

Queen Mary's College (Autonomous) Chennai – 04

Faculty and Students of PG & Research Department of Mathematics

International Conference

on EMERGING TRENDS IN MATHEMATICS ICOETIM-2025

Sponsored by Tamil Nadu State Council for Science and Technology

> Dates: 25.3.2025 & 26.3.2025 Venue: Velu Nachiyar Hall





Queen Mary's College is best described as a pioneer in the task of empowering women through education. It was started in 1914 by the British Government as Madras College for Women. With a modest intake of 33 women students at the time of its existence, grown phenomenally from an intermediate to a tertiary level institution and on to a full-fledged premier institution. Today it caters to over 5099 women students.

ABOUT THE DEPARTMENT

The Department of Mathematics was established in 1948 to provide a strong foundation in Mathematics and its applications for women students. The Department of Mathematics has 18 faculty members with 11 Doctorates working on diverse areas such as Graph Theory, Functional Analysis, Formal Languages & Automata and Operations Research. With 6 Research Supervisors in the department, 14 Research Scholars have completed their Ph.D. Programme while 19 scholars are pursuing their course. Our Department faculty members and research scholars have published 131 papers in reputed journals with good citation index and h-index. Ramanujan Research Club is also an integral part of the Department.

ABOUT THE CONFERENCE

The International Conference on Emerging Trends in Mathematics aims to bring together researchers and academicians in the area of pure and applied Mathematics to share their expertise. It also provides a platform to exchange their ideas and present the research findings leading to rich discussions and an opportunity to the students to get exposure to the recent trends in Mathematics.

ICOETIM-2025

Patron

Dr. B. Uma Maheswari Principal, Queen Mary's College, Chennai

Convenor

Dr. N. Jansi Rani, Associate Professor & Head Department of Mathematics

Organizing Secretary

Dr. R. Hemavathy, Associate Professor

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Dr. B. Usna Banu, Associate Professor Dr. P. Vasanthi Beulah, Associate Professor Mrs. T. Premalatha, Assistant Professor Mrs. M. Chitra, Assistant Professor Mrs. K. Gomathi, Assistant Professor Dr. K. Sumathy, Associate Professor Dr. S. Najeema, Assistant Professor Mrs. K. Geetha, Assistant Professor Dr. M. Geethalakshmi, Associate Professor Dr. J. Emerald Princess Sheela, Assistant Professor Dr. C. Sugapriya, Assistant Professor Dr. R. Sumitra, Assistant Professor Dr. R. Chitra Lekha, Guest Lecturer Mrs. M. Lavanya, Guest Lecturer Mrs. B. Kaviyarasi, Guest Lecturer Mrs. S. Maheswari, Guest Lecturer

KEY NOTE SPEAKERS

Speaker 1: Prof. Marian Gheorghe Emeritus Professor Department of Computer Science University of Bradford, UK.

Speaker 2:

Dr. K. G. Subramanian Madras Christian College (Retired) Chennai Honorary Visiting Professor Liverpool Hope University, UK.

INVITED TALK

Talk 1:

Dr. M. Joice Punitha Associate Professor Department of Mathematics Bharathi Women's College Chennai, TamilNadu, India.

Talk 2:

Dr. J. Jeba Jesintha Associate Professor & Head, PG Department of Mathematics, Women's Christian College, Chennai, TamilNadu, India.

PROGRAMME SCHEDULE Day-1 - 25.03.2025

INVOCATION

9:30 a.m.

WELCOME ADDRESS
Dr. N. Jansi Rani
Associate Professor & Head
Department of Mathematics
Queen Mary's College, Chennai.
LIGHTING OF KUTHUVILAKKU
PRESIDENTIAL ADDRESS
Dr. B. Uma Maheswari
Principal
Queen Mary's College Chennai

KEYNOTE ADDRESS 1

Speaker 1: Prof. Marian Gheorghe **Emeritus Professor** Department of Computer Science University of Bradford, UK.

TEA BREAK

Speaker 2:

10:45 a.m.

9:45 a.m.

KEYNOTE ADDRESS 2 11:00 a.m. Dr. K. G. Subramanian Madras Christian College (Retired), Chennai

Honorary Visiting Professor, Liverpool Hope University, UK.

PAPER PRESENTATION SESSION	11 : 35 a.m.
LUNCH BREAK	12 : 15 p.m.
DISCUSSION FORUM	1 · 00 p m

Day- 2 - 26.03.2025

DISCUSS FORUM

9:30 a.m.

INVITED TALK 1 Title: Dom Coloring in Graphs Dr.M.Joice Punitha Associate Professor Department of Mathematics Bharathi Women's College Chennai.

10:00 a.m.

TEA BREAK

11:00 a.m.

11:15 a.m.

INVITED TALK 2 Title: Variations in Graceful Labeling Dr. J. Jeba Jesintha Associate Professor & Head, PG Department of Mathematics Women's Christian College Chennai.

LUNCH BREAK

VALEDICTORY FUNCTION

12 : 00 p.m.

12:30 p.m.

VOTE OF THANKS

NATIONAL ANTHEM





International Conference on Emerging Trends in Mathematics (ICOETIM-2025)

Sponsored by TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY Organized by POSTGRADUATE AND RESEARCH DEPARTMENT OF MATHEMATICS QUEEN MARY'S COLLEGE (AUTONOMOUS), CHENNAI 600 004 25th and 26th March 2025

A BRIEF WRITE-UP OF THE PROGRAMME

OBJECTIVE OF THE CONFERENCE

Post Graduate and Research Department of Mathematics, Queen Mary's College, Chennai organized a Two-Day International conference on Emerging Trends in Mathematics, ICOETIM 2025 on 25.03.2025 and 26.03.2025. This International Conference on Emerging Trends in Mathematics aims to bring together researchers and academicians in the area of pure and applied Mathematics to share their expertise in their respective fields. It also provides a platform to exchange their ideas and present their research findings leading to rich discussions and an opportunity to the students to get exposure to the recent trends in Mathematics. Dr.B.Uma Maheswari, Principal, Queen Mary's College, Chennai has served as Patron, Dr.N.Jansi Rani, Associate Professor and Head, Department of Mathematics has served as Convenor while Dr.R.Hemavathy, Associate Professor, Department of Mathematics has served as Organizing Secretary. 75 participants including Faculty members, Research Scholars and Post Graduate Students registered for the Conference.

INAUGURAL FUNCTION

On Day 1-25.03.2025, Inaugural Function was Presided over by Dr.N.Jansi Rani, Convenor, International Conference on Emerging Trends in Mathematics, Associate Professor and Head, Department of Mathematics, Queen Mary's College, Chennai., **Dr.Marian Georghe**, Emeritus Professor, Department of Computer Science, University of Bradford, Bradford, United Kingdom and Dr.K.G.Subramanian, Honorary Professor, Department of Mathematics, Liverpool University, Liverpool, United Kingdom. During the Inaugural Function, Convenor thanked TAMILNADU STATE COUNCIL FOR SCIENCE AND TECHNOLOGY for sanctioning Rs.20000/-(Rupees Twenty Thousand only) and approving the Proposal submitted to Council for organizing International Conference on Emerging Trends in Mathematics in the year 2023.

<u>KEY-NOTE ADDRESS</u>

Dr.Marian Georghe, Emeritus Professor, Department of Computer Science, University of Bradford, Bradford, United Kingdom gave an enlightening talk on "Membrane Computing" followed by Dr.K.G.Subramanian, Honorary Professor, Department of Mathematics, Liverpool University, Liverpool, United Kingdom motivated our department young researchers with his Keynote Address on "Graphs Associated with Sequences of Symbols". Both the Professors Provided a wealth of information and discussed Open Problems & Future Scope in the area of Formal Languages and Automata theory and theoretical Computer Science which was an Eye-opener to our Research Scholars. Both the Professors, overwhelmed with joy by the grand Reception and exemplary Hospitality by the Department of Mathematics. Questions raised by the students were clearly answered by the Expert members.

Brief Abstract of "Membrane Computing"

Membrane computing, a research field initiated by Gh. Paun, in a seminal paper ("Computing with Membranes", Journal of Computer and System Sciences,61(1), 108-143, 2000), is a computing paradigm inspired by the structure and bio-chemical interactions of the living cells. The key models are called *membrane systems* or *P systems*. The field has developed on various research directions and many classes of membrane systems (P systems) have been investigated. These may be classified as *cell-like*, *tissue-like* and *neural-like* P systems. The membrane computing area has developed very rapidly and in 2003, Thomson ISI qualified this field as

"an emergent research front in computer science". H. Rong, Y. Duan and G. Zhang in a recent paper analysing the development of the field ("A bibliometric analysis of membrane computing (1998-2019)", Journal of Membrane Computing, 4, 177-207, 2022), mention that after around 20 years the field has become a well-established corpus of research with around 4000 publications, involving 1200 authors from more than 40 countries, 20 monographs and collective volumes, more than 100 PhD theses (the first PhD student in this area being S.N. Krishna, at IIT, Chennai, India). The flagship journal of the community, Journal of Membrane Computing, is now included in ESCI and Scopus, being ranked as Q2. Mathematical Reviews and zMATH mention membrane computing as a specific research topic with the classification number 68Q07.

In this talk are presented several types of membrane systems, namely *spiking neural P systems*, *numerical P systems*, *P systems with broadcasting communication capabilities* and *kernel P systems*. With these models are illustrated problems of different types, such as: simple arithmetic operations; computing 2^n3^m , $n \ge 0$, $m \ge 0$; compute n^2 , $n \ge 1$; synchronization problem (firing squad); computing the partition problem in linear time. A short bibliography including papers of the topics presented is appended to the set of slides.

Brief Abstract of "Graphs Associated with Sequences of Symbols"

A word is a finite sequence of symbols belonging to an alphabet which is a finite set of symbols. A subword (also called scattered subword) of a word w is a subsequence of w. The notion of Parikh matrix (PM) of a word over an ordered alphabet, which was recently introduced, is based on subwords and has given rise to a very interesting and effective tool in the study of certain numerical properties of a word. Graphs associated with words have been introduced in different studies. A Parikh Word Representable Graph (PWRG) G(w) associated with a binary word w over an ordered binary alphabet is a bipartite graph. In this talk, these notions will be introduced and illustrated. Several graph-theoretic properties of Parikh Word Representable Graphs will be discussed and problems for future work will be pointed out.

PAPER PRESENTATION SESSION

17 research papers were presented in 2 Parallel sessions and also in hybrid mode of Presentation with 4 research scholars presented in online mode through a Gmeet link. **Dr.Marian Georghe**, **Emeritus Professor, Department of Computer Science, University of Bradford, Bradford, United Kingdom and Dr.K.G.Subramanian, Honorary Professor, Department of Mathematics, Liverpool University, Liverpool, United Kingdom** chaired Session – I at Velu Nachiyar Hall, Queen Mary's College, Chennai while **Dr.B.Usna Banu and Dr.P.Vasanthi Beulah, Associate Professors, Department of Mathematics, Queen Mary's College**, **Chennai** chaired Session – II at the Computer Laboratory of the Department.

Discussion Forum was conducted to broach the Emerging Trends in Mathematics for the Research Scholars of the Department. 17 Research Scholars participated and discussed the Recent Developments in the fields of Automata and Formal Languages, Graph Theory, Functional Analysis and Inventory Control theory.

LIST OF PAPERS PRESENTED :

S.No.	Name Of The Research Scholar	Title Of The Paper For Presentation
1	Subha E	Mutual -Visibility Number Of Parikh Word Representable Graphs

2	T. Vasugi	Discrete Pattern In Diminishing Cells Infinite Array: A Mathematical And Applied Perspective
3	Mr. N. Vijayaraghavan	Picture Fuzzy Finite Switchboard State Machines
4	R. Rama	Spectral Properties Of Eulerian And Non Eulerian Tournament
5	A.J. Sherine	A Study On Hamming Distance In Two Infinite Sequences
6	L Aatif Ahamed	Kolakoski Sequence And Its Combinatorial Connection With Golden Ratio
7	Subharani V	Injectivity Of One And Two Dimensional Dynamic Pattern Arrays
8	V. Sakthipriya	The Structural Paradigms Of Kolakoski Cubes And Dissecting The Intrinsic Patterns Of Two Endless Word Sequences
9	Aishwarya S	Fixed Point Theorems In M_B-Metric Spaces Endowed With Graphs
10	R. Om Gayathri	Fixed Point Theorems In B-Metric Space Using Disconnected Graph And Bipartite Graph
11	Vidhya S	Fixed Point Results On S-Multiplicative Metric Space
12	Uma Maheswari P	Approximation Of Fixed Points In Convex S- Metric Space By Mann's Iteration Approach
13	Sharon Roshini	Certain Relations Between Musical Scales And Christoffel Words
14	Dhivya Bharathi. L	Sustainable Eoq Inventory System In Triangular Fuzzy Area For Items With Partial Backorder And Inspection Learning For Items With Imperfect Quality

		Neutrosophic Implementation Of A Sustainable Epq Inventory
	P.Saranyaa	System With Goods Of Variable Quality, Two-Way Imperfect
15		Inspection, Rework And Sales Return
		A Fuzzy Inventory Model For Complementary Items In A Web
16	Fariya Azleena. A	Based Environment With Returns And Grade Examination
	0 1:14	Fixed Point Theorem For New Iteration With Accelerated
17	Swathi M	Convergence

INVITED TALK

On Day 2 - 26.03.2025, Dr.Joice Punitha, Associate Professor, Department of Mathematics, Bharathi Women's College, Chennai gave an invited talk on "Dom-Colouring of Graphs" followed by the Invited talk on "Variations in Graceful Labeling" by Dr.Jeba Jesintha, Associate Professor and Head, PG Department of Mathematics, Women's Christian College, Chennai. Both the Young researchers have a created a charm in the Emerging Trends of Graph theory and its applications in various fields. Questions raised by the students were clearly answered by the Expert members.

A Brief Abstract of "Variations in Graceful Labeling"

The famous graceful tree conjecture posed by Ringel-Kotzig-Rosa has been a long standing problem since 1960's. In this context, various classes of trees are proved to be graceful. The introduction of the graceful labeling by Rosa, has helped to prove other families of graphs as graceful. New labelings have been introduced and a variety of proof techniques have evolved over the years. In our presentation, we give an overview of the graceful labeling and its history. We present few conjectures which still exist and are a challenge. We give proof technique for the settlement of the famous conjecture on Banana Trees and the method in which we prove it. We introduce variations in Graceful Labeling and also touch upon new graphs invented by us through graph operations and prove them as graceful or to admit any other variation of the graceful labeling.

A Brief Abstract of " Dom-Coloring of Graphs"

In graph theory, the notion of domination along with coloring has found diversified applications across several areas of research. For any graph G, a non- empty subset D of the vertex set V is a dominating set if all the vertices in the complement of D and some vertex in D share a common edge. Such a set with the least number of vertices is a minimum dominating set whose cardinality is termed, the domination number. Coloring can be stated as the method of allotting colors to every single vertex in such a way that no two adjacent vertices receive the same colors. Till 2016, the above two concepts were dealt with separately by many researchers, whereas, the above two concepts were blended to form a new problem called dom-coloring problem which yields in the determination of dom-chromatic number, which was put forth by Chaluvaraju B. and Appajigowda C in 2016.

For a given graph G with proper coloring, the problem of selecting a dom-coloring set is to choose a dominating set having a property that it has a minimum of one vertex from every possible color class in G. We aim to determine the family of networks that allow dom-coloring and to find its dom-chromatic number. We have applied the algorithmic method of choosing the dom-coloring set (dc-set). Here we have designed algorithms to yield the proper coloring for the graph's vertices and to determine the dominating set for the given graph. Then, the dc-set for the graph is obtained by applying the above two algorithms. In this study, we have established the survey of finding the dc-set of certain graphs like path, cycle and Petersen graphs. The graph coloring concept is extensively applied in exam scheduling, image capture, time-tabling problems, frequency assignment in radio stations, picture segmentation, map coloring and much more.

Again, the discussion Forum was conducted to discuss the Emerging Trends in Mathematics for the Research Scholars of the Department.

VALEDICTORY FUNCTION

Valedictory Function was Presided over by Dr.B.Uma Maheswari, Principal, Queen Mary's College, Chennai with a motivating Valedictory Address. Certificates were given and Students were appreciated for their enthusiastic participation.

OUTCOME OF THE CONFERENCE

Enlightening Talks by Expert members, Paper Presentations by Research Scholars, Participation by Post Graduate Students in the International Conference has lead to a potential Knowledge Sharing, Networking and Gaining deep Insights into various fields of Mathematics.



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