
**KONGU ARTS AND SCIENCE COLLEGE**

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

**ERODE – 638 107**

# M.Sc (Mathematics)

# KONGU ARTS AND SCIENCE COLLEGE

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

**ERODE – 638 107**

# 2021-2022

# KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

## ERODE – 683 107

## Department of Mathematics (for PG Departments)

## SCHEME OF EXAMINATION – CBCS PATTERN

**(For the candidates admitted during the academic year 2021 – 2022 and onwards)**

| Course Code | Course | Hrs/Week | T/P | Exam Duration | CIA | ESE | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| **SEMESTER I** | | | | | | | | |
| 21PBECT101 | Core I : Algebra | 7 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT102 | Core II : Real Analysis | 7 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT103 | Core III : Ordinary Differential Equations | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT104 | Core IV : Numerical Analysis | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBEET105/ 21PBEET106 | Elective - I | 4 | T | 3 | 50 | 50 | 100 | 4 |
| | **Total** | 30 | | | | | 500 | 20 |
| **SEMESTER II** | | | | | | | | |
| 21PBECT201 | Core V : Complex Analysis | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT202 | Core VI : Partial Differential Equations | 7 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT203 | Core VII : Classical Mechanics | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT204 | Core VIII : Operations Research | 7 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBEEP205/ 21PBEEP206 | Elective - II | 4 | P | 3 | 50 | 50 | 100 | 4 |
| | **Total** | 30 | | | | | 500 | 20 |
| **SEMESTER III** | | | | | | | | |
| 21PBECT301 | Core IX : Topology | 7 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT302 | Core X : Modern Fluid Dynamics | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT303 | Core XI : Mathematical Statistics | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT304 | Core XII : Graph Theory | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBEET305/ 21PBEET306/ 21PBEET307 | Elective - III | 5 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBEOE308 | Comprehensive Examination (Online) | - | - | 100 min | - | - | 100 | 2 |
| 21PBEIT01 | Institutional Training* | | Grade | | | | | |
| | **Total** | 30 | | | | | 600 | 22 |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107

| SEMESTER IV | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 21PBECT401 | Core XIII : Functional Analysis | 5 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT402 | Core XIV : Mathematical Methods | 6 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECT403 | Core XV : Python Programming with Math (Theory) | 4 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECP404 | Core Practical I : Python Programming with Math | 4 | P | 3 | 50 | 50 | 100 | 4 |
| 21PBECT405 | Core XVI : Number Theory | 5 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBEET406/ 21PBEET407/ 21PBEET408 | Elective - IV | 4 | T | 3 | 50 | 50 | 100 | 4 |
| 21PBECV409 | Project Work** | 2 | | | 100 | 100 | 200 | 4 |
| 21PSWT410 21PADT411 | SWAYAM/ Scientific Computing using MATLAB # | | | | -- | 50 | 50 | 2 |
| | **Total** | 30 | | | | | 850 | 30 |
| **Grand Total** | | | | | | | 2450 | 92 |

* Candidates have to go for teaching practice as an Institutional Training for 15 days and the training report has to be submitted. Completion of training is mandatory to get a degree. Grade will be given based on the performance of viva-voce conducted by the Department at the end of the training.

\# The learners have to complete either any course in SWAYAM in the domain with 2 Credits or an equivalent course of SWAYAM framed by the Department as a self study course.

**** GUIDELINES FOR PROJECT WORK**

- A supervisor has been allotted to each candidate by the department.
- Candidate can select the broad field and the topic of the project in discussion with the supervisor.
- Candidates should maintain a work diary wherein weekly work carried out has to be written which will be reviewed by the supervisor.
- A minimum of three reviews have to be done.
  - In the first review, the candidate has to submit the basic materials which are needed for the project.
  - During the second review, the progress of the project will be monitored.
  - In the final review, the candidate has to submit the rough copy of the project.
- They should be asked to present the work done to the respective supervisor during the reviews.
- The candidates should submit a rough copy of the project to their supervisor before the final copy.
- The project report should be documented using **LaTeX.**
- The work diary along with project report should be submitted at the time of viva voce.

**CIA Marks Distribution:**

The supervisor will give the marks for CIA as per the norms stated below:

| | |
|---|---|
| First Review | 25 Marks |
| Second Review | 25 Marks |
| Final Review | 30 Marks |
| Attendance | 20 Marks |
| Total | 100 Marks |

**End Semester Examination:**

The evaluation for the End Semester Examination should be as per the norms given below:

| | |
|---|---|
| Project Report | 75 Marks |
| Viva-Voce Examination | 25 Marks (Jointly given by the External and Internal Examiners) |
| Total | 100 Marks |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107

| List of Electives | | | |
|---|---|---|---|
| | **Group** | **Course Code** | **Subjects** |
| **ELECTIVE –I** | A | 21PBEET105 | LATEX |
| | B | 21PBEET106 | Object Oriented Programming in C++ |
| **ELECTIVE -II** | A | 21PBEEP205 | LATEX Practical |
| | B | 21PBEEP206 | Object Oriented Programming in C++ Practical |
| **ELECTIVE -III** | A | 21PBEET305 | Fuzzy Mathematics |
| | B | 21PBEET306 | Mathematical Modelling |
| | C | 21PBEET307 | Differential Geometry |
| **ELECTIVE -IV** | A | 21PBEET406 | Neural Networks |
| | B | 21PBEET407 | Control Theory |
| | C | 21PBEET408 | Stochastic Differential Equations |

**Extra Credit Courses:**

**Advance Learner Courses**

| S. No | Course code | Course |
|---|---|---|
| 1 | 21PBEAL308 | Difference Equations |
| 2 | 21PBEAL309 | Cryptography |

- The above courses are offered to the PG students who have secured 7.5 and above CGPA upto second Semester only.
- The students can choose any one of the above mentioned Courses.
- Only **External** Assessment for **100 Marks.**
- **2 Credits** allotted for each ALC.
- It is purely a **Self Study Course** and will not be considered for computation of Cumulative Grade Point Average (CGPA).

**Total Marks : 2450**

**Total Credit : 92**

**Dr.S.Nagarajan**
**Chairman**
**Board of Studies**
**Department of Mathematics**

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107

| Sem | Course Code | Core - II REAL ANALYSIS | Total Marks:100 | | Hours Per Week | Credits |
|---|---|---|---|---|---|---|
| I | 21PBECT102 | | 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)**

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| | |
|---|---|
| **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 |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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.

| | |
|---|---|
| **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.<br>**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.<br>**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.<br>2. Solve and submit any 10 questions from previous year CSIR/ SET.<br>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 |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

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

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

D.N. NATARAJAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) 638 107

Dr. N. RAMAN PRINCIPAL KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) NANJANAPURAM, ERODE - 638 107.

| 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)**<br>Answer ALL the questions<br>Choose the correct answer | **SECTION-B (5 X 3 = 15 Marks)**<br>Answer ALL the questions<br>Either or type<br>Two questions from each unit | **SECTION-C (5 X 5 = 25 Marks)**<br>Answer ALL questions<br>Question Number: 16 to 19 (Either or type)<br>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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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.

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 |
|---|---|---|
| Dr.M.LALITHA | Dr.S.SURESH | Dr.S.NAGARAJAN |

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

**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**


Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 |

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN PRINCIPAL KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ANAPURAM, ERODE 638 107

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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.

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**<br>Answer ALL the questions<br>Choose the correct answer | **SECTION-B (5 X 3 = 15 Marks)**<br>Answer ALL the questions<br>Either or type<br>Two questions from each unit | **SECTION-C (5 X 5 = 25 Marks)**<br>Answer ALL questions<br>Question Number: 16 to 19 (Either or type)<br>Question Number 20 is Compulsory-Case Study |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. NAGARAJAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 | | | | | | | | | | | | |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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)**

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 |

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

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

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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.

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

**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 | 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**

HEAD OF THE DEPARTMENT
DEPARTMENT OF MATHEMATICS
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
ERODE - 638 107.

KONGU ARTS & SCIENCE COLLEGE (AUTONOMOUS) ★ ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| Sem | Course Code | | Total Marks:100 | | Hours Per Week | Credits |
|---|---|---|---|---|---|---|
| II | 21PBEEP205 | Elective II<br>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) $x = \frac{-b \pm \sqrt{b^2 - 4a}}{2a}$

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL,
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE -638 107.

(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.

KONGU ARTS AND SCIENCE COLLEGE ERODE 638 107

Dr. N. RAMAN
PRINCIPAL.
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.

| 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 | | | | | | | | | | | | |

HEAD OF THE DEPARTMENT
DEPARTMENT OF MATHEMATICS
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
ERODE - 638 107.

KONGU ARTS AND SCIENCE COLLEGE (AUTONOMOUS) ERODE 638 107

Dr. N. RAMAN
PRINCIPAL
KONGU ARTS AND SCIENCE COLLEGE
(AUTONOMOUS)
NANJANAPURAM, ERODE - 638 107.