = f(t), y= g(t) (parametric equation).

Text Book :

Dr.S.Arumugam , Mr.A.Thangapandi Isaac , "Calculus" New Gamma Publishing House, Palayamkottai , July 2001.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – I

Non Major Elective I : Fundamentals of Mathematics – 15UMAN11 Duration : 30Hrs
Credit : 1

Aim and Objectives:

- To know about the basic concepts of sets and matrices.
- To study about types of matrices.
- To know more about differentiation .

Course Outcome :

- Able to find LCM and HCF of nmbers
- Use sets and/or Venn diagrams to solve a stated problem
- Learn the differentiation rules for products, quotients and the chain rule
- Find critical points, and use them to locate maxima and minima.

Unit I (6 Hrs)

The Real Number System – Constant – Variable – Least Common Multiple (L.C.M) and Highest Common Factor (H.C.F) – Set Theory – Meaning – Definition – Notation – Representation of a set – Forms of set – Examples.

UnitII (6Hrs)

Set Operations – Venn Diagrams – Ordered Pairs – Cartesian product – Examples.

Unit III (6 Hrs)

Matrices - Meaning – Notations – Basic Concepts – Types of Matrices – Algebra of Matrices – Examples.

Unit IV (6 Hrs)

Differential calculus – Meaning – Differential calculus of one variable – Rules of differentiation – Polynomial function rule – Constant function rule – Linear function rule – Addition rule – Subtraction rule – Product rule – Quotient rule – Chain rule – Parametric function rule – Implicit function rule – Inverse function rule – Derivative of a derivative – Exponential function rule – Logarithmic function rule – The derivative of Trigonometric functions – Examples.

Unit V (6 Hrs)

Maxima and Minima – Definition – Maxima and Minima of one variable – Conditions for Maxima and Minima – Examples.

Text Book:

Dr.D.Bose , "An Introduction to Mathematical Methods" Himalaya Publishing House, Reprint 2001.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – I

Enrichment Course – I : MS – Office – 15UMAE11 **Duration : 30 Hrs**
Credit : 1

Aim and Objectives:

- To know about how MS-Office works.
- To help the students prepare the documents.
- To gain knowledge of Word, Excel.

Course Outcome :

- Demonstrate fundamental knowledge of MS Word.
- Relate real-life MS Word applications for professional or personal use.
- Develop an informal business letter.
- Apply MS Word techniques to create promotional hand-outs.
- Understand a Word Processor Create, Edit and Format documents
- Work with Tables, Import and Export data between Files Proofing a Document Save, Protect and Print documents
- Determine and use various workplace application software to develop, document, and manage office projects, procedures and systems

Unit I **(6 Hrs)**

MS-Word Introduction – Word for Windows – Creating and saving documents – Page setup – Print preview – Print - Edit – Redo, cut, copy, paste, find and replace.

Unit II **(6 Hrs)**

Views – Normal, print layout, Ruler, Header and Footer. Insert – Page number , Picture, Text box, Word Art, Format fonts (size, colors and type), Bulleted numbering, border and shading, Columns and Change cases.

Unit III **(6 Hrs)**

Tools – Spelling and Grammar mail merge. Table – draw insert, delete, select, split columns and rows.

Unit IV **(6 Hrs)**

Explanation for an Excel page (rows, columns and cells) Entering data – Usage of Formulae and functions

Unit V **(6 Hrs)**

Creating an Excel chart – Data Manipulation and Type of Functions.

Text Book:

S. David Laurence , "MS – Office " , JDP, Rajapalayam , First Edition August 2008.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – II

Core – III : Theory of equations – 15UMAC21 **Duration : 60 Hrs**

Credits : 4

Aim and Objectives:

- To find the solution of equations.
- To know more about transformation of equations.
- To find the roots of cubic and biquadratic equations.

Course Outcome :

- Attain the basic knowledge about equations and to solve equations in different Methods
- Learn the concept of rational roots, irrational roots , imaginary roots and the relation between the roots and coefficient of the equations.
- Gain knowledge of symmetric function of the roots.
- Make a good background on basic concepts of algebra.
- Gain knowledge of removal of terms using theorems like Rolle's theorem and strum's theorem.
- Find the roots of biquadratic and cubic equations by using Cardon's method.

Unit I **(12Hrs)**

Formation of equations – Division algorithm – Fundamental theorem of Algebra – Relation between roots and coefficient.

Unit II **(12Hrs)**

Sum of the powers of the roots – Newton's Theorem – Reciprocal equation – Remainder Theorem- Imaginary roots – Irrational roots – Relations between the roots and coefficients of equations– Symmetric function of the roots.

Unit III **(12Hrs)**

Transformation of equations – Formation of the equation whose roots are k times the roots of $f(x)= 0$ – Formation of the equation whose roots are diminished by h - Removal of terms – Multiple roots.

Unit IV **(12Hrs)**

Nature and position of roots - Rolles' theorem – Strum's theorem – Cubic equations- Cardan's method for solving a cubic equation – Nature of roots of the cubic.

Unit V **(12Hrs)**

Biquadratic equations – Ferrari's method – Approximate solutions of numerical equations- Newton's method – Horner's method .

Text Book:

Dr.S.Arumugam & Mr.A.Thangapandi Isaac , " Set Theory , Number system and Theory of equations" New Gamma Publishing House, Palayamkottai.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – II

Core – IV : Analytical Geometry 3D – 15UMAC22 **Duration : 60 Hrs**

Credits : 4

Aim and Objectives:

- To extend analytical geometry of 2D in a natural way to analytical geometry of 3D.
- To know the application of algebraic methods to the study of curves and surfaces that lie in three dimensional spaces.
- To improve analytical skills.

Course Outcome :

- Define and represent geometrical shapes in a numerical way and extracting numerical information from shapes' numerical definitions and representations.
- Enable the students to develop their skill in 3 dimensional Cartesian Co-ordinates system
- Learn the properties of straight lines and spheres.
- Derive the conditions for parallelism and perpendicularity of two lines

Unit I **(12 Hrs)**

Rectangular Cartesian coordinates – Distance between two points – Direction Cosines – Equation of a plane – Transformation to the normal form – Angle between two planes.

Unit II **(12 Hrs)**

Angle bisectors of two planes – Equation of a straight line.

Unit III **(12 Hrs)**

A plane and a line – Equation of two skew lines in a simple form

Unit IV **(12 Hrs)**

The intersection of three planes – Volume of a tetrahedron –Equation of a sphere.

Unit V **(12 Hrs)**

Tangent line and tangent plane – Section of a sphere.

Text book:

Dr.S.Arumugam & Mr.A.Thangapandi Issac , "Analytical Geometry 3D Vector Calculus & Trigonometry" New Gamma Publishing House, Palayamkottai , Edition 2003.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – II

Non Major Elective II : Statistical Methods – 15UMAN21 **Duration : 30 Hrs**

Credit : 1

Aim and Objectives :

- To introduce statistical constants measures of central tendency, dispersion.
- To study the quantitative and qualitative characteristics of a missing data.

Course Outcome :

- Enable the students to understand the meaning, definition, nature, importance and limitations of statistics.
- Able to create, read, and interpret graphs, charts, histograms, and diagrams .
- Understand and use the basic measure of central tendency.
- Explain the relevance and use of statistical tools for analysis and forecasting .

Unit I **(6 Hrs)**

Collection of Data – Classification of Data – Class intervals and Frequency Distribution – Frequency curve and cumulative Frequency curve.

Unit II **(6 Hrs)**

Arithmetic Mean – Partition values (Median, Quartiles, Deciles and Percentiles) – Mode – Geometric mean and Harmonic Mean.

Unit III **(6 Hrs)**

Measures of Dispersion – Range – Quartile deviation – Mean deviation – Standard deviation.

Unit IV **(6 Hrs)**

Attributes – Consistency of data.

Unit V **(6 Hrs)**

Newton's forward interpolation formula – Newton's backward interpolation formula – Lagrange`s Formula.

Text Book:

S.Arumugam, Isaac , " Statistics" , New Gamma Publishing House , July 2009.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – II

Enrichment Course – II : Integral Calculus – 15UMAE21 **Duartion : 30 Hrs**

Credit : 1

Aim and Objectives :

- To know more about integration
- To study about reduction formulae
- To know about the functions defined in terms of some improper integrals.

Course Outcome :

- Classify angles as acute, right, obtuse, or straight.
- Find measures of angles, parallel and perpendicular lines.
- Find the missing measurements in a pair of similar triangles.
- Understand the meaning of the derivative in terms of a rate of change and local linear approximation.
- Familiarize themselves with the techniques of integration and differentiation of functions with real variables.
- Able to compute the limit of a function when $x \to \infty$
- Write the equation of a line tangent to the curve of f(x) at a given point.
- Write given function in terms of sine and cosine terms in Fourier series and also to get knowledge in Fourier transforms.
- Able to solve finite difference equations using Z transforms.
- Able to solve improper integrals using beta, gamma functions.
- Apply method of least square to find the curve of best fit for the given data.

Unit I **(6 Hrs)**

Evaluation of definite integrals – Integration by parts.

Unit II **(6 Hrs)**

Reduction formulae – Reduction formula for $\int x^n e^{ax} dx$, $\int x^n cosaxdx$, $\int sin^n xdx, \int tan^n xdx, \int cot^n xdx, \int sec^n xdx, \int cosec^n xdx, \int sin^m x\, cos^n xdx$.

Unit III **(6 Hrs)**

Double integrals – Evaluation of double integrals.

Unit IV **(6 Hrs)**

Triple integrals – Change of variables in double and triple integrals.

Unit V **(6 Hrs)**

Beta and Gamma functions – Properties and results involving beta and gamma functions.

Text Book:

Dr.S.Arumugam , Mr.A.Thangapandi Isaac , "Calculus" New Gamma Publishing House, Palayamkottai , July 2001.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – III

Core – V : Sequences and series – 15UMAC 31 **Duration: 60 Hrs**
Credits : 5

Aim and Objectives:

- To create interest in learning analysis
- To know about the behavior of sequences
- To know about the convergence of series

Course Outcome :

- Provide a formal introduction to the concept of limit and compute the limits of sequences.
- Gain knowledge of some simple techniques for testing the convergence of sequences.
- Apply the properties of limits summarized in Theorems and recognize when a sequence is increasing,decreasing,bounded and monotonic.
- Gain knowledge of the various aspects of divergence of sequences.
- Relate the convergence or divergence of the series using the sequence of partial sums.
- Recognize the infinite series and determine whether they converge or diverge.
- Study about the integral test which shows the equivalence between the convergence of a series and that of an associated integral.
- Know about the alternating series and its properties.
- Gain knowledge for testing the convergence of series of positive terms.

Unit I **(12 Hrs)**

Sequences – Bounded sequences – Monotonic sequences – Convergent sequences – Divergent and Oscillating sequences – The algebra of limits – Behavior of Monotonic sequences.

Unit II **(12 Hrs)**

Some theorems on Limits – Subsequences – Limit points – Cauchy sequences – The upper and lower limits of a sequence.

Unit III **(12 Hrs)**

Infinite series – Comparison test.

Unit IV **(12 Hrs)**

Kummer's test– Root test and Condensation test – Integral test.

Unit V **(12 Hrs)**

Alternating series – Absolute convergence-Tests for convergence of series of arbitrary terms.

Text Book:

Dr. S.Arumugam and Mr.A.Thangapandi Isaac , "Sequences & Series and Fourier series" New Gamma Publishing House, Palayamkottai , Edition 2006

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – III

Core – VI : Numerical Methods – 15UMAC32 **Duration : 60 Hrs**
Credits : 4

Aim and Objectives:

- To find numerical solutions to problems where the exact solutions are not known.
- To apply numerical methods to solve problems in physical and technical applications.
- To use numerical methods for solving linear algebraic equations which occur in engineering and statistical problems.

Course Outcome :

- Give procedures for solving numerically different kinds of problems occurring in engineering and technology
- Find solution of system of linear equations, roots of non-linear equations
- Learn the concept of interpolation
- Able to approximate the functions and to estimate the errors.
- Use the numerical techniques to solve algebraic and differential equations
- Develop skills in solving problems using numerical techniques.

Unit I **(12Hrs)**

Errors in Numerical Computation – Iteration method – Bisection method – Regula Falsi method – Newton Raphson method

Unit II **(12Hrs)**

Gauss elimination method – Gauss Jordan elimination method-Calculation of inverse of a matrix – Gauss seidal iteration method.

Unit III **(12Hrs)**

Newton's interpolation formulae – Central difference interpolation formulae –Lagrange's interpolation formulae – Inverse interpolation.

Unit IV **(12Hrs)**

Derivatives using Newton's forward difference formula - Derivatives using Newton's backward difference formula – Numerical Integration –Trapezoidal rule – Simpson's rule – Weddle's rule - Boole's rule- Romberg's method.

Unit V **(12Hrs)**

Taylor's series method –Euler's method –Runge-kutta methods –Classification of partial differential equations of second order – Finite Difference Approximations to Derivatives-Laplace equation- Poisson's equation

Text Book:

Dr. S. Arumugam , Mr.A.Thangapandi Isaac , Mr. A.Somasundaram , “Numerical Methods “SciTech Publications (India) PVT, LTD, Chennai, Second Edition – Reprint September 2007

Semester – III

Allied Course – III : Programming in C – 15UMAA31 **Duration : 60 Hrs**
Credits : 3

Aim and Objectives:

- To improve logical thinking and better understanding of programming techniques.
- To pursue the art of programming with C
- To help the students to solve large and complex problem in reasonable time
- To learn a language that is well suited for both systems software and business packages.

Course Outcome :

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers.
- Use different data structures and create/update basic data files.

Unit I (18 Hrs)

History of C – Importance of C – Programming Style- Constants, variables and Data types – Operations and Expressions – Managing input and output operations.

Unit II (18 Hrs)

Decision Making and Branching – Decision making and looping - Arrays –Character arrays and strings.

Unit III (18 Hrs)

Functions: need and elements of user – defined function – Definition of functions- function calls – function declaration – category of functions – nesting of function – Recursion.

Unit IV (18 Hrs)

Structures and Unions: Introduction – Defining a structure – Declaring structure variables- Accessing structure members- structure initialization– copying and comparing structure variable – array of structure-arrays with in structures – Structure with in structure- Structures and functions – unions.

Unit V (18 Hrs)

File Management in C: Introduction – Defining and opening a file – closing a file – Input / output operations on files – Errors handling I /O operations – Random Access to Files- Command Line Arguments.

Pointers: Introduction – declaring pointer variables – Initialization of pointer variables- accessing a variable through its pointer – Chain of pointers.

Text Book:

E.Balagurusamy , " Programming in ANSI C " , 4th Edition,2008.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Based Credit System
UG Programme - B. Sc Mathematics-2015-2018
Semester III

Allied Course – III : Programming in C Lab – 15UMAA3P **Duration : 30 Hrs**
Credits : 2

C practical list

- Simple interest and compound interest problems
- Salesman's commission problem using if and ternary operator
- Finding the roots of the quadratic equation using switch …. Case statements
- Testing a given number as a prime or not and finding the prime number between 1 and any number.
- Write a program for finding a sine value or cosine value.
- Write a program for finding the sum of two matrices.
- Write a program for finding the product of two matrices.
- Arranging the numbers in ascending order.
- Arranging the names in alphabetical order.
- Finding the number of words and characters in a given text.
- Write a program to test a given string is palindrome or not.
- Create a student file using fwrite statement.

Skill Based course – I : Theory of Numbers – 15 UMAS31 Duartion : 30 Hrs
Credits : 2

Aim and Objectives:

- To learn about numbers ,like prime numbers and composite numbers.
- To study about congruences.
- To solve problems which has fascinated to professional and amateur mathematicians.

Course Outcome :

- Understand the basic knowledge of numbers and its types.
- Introduce the notion of Euler's function .
- Develop the skill about the criteria of divisibility of number by 3,9 and 11
- Explain congruences and its properties.
- Get in insight into divisibility using Fermat's Theorem and generalized Fermat's Theorem.
- Learn about the characterization of prime numbers using Wilson's theorem.

Unit I (6 Hrs)

Prime and Composite numbers – The sieve of Eratosthenes – Divisors of a given number N.

Unit II (6 Hrs)

Euler's function $\phi(N)$- Integral part of a real number – The highest power of a prime p contained in n! – The product of r consecutive integers is divisible by r!

Unit III (6 Hrs)

Congurences – Criteria of divisibility of a number by 3, 9, 11 - Numbers in arithmetical progession

Unit IV (6 Hrs)

Fermat's theorem – Generalization of Fermat's theorem

Unit V (6 Hrs)

Wilson's theorem - Lagrange's theorem

Text book:

T.K.Manicavachagom Pillay, T. Natarajan and K.S. Ganapathy , "Algebra – Volume II" , Reprint 2006.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – III

Value Based course – I :Data Interpretation – 15UMAV31 Duartion : 30 Hrs
Credits : 1

Aim and Objectives :

- To study about collection of data
- To prepare the students for competitive examination

Course Outcome :

- Able to independently read mathematical and statistical literature of various types, including survey articles, scholarly books, and online sources.
- Communicate statistical ideas clearly in both oral and written form using appropriate statistical terminology.
- Generate reports that show statistical expertise in writing and model implementation.
- Methods to summarize a collection of data by describing what was observed using numbers or graphs.
- Ability to deal with the collection, organization, presentation, computation and interpretation of data.

Unit I (6 Hrs)

Collection of data-Introduction - Primary and secondary data - Choice between Primary and Secondary Data - Methods of collecting Primary data - Direct Personal Interviews – Indirect Oral Interviews – Information from Correspondents – Mail Questionnaire Method - Drafting the questionnaire – Pre-testing the questionnaire-Specimen questionnaire - Sources of secondary data – Published Sources – Unpublished Sources - Editing Primary and secondary data-Precautions in the use of secondary data

Unit II (6 Hrs)

Classification and tabulation of data – Introduction – Meaning and objectives of classification – Objects of classification – Types of classification – Geographical classification – Chronological classification – Qualitative classification – Quantitative classification – Formation of discrete frequency distribution – Formation of Continuous frequency distribution – Considerations in the construction of frequency distributions – Relative frequency distribution – Bivariate or Two-way frequency distribution

Unit III (6 Hrs)

Tabulation of data – Difference between classification and tabulation – Role of tabulation – Parts of a table – General rules of tabulations – Review of the table – Types of tables – Miscellaneous illustrations – Machine tabulation

Unit IV (6 Hrs)

Diagrammatic and Graphic presentation – Introduction – Significance of diagrams and graphs – Comparison of tabular and diagrammatic presentation – Difference between diagrams and graphs – general rules for constructing diagrams – Types of diagrams – One-dimensional or

Bar diagrams – Types of Bar diagrams – Two-dimensional diagrams – Three-dimensional diagrams – Pictographs and Cartograms – Choice of a suitable diagram

Unit V **(6 Hrs)**

Graphs – Technique of constructing graphs - Graphs of time series or line graphs – Rules for constructing line graphs on natural scale – False base line - Graphs of one variable – Graph of two or more variables – Graphs having Two scales – Range chart – Band graph – Semi-logarithmic line graphs or ratio charts – Graphs of frequency distributions – Histogram – Frequency Polygon – Smoothed frequency curve – Cumulative frequency curve or Ogives – Limitations of Diagrams and Graphs

Text Book:

Dr.S.P.Gupta, "Statistical Methods" , Sultan Chand & Sons, 23, Daryaganj, New Delhi, Fortieth Revised Edition 2011.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV

Core –VII : Mechanics – 15UMAC41 **Duration : 60 Hrs**
Credits : 4

Aim and Objectives:

- To know about various law of forces.
- To study about two like & unlike parallel forces and moment of a force.
- To know about Impact.

Course Outcome :

- Able to construct free-body diagrams and to calculate the reactions necessary to ensure static equilibrium.
- Understand the analysis of distributed loads.
- Able to calculate centroids and moments of inertia.
- Gain knowledge of kinetic energy and momentum methods for particles and systems of particles.
- Acquire knowledge of the general principles of dynamics.

Unit I **(12 Hrs)**

Definition of resultant and components –Simple cases of finding the resultant- Parallelogram of forces – Analytical expression for the resultant of two forces acting at a point-Triangle of forces – Perpendicular triangle of forces-Converse of the triangle of forces –The polygon of forces- Lami's theorem –An extended form of the Parallelogram law of forces - Resolution of a force – Components of a force along two given directions-Theorem on resolved parts-Resultant of any number of forces acting at a point: Graphical method-Resultant of any number of coplanar forces acting at a point: Analytical method - Condition of equilibrium of any number of forces acting upon a particle..

Unit II **(12 Hrs)**

Resultant of two like and unlike parallel forces – Resultant of a number of parallel forces – Conditions of equilibrium of three coplanar parallel forces- Centre of two parallel forces-Moment of a force – Geometrical Representation of a moment- Sign of the moment-Unit of moment- Varigon's theorem of moments-Generalized theorem of moments.

Unit III **(12 Hrs)**

Projectiles-Path of a projectile - Maximum height-time taken by a particle -Time of flight - Horizontal Range - Range on a inclined plane -Simple problems.

Unit IV **(12 Hrs)**

Impact- Laws of impact - Impact in a fixed plane -Direct and Oblique impact.

Unit V **(12 Hrs)**

Central orbits - Components of velocities and accelerations along and perpendicular to radius vector - Differential equation of a central orbit - Pedal equations.

Text Books:

1. Dr. M. K. Venkataraman , “Statics” , Agasthiar Publications, 9-A, Clives Building, 33, Nandhi koil street, Teppakulam, Trichy, Tenth Edition, July 2001

2. Dr. M. K. Venkataraman, “Dynamics” , Agasthiar Publications, 9-A, Clives Building, 33, Nandhi koil street, Teppakulam, Trichy, Tenth Edition , January 2001

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV

Core –VIII : Graph Theory – 15UMAC42 **Duration : 60 Hrs**
Credits : 4

Aim and Objectives:

- To translate real life situation to diagrammatic representations.
- To develop problem solving skills and thereby solve real life problems
- To create interest in Research.

Course Outcome :

- Understand the basic concepts of graphs
- Able to present a graph by matrices.
- Understand the properties of trees
- Understand Eulerian and Hamiltonian graphs.
- Apply the Planarity Algorithm
- Demonstrate the usage of Euler's Formula

Unit I **(12 Hrs)**

Graphs and Subgraphs – Definition and examples – Degrees – Sub graphs – Isomorphism – Ramsey Numbers – Independent Sets and Coverings – Intersection graphs and Line graphs – Matrices – Operations on graphs.

Unit II **(12 Hrs)**

Degree sequences – Graphic sequences – Connectedness – Walks, Trails and Paths – Connectedness and Components – Blocks – Connectivity.

Unit III **(12 Hrs)**

Eulerian graphs – Hamiltonian graphs.

Unit IV **(12 Hrs)**

Trees –Characterization of trees – Centre of a tree – Matchings – Matchings in Bipartite graphs.

Unit V **(12 Hrs)**

Planarity –Definition and properties – Characterization of planar graphs – Thickness, Crossing and Outer planarity.

Text Book:

Dr. S. Arumugam and Dr. S. Ramachandran, " Invitation to Graph Theory" , Scitech Publications (India) Pvt. Ltd, Chennai , January 2009.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV

Allied Course – IV : Object oriented programming with C++ and Visual Basic – 15UMAA41 **Duration : 60 Hrs**
Credits : 3

Aims and Objectives :

- To gain the basic concept of Oops.
- To learn the concept of GUI
- To know about various controls of IDE

Course Outcome :

- Explain the need and importance of OOP using C++.
- Distinguish basic data types, custom input/output operators and illustrate class definition
- using member functions.
- Apply concept of overloading, type conversion and virtual functions.
- Demonstrate templates, use and handle exceptions.
- Describe inheritance, polymorphism and concepts related to files.
- Discuss the concept of pointers, make use of constructors and destructors themselves and manage a class' resources using dynamic memory allocation and de-allocation.

Unit I **(18 Hrs)**

Principles of Oops - Basic Concept of Oops - Benefit of Oops - Structure of C++ program - Tokens – Keywords – Identifiers and Constants – Basic Data types : User Defined Data Types – Derived Data Types - Declaration of Variables - Operators - Manipulators - Expressions and its types - Control Structures.

Unit II **(18 Hrs)**

Function prototyping -Call By Value - Return By Reference – Inline Functions – Function Overloading - Friend and Virtual functions - Classes and objects – Constructors and Destructors.

Unit III **(18 Hrs)**

Operator Overloading and Type Conversion – Inheritance: Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Class.

Unit IV **(18 Hrs)**

Visual Basic Environment - Starting a new project- The properties window- Common form properties - scale properties - color properties - The Toolbox - creating controls - Properties of command buttons - List and Combo box - image controls - Text boxes – labels - navigating between controls - Message boxes - variables- Data types- Working with variables

Unit V **(18 Hrs)**

Input Boxes- picture boxes-rich text boxes- controlling program flow- Determinate Loops- Indeterminate Loops – Making Decisions- String function – Date and Time function – One-Dimensional Arrays

Text Books:

1. E.Balagurusamy , "Object oriented Programming with C++" , Tata McGraw-Hill Publishing Company New Delhi, 2nd Edition,2001.

2. Gary Cornell, "Visual Basic 6 from the ground up" , Tata McGraw-Hill Publishing Company New Delhi , 1999.

Allied Course – IV : Object oriented programming with C++ and Visual Basic Lab – 15UMAA4P **Duration: 30 hrs**
Credits : 2

Program List

- Write a C++ program for simple Class and object.
- To Calculate the Area of shapes using Function Overloading
- To Calculate the Volume of different shapes using Inline Function
- Write a C++ program for Constructor and Destructor
- Write a C++ program to implement Operator Overloading
- Write a C++ program to implement Inheritance
- Write a VB program to perform mathematical operations using various controls.
- Write a VB program to perform string and date manipulation.
- Write a VB program to design Digital Clock using Timer Control
- Write a VB program to animate a Picture and Text
- Write a VB program to check given number is Armstrong or not
- Write a VB program sorting a number using Array Concept.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV
Optional / Elective Course – I : Trigonometry – 15UMAO41 **Duration : 60 Hrs**
Credits : 3

Aim and Objectives:

- To study logarithm of a complex number.
- To study about expansions and hyperbolic functions

Course Outcome :

- Able to use formulae for arc length and sector area in terms of radians.
- Familiarize themselves with basic properties of sine, cosine and tangent functions.
- Determine the six trigonometric function values for any angle in standard position when the coordinates of a point on the terminal side are given.
- Evaluate inverse trigonometric functions.
- Learn about the hyperbolic functions.
- Apply logarithms to the solution of problems encountered in mathematics and the sciences.
- Apply trigonometric techniques as tools in the analysis of mathematical, physical, and scientific problems

Unit I **(12 Hrs)**

The Argand diagram of complex numbers – Sum and difference of the complex numbers – Product of two complex numbers – Quotient of the complex numbers – Geometrical illustration of the n^{th} root of a number - Expansions of $\cos n\theta$ and $\sin n\theta$ - Expansion of $\tan n\theta$ in powers of $\tan\theta$ - Expansion of tan(A+B+C+….) - Examples on formation of equations.

Unit II **(12 Hrs)**

Powers of sines and cosines of θ in terms of functions of multiples of θ - Expansions of $\cos^n \theta$ when n is a positive integer - Expansions of $\sin^n \theta$ when n is a positive integer - Expansions of $\sin\theta$ and $\cos\theta$ in a series of ascending powers of θ - Hyperbolic functions – Relations between hyperbolic functions – Inverse hyperbolic functions.

Unit III **(12 Hrs)**

Logarithms of complex quantities – To find the logarithm of x+iy – General value of logarithm of x+iy - Binomial series.

Unit IV **(12 Hrs)**

Exponential series – Logarithmic series.

Unit V **(12 Hrs)**

Summation of Trigonometric series - Method of Differences – Sum of sines of n angles in A.P. - Sum of cosines of n angles in A.P. - Summation of series by using complex quantities – Gregory's series – Euler's series - Expansions.

Text books:

1. S. Narayanan, T.K. Manicavachagom Pillay , "Trigonometry "S. Vishwanathan Printers and Publishers, PVT., LTD, Chennai , Reprint 2011.

2. Dr. S.Arumugam, Prof. A.Thangapandi , "Summation of Series and Trigonometry'' , New Gamma Publishing House, Palayamkottai **,** July 2003.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV
Optional / Elective Course – II :Fourier series and Laplace Transforms – 15UMAO42
Duration : 60 Hrs

Credits : 3

Aim and Objectives:

- To Find the Fourier Series of the function f(x)
- To enrich the knowledge of the students about the half range fourier series
- To develop the solution of Linear differential equations using Laplace Transform

Course Outcome :

- Gain knowledge of Even and odd Functions .
- Introduce the concept of half range Fourier series.
- Gain an in-depth knowledge of the various aspects of cosine series and change of interval.
- Inculcate the insight knowledge of Laplace Transforms and the conditions for its existence.
- Demonstrate the idea of inverse Laplace Transforms
- Find the inverse Laplace Transform of certain functions by the method of partial fractions.
- Evaluate the ordinary differential equations with constant coefficients by using Laplace Transform .
- Able to solve certain equations involving integrals by Laplace Transform.

Unit I (12 Hrs)

Fourier Series- Even and odd Functions-Properties of odd and even functions.

Unit II (12 Hrs)

Half range Fourier series - Development in cosine series- Change of interval.

Unit III (12 Hrs)

The Laplace Transforms - Definition –Sufficient conditions for the existence of the Laplace Transform - Results – Examples - Laplace Transform of periodic functions-Some general Theorems - Evaluation of certain integrals using Laplace Transform.

Unit IV (12 Hrs)

The inverse Laplace Transforms - Results -Examples - To finds the inverse Laplace Transform of certain functions by the method of partial fractions.

Unit V (12 Hrs)

To solve ordinary differential equations with constant coefficients by using Laplace Transform - To solve system of differential equations by using Laplace Transform - To solve ordinary differential equations with variable coefficients by using Laplace Transform-Certain equations involving integrals can be solved by Laplace Transform.

Text Book:

S.Narayanan and T.K.Manicka Vasagam Pillai , “Calculus- Volume III” , S. Vishwanathan Printers and Publishers, PVT., LTD, Chennai , Reprint July 2002.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System
UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – IV
Optional / Elective Course – III : Mathematical Modelling– 15UMAO43

Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To create interest in Mathematics
- To expected that students will be able to transfer the learning gained from special case-studies to other situations.

Course Outcome :

- Familiarize themselves with the basic knowledge of mathematical modelling and its techniques.
- Gain knowledge of Mathematical modelling through Geometry, Algebra and Calculus.
- Learn about the limitations of Mathematical modelling.
- Understand the idea of Mathematical modelling through Differential Equations.
- Study about Linear Growth and non linear growth with Decay Models.
- Gain an in-depth knowledge of Mathematical modelling in dynamics through ordinary differential equations
- Study the concept of Models in terms of directed Graphs and signed Graphs
- Develop the idea of Mathematical Modelling in terms of Unoriented Graphs.

Unit I **(12 Hrs)**

Simple situations requiring mathematical modelling-The technique of mathematical modelling- Classification of Mathematical models-Some Characteristics of Mathematical models- Mathematical modelling through Geometry.

Unit II **(12 Hrs)**

Mathematical modelling through Algebra - Mathematical modelling through Trigonometry - Mathematical modelling through Calculus - Limitations of Mathematical modelling.

Unit III **(12 Hrs)**

Mathematical modelling through Differential Equations - Linear Growth and Decay Models - Non-linear Growth and Decay Models.

Unit IV **(12 Hrs)**

Compartment models - Mathematical modelling in dynamics through ordinary differential equations of first order - Mathematical modelling of geometrical problems through ordinary differential equations of first order.

Unit V **(12 Hrs)**

Situations that can be Modelled Through Graphs - Mathematical Models in Terms of Directed Graphs - Mathematical Models in Terms of Signed Graphs - Mathematical

Modelling in Terms of Weighted Digraphs - Mathematical Modelling in Terms of Unoriented Graphs.

Text Book:

J.N.Kapur , "Mathematical Modelling" **N**ew age international (P) limited, Chennai, Reprint 2009

Core – IX : Modern Algebra – 15UMAC51 **Duration: 90 Hrs**
Credits : 5

Aim and Objectives:

- To introduce the study of abstract set endowed with one or more binary operations.
- To introduce and develop abstract concepts.
- To study the basic structures like groups and rings.

Course Outcome :

- Understand the relationships between abstract algebraic structures with familiar numbers systems such as the integers and real numbers.
- Learn the concepts of the relationships between operations satisfying various properties.
- Learn the concepts and properties of various algebraic structures.
- Use results from elementary group theory to solve contemporary problems
- Demonstrate ability to think critically by interpreting theorems and relating results to problems in other mathematical disciplines
- Learn the elementary theorems and proof techniques of group and ring theory
- Apply the theorems, proof techniques and standard computations of group and ring theory to solve problems.

Unit I **(18 Hrs)**

Relations - Equivalence relations – Partial order - Functions - Binary operations

Unit II **(18 Hrs)**

Groups – Definition and Examples – Elementary properties of a group – Equivalent definitions of a group – Permutation groups – Subgroups.

Unit III **(18 Hrs)**

Cyclic groups – Order of an element – Cosets and Lagrange's Theorem – Normal subgroups and quotient groups – Isomorphism – Homomorphisms.

Unit IV **(18 Hrs)**

Rings – Definition and examples – Elementary properties of rings – Isomorphism – Types of rings – Characteristic of a ring – Subrings.

Unit V **(18 Hrs)**

Ideals – Quotient rings – Maximal and prime ideals – Homomorphism of rings – Field of quotients of an integral domain

Text Book:

Dr. S. Arumugam & Mr.Thangapandi Isaac, “Modern Algebra” , SciTech Publications (India) PVT, LTD, 7/3c, Madley Road,Chennai , July 2008.

Semester – V

Core – X : Real Analysis – 15UMAC52 **Duration: 90 Hrs**
Credits : 5

Aim and Objectives:

- To assist the students in learning fundamental ideas and theorems about metric space
- To enrich their knowledge in completeness and connectedness of a metric space
- To study about continuous and Discontinuous functions on Real number system

Course Outcome :

- Learn the basic ingredients of reals and understand the properties of functions defined on the Real line.
- Develop a sound knowledge and appreciation of the ideas and concepts related to metric spaces
- Give a strong foundation to take up advanced level courses in analysis.
- Construct proofs, counter arguments or counter examples in reals.
- Construct the field axioms of the reals, covers, density, monotonicity, boundedness,
- Demonstrate completeness, limits, continuity.
- Describe and prove continuity conditions for real
- Demonstrate compactness and its characterization.
- Make the student a good background on basic real analysis

Unit I **(15 Hrs)**

Sets and functions - Countable sets - Uncountable sets - Inequalities of Holder and Minkowski - Metric space - Definition & Examples - Bounded sets in a metric space -Open ball in a metric space - Open sets - Subspace - Interior of a set - Closed sets – Closure - Limit point - Dense sets.

Unit II **(15 Hrs)**

Complete metric space – Completeness – Cantor's intersection theorem – Baire's category theorem.

Unit III **(15 Hrs)**

Continuity – Homeomorphism – Uniform continuity – Discontinuous functions on R.

Unit IV **(15 Hrs)**

Connectedness – Definition & Examples – Connected subsets of R – Connectedness & Continuity.

Unit V **(15 Hrs)**

Compact space – Compact subsets of R – Equivalent characterization for compactness – Compactness and Continuity.

Text Book :

S. Arumugam & Isaac , "Modern Analysis" , New Gamma Publishing House –Palayamkottai, June 2010.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Core – XI : Operations Resrearch– 15UMAC53 **Duration: 90 Hrs**
Credits : 5

Aim and Objectives:

- To provide a scientific basis to the decision makers for obtaining optimal solution.
- To study about the formulation of Linear Programming Problem and its solution.
- To introduce the concept of Game theory
- To know about inventory control

Course Outcome :

- Identify and develop operational research models from the verbal description of the real System.
- Understand the mathematical tools that are needed to solve optimisation problems.
- Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes.
- Able to design new simple models, like: CPM, PERT ,etc to improve decision – making and develop critical thinking and objective analysis of decision problems.
- Formulate simple reasoning, learning and optimization problems, in terms of the representations and methods presented.
- Evaluate analytically the limitations of these algorithms, and assess tradeoffs between these algorithms.
- Demonstrate the hand execution of basic reasoning and optimization algorithms on simple problems

Unit I (Theorems without proof) **(15 Hrs)**

Linear Programming Problem: Mathematical Formulation of the problem - Graphical solution method – Some exceptional cases – General Linear Programming Problem – Canonical and standard forms of L.P.P - Linear Programming: Simplex method - The computational procedure. Use of artificial variables –Duality in Linear Programming - General Primal-Dual pair – Formulating a Dual problem - Primal-Dual pair in matrix form

Unit II **(15 Hrs)**

Games and strategies – Two person zero sum games – Some basic terms – The maximin-minimax principle – Games without saddle points-Mixed strategies – Graphic solution of 2×n and m×2 games – Dominance property – Arithmetic method for n×n games – General solution of m × n rectangular games .

Unit III (Theorems Without Proof) **(15 Hrs)**

Inventory control – The inventory decisions – Costs associated with inventories – Factors affecting inventory control – Economic order quantity – Deterministic inventory problems with no shortages - Deterministic inventory problems with shortages – EOQ problems with price breaks.

Unit IV **(15 Hrs)**

Network Scheduling by PERT/CPM – Network and Basic Components – Logical Sequencing –Rules of Network Construction – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM

Unit V **(15 Hrs)**

Resource analysis in network scheduling – Project cost – Time-cost optimization algorithm – Linear programming formulation – Updating – Resource allocation and scheduling.

Text Book :

Kanti Swarup, P.K.Gupta, Man Mohan , "Operations Research" ,Sultan Chand & Sons 23, Daryaganj, New Delhi, Twelfth thoroughly revised edition, 2005.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Core – XII : Mathematical Statistics –I – 15UMAC54 **Duration : 90 Hrs**
Credits : 5

Aim and Objectives:

- To introduce several statistical constants measures of central tendency, dispersion, skewness etc.
- To study about the relation between two variables
- To analyze the qualitative data.

Course Outcome :

- Gain knowledge in basic mathematical statistics..
- Able to collect, organise, and represent data, and be able to recognise and describe relationships
- Demonstrate the relevance and use of statistical tools for analysis and forecasting
- Gain the basic knowledge of measures of dispersion like mean, median and mode.
- Obtain a point estimate for the variance and standard deviation of the conditional distribution of the response variable given a value for the predictor.
- Know about the concept of correlation and regression.
- Construct a confidence interval for the slope of the regression line.
- Gain an in-depth knowledge of the various aspects of curve fitting of curves.
- Know about the concept of Index numbers.
- Understand the concept of Attributes.

Unit I **(15 Hrs)**

Central tendencies – Arithmetic Mean – Partition values (Median,Quartiles, Deciles and Percentiles) – Mode – Geometric mean and Harmonic Mean – Relative advantages of different averages – Measures of Dispersion – Relative advantages of different Measures of Dispersion - Moments-Skewness and kurtosis.

Unit II **(15 Hrs)**

Correlation and regression – Correlation – Rank Correlation – Regression – Correlation coefficient for a bivariate frequency distribution.

Unit III **(15 Hrs)**

Index Numbers – Consumer Price Index Numbers (Cost of living Index Numbers) – Conversion of Chain base index numbers into fixed base Index Numbers and conversely.

Unit IV **(15 Hrs)**

Curve fitting – Principle of least squares –Fitting a straight line – Fitting a second degree parabola – Fitting curves of the form $y= bx^a$, $y=ab^x$, $y=ae^{bx}$ - Analysis of Time Series: Time Series – Components of a Time Series – Measurement of Trends

Unit V **(15 Hrs)**

Theory of Attributes: Attributes – Consistency of data-Independence and Association of data.

Text Book:

S.Arumugam and A.Thangapandi Isaac , " Statistics " , New Gamma Publishing House, Palayamkottai , July 2011.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V
Optional / Elective Course – II : History of Mathematics – 15UMAO51
Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To enrich the knowledge about the axiomatic and genetic methods.
- To introduce the history of mathematics from the Old Stone Age period.s
- To study the contributions of mathematicians in various centuries.

Course Outcome :

- Acquire a knowledge of the history of mathematics
- Able to communicate mathematical ideas with others
- Know and demonstrate understanding of the concepts from the five branches of mathematics (number, algebra, geometry and trigonometry, statistics and probability, and discrete mathematics)
- Use appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
- Understand and be able to articulate the differences between inductive and deductive reasoning.

Unit I **(12 Hrs)**

Foundations of Mathematics

Unit II **(12 Hrs)**

History of Mathematics

Unit III **(12 Hrs)**

History of Indian Mathematics

Unit IV **(12 Hrs)**

History of Algebra, Geometry and Calculus

Unit V **(12 Hrs)**

Men of Mathematics

Text book:

K.S. Narayanan & K. Narasimhan, " A History of Mathematics" , Mercury printers, Palayamkottai , First Edition 1980.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Optional / Elective Course – II : Vector Calculus – 15UMAO52 Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To learn about gradient, divergence and curl
- To discuss the classical theory of curves and surfaces using vector methods
- To study about surface integrals

Course Outcome:

- Gain knowledge about the dot product of vectors, lengths of vectors, and angles between vectors.
- Evaluate line integrals of scalar functions or vector fields along curves.
- Recognize conservative vector fields, and apply the fundamental theorem for line integrals of conservative vector fields.
- Evaluate surface integrals; compute surface area.
- Evaluate integrals over parametric surfaces.
- Identify various quadric surfaces through their equations.
- Apply the divergence theorem to give a physical interpretation of the divergence of a vector field.
- Evaluate the velocity and acceleration of a particle moving along a space curve.
- Apply triple integrals to find volumes and center of mass

Unit I (12 Hrs)

Differentiation of vectors – A few results on differentiation of vectors – Meaning of the derivative of position vector – Physical applications – Level surfaces – The vector differential operator – Gradient – Direction and magnitude of gradient

Unit II (12 Hrs)

Divergence and curl – Solenoidal – Irrotational – Formulae involving operator ∇ – operators involving ∇ twice

Unit III (12 Hrs)

Space curve – Tangent at a given point – Curvature: Principal normal – Equation of the osculating plane at P – Binormal: Torsion Frenet's formulae

Unit IV (12 Hrs)

Line integral – Volume integral – Surface integral – Evaluation of the surface integral

Unit V (12 Hrs)

Gauss divergence theorem – Green's theorem – Stokes' theorem (without proof for all these theorems)

Text book:

S. Narayanan, T.K. Manicavachagom Pillai , "Vector Calculus" , S. Vishwanathan Printers and Publishers, PVT., LTD,Chennai , New Print 1997.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Optional / Elective Course -II : Mathematical methods in Social Sciences – 15 UMAO53
Duration : 60 Hrs
Credits : 3

Aims and Objectives:

- To enrich the knowledge about consumer behaviourism
- To apply optimization principle in production
- To study about the static-dynamic models

Course Outcome :

- Understand the mathematical methods that are most widely used in economics, both from a formal, abstract perspective, and an intuitive perspective.
- Know how to read, understand, and construct mathematical proofs, and appreciate their role in the derivation of mathematical concepts and structures.
- Apply mathematical methods and techniques that are formulated in abstract settings to concrete economic applications.
- Static (or equilibrium) analysis in which the economic unit (such as a household) or economic system (such as a market or the economy) is modeled as not changing.

Unit I **(12 Hrs)**

Theory of consumer behavior – Basic concepts – Equilibrium of the consumer – Demand function – Marshall's analysis – Price income and cross elasticities of demand – Indifference curve analysis – Price income and substitution effect sultsky's theorem – consumer's surplus – Marshall and Hicks Theory of revealed preferences – Weak and strong axioms.

Unit II **(12 Hrs)**

Theory of firms: Basic concepts – Production function – Isoquants optimization of outputs – Cost minimization – Profit maximization – Homogeneous production functions – Euler theorems – Colb Douglas and CES.Production function – Supply function – Exter Economics and dis– economics.

Unit III **(12 Hrs)**

Market equilibrium and perfect competition – Tools of analysis – Product pricing under perfect competition – very short period, short period, long period – Product pricing under monopoly – simple monopoly, discriminating monopoly.

Unit IV **(12 Hrs)**

Product pricing under monopolistic competition – Product pricing under duopoly and oligopoly – Factor pricing– rent, wages, interest, profit – Stability of equilibrium – Static stability – Dynamic stability – Lagged adjustment – Continued adjustment

Unit V **(12 Hrs)**

Input output analysis – Main features – The static – dynamic model – Dynamic input– output model – Balanced growth without excess capacity – Limitations of input – output analysis – Importance – Use of input– output teaching in development planning.

Text Book:

H.S.Agarwal , "A Mathematical approach to Economics" , Laxmi Narayanan Agarwal.

Reference Books:

1. Henderson quant-Micro-economics ,MC Graw Hill
2. Chiang- Mathematical Economics ,MC Graw Hill

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Skill Based Course – II : Lattices and Boolean Algebra – 15UMAS51

Duartion : 30 Hrs
Credits : 1

Aim and Objectives:

- To introduce lattices and various type of lattices.
- To study about Boolean algebra
- To learn Karnaugh Map and its applications.

Course Outcome :

- Able to recognize, identify, classify and describe the problems of set theory so that they can differentiate between functions and relations
- Understand abstract algebra, posets, lattices, Boolean algebra.
- Gain an the insight into the types of lattices and its properties.
- Demonstrate the concepts of Boolean algebra.
- Draw a Karnaugh map for a logic system with up to four inputs and use it to minimise the Boolean expression.
- By studying mathematical logic, they will be able to learn to use logically valid forms of arguments.

Unit I **(6 Hrs)**

Lattices – Some Properties of Lattices.

Unit II **(6 Hrs)**

New Lattices –Modular and Distributive Lattices.

Unit III **(6 Hrs)**

Boolean Algebras – Boolean Polynomials.

Unit IV **(6 Hrs)**

Karnaugh Map – Simplification of logical functions using Karnaugh map – Minimization algorithm for Boolean polynomials – Karnaugh maps for 5-variables and 6-variables.

Unit V **(6 Hrs)**

Switching Circuits.

Text Book:

Dr. M.K. Venkataraman , Dr. N. Sridharan, and N. Chandrasekaran , " Discrete Mathematics" , National Publishing Company, Chennai, Reprint January 2011.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – V

Skill Based Course – III : Quantitative Aptitute – I – 15 UMAS52 Duration : 30 Hrs
Credits : 1

Aim and Objectives:

- To solve the questions in a fraction of a minute using short-cut methods.
- To prepare for the competitive examinations.
- To have an idea of solving day-to-day problems.

Course Outcome :

- Able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- Understanding the properties of proportion and its usage.
- Able to add, subtract, multiply and divide whole numbers, decimal numbers and fractions.
- Manipulate equations and formulas in order to solve for the desired variable.
- Able to perform operations with surds and indices.
- Determine the square roots, cube roots of positive whole numbers, decimals and common fractions.

Unit I **(6 Hrs)**

Numbers – H.C.F & L.C.M of Numbers – Decimal Fractions.

Unit II **(6 Hrs)**

Simplification – Square roots & Cube roots – Average.

Unit III **(6 Hrs)**

Problems on numbers – Problem on ages – Surds & Indices – Percentage.

Unit IV **(6 Hrs)**

Profit & Loss – Ratio & Proportion – Partnership.

Unit V **(6 Hrs)**

Chain rule – Time & work – Pipes & Cistern.

Text Book:

R.S.Aggarwal , "Quantitative Aptitude" , S.Chand & Company LTD, Ram nagar, New Delhi, Reprint 2011.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Core – XIII : Linear Algebra – 15UMAC61 **Duration : 90 Hrs**
Credits : 5

Aim and Objectives:

- To study the basic algebraic structures like vector spaces and inner product spaces.
- To study vector spaces as an abstract algebraic system and establish some of the properties of such system.
- To study about matrices and its types.

Course Outcome :

- Present basic concepts of vector spaces
- Inculcate basic concepts of matrices and matrix algebra
- Present methods of solving systems of linear equations
- Demonstrate concepts of linear transformations
- Learn about the span of a set and linear independence.
- Demonstrate ability to work within vector spaces and to distil vector space properties.
- Present methods of computing and using eigen values and eigenvectors.
- Present the concept of and methods of computing determinants
- Able to find the change-of-basis matrix with respect to two bases of a vector space

Unit I **(15 Hrs)**

Vector spaces – Subspaces –Linear transformation.

Unit II **(15 Hrs)**

Span of a set – Linear independence – Basis and dimension – Rank and nullity – Matrix of a linear transformation.

Unit III **(15 Hrs)**

Inner product spaces – Orthogonality – Gram - Schmidt orthogonalization process – Orthogonal complement.

Unit IV **(15 Hrs)**

Algebra of Matrices – Types of Matrices – The inverse of the matrix – Elementary transformations – Rank of a matrix – Simultaneous linear equations – Characteristic equations and Cayley Hamilton theorem.

Unit V **(15 Hrs)**

Eigen values and eigen vectors of a matrix – Bilinear forms – Quadratic forms.

Text Book:

S. Arumugam & A. Thangapandi Issac , “ Modern Algebra” , Scitech publications (India) Pvt Ltd, Chennai , Reprint, July 2008.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Core – XIV : Complex Analysis – 15 UMAC62 **Duration : 90 Hrs**
Credits : 5

Aim and Objectives:

- To assist the students in learning fundamental ideas and theorems about complex plane
- To learn various transformations in complex plane
- To enrich their knowledge in complex integration

Course Outcome :

- Explain the fundamental concepts of complex analysis and their role in modern mathematics and applied contexts
- Demonstrate accurate and efficient use of complex analysis techniques
- Gain knowledge about the elementary transformation and bilinear transformation
- Compute the fixed points of a bilinear transformation.
- Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations;
- Evaluate integrals along a path in the complex plane and understand the statement of Cauchy's Theorem
- Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues
- Identify the isolated singularities of the function and determine whether they are removable, poles or essential.
- Compute innermost Laurent Series at an isolated singularity and determine the residue.
- Use the Residue theorem to compute complex line integral and real integreals.

Unit I **(15 Hrs)**

Functions of a complex variable – Limits – Theorems on Limit – Continuous functions – Differentiability – The CR equations – Analytic functions – Harmonic functions – Conformal mapping.

Unit II **(15 Hrs)**

Elementary transformation – Bilinear transformations – Cross ratio – Fixed points of bilinear transformation – Some special bilinear transformations – The Mapping $w=z^2$,$w=z^n$ $w=e^z$, $w=\sin z$, $w=\cos z$.

Unit III **(15 Hrs)**

Definite Integral – Cauchy's theorem – Cauchy's integral formula – Higher derivatives.

Unit IV **(15 Hrs)**

Taylor's series – Laurent's series – Zeros of an Analytic Function – Singularities.

Unit V **(15 Hrs)**

Residues – Cauchy's Residue Theorem – Argument Theorem – Rouche's theorem – Fundamental theorem of Algebra – Evaluation of definite integrals.

Text Book:

Dr. S. Arumugam , "Complex Analysis" , Scitech Publications (India) Pvt Ltd; Chennai, May 2011.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Core – XV : Differential Equations and its applications – 15 UMAC63

Duration : 90 Hrs
Credits : 5

Aims and Objectives:

- To create interest in learning Differential Equations
- To develop the skill in solving Differential Equations
- To study various methods of solving Differential Equations

Course Outcome :

- understand some basic definitions and terminology associated with differential equations and their solutions
- visualize the direction field associated with a first-order differential equation
- Use analytical methods of solution by direct integration; separation of variables; and the integrating factor method.
- identify a general method for constructing solutions to inhomogeneous linear constant-coefficient second-order equations
- Show an awareness of initial and boundary conditions to obtain particular values of constants in the general solution of second-order differential equations.
- Determine solutions to first order linear differential equations.
- Determine solutions to first order exact differential equations.
- Determine solutions to second order linear homogeneous differential equations with constant coefficients.
- Convert separable and homogeneous equations to exact differential equations by integrating factors.
- Classify the differential equations with respect to their order and linearity.

Unit I **(15 Hrs)**

Variables separable – Homogeneous equations – Non-homogeneous equations of the first degree in x and y – Linear equation – Bernouilli's equation - Exact differential equations – Applications of first order equations – Growth , Decay and Chemical Reactions.

Unit II **(15 Hrs)**

Equations solvable for dy/dx – Equations solvable for x and y – Clairaut's form–Equations that do not contain x explicitly – Equations that do not contain y explicitly – Equations homogeneous in x and y – Linear equation with constant coefficients – Linear equation with variable coefficients – Equations reducible to the linear equations – Newton's Law of Gravitation and the motion of Planets.

Unit III **(15 Hrs)**

Simultaneous equations of the first order and first degree – Solution of $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ – Methods for solving $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ – Geometrical interpretation of $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ – Simultaneous linear differential equations – Simultaneous equations with variable coefficients.

Unit IV **(15 Hrs)**

Complete solution for a given integral – Reduction to the normal form – Change of the independent variable – Variation of parameters – Methods of operational factors.

Unit V **(15 Hrs)**

Partial differential equations of the first order – Classification of integrals – Derivation of partial differential equations – Lagrange's method of solving the linear equation – Special methods; Standard forms – Charpit's method.

Text Book:

S.Narayanan and T.K.Manicavachagom pillay , "Equations and its Applications", S.Viswanathan (printers and publishers) P.Ltd. Chennai , 2011.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Core – XVI : Mathematical Statistics – II – 15UMAC64 **Duration : 90 Hrs**
Credits : 5

Aim and Objectives:

- To introduce the concept of discrete, continuous random variables
- To study about sampling theory
- To study the method employed to understand the parent population.
- To study the quantitative and qualitative characteristics of a population.
- To know about ANOVA

Course Outcome :

- Learn the concepts and methods of probability and distribution theory.
- Gain wide knowledge in probability which plays a main role in solving real life problems.
- Frame distribution functions and its types.
- Learn the applications of Binomial and Poisson distributions.
- Apply the standard discrete probability distribution to different real life situations.
- Determine a probability distribution of random variable (one or two dimensional) in the given situation
- Able to understand the significance of the connection between statistics and probability and their applicability to the real world
- Gain knowledge about the multivariate distributions.

Unit I **(15 Hrs)**

Probability – Conditional Probability – Random variables – Discrete Random variable – Continuous Random variable.

Unit II **(15 Hrs)**

Mathematical Expectations – Moment generating function – Characteristic function – Binomial distribution – Poisson distribution.

Unit III **(15 Hrs)**

Normal distribution – Sampling – Sampling Distribution – Testing of Hypothesis.

Unit IV **(15 Hrs)**

Procedure for testing of hypothesis for large samples – Tests of significance for large samples – Test of significance based on t-distribution – Test of significance based on F test – Test of significance of an observed sample correlation.

Unit V **(15 Hrs)**

χ^2 distribution – Test based on χ^2 -test – χ^2 -test to test the goodness of fit – Test for independence of attributes – Analysis of variance – One criterion of classification – Two criteria of classification – Three criteria of classification Latin Square.

Text Book:

S.Arumugam and A.Thangapandi Isaac, "Statistics" , New Gamma Publishing House, Palayamkottai , July 2011 .

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Optional / Elective Course – III : Fuzzy sets and Logics – 15UMAO61
Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To study the newly developed fuzzy concepts
- To introduce the concepts in fuzzy logics
- To study applications of fuzzy concepts

Course Outcome :

- Explain the fundamental concepts of fuzzy set.
- Demonstrate the concept of α-cut and its properties.
- Learn about Linguistic variables using fuzzy number.
- Compute the fuzzy number using the arithmetic operations.
- Able to know the relation of fuzzy set.
- Get the inference from conditional, quantified proposition.
- Understand the basic applications of fuzzy in engineering
- Get insight into interpersonal communication as an application of fuzzy.

Unit I **(12 Hrs)**

Fuzzy sets - Basic types - Fuzzy sets - Basic concepts - Additional properties of α-cuts - Representation of fuzzy sets - Extension principle for fuzzy sets - Types of operations - Fuzzy complements.

Unit II **(12 Hrs)**

Fuzzy numbers - Linguistic variables - arithmetic operations on intervals - arithmetic operations on intervals - arithmetic operation on fuzzy numbers

Unit III **(12 Hrs)**

Fuzzy relation - Crisp versus fuzzy relations - projections and cyclinderic extensions - Binary fuzzy relations on a single set - Fuzzy equivalence relations - Fuzzy compatibility relations - Fuzzy ordering relations

Unit IV **(12 Hrs)**

Fuzzy logic - Classical logic - An over view - multivalued logic - Fuzzy propositions - Fuzzy quantifiers - Linguistic Hedges - Inference from conditional fuzzy propositions - Inference from conditional and quantified propositions - Inference from quantified propositions

Unit V **(12 Hrs)**

Applications - Application to Civil Engineering - Computer Engineering - Reliability theory - Robotics - Medicine - Economics - Fuzzy regressions - Interpersonal communications

Text Book:

George J.Klir and B.Yuan, " Fuzzy sets and Fuzzy logic - Theory and applications", Prentice Hall , second edition (1995)

Reference Book:

A.J.Zimmermann , "Fuzzy set theory and its applications" ,Springer- International edition, fourth edition.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Optional / Elective Course – III : Stochastic Processes – 15UMAO62 Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To enrich the knowledge of applied probability and applied stochastic processes.
- To introduce non negative integral valued random variables and generating functions.
- To know about Markov chain.

Course Outcome :

- Apply the specialised knowledge in probability theory and random processes to solve practical problems.
- Gain advanced and integrated understanding of the fundamentals of and interrelationship between discrete and continuous random variables and between deterministic and stochastic processes.
- Analyse the performance in terms of probabilities and distributions achieved by the determined solutions.
- Demonstrate essential stochastic modelling tools like Markov chains .
- Evaluate the n-step transition probability.
- Learn about renewal theory.
- Demonstrate the transition function
- Know about the Birth – Death and Yule process
- Study the properties of Poission process and their characterization.
- Understanding of the relationship between the purpose of a model and the appropriate level of complexity and accuracy.

Unit I **(12 Hrs)**

Generating functions – Laplace transforms – Laplace (stieltjes) transform of a probability distribution or of a random variable – Difference equations – Differential - Difference equations – Matrix analysis.

Unit II **(12 Hrs)**

Specification of stochastic processes – Stationary processes.

Unit III **(12 Hrs)**

Definition and examples – Higher transition probabilities – Classification of states and chains – Determination of higher transition probabilities – Stability of a Markov system – Statistical inference for Markov chains - Markov chains with continuous state space – Non homogeneous chains.

Unit IV **(12 Hrs)**

Poisson Process – Poisson Process and Related Distributions – Generalizations of Poisson Process – Birth and Death Process – Markov Processes with Discrete State Space (Continuous Time Markov Chains) – Erlang process.

Unit V **(12 Hrs)**

Brownian motion - Wiener process –Differential equations for a Wiener process - Kolmogorov equations – First passage Time Distribution for wiener process.

Text Book:

J.Medhi , "Stochastic processes" , New age international (P) limited, publishers, Second edition, Reprint 2004.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Optional /Elective Course – III : Optimization Thechniques – 15UMAO63
Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To study about transportation cost optimization.
- To enrich the knowledge about O.R. and to explain how it gives integrated solutions for the entire organization.
- To know more about decision making problems in multi-stage.

Course Outcome :

- Understand and identify the need of using Operations Research techniques.
- Find optimum solution for real life problems.
- Gain the knowledge of transportation problem using many techniques.
- Find optimum solution using assignment method.
- Develop the ability to solve the transhipment problems.
- Inculcate the basic knowledge of sequencing problems.
- Enhance the ideas for solving the problems in crew scheduling.
- Describe about the concept of Dynamic programming.
- Make a wide knowledge in Dynamic programming for solving real life problems.

Unit I **(12 Hrs)**

General Transportation problem – The Transportation table – Duality in Transportation problem – Loops in Transportation tables – LP formulation of the Transportation problem – Triangular Basis in a T.P. – Solution of a Transportation Problem – Finding an Initial Basic Feasible Solution .

Unit II **(12 Hrs)**

Test for Optimality - Degeneracy in Transportation problem – Transportation Algorithm (MODI method) - Stepping Stone Solution method – Some Exceptional Cases – Time-minimization Transportation problem – Transhipment problems.

Unit III **(12 Hrs)**

Mathematical Formulation of the problem – The Assignment method – Special cases in Assignment problems – A Typical Assignment Problem – The Travelling Salesman Problem.

Unit IV **(12 Hrs)**

Problem of Sequencing – Basic Terms used in Sequencing – Processing n jobs through two machines – Processing n jobs through k machines – Processing 2 jobs through k machines – Maintenance Crew Scheduling.

Unit V **(12 Hrs)**

The Recursive equation approach – Characteristics of Dynamic programming – Dynamic programming algorithm – Solution of Discrete D.P.P – Some applications – Solution of L.P.P. by Dynamic programming.

Text Book:

Kanti Swarup, P.K.Gupta, Man Mohan, "Operations Research" , Sultan Chand & Sons, 23, Daryaganj, New Delhi , Twelfth Thoroughly Revised Edition,2005.

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Skill Based Course – IV : Quantitative Aptitude –II – 15UMAS61 Duration : 30 Hrs
Credits : 1

Aim and Objectives:

- To solve the questions in a fraction of a minute using short-cut methods.
- To prepare for the competitive examinations.
- To have an idea of solving day-to-day problems.

Course Outcome :

- Able to apply quantitative reasoning and mathematical analysis methodologies to understand and solve problems.
- Examine how to calculate using Simple and Compound formulas.
- Able to demonstrate an understanding of the difference between area and perimeter.
- Apply general mathematical models to solve a variety of problems.
- Apply the properties of logarithms to write logarithmic expressions in different forms, and evaluate the resulting expressions.
- Able to solve applications involving permutations and combinations.
- Understanding event, outcome, trial, simple event, sample space and calculate the probability that an event will occur.

Unit I (6 Hrs)

Time & Distance – Problems on trains – Boats & Streams – Alligation or Mixture.

Unit II (6 Hrs)

Simple interest – Compound interest – Logarithms.

Unit III (6 Hrs)

Area – Volume & surface areas – Races & Games of skill

Unit IV (6 Hrs)

Calendar– Clocks – Stocks & Shares – Permutations & Combinations.

Unit V (6 Hrs)

Probability – True Discount – Banker`s Discount – Heights & Distances – Odd man out & Series.

Text Book:

R.S.Aggarwal, " Quantitative Aptitude" , S.Chand & Company LTD, Ram nagar, New Delhi , Reprint 2011.

Sri Kaliswari College (Autonomous)-Sivakasi
Choice Base Credit System

UG Programme – B.Sc (Mathematics) – 2015-2018
Semester – VI

Value Based Course – II : Astronomy – 15UMAS61 **Duration : 30 Hrs**
Credits : 1

Aim and Objectives:

- To introduce the students to space science
- To study about duration of day and night time and different system of co-ordinates.
- To know about the changes in the azimuth of a star in the course of a day.

Course Outcome :

- Apply scientific reasoning to future astronomical discoveries to understand their validity as well as to everyday situations.
- Demonstrate an understanding that science is based upon observations of the universe and how that is used to understand some basic phenomenon of our world.
- Develop analytical skills and the ability to solve problems.
- Achieve a good understanding of physical laws and principles.
- Gain experience with measurement techniques and equipment, and develop the ability to assess uncertainties and assumptions.
- Understand the scale of items within the Universe
- Appreciate the wide variety of objects contained in the Universe
- Understand the relative sizes of the planets within the Solar System
- Calculate how long it takes for light to reach the Earth from the Sun.
- Describe the solar nebula model

Unit I **(6 Hrs)**

Sphere – Theorem "The section of a sphere by a plane is a circle" - Great circles and small circles – Axis and poles of a circle – Distance between two points on a sphere – Angle between two circles – Secondaries – Angular radius or spherical radius – Theorems i) The points of intersection of two great circles are the poles of the great circles joining their poles(without proof) (ii) The angle between two great circles is the angle between the tangents to the circles at a point of intersection (without proof) (iii) The length of an arc of a small circle is equal to the corresponding arc on the parallel great circle multiplied by the sine of its spherical radius (without proof) – Spherical figures - Spherical triangle – Polar triangle – Theorem "If A'B'C' is the polar triangle of ABC then ABC is the polar triangle of A'B'C'" – Relation between the elements of a spherical triangle and its polar triangle – Some properties of spherical triangles(without proof) – Principle of duality - Colunar and Antipodal triangles – Relations between the sides and angles of a spherical triangle – Cosine formula – Sine formula – Cotangent formula – Supplemental cosine formula.

Unit II **(6 Hrs)**

Five parts formula – Functions of half an angle – Functions of half a side – Delambre's analogies - Napier's analogies – Right angled spherical triangle – Theorem - Napier's rules – Spherical coordinates – Relations between the spherical and rectangular co-ordinates(without proof) – Worked examples.

Unit III **(6 Hrs)**

Astronomy – Celestial sphere – Diurnal motion, celestial axis and equator - Celestial Horizon – Zenith and Nadir – Celestial Meridian – Cardinal points – Northern and southern hemispheres – Eastern and western hemispheres – Visible and invisible hemispheres – Declination circles – Verticals – Parallactic angle – Rising and setting - Transit or culmination – Due east and due west – Due south and due north – Annual motion of the Sun, Ecliptic, Obliquity – First point of Aries and first point of Libra – Equinoxes and solstices – Colures – Celestial co-ordinates – Horizontal system – Definition of Azimath and altitude only - Equatorial system - Definition of Right Ascension and Declination(α,δ) only – Meridian system – Definition of Hour angle and Declination(h, δ) only - Ecliptic system – Definition of Celestial longitude and latitude(λ,β) only - Conversion of coordinates(without proof) – To find the relation between right ascension and longitude of the sun – To trace the changes in the co-ordinates of the sun in the course of a year – To find the Longitude of the sun on any day –Worked examples.

Unit IV **(6 Hrs)**

Experimental proofs for the Rotation of Earth – Worked examples - Dip of Horizon – To find an expression for Dip – To find the distance between two mountains whose tops are just visible from each other – Effects of Dip – To find the acceleration in the time of rising of a star due to dip – Worked examples.

Unit V **(6 Hrs)**

Twilight – To find the duration of twilight – To find the condition that twilight may last throughout night – To find the number of consecutive days having twilight throughout night – To find the duration of twilight when it is shortest – Civil, nautical and astronomical twilights – Worked examples.

Text Book:

S. Kumaravelu and Susheela Kumaravelu , " Astronomy" , S. Kumaravelu, Muruga Bhavanam, 244 Chidambaranagar, Nagercoil, Revised and enlarged edition – 2011.

UG Programme- B.Sc Physics/Chemistry -2015-2018
Semester I

Allied -I:Mathematics –I – 15UPHA11/15UCHA11 **Duration: 90 Hours**

Credits : 4

Aim and Objectives:

- To create interest in Mathematics
- To study about Statistical tools
- To know about Operations Research techniques

Course Outcome :

- Impart knowledge in basic mathematical statistics.
- Inculcate the basic knowledge of measures of dispersion like mean, median and mode.
- Know about the concept of correlation and regression.
- Gain an in-sight knowledge in the various aspects of fitting curves.
- Understand the concept of Index numbers.
- Understand and identify the need of using Operations Research.
- Find optimum solution of real life problems.
- Gain knowledge of linear programming technique using graphical solution method.
- Find optimum solution using assignment method.
- Gain knowledge of transportation problem using many techniques.

Unit I: **(18 Hrs)**

Mean – Median – Mode - Standard Deviation (Theorems without proof)

Unit II: **(18 Hrs)**

Curve fitting – Fitting a Straight line – Fitting a second degree parabola- Fitting curves of the form $y = bx^a$, $y = ab^x$ and $y = ae^{bx}$ - Correlation - Rank Correlation- Regression (Theorems without proof)

Unit III: **(18 Hrs)**

Index numbers-Consumer Price index numbers-Conversion of Chain base Index numbers into fixed base Index numbers and conversely.

Unit IV: **(18 Hrs)**

Linear Programming Problems - Formulation of LPP - Graphical solution method.

Unit V: **(18 Hrs)**

Mathematical formulation of an Assignment Problem-Optional solution of Assignment Problem- Mathematical formulation of Transportation Problem-Methods for obtaining initial feasible solution – Optimal solution of Transportation.

Text Book:

1. Dr.S.Arumugam, "Statistics", New Gamma Publishing House, 199-B/2, Trichendur Road, Behind Assembly of God Church, Palayamkottai, July 2009.
2. Dr.S.Arumugam , "Operations Research", New Gamma Publishing House, 199-B/2, Trichendur Road, Behind Assembly of God Church, Palayamkottai, Volume 1- First edition 2003.

UG Programme- B.Sc Physics/Chemistry -2015-2018
Semester II

Allied -II:Mathematics –II – 15UPHA21/15UCHA21 Duration: 90 Hours

Credits : 4

Aim and Objectives:

- To study about Differentiation and Integration
- Introduce Differential equation

Course Outcome:

- Attain the basic knowledge about equations and to solve equations in different Methods.
- Develop an analytic thinking in the concept of Transformation of equations.
- Demonstrate reciprocal equations
- Understand the concept of differentiation.
- Introduction about the higher derivatives.
- Endew with an in-depth knowledge of partial differentiation using Euler's theorem.
- Equip with the basic knowledge of integration.
- Expose to the various techniques like integration by parts and integration using reduction formula.
- Develop the skill of solving differential equations.
- Learn about exact differential equations and solving equations using integrating factor.

Unit I: (18 Hrs)

Theory of equations-Introduction-Formation of equation-Reciprocal equations-Transformations of equations-Approximate solutions of numerical equations

Unit II: (18 Hrs)

Differentiation –Higher derivatives-n th derivatives

Unit III: (18 Hrs)

Leibnitz Theorem-Partial Differentiation-Euler's Theorem

Unit IV: (18 Hrs)

Evaluation of definite integrals-Integration by parts-Reduction formula

Unit V: (18 Hrs)

Differential Equation-Exact differential Equations- Integrating factor-Linear Equations

Text Book:

1. Dr.S.Arumugam, "Calculus", New Gamma Publishing House, 199-B/2, Trichendur Road, Behind Assembly of God Church, Palayamkottai, July 2001.

2. Dr.S.Arumugam , “Ancillary Mathematics Paper I”, New Gamma Publishing House, 199-B/2, Trichendur Road, Behind Assembly of God Church, Palayamkottai, June2007.
3. Dr.S.Arumugam, “Differential Equation and its Application”, New Gamma Publishing House, 199-B/2, Trichendur Road, Behind Assembly of God Church, Palayamkottai, January 2008.

Semester I

Allied -I: Mathematical Foundations - 15UCSA11/15UCAA11/15UITA11

Duration : 60 Hrs

Credits : 3

Aim and Objectives:

- To introduce the basic concepts of sets and relations
- To study about logic
- To provide a basic foundation for Graph Theory concepts

Course Outcome :

- Understand the basic knowledge of Mathematical logics.
- Explain about the conditional statements and well formed formulas.
- Demonstrate the idea of sets and operations on sets.
- Understand the functions and relations which are defined on a set.
- Gain knowledge about matrices and its basic operations.
- Evaluate the inverse and rank of a matrix.
- Present the idea of graph theory and basic definitions which are related to graphs.
- Represent the graph as a matrix.
- Learn about the operations on graphs.
- Get acquainted with some special graphs.

Unit I: (12 Hrs)

Mathematical logic – Introduction – Statements – Laws of Formal logic – Connectives and compound Statements – Preposition – Solved Examples – Conditional statements – Well formed formulas – Tautology - Contradiction – Contingency – Logical equivalence – Solved Examples – Laws of logic – The duality principle – Solved Examples – Logical implication – Other connectives.

Unit II: (12 Hrs)

Set theory – Introduction – Sets and Operations on sets – Subsets – Null set – Singleton set – Finite set – Infinite set – Universal set – The power set – Disjoint sets – Properties of set containment-Union of sets -Properties of union operations – Intersection of sets – Properties of intersection operations – Distributive laws – Complement of a sets – Properties of Complementation – Properties of difference – Symmetric difference – Properties of symmetric difference – Relations – concept of relation – properties of relations – Miscellaneous Examples – Matrix representation of relations – Functions – introductions – Definitions – Restriction and Extension – One-to-One mapping – Onto mapping – Bijection – identity mapping – Compassion of function –Associative of mappings – Constant function - Inverse mapping.

Unit III: (12 Hrs)

Matrices - Matrix operations - Inverse of a square matrix - Elementary operations and Rank of a matrix.

Unit IV: (12 Hrs)

Introduction – Basic definitions – Incidence of degree – Order of a graph – Size of a graph – Solved Examples – Edges in Series Adjacency – Matrix representation of graphs – Linked representation

Unit V: (12 Hrs)

Walks, Paths and Circuits - Subgraphs – Removal of vertices and Edges from a graph – Addition of a vertex – Operations on graphs – Complement of a graph – Connected graph - Partitions

Text Book:

Study Material Prepared by Department of Mathematics

Allied -II: Operations Research - 15UCSA21/15UCAA21/15UITA21

Duration : 60 Hrs

Credits : 3

Aim and Objectives:

- To study about the formulation of Linear Programming Problem and find its solution.
- To study about Assignment & Transportation problem

Course Outcome :

- Present the history, nature and scope of operation research.
- Demonstrate the main Characteristics of Operations Research
- Inculcate the insight knowledge of Linear programming problem.
- Evaluate the solution of Linear programming problem using Graphical method.
- Understand the computational procedure of simplex method.
- Find the solution of Linear programming problem using simplex method, Big M Method and Two phase method.
- Find optimum solution using assignment method.
- Learn the application of assignment problem in real life situations.
- Study the computational procedure of Transportation problem.
- Gain knowledge of transportation problem using many techniques.

Unit I : (12 Hrs)

The Historical Development of Operations Research -The nature and meaning of Operations Research - Modeling in Operations Research - Main Characteristics of Operations Research - Main phases of Operations Research study –Tools, techniques and methods - Scope of Operations Research.

Unit II: (12 Hrs)

Linear programming problems -Formulation of Linear Programming Problem - Graphical solution of Linear Programming Problem - General formulation of Linear Programming Problem - Slack and surplus variables.

Unit-III (12 Hrs)

Computational procedure for Simplex methods – Simple way for simplex computations - Artificial variables technique.

Unit IV: (12 Hrs)

Mathematical formulation of Assignment problem - Hungarian method for Assignment problem - Examples- Unbalanced Assignment problem- Variations of the Assignment problem- Travelling salesman problem.

Unit V: (12 Hrs)

Mathematical formulation of Transportation problem- Initial Basic feasible solution to transportation problem – Moving towards Optimum solution – Transportation algorithm for

minimization problem - Degeneracy in transportation problem - Unbalanced transportation problem.

Text Book:

S.D.Sharma, “Operations Research”, Kedar Nath Ramnath & Co. 2003

Semester III

Allied –III: Fundamentals of statistics – 15UCSA31 **Duration : 60 Hrs**
Credits : 3

Aim and Objectives:

- To create interest in Mathematics
- To introduce how to classify statistical data's basic statistical methods.
- To introduce Measure of dispersion, correlation and Probability

Course Outcome :

- Understand the meaning, definition, nature, importance and limitations of statistics.
- Able to create, read, and interpret graphs, charts, histograms, and diagrams .
- Understand and use the basic measure of central tendency.
- Demonstrate the relevance and use of statistical tools for analysis and forecasting.
- Learn about the measures of dispersion.
- Inculcate knowledge about Correlation and Regression
- Understand the concept of probability.
- Evaluate the addition and multiplication theorem.

Unit I : **(12 Hrs)**

Collection of data-Introduction - Primary and secondary data - Choice between Primary and Secondary Data - Methods of collecting Primary data - Direct Personal Interviews – Indirect Oral Interviews – Information from Correspondents – Mailed Questionnaire Method - Delhi Metro Rail survey - Sources of secondary data – Published Sources – Unpublished Sources - Editing Primary and secondary data-Precautions in the use of secondary data -

Classification and tabulation of data – Introduction – Meaning and objectives of classification – Objects of classification – Types of classification – Geographical classification – Chronological classification – Qualitative classification – Quantitative classification – Formation of discrete frequency distribution – Formation of Continuous frequency distribution – Considerations in the construction of frequency distributions – Relative frequency distribution – Bivariate or Two-way frequency distribution - Tabulation of data – Difference between classification and tabulation – Role of tabulation – Parts of a table – General rules of tabulations – Review of the table – Types of tables – Diagrammatic and Graphic presentation – Introduction – Significance of diagrams and graphs – Comparison of tabular and diagrammatic presentation – Difference between diagrams and graphs – general rules for constructing diagrams – Types of diagrams – One-dimensional or Bar diagrams – Types of Bar diagrams – Two-dimensional diagrams – Three-dimensional diagrams – Pictographs and Cartograms – Graphs - Technique of constructing graphs - Graphs of time series or line graphs – Rules for constructing line graphs on natural scale – False base line - Graphs of one variable – Graph of two or more variables – Graphs having Two scales – Range chart – Band graph – Semi-logarithmic line graphs or ratio charts – Graphs of frequency distributions – Histogram – Frequency Polygon – Smoothed frequency curve – Cumulative frequency curve or Ogives.

Unit II: **(12 Hrs)**

Measures of central Value – Types of averages - Arithmetic Mean – Calculation of simple arithmetic mean-individual observations - Calculation of arithmetic mean-discrete series - Calculation of arithmetic mean-continuous series - Calculation of arithmetic mean in case of open end classes – Weighted arithmetic mean – Median – Calculation of median-individual observations – Computation of median-discrete series - Calculation of median-continuous series - Calculation of median when class intervals are unequal – Related positional measures – Computation of quartiles, percentiles, etc – Mode – Calculation of mode- individual observations – Calculation of mode- discrete series - Calculation of mode- continuous series – Geometric mean – Calculation of geometric mean-individual observations - Calculation of geometric mean-discrete series - Calculation of geometric mean-continuous series – Harmonic mean - Calculation of Harmonic mean-individual observations - Calculation of Harmonic mean-discrete series - Calculation of Harmonic mean-continuous series.

Unit III: **(12 Hrs)**

Measures of dispersion – Computation of quartile deviation –The mean deviation – Calculation of mean deviation-individual observations - Calculation of mean deviation-Discrete series - Calculation of mean deviation -continuous series – Calculation of standard deviation- individual observations - Calculation of standard deviation-Discrete series - Calculation of standard deviation -continuous series - Measures of skewness –Karl Pearson's coefficient of skewness – Bowley's coefficient of skewness – Kelly's coefficient of skewness.

Unit IV: **(12 Hrs)**

Correlation analysis – Types of correlation – Methods of studying correlation - Scatter diagram method – Karl Pearson's coefficient of correlation – Direct method of finding out correlation coefficient – Calculation of correlation coefficient when change of scale and origin is made – Calculation of correlation coefficient when deviations are taken from an assumed mean – Correlation of grouped data – Rank correlation coefficient – Regression Analysis – Regression lines – Regression equations – Regression equation of y on x - Regression equation of x on y – Deviations taken from arithmetic means of x and y(without proof) - Deviations taken from assumed means (without proof) – Regression equations in case of correlation table.

Unit V: (without proof) **(12 hrs)**

Calculation of probability - Experiment and Events – Mutually exclusive events – Independent and dependent events – Equally likely events – simple and compound events –

Exhaustive events – Complementary events – Addition theorem - Multiplication theorem - Conditional probability - Baye's theorem(without proof) – Mathematical expectation .

Text Book:

S.P.Gupta, "Statistical Methods" Sultan Chand and Sons, New Delhi , Forty Second Revised Editions, 2012

Semester IV

Allied –IV: Computer Oriented Numerical Methods – 15UCSA41

Duration : 60 Hrs
Credits : 3

Aim and Objectives:

- To apply numerical methods to solve problems in physical and technical applications
- To use numerical methods for solving linear algebraic equations which occur in Engineering and statistical problems \

Course Outcome:

- Introducte the learners to the methods of solving equations.
- Enable students to use numerical techniques to tackle problems that are not analytically solvable.
- Inculcate the basic knowledge of algebraic and transcendental equations.
- Introduce the concept of simultaneous linear equations.
- Find the solutions of simultaneous linear equations using Gauss elimination, Gauss Jordan and Gauss seidal methods.
- Introduce the concept of Interpolation which will be used to predict the data.
- Understand the concept of numerical differentiation.
- Find the derivatives using numerical formulae.
- Use various techniques like trapezoidal rule , simpson's rule and weddle's rule in solving s numerical integration problems.
- Learn about the solution of differential equations using different techniques like taylor's series method and Runge Kutta method.

Unit I: (12 Hrs)

Algebraic & Transcendental Equations: Errors in Numerical Computation – Iteration method – Bisection method – Regula Falsi method – Newton Raphson method.

Unit II: (12 Hrs)

Simultaneous Equation: Gauss elimination method – Gauss Jordan elimination method-Calculation of inverse of a matrix – Gauss seidel iteration method

Unit III: (12 Hrs)

Interpolation: Newton's interpolation formulae – Central difference interpolation formulae – Lagrange's interpolation formulae – Inverse interpolation

Unit IV: (12 Hrs)

Numerical Differentiation: Derivatives using Newton's forward and backward difference formulae– Numerical Integration: Trapezoidal rule – Simpson's rule-Weddle's rule – Boole's rule – Romberg's method.

Unit V: (12 Hrs)

Numerical solution of differential equations: Taylor's series method -Euler's method– Runge-kutta method.

Text book:

S. Arumugam & A.Thangapandi Issac, "Numerical Methods" SciTech Publication, Chennai, September 2007