KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

ERODE – 638 107

PROGRAM NAME

M.Sc. (Mathematics)

KONGU ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)

ERODE – 638 107

2021-2022

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ERODE – 638 107

SYLLABUS

Sem	Course Code	Core - II	Total Marks:100		Hours Per Week	Credits
I	21PBECT102	REAL ANALYSIS	CIA : 50	ESE :50	7	4

Course Objectives:

1. To give a systematic study in Real Analysis about Riemann Stieltjes Integral, Linear Transformations, Lebesque Measure and Lebesque Integral.
2. To obtain knowledge in analysis of real numbers to meet out employability.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Outline the concepts of the Riemann-Stieltjes Integral.	K1- K5
CO 2	Analyse Uniform Convergence and Continuity.	K1- K5
CO 3	Discuss about Linear transformations, Contraction mapping principle, Inverse function and Implicit function theorems.	K1- K5
CO 4	Analyse Lebesque measure.	K1- K5
CO 5	Discuss about Lebesque integral.	K1- K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit – I : The Riemann-Stieltjes Integral

Definition and Existence of the Integral – Properties of the Integral – Integration and Differentiation – Integration of Vector-valued Functions – Rectifiable Curves.

Text Book 1: Chapter 6 (Page No. 120 - 142)

Unit – II : Sequences and Series of Functions

Uniform Convergence - Uniform Convergence and Continuity – Uniform Convergence and Integration - Uniform Convergence and Differentiation- Equicontinuous Families of Functions – The Stone -Weierstrass Theorem.

Text Book 1: Chapter 7 (Page No. 147 - 171)

Unit – III : Functions of Several Variables

Linear Transformations - Differentiation– The Contraction Principle – The Inverse Function Theorem–The Implicit Function Theorem.

Text Book 1: Chapter 9 (Page No. 204 – 227)

Unit – IV : Lebesgue Measure

Introduction - Outer Measure – Measurable Sets and Lebesgue Measure – Measurable Functions – Littlewood's Three Principles.

Text Book 2: Chapter 3 (Except Section 4)(Page No. 54 – 64, 66 - 74)

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Unit – V :	**Lebesgue Integral**

The Lebesgue Integral of Bounded Function over a Set of Finite Measure – The Integral of a Non – negative Function – The General Lebesgue Integral.

Text Book 2: Chapter 4 (Section 2, 3 and 4 only) (Page No. 77 - 94)

SKILL DEVELOPMENT ACTIVITIES

1. Brief the applications of Riemann – Stieltjes integral through a power point presentation.
2. Solve and submit any 10 questions from previous year CSIR/ SET.
3. Verify that Lebesgue outer measure is translation invariant and find the measure of Cantor ternary set.

TEXT BOOKS

1	Walter Rudin, "Principles of Mathematical Analysis", 3rd Edition, McGraw Hill Book Company, New Delhi, 1976.
2	H.L.Roydon, "Real Analysis", 3rd Edition, Prentice-Hall of India Pvt. Ltd, New Delhi, 2001.

REFERENCE BOOKS

1	R.G.Bartle, "Elements of Real Analysis", 2nd Edition, John Wily and Sons, New York, 1976.
2	T.M.Apostol, "Mathematical Analysis", 2nd Edition, Narosa Publishing Company, Chennai, 1990.

Web Resources

1	http://www.maths.lth.se/matematiklu/personal/olofsson/CompHT06.pdf
2	www.pdfdrive.net
3	www.bookfi.net

Course Designed By	Verified By	Approved By HOD
Ms.C.RADHAMANI	Dr.S.SURESH	Dr.S.NAGARAJAN

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QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	M	M	M	S	S	M	M	M	M
CO2	M	M	M	M	M	M	S	S	M	M	M	M
CO3	S	M	M	M	M	M	S	S	S	S	S	M
CO4	S	M	M	M	M	M	S	S	M	S	S	M
CO5	S	M	M	M	M	M	S	S	M	S	S	M

S - Strong, M - Medium, L - Low

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Sem	Course Code	Core - III	Total Marks:100		Hours Per Week	Credits
I	21PBECT103	ORDINARY DIFFERENTIAL EQUATIONS	CIA : 50	ESE :50	6	4

Course Objectives:

1. To impart knowledge in the concepts of Picard's theorem, Simultaneous differential equations of the form $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$, Legendre equation and Legendre polynomials, Bessel equation, Existence and Uniqueness theorems.
2. To develop employability opportunities by obtaining knowledge in solving ordinary differential equations.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Determine the Picard's method of successive approximation and Problems of existence and uniqueness.	K1 – K5
CO 2	Solve the Simultaneous differential equations.	K1 – K5
CO 3	Find the solution of Legendre equation, Legendre polynomials and Bessel functions.	K1 – K5
CO 4	Solve the Existence and uniqueness theorem and Fundamental matrix.	K1 – K5
CO 5	Determine the general solution of linear systems.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Picard's Iterative Method. Uniqueness and Existence Theorem

Introduction - Picard's method of successive approximation -Working rule for Picard's method of solving simultaneous differential equations with initial conditions - Problems of existence and Uniqueness - Lipschitz condition - Picard's Theorem . Existence and Uniqueness theorem –An important theorem- Solved examples.

Text Book : 1- Chapter 1 : Sections 1.1 – 1.8 (Page No: 1.3 – 1.26)

Unit – II: Simultaneous differential equations of the form $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$

Introduction -The nature of solution of $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Geometrical interpretation of $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Rule I for solving $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Rule II for solving $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Rule III for solving $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Rule IV for solving $\frac{(dx)}{P} = \frac{(dy)}{Q} = \frac{(dz)}{R}$ - Orthogonal trajectories of a system of curves on a surface - Solved examples.

Text Book : 1- Chapter 2 : Sections 2.1 – 2.12 (Page No: 2.1 – 2.24)

Unit – III : Solutions in Power Series

Second order linear equations with ordinary points – Legendre equation and Legendre polynomials – Second order equation with regular singular point – Properties of Bessel functions.

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Text Book : 2- Chapter 3 : Sections 3.2 – 3.5 (Page No: 69 - 91)	
Unit – IV :	**System of Linear Differential Equations**
Introduction – Systems of first order equations– Existence and uniqueness theorem– Fundamental matrix. **Text Book : 2- Chapter 4 : Sections 4.1, 4.2, 4.4, 4.5 (Page No: 92 – 96, 99 - 108)**	
Unit – V :	**System of Linear Differential Equations**
Non-homogeneous linear systems – Linear systems with constant coefficients –Linear systems with periodic coefficients. **Text Book : 2- Chapter 4 : Sections 4.6– 4.8(Page No: 108- 128)**	
SKILL DEVELOPMENT ACTIVITIES	
1. Give a power point presentation of existence and uniqueness theorems and their applications. 2. Solve and submit any 10 questions from previous year CSIR/ SET. 3. Chart out and explain the applications of Bessel's Recurrence relation in Engineering Mathematics.	
TEXT BOOKS	
1	Dr.M.D.Raisinghania, " Advanced Differential Equations", S.Chand & Company Ltd., New Delhi , 2016.
2	S.G.Deo , V. Lakshmikantham and V.Raghavendra. "Ordinary Differential Equations", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 1997.

REFERENCE BOOKS	
1	Earl A.Coddington and N.Levinson, "Theory of Ordinary Differential Equations", McGraw Hill, NewYork,1972.
2	S.G.Venkatachalapathy, "Ordinary Differential Equations(for M.Sc. Mathematics)", Margham Publications, Chennai, 2005.
Web Resources	
1	https://users.math.msu.edu/users/gnagy/teaching/ode.pdf
2	https://www.math.uefa.edu/~yanovsky/handbooks/ODEs.pdf
3	www.bookfi.net

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Course Designed By	Verified By	Approved By HOD
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QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	M	M	M	M	S	S	M	S	M	S
CO2	S	M	M	M	M	M	S	S	M	S	M	S
CO3	S	M	M	M	S	M	S	S	M	S	M	S
CO4	S	M	M	M	S	M	S	S	M	S	M	S
CO5	S	M	M	M	S	M	S	S	M	S	M	S

S - Strong, M - Medium, L - Low

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Sem	Course Code	Core - IV	Total Marks:100		Hours Per Week	Credits
I	21PBECT104	NUMERICAL ANALYSIS	CIA : 50	ESE :50	6	4

Course Objectives:

1. To make the students understand and solve Algebraic and Transcendental Equations, Interpolation, Numerical Differentiation and Integration, Ordinary Differential Equations and Partial Differential Equations.
2. To impart the skills of numerical methods in finding approximate solutions.

Course Outcomes (CO): On completion of the course, students should be able to

CO 1	Find the solution of algebraic and transcendental equations.	K1 – K5
CO 2	Solve Interpolation problems.	K1 – K5
CO 3	Find the Numerical solution of Differentiation and Integration problems.	K1 – K5
CO 4	Compute Numerical Solution of Ordinary Differential Equations.	K1 – K5
CO 5	Classify and find the Numerical Solution of Partial Differential Equations.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Solution of Algebraic and Transcendental Equations

Introduction - Iteration Method- Newton-Raphson Method – Ramanujan's Method - Secant Method - Muller's Method - Graeffe's Root -Squaring Method.

Chapter II - Sections 2.1, 2.4 -2.9 (Page No: 22, 31-56)

Unit – II: Interpolation

Introduction - Errors in Polynomial Interpolation. Finite Differences : Forward Difference - Backward Difference - Central Difference - Symbolic Relations and Separation of Symbols- Detection of Errors by Use of Difference Tables - Difference of a polynomial - Newton's Formulae for Interpolation.

Central Difference Interpolation Formulae : Gauss's Central Difference Formulae - Stirling's Formula - Bessel's Formula - Everett's Formula- Relation between Bessel's and Everett's Formulae.

Chapter III - Sections 3.1 - 3.7 (Page No: 73 – 97)

Unit – III : Numerical Differentiation and Integration

Introduction – Numerical Differentiation: Errors in Numerical Differentiation - Cubic Spline Method - Differentiation Formulae with Function Values - Maximum and Minimum values of a tabulated Function

Numerical Integration: Trapezoidal rule - Simpson's 1/3 Rule - Simpson's 3/8 Rule -Boole's and Weddle's Rules - Use of cubic Splines - Romberg integration–Newton-Cotes Integration Formulae.

Chapter VI - Sections 6.1 - 6.4 (Page No: 207-232)

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Unit – IV :	Numerical Solution of Ordinary Differential Equations

Introduction - Solution by Taylorseries - Picard's Method of Successive Approximations -Euler's Method: Error Estimates for the Euler Method – Modified Euler's Method - Runge – Kutta Methods - Predictor - Corrector Methods : Adams- MoultonMethod - Milne'sMethod.

Chapter VIII - Sections 8.1 - 8.6 (Page No: 302 - 321)

Unit – V :	Numerical Solution of Partial Differential Equations

Introduction – Laplace's Equation - Finite-difference Approximations to Derivatives - Solution of Laplace's Equation : Jacobi's Method - Gauss- Seidel Method - Successive Over -Relaxation Method - ADI Method - Heat Equations in One Dimension : Finite -difference Approximations - Iterative Methods for the Solution of Equations.

Chapter IX - Sections 9.1 - 9.6 (Page No: 342 - 368)

SKILL DEVELOPMENT ACTIVITIES

1. Chart out and explain few situations where numerical methods can be applied?
2. Prepare an analysis report based on direct and indirect method in solving linear algebraic equations.
3. List out and explain the methods available to solve ordinary and partial differential equations.

TEXT BOOK

1	S.S.Sastry, " Introductory Methods of Numerical Analysis", 5th Edition, PHI Learning Private Limited, Delhi, 2013.

REFERENCE BOOKS

1	P.Kandasamy, K.Thilagavathy and K.Gunavathi, "NUMERICAL METHODS", S.Chand&Company pvt. Ltd., Reprint 2015
2	R.L.Burdenand J.Douglas Faires,"Numerical Analysis", 4thEditionP.W.S.Kent Publishing Company,Boston,1989.
3	M.K.Venkataraman,"Numerical Methods in science and Engineering" NationalPublishing company 5th Edition 1999.

Web Resources

1	https://lecturenotes.in/notes/7810-notes-for-numerical-methods-nm-by-ranu- singh?reading=true
2	https://examstime.in/numerical-analysis-study-materials/#Numerical-Methods-E-Books
3	www.bookfi.net

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Course Designed By	Verified By	Approved By HOD
Dr.S.SURESH	Dr.M.LALITHA	Dr.S.NAGARAJAN

QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	M	M	M	M	S	S	M	S	M	S
CO2	S	M	M	M	M	M	S	S	M	S	M	S
CO3	S	M	M	M	S	M	S	S	M	S	M	S
CO4	S	M	M	M	S	M	S	S	M	S	M	S
CO5	S	M	M	M	S	M	S	S	M	S	M	S

S - Strong, M - Medium, L - Low

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Sem	Course Code	Elective I	Total Marks:100		Hours Per Week	Credits
I	21PBEET106	OBJECT ORIENTED PROGRAMMING IN C++	CIA : 50	ESE :50	4	4

Course Objectives:

1. To enable the students to understand the concepts of C++ Programming structures, Classes and Objects, Control statements, Functions, Operators, and Inheritance properties.
2. To learn the skills in C++ programming language.

Course Outcomes (CO): On completion of the course, students should be able to

CO1	Know about basic concepts of Object Oriented Programming.	K1 – K5
CO2	Understand Tokens, Expressions and Control structure.	K1 – K5
CO3	Know about functions Manage in C++ and Console I/O operations.	K1 – K5
CO4	Understand classes, objects, constructors and destructors.	K1 – K5
CO5	Utilize Operators overloading and Inheritence.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Principles of object-Oriented Programming

Software evolution – A look at procedure-oriented Programming – Object-oriented Programming Paradigm– Basic Concept of Object-Oriented Programming – Benefits of OOP – Object-Oriented languages – Applications of OOP.

Chapter 1 : Sections 1.2-1.8(Page No: 3 – 13)

Unit – II: Tokens, Expressions and Control structures

Introduction – Tokens – Keywords – Identifiers and constants – basic data types – User defined data types – Storage Classes - Derived data types – Symbolic constants – Type Compatibility - Declaration of variables – Dynamic initialization of variables – Reference variables – operations in C++ - Scope resolution operator –Member Dereferencing Operators - Memory management operators –Manipulators – Type cast Operator - Expressions and their types – Control structures.

Chapter 3-Sections: 3.1 – 3.21, 3.25 (Page No: 30 – 58, 60-64)

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Unit – III :	Functions in C++

Introduction – The main function – Function prototyping – Call by reference – Return by reference - Inline functions – Default arguments – Constant arguments – Function over loading. Managing Console I/O operations: Introduction – C++ streams – C++ stream classes – Unformatted I/O operations - Formatted I/O operations – Managing output with manipulators.

Chapter 3- Sections:4.1 – 4.10, 10.1- 10.6 (Page No: 71 – 84, 261 - 285)

Unit – IV :	Classes and Objects

Introduction – Specifying a class – Defining Member Functions – A C++ Program with class – Making an outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a class – Memory Allocation for Objects – Static Data members – static member Functions - Arrays of Objects – Objects as Function Arguments – Friendly functions – Returning Objects – Constant Member Functions.

Constructors and Destructors: Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a class - Constructors with Default Arguments - Copy Constructor – Dynamic Constructors – Constructing Two-Dimensional Arrays- Const Objects - Destructors.

Chapter 5- Sections: 5.1 - 5.17(Page No: 90-122), Chapter 6- Sections: 6.1 – 6.11 (Page No:131-150)

Unit – V :	Operators overloading

Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators.

Inheritance: Defining Derived Classes – Single inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance.

Chapter 7 – Section 7.1-7.4 (Page No: 155-161), Chapter 8 - Section: 8.1- 8.8 (Page No: 182- 205)

SKILL DEVELOPMENT ACTIVITIES

1. Develop a coding for a real time problem.
2. Debug errors in the given program.
3. Prepare a mark statement on your own using C++.

TEXT BOOK

1	E. Balaguruswamy, "Object Oriented Programming with C++", Tata McGraw-Hill Publishing Company limited, 1999.

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REFERENCE BOOKS	
1	Ashok N Kamthane , "Object-Oriented Programming with ANSI and TURBOC C++," Pearson Education publication. 2003.
2	Maria Litvin & Gray Litvin , "C++ for you", Vikaspublication, 2002.

Web Resources	
1	http://www.ddegjust.ac.in/studymaterial/mca-3/ms-17.pdf
2	https://lecturenotes.in/notes/6206-notes-for-object-oriented-programming-using-cpp-oop-by-swarnalata-rath

Course Designed By	Verified By	Approved By HOD
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QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory- Case Study

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Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	M	M	M	M	S	M	M	M	M
CO2	M	M	M	M	M	M	M	S	M	M	M	M
CO3	M	M	M	M	M	M	M	S	M	M	M	M
CO4	S	S	M	M	M	M	M	S	M	M	M	M
CO5	M	M	M	M	M	M	M	S	M	M	M	M

S - Strong, M - Medium, L - Low

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Sem	Course Code	Core - VII	Total Marks:100		Hours Per Week	Credits
II	21PBECT203	CLASSICAL MECHANICS	CIA : 50	ESE :50	6	4

Course Objectives:

1. To impart knowledge among the students in the concepts of D'Alembert principle, Lagrange's equations, Hamilton equations of motion, Canonical transformations and Hamilton Jacobi theory.
2. To gain knowledge in combining Mathematical and Physical concepts for getting employability skills.

Course Outcomes (CO): On completion of the course, students should be ableto

CO 1	Analyze mechanical behavior of particle.	K1 – K5
CO 2	Study Lagrange's equations for various systems.	K1 – K5
CO 3	Solve the Hamilton Equations of Motion.	K1 – K5
CO 4	Understand the concepts of Canonical transformation and Poisson brackets.	K1 – K5
CO 5	Solve Hamilton – Jacobi theory and the Harmonic Oscillator problem.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Survey of the Elementary Principles

Mechanics of a particle - Mechanics of a system of particles - Constraints – D'Alembert's Principle and Lagrange's equations - Simple applications of the Lagrangian formulation.

Chapter I : Sections 1.1 – 1.4 , 1.6 (Page No: 1-20, 25-34)

Unit – II: Variational Principles and Lagrange's Equations

Hamilton's principle -Some techniques of the calculus of variations- Derivation of Lagrange's equations from Hamilton's principle -Extension of Hamilton's principle to non holonomic systems.

Chapter II : Sections 2.1 – 2.4 (Page No: 35 - 51)

Unit – III : The Hamilton Equations of Motion

Legendre transformations and the Hamilton equations of motion - Cyclic coordinates and Conservation theorems - Routh's procedure and oscillations about steady motion- Derivation of Hamilton's equations from a variational principle - The principle of least action.

Chapter VIII : Sections 8.1 – 8.3, 8.5 - 8.6 (Page No: 339-356, 362-377)

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Unit – IV :	**Canonical Transformations**
The equations of Canonical transformation – Examples of Canonical transformations- Poisson brackets and other Canonical invariants. **Chapter IX : Sections 9.1 , 9.2 and 9.4 (Page No: 378-390, 397-405)**	
Unit – V :	**Hamilton – Jacobi theory**
The Hamilton – Jacobi equation for Hamilton's principal function - The Harmonic Oscillator problem as an example of Hamilton – Jacobi method - The Hamilton – Jacobi equation for Hamilton's characteristics function – Separation of variables in the Hamilton –Jacobi equation. **Chapter X : Sections 10.1 - 10.4 (Page No: 438-457)**	
SKILL DEVELOPMENT ACTIVITIES	
1. Prepare any one physical model related to the syllabus. 2. Solve and submit any 10 questions from previous year CSIR/ SET. 3. Give few real time examples for principle of conservation energy.	
TEXT BOOK	
1	Herbert Goldstein, "Classical Mechanics", Second Edition, Narosa Publishing House , New Delhi, 2001.

REFERENCE BOOKS	
1	S.G.Venkatachalapathy, "Classical Mechanics (for M.Sc. Mathematics)", Margham, Publications, Chennai, 2006.
2	Donald T.Greenwood, "Classical Dynamics", Dover Publication, New York, 1977.
Web Resources	
1	http://www.thphys.nuim.ie/Notes/MP350/MP350-lectures.pdf ; http://www.freebookcentre.net/physics-books-download/Classical-Mechanics-Course- Material.html
2	www.pdfdrive.net
3	www.bookfi.net

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QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	M	S	M	M	S	S	M	S	M	S
CO2	S	M	M	S	M	M	S	S	M	S	M	S
CO3	S	M	M	S	S	M	S	S	M	S	M	S
CO4	S	M	M	S	S	M	S	S	M	S	M	S
CO5	S	M	M	S	S	M	S	S	M	S	M	S

S - Strong, M - Medium, L - Low

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Sem	Course Code	Core - VIII	Total Marks:100		Hours Per Week	Credits
I	21PBECT204	OPERATIONS RESEARCH	CIA : 50	ESE :50	7	4

Course Objectives:

1. To introduce the basic concepts of Linear Programming problems, Network models, advanced linear programming and the measures of performance for some queueing models.
2. To inculcate entrepreneurial skills in business decision making by using operations research.

Course Outcomes (CO): On completion of the course, students should be able to

CO1	Learn the concepts of Linear Programming problems and find its solution.	K1 – K5
CO2	Gain knowledge about duality and post-Optimal Analysis Transportation Model.	K1 – K5
CO3	Learn Network Models.	K1 – K5
CO4	Gain knowledge in Queueing systems.	K1 – K5
CO5	Gain knowledge of Poisson Queues and Queueing models.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Operations Research

What is Operations Research?: - Operations research Models – Solving the OR Model – Queuing and Simulation Models- Art of Modeling.

Modeling with Linear Programming:- Two variable LP Model – Graphical LP Solution.

The Simplex Method and Sensitivity Analysis:- LP Model in equation form - The Simplex method:- Iterative Nature of the Simplex method – Computational Details of the Simplex Algorithm - Artificial starting solution - Special cases in the simplex method.

Chapter 1: Sections 1.1-1.4(Page No: 1 – 6), Chapter 2 : Sections 2.1, 2.2 (Page No: 12 – 26)

Chapter 3 : Sections 3.1 (Page No: 82 – 85), 3.3(Page No: 90 – 99), 3.4, 3.5 (Page No: 103 – 122)

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Unit – II:	Duality and Post-Optimal Analysis

Duality and Post-Optimal Analysis: -Definition of the dual problem- primal – Dual relationships.

Additional simplex algorithms:- Dual Simplex Method.

Transportation Model and its variants:- Definition of the transportation model-

Nontraditional transportation models- The transportation algorithm- The Assignment model.

Chapter 4 : Sections 4.1, 4.2,4.2.1,4.2.2,4.2.3 (Page No: 151 – 165), 4.4.1 (Page No: 174 – 179)

Chapter 5 : Sections 5.1-5.4(Page No: 193 –229)

Unit – III :	Network Models

Network Models:- Scope and definition of Network models– Minimal Spanning Tree Algorithm – Shortest Route Problem .

Chapter 6: Sections 6.1-6.3 (Page No: 235 – 262)

Unit – IV :	Queuing Systems

Queueing Systems: Why Study Queues? – Elements of a Queueing Model – Role of Exponential Distribution – Pure Birth and Death Models (Relationship between the Exponential and Poisson Distributions).

Chapter 15: Sections 15.1- 15.4 (Page No: 549-563)

Unit – V :	Queuing Model

Generalized Poisson Queueing Model -Specialized Poisson Queues - (M/G/1): (GD/ /)- Pollaczek-Khintchine (P-K) Formula

Chapter 15 : Sections 15.5-15.7(Page No: 563 – 597)

SKILL DEVELOPMENT ACTIVITIES

1. Real Life applications of Transportation and Assignment model.
2. Brief the applications of network models through a power point presentation.
3. Real Life applications of Queueing Theory.

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TEXT BOOK	
1	Hamdy A. Taha "Operations Research: An Introduction", 8th Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2008.

REFERENCE BOOKS	
1	KantiSwarup, P.K.Gupta, Man Mohan, "Operations Research", Sultan Chand and Sons, New Delhi, Sixteenth Edition 2012.
2	Er. Premkumar Gupta and D.S.Kira, "Problems in Operations Research", S.Chand and Company Ltd, New Delhi, 2012.
Web Resources	
1	https://thalis.math.upatras.gr/~tsantas/DownLoadFiles/Taha%20-%20Operation%20Research%208Ed.pdf
2	http://home.ustc.edu.cn/~liweiyu/documents/Operations%20Research.%20An%20Introduction-%20H.A.%20Taha-%20Pearson%202007.pdf

Course Designed By	Verified By	Approved By HOD
Dr.M.LALITHA	Ms.C.RADHAMANI	Dr.S.NAGARAJAN

QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

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Mapping of COs with POs and PSOs												
PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	M	M	M	M	S	S	M	S	M	S
CO2	S	M	M	M	M	M	S	S	M	S	M	S
CO3	S	M	M	M	S	M	S	S	M	S	M	S
CO4	S	M	M	M	S	M	S	S	M	S	M	S
CO5	S	M	M	M	S	M	S	S	M	S	M	S
S - Strong, M - Medium, L - Low												

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Sem	Course Code	Elective I	Total Marks:100		Hours Per Week	Credits
I	21PBEET105	LaTeX	CIA : 50	ESE :50	4	4

Course Objectives:

1. To introduce the Mathematical typesetting tool LaTeX for high-performance mathematical notations and visualization.
2. To apply LaTeX built-in functions for mathematical notations and equations.
3. To develop the skills in LaTeX for scientific documentation.

Course Outcomes (CO): On completion of the course, students should be able to

CO1	Know about Text formatting and Basics of a LaTeX file.	K1 – K5
CO2	Know about commands and environments.	K1 – K5
CO3	Do document Layout and Organization.	K1 – K5
CO4	Draw pictures in LaTeX.	K1 – K5
CO5	Create tables and type mathematical formulas, environments and symbols in LaTeX.	K1 – K5

K1 :Recall; K2: Understand; K3 :Apply; K4: Analyze; K5 : Evaluate

Unit –I : Commands and Environments

Command names and arguments – Environments- Declarations – Lengths – Special characters – Fragile commands

Chapter 2 : Sections : 2.1 – 2.6 (Page No : 15 – 23)

Unit – II: Document Layout and Organization

Document class – Page style – Parts of the document – Table of contents– Fine- tuning text – Word Division.

Chapter 3 : Sections : 3.1 – 3.6 (Page No : 25 – 56)

Unit – III : Displayed Text

Changing font – Centering and indenting – Lists – Generalized lists –Theorem like declarations – Tabulator stops.

Chapter 4 : Sections : 4.1 – 4.6 (Page No : 57 – 84)

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Unit – IV :	Displayed Text (Continued)
Boxes – Tables – Printing literal text – Footnotes and marginal notes – Comments within text. **Chapter 4 : Sections : 4.7 – 4.11(Page No : 84 - 116)**	

Unit – V :	Mathematical Formulas
Mathematical environments - Main elements of Math mode - Mathematical symbols – Additional elements – Fine tuning Mathematics. **Chapter 5: Sections : 5.1 – 5.5 (Page No : 117 - 149)**	

SKILL DEVELOPMENT ACTIVITIES

1. Create a document in book format
2. Covert a LaTeX file to a power point presentation using Beamer Software.
3. Prepare a sample article for a Mathematical journal.

TEXT BOOK

1	H. Kopka and P.W. Daly, "A Guide to LaTeX", Third Edition, Addison –Wesley, London, 1999.

REFERENCE BOOKS

1	Leslie Lamport, " A Document Preparation system", second Edition, Addison – Wesley, 1994.
2	Tobias Oetiker, Hubert Part, Irene Hyna and Elisabeth Schlegl, "LaTeX 2e" Cambridge, USA, 2007.

Web Resources

1	https://www.maths.ox.ac.uk/system/files/legacy/2875/TexLaTeX_Intro2012MT-Ver2_1.pdf
2	http://g2pc1.bu.edu/~qzpeng/manual/latex-guide.pdf

Course Designed By	Verified By	Approved By HOD
Dr.M.LALITHA	Dr.S.NAGARAJAN	Dr.S.NAGARAJAN

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QUESTION PAPER PATTERN		
Time: 3 hours		**Max. Marks: 50**
SECTION-A(10 X 1 = 10 Marks) Answer ALL the questions Choose the correct answer	**SECTION-B (5 X 3 = 15 Marks)** Answer ALL the questions Either or type Two questions from each unit	**SECTION-C (5 X 5 = 25 Marks)** Answer ALL questions Question Number: 16 to 19 (Either or type) Question Number 20 is Compulsory-Case Study

Mapping of COs with POs and PSOs

PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	M	S	M	M	M	S	M	M	M
CO2	M	M	M	M	S	M	M	M	S	M	M	M
CO3	M	M	M	M	S	M	M	M	S	M	M	M
CO4	M	M	M	M	S	M	M	M	S	M	M	M
CO5	M	M	M	M	S	M	M	M	S	M	M	M

S - Strong, M - Medium, L - Low

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Sem	Course Code	Elective II	Total Marks:100		Hours Per Week	Credits
II	21PBEEP206	OBJECT ORIENTED PROGRAMMING IN C++ PRACTICAL	CIA : 25	ESE:75	4	4

Objective:

To apply the skills in coding and debugging using C++ programming language.

Course Outcomes(CO): On the successful completion of the course, students will be able to

CO1	create a class FLOAT.
CO2	represent points in the polar and rectangle systems.
CO3	create a class MAT of size M*N.
CO4	find Area Computation using Derived Class.
CO5	apply overloading concepts for vector addition, Multiplication of a vector by a scalar quantity

LIST OF EXPERIMENTS :

1. Overloading Objects: Create a class FLOAT that contains one float data member overload all the four arithmetic operators so that operate on the objects of FLOAT.
2. Polar Conversion: Define two classes polar and rectangular to represent points in the polar and rectangle systems. Use conversion routines to convert from one system to another.
3. Overloading Matrix: Create a class MAT of size M*N. Define all possible matrix operations for MAT type objects. Verify the identity. $(A-B)^2 = A^2+B^2 - 2*A*B$
4. Area Computation using Derived Class: Area of rectangle = $X*Y$

   Area of triangle = $\frac{1}{2} * X * Y$
5. Vector Problem: Define a class for vector containing scalar values. Apply overloading concepts for vector addition, Multiplication of a vector by a scalar quantity, replace the values in a position vector.

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PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	L	M	L	M	M	M	M	S	M	M	L	M
CO2	M	M	L	M	M	M	M	S	M	M	L	M
CO3	L	M	L	M	M	M	M	S	M	M	L	M
CO4	S	S	L	M	M	M	M	S	M	M	L	M
CO5	L	M	L	M	M	M	M	S	M	M	L	M

S - Strong, M - Medium, L - Low

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Sem	Course Code	Elective II	Total Marks:100		Hours Per Week	Credits
II	21PBEEP205	LaTeX Practical	CIA : 50	ESE:50	4	4

Objectives

To apply the skills in LaTex for scientific documentation.

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Fix foot note, margin note, end note and to prepare bio-data using LaTeX.	K1 – K5
CO2	Draw tables and graphs using LaTeX.	K1 – K5
CO3	Write mathematical expressions using LaTeX.	K1 – K5
CO4	Write mathematical equations using LaTeX.	K1 – K5
CO5	Prepare model question paper, conference invitation and power point presentation using LaTeX.	K1 – K5

LIST OF EXPERIMENTS:

1) Write a passage and make footnote, margin note and end notes using LaTeX.

2) Draw the various table structures for the end semester results.

3) Type your Bio-Data.

4) Draw the graph of $y = x^2$, $y = \cos x$ and $y = \sin x$.

5) Type the following expressions using LaTeX.

(i) $(x + y).(x - y) = x^2 - y^2$

(ii) $(x - y)^2 = x^2 - 2xy + y^2$

(iii) $(x + a)^n = x^n + nC_1 x^{n-1} a + nC_2 x^{n-2} a^2 + \ldots + nC_r x^{n-r} a_r$.

(iv) $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \ldots + \frac{x^r}{r!}$

(v) $\log(1 + x) = x - \frac{x^2}{2!} + \frac{x^3}{3!} - \cdots + (-1)^n \frac{x^n}{n!} + \cdots$

6) Type the following expressions:

(i) $x = \frac{-b \pm \sqrt{b^2 - 4a}}{2a}$

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(ii) $\lim_{x\to 0}\frac{\sin x}{x}=1$

(iii) $\Delta x,\ \Delta^2 y,\ \nabla x,\ \nabla^2 y$

(iv) $\frac{f(x+\Delta x)-f(x)}{\Delta x}$

7) Express the following equations:

(i) $\frac{dy}{dx},\frac{d^2y}{dx^2},Dy,y',\dot{y},\ \ddot{y}$

(ii) $\frac{\partial w}{\partial x},\frac{\partial^2 w}{\partial t^2},\frac{\partial^2 w}{\partial x\,\partial y}$

(iii) $x^2\frac{d^2y}{dx^2}+4x\frac{dy}{dx}+2y=x\log x$

(iv) $\frac{\partial^2 z}{\partial x^2}-5z\frac{\partial z}{\partial x}+6z=12x$

8) Express the following integrals:

(i) $\Gamma(x)=\int_0^t e^{-t}t^{x-1}dt,\ \ \mathrm{Re}(x)>0$

(ii) $\iint_s F(x,y)dxdy \quad and \quad \iiint_v F(x,y,z)dxdydz$

(iii) $\oint F.\,dr=\iint_s(\Delta\times F)ds$

(iv) $x^nJ_n(x)=\int x^nJ_{n-1}(x)dx$

9) Type the following

(i) $\sum|x_iy_i|\le(\sum|x_i|^p)^{\frac{1}{p}}(\sum|y_i|^q)^{\frac{1}{q}}$

(ii) $\sum_{n=1}^{\infty}x_i$

(iii) $(A\cup B)'=A'\cap B'$

(iv) $\prod_{j=0}^{J}K_j$

(v) $|u.v|\le\|u\|\,\|v\|$

10) Prepare a model question paper as per your department pattern.

11) Make your department conference invitation using LaTeX.

12) Make a PowerPoint presentation of your own topic of interest.

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Mapping of COs with POs and PSOs												
PO/PSO / CO	PO							PSO				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	M	M	M	M	S	M	M	M	S	M	M	M
CO2	M	M	M	M	S	M	M	M	S	M	M	M
CO3	M	M	M	M	S	M	M	M	S	M	M	M
CO4	M	M	M	M	S	M	M	M	S	M	M	M
CO5	M	M	M	M	S	M	M	M	S	M	M	M
S - Strong, M - Medium, L - Low												

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KONGU ARTS AND SCIENCE COLLEGE

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ACTIVITIES

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

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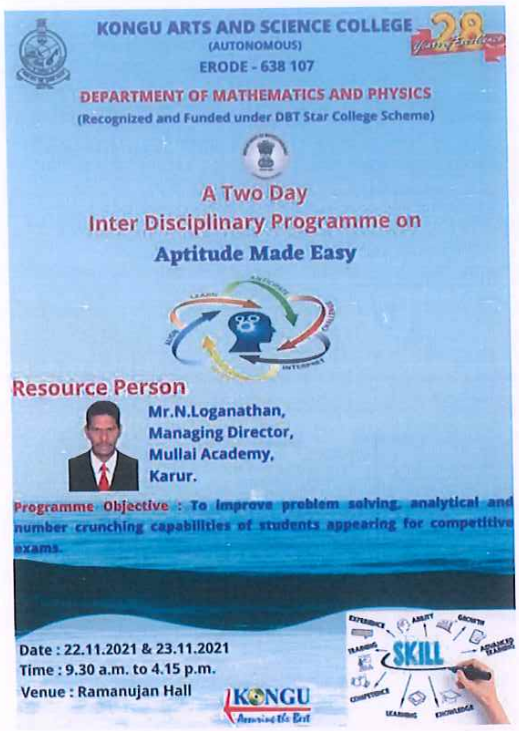
DEPARTMENT OF MATHEMATICS AND PHYSICS

A Two Day Inter Disciplinary Programme on "Aptitude Made Easy" – 22.11.2021 & 23.11.2021



A Two Day Inter Disciplinary Programme on "Aptitude Made Easy" was organized under DBT Star College Scheme with Mr.N.Loganathan, Managing Director, Mullai Academy, Karur, for our I B. Sc., Mathematics and I & II B. Sc., Physics students. During the training, the trainer addressed the gathering on aptitude. Students were taught about problem solving, analytical and number crunching capabilities. Further, students were motivated to attend competitive exams by solving problems in an easy manner. 72 students (Physics-40 & Mathematics-32) gained the knowledge on problem solving skills.

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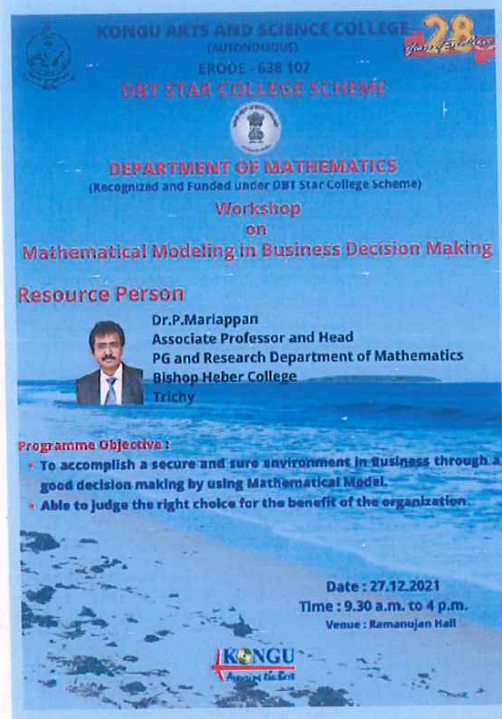
DEPARTMENT OF MATHEMATICS

WORKSHOP -27.12.2021



Workshop on Mathematical Modelling in Business Decision Making was organized by PG and Research Department of Mathematics of Kongu Arts and Science College (Autonomous) on 27.12.2021. Students were trained by Dr.P.Mariappan, Associate Professor and Head, PG and Research Department of Mathematics, Bishop Heber College, Trichy. This workshop was organized for students to have better knowledge in Business through a good decision making by using Mathematical Model. Dr.P.Mariappan interacted with students to bring students area of interest.

Beneficiaries: 202

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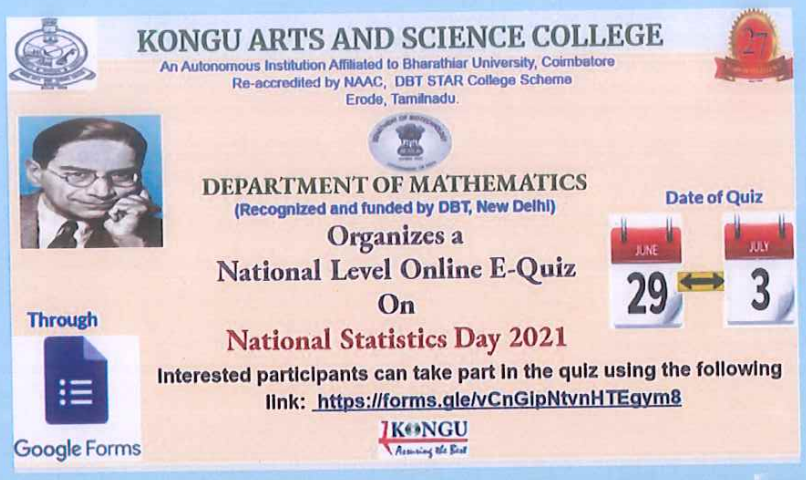
DEPARTMENT OF MATHEMATICS

National Level Online E-Quiz(29.06.2021-03.07.2021)



National Level Online E-Quiz was organized by PG and Research Department of Mathematics of Kongu Arts and Science College (Autonomous) from June 29,2021 to July 03,2021 on the birth anniversary of late Professor Prasanta Chandra Mahalanobis, Often referred to as the 'Father of Indian statistics'. This quiz was organized to bring out awareness on Statistics and to know about contributions by Professor Prasanta Chandra Mahalanobis to the Mathematics.

Participants : 860

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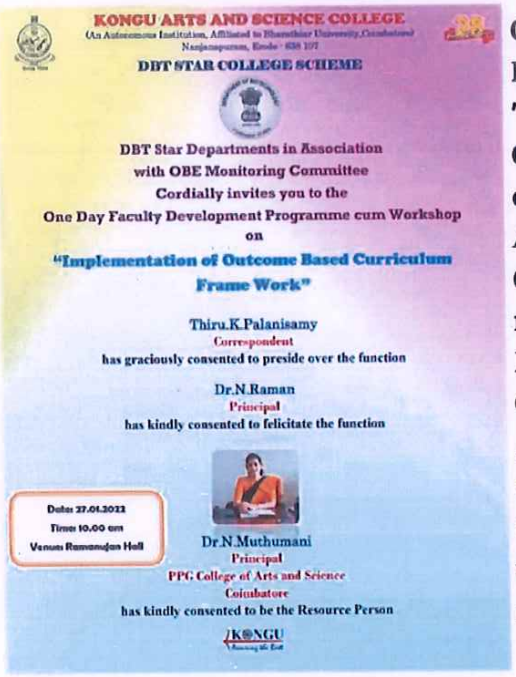
DBT STAR COLLEGE SCHEME

Faculty Development Programme-27.01.2022

"IMPLEMENTATION OF OUTCOME BASED CURRICULUM FRAME WORK"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DBT STAR COLLEGE SCHEME
DBT Star Departments in Association
with OBE Monitoring Committee
Cordially invites you to the
One Day Faculty Development Programme cum Workshop
on
"Implementation of Outcome Based Curriculum Frame Work"
Thiru.K.Palanisamy
Correspondent
has graciously consented to preside over the function
Dr.N.Raman
Principal
has kindly consented to felicitate the function
Date: 27.01.2022
Time: 10.00 am
Venue: Ramanujan Hall
Dr.N.Muthumani
Principal
PPG College of Arts and Science
Coimbatore
has kindly consented to be the Resource Person
KONGU

One Day Faculty Development Programme cum Workshop on "Implementation of Outcome Based Curriculum Frame Work" was organized by DBT Star Departments in Association with OBE Monitoring Committee on 27.01.2022. Faculty members were trained by Dr.N.Muthumani, Principal, PPG College of Arts and Science ,Coimbatore. This programme was organized to guide the implementation of OBE. Faculty members interacted with the resource person and raised many queries regarding OBE.

Beneficiaries: 170

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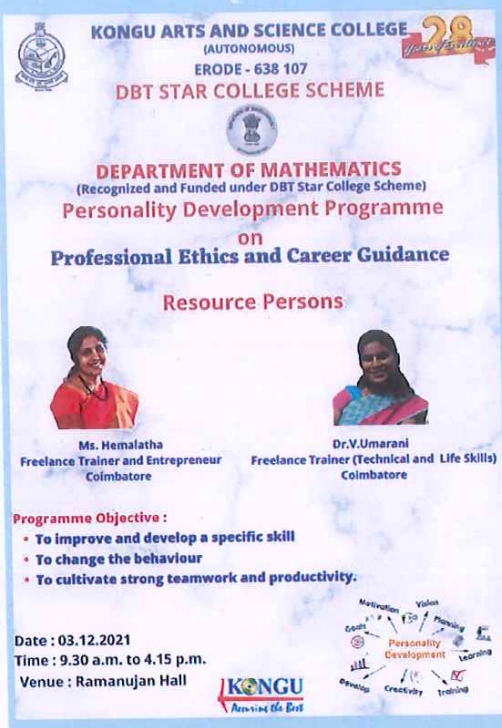
DEPARTMENT OF MATHEMATICS

Personality Development Programme-03.12.2021



Personality Development Programme on Professional Ethics and Career Guidance was organized by PG and Research Department of Mathematics of Kongu Arts and Science College (Autonomous) on 03.12.2021. Students were trained by Dr.V.Umarani and Ms. Hemalatha, Freelance Trainers (Technical and Life Skills),Coimbatore. This programme was organized for first and second year students to improve and develop their specific skill, to change their behaviour and to cultivate strong teamwork among them. Trainers were interacted with students and conducted various activities to bring out skills of the students.

Beneficiaries: 86

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DEPARTMENT OF MATHEMATICS

National Mathematics Day-22.12.2021

National Mathematics Day was celebrated on 22.12.2021 by PG and Research Department of Mathematics of Kongu Arts and Science College (Autonomous) to commemorate the 134th birth anniversary of great Mathematician Srinivas Ramanujan . A special lecture was given by Dr.S.Jagatheswari, Assistant Professor of Mathematics, School of Advanced Sciences, Vellore Institute of Technology, Vellore. This programme was organized for students to Know about Ramanujan's contributions to Mathematics and to bring out Knowledge on recent advancements in Mathematics.

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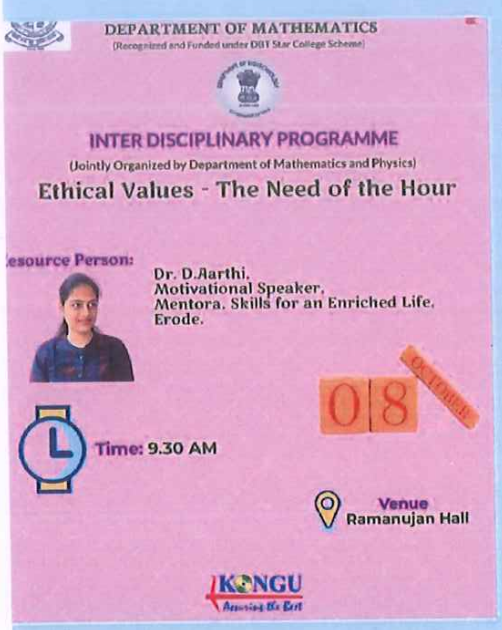
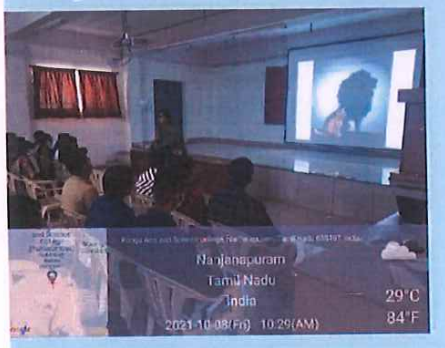
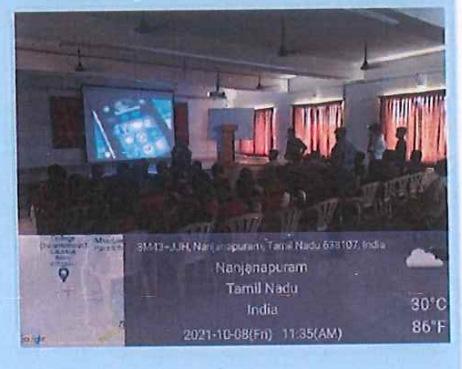
DEPARTMENT OF MATHEMATICS

INTER DISCIPLINARY PROGRAMME - 8 OCTOBER 2021



An Inter Disciplinary programme on "Ethical Values- The Need of the Hour" was organized by the Departments of Mathematics and Physics on 08.10.2021. The aim of the programme was to made students to get self motivated and to get aware of Moral values. She motivated the students to achieve and to get aware on ISR(Individual Social Responsibilities). Dr.D.Aarthi answered the queries raised by the participants.





Beneficiaries :

64 Students

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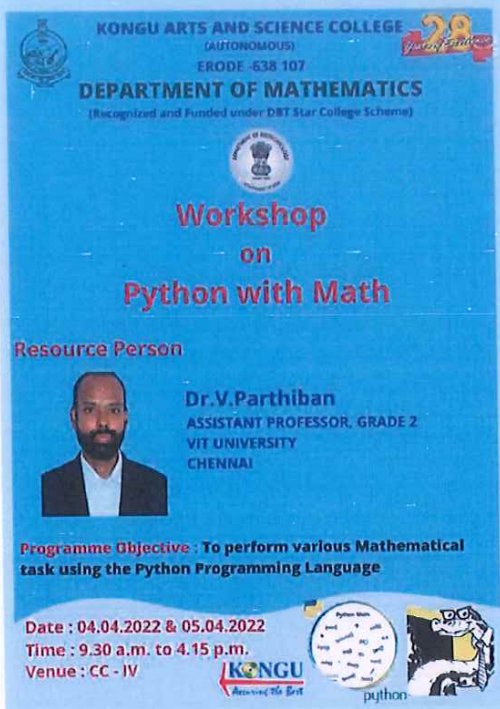
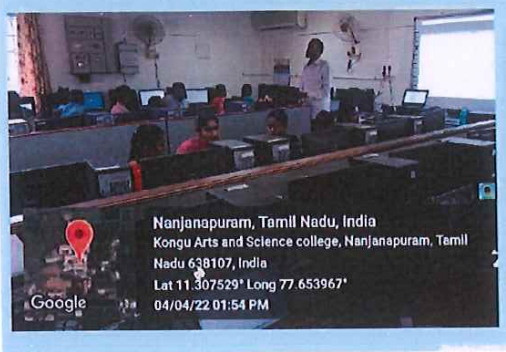
DEPARTMENT OF MATHEMATICS

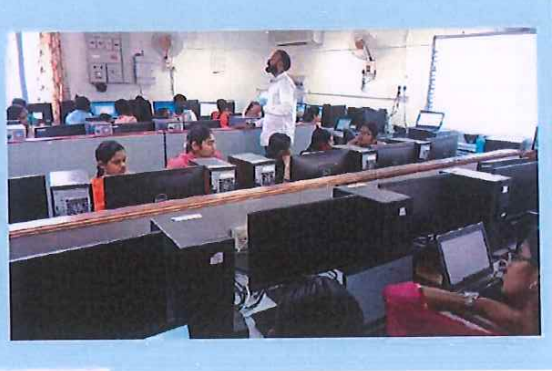
WORKSHOP -04.04.2022 & 05.04.2022



Workshop on Python with Math was organized by PG and Research Department of Mathematics of Kongu Arts and Science College (Autonomous) on 04.04.2022 & 05.04.2022. Students were trained by Dr.V.Parthiban, Assistant Professor , Grade 2, PG and Research Department of Mathematics, VIT University , Chennai. This workshop was organized for students to have better practice for using the Python Programming Language. More techniques were learned by the students on Python Programming.

Beneficiaries: 48





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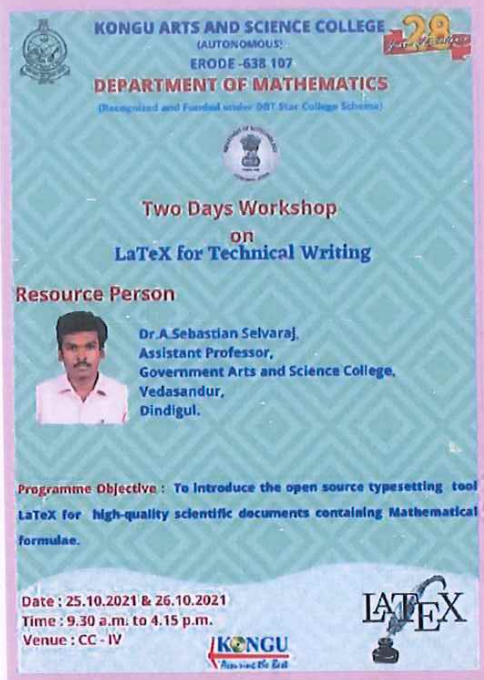
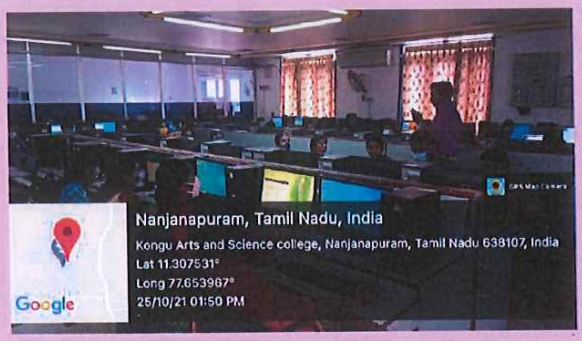
DEPARTMENT OF MATHEMATICS

INTER DISCIPLINARY PROGRAMME - 25&26 OCTOBER 2021



A Two Day Workshop on "Latex for Technical Writing" was organized by the Department of Mathematics on 25.10.2021 and 26.10.2021. The main objective of the programme was to make students to use the open source typesetting tool Latex for the future use. Dr.A.Sebastian Selvaraj trained the students on LaTex and asked them to improve their Mathematical Software skills.



Beneficiaries : 150 Students

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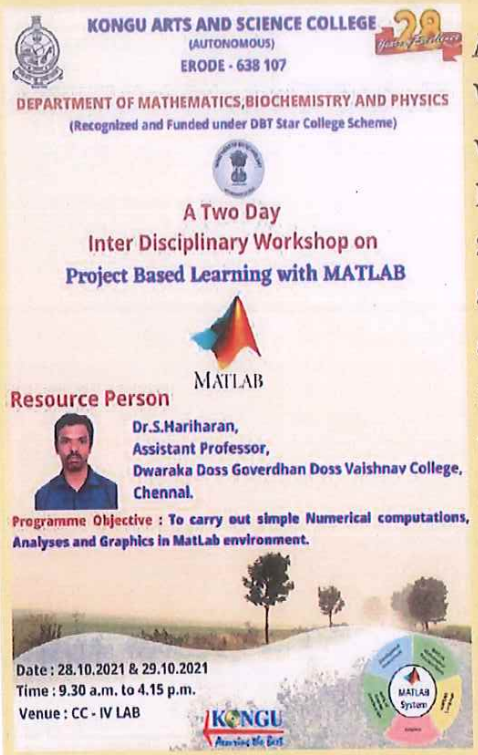
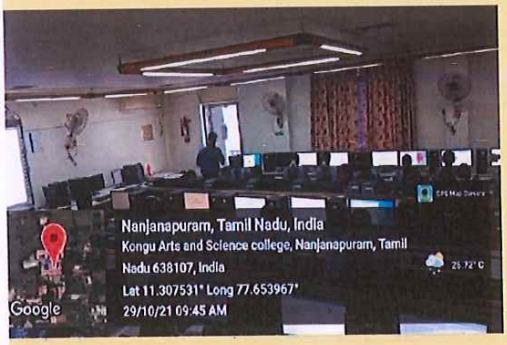
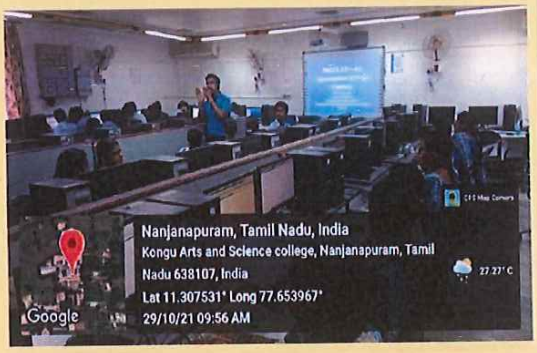
INTER DISCIPLINARY PROGRAMME - 28&29 OCTOBER 2021



A Two Day Inter Disciplinary Workshop on "Project Based Learning with MATLAB" was organized by the Department of Mathematics on 28.10.2021 and 29.10.2021.Final year students of Mathematics, Bio Chemistry and Physics were participated. The main objective of the programme was to make students to use the open source typesetting tool MATLAB for their future use. Dr.S.Hariharan, Assistant Professor from Chennai trained the students on MATLAB and asked them to improve their Mathematical Software skills.





Beneficiaries : 200 Students

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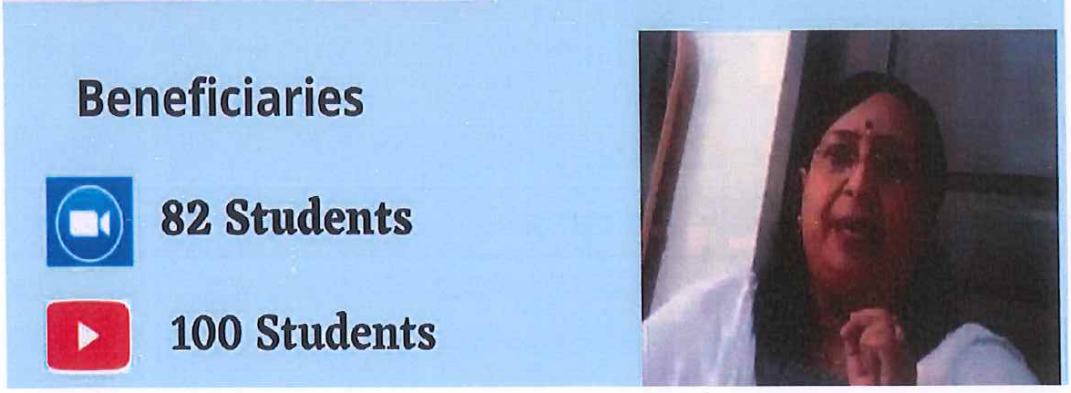
INDUCTION PROGRAMME - 8 SEPTEMBER 2021

An Induction programme on "Technology and Science - A Boon or a Bane" was organized by the Departments of Bio Chemistry, Bio Technology , Mathematics, Physics , Psychology and CDF on 08.09.2021. The aim of the programme was to made students to get aware of Science and Technology field. She motivated the students to make new inventions and to improve their knowledge on Science concepts. Dr.V.P.Moula Devi answered the queries raised by the participants.



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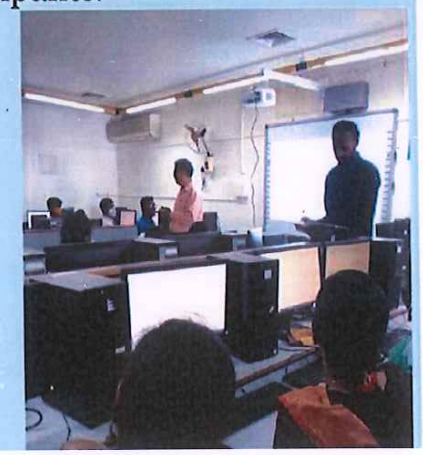
INTER DISCIPLINARY PROGRAMME - 12&13 OCTOBER 2021

An Inter Disciplinary programme on "Biostatistical Design and Data Analysis Using R" was organized by the Department of Mathematics on 12.10.2021 and 13.10.2021. The aim of the programme was to made students to gain knowledge on R Software in the field of Data Analysis . Dr.V.Parthiban motivated the students to improve their Mathematical Software skills. He answered the queries raised by the participants.



Beneficiaries :

120 Students

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