

Ramanujan Mathlab and Research Centre

Mathematics Laboratory provides the following facilities for the academic and research community:

1. Active learning through Mathmodels
2. FOSS for teaching, learning and research
3. Extension activity for government schoolchildren to provide hands-on experience

Ramanujan Mathlab and Research Centre – Inauguration (10.12.2012)

PROGRAMME
10.12.2012 Monday

- > **Laboratory Visit** : 10.30 a.m - 11.00 a.m
- > **Inauguration** : 11.00 a.m - 1.00 p.m
- > **Prayer**
- > **Welcome Address** : **Dr. (Mrs). R. Parvathi**
Associate Professor & Head
Department of Mathematics
- > **Introducing the Chief Guest** : **Mrs.S.P.Geetha**
Assistant Professor of Mathematics
- > **Lighting the Kuthuvilakku**
- > **Presidential Address** : **Thiru. S.S. Kandasamy**
President
Vellalar Educational Trust.
- > **Felicitation** : **Thiru. S.D. Chandrasekar**
Secretary
Vellalar Educational Trust.
Dr.(Mrs). C. Suseela
Principal
Vellalar College for Women.
- > **Inaugural Address** : **Dr. Ashok Rao**
Former Head
Network Project, CEDT
Indian Institute of Science
Bengaluru.

Topic : "What can Mathematics and Computing Together Do ?"

- > **Vote of thanks** : **Mrs. K.K. Myithili**
Assistant Professor of Mathematics
- > **National Anthem**

VELLALAR COLLEGE FOR WOMEN (AUTONOMOUS)
ERODE-12
"College with Potential for Excellence"
(Re-accredited with 'A' Grade by NAAC and
Affiliated to Bharathiar University, Coimbatore-46)

DEPARTMENT OF MATHEMATICS

**RAMANUJAN MATHLAB AND
RESEARCH CENTRE**

Established under UGC - CPE Scheme (XI Plan)

Inauguration

10.12.2012 Monday

Chief Guest : **Dr. Ashok Rao**
Former Head
Network Project, CEDT
Indian Institute of Science
Bengaluru.

Venue : Kasthuba Gandhi Kalairangam
All are cordially invited...



1. Active learning through Mathematical Models (Mathmodels)

Demonstration and hands-on experience using two and three dimensional Mathmodels in Mathematics education not only enhances active learning, but also facilitates the learning capacity of the slow learners too.

Rotating Paraboloid



This exhibit consists of a rectangular container, filled with a colour liquid. When the handle is turned, the container with the liquid rotates, creating a centrifugal force at the periphery of the container, making the liquid rise. This in turn, forms a paraboloid, making the liquid rise, then making the liquid at the center to dip. You may also notice that the dipping at the center will increase with the speed of rotation of the container. *The students are able to understand the shape and formation of the paraboloid.*

Transfer of Momentum



A body in motion has a momentum which is equal to the product of its mass and velocity. When a ball strikes the ball in front, the momentum moves out with a velocity same as that of the first ball. When two or three balls strike, the momentum is doubled or trebled and hence the last two or three balls go out. When four balls strike, the momentum is quadrupled. This means that at the other end four balls should go out. That is why the central ball, in the case, has to regroup itself. *This model helps the students to understand the momentum transfer between the particles.*

Octant Space



In a two dimensional plane, the axes separate the plane into quadrants. These are numbered one to four. Similarly, in three dimensional space there are eight octants, which is explained using a cube. These octants are numbered one to eight. An octant is one of the eight divisions of Euclidean three-dimensional coordinate system. It is similar to the two-dimensional quadrant and the one-dimensional ray. *The students will be able to position a point in three dimensional coordinate system.*

Conic Section



A cone has lots of interesting useful curves contained it. Hence it is called the king of all solids. Cutting a cone

- parallel to its base gives a CIRCLE
- inclined in its base yields an ELLIPSE
- parallel to its slant side gives a PARABOLOID
- perpendicular to its base gives a HYPERBOLA

The students can visualize the conic sections and understand their properties through this model.

Tracing Hyperbola



Hyperbola is a conic section, which always occurs as a pair generated by cutting a double cone, by a plane perpendicular to its base. For every such plane of cut, the edge of the cone always becomes a pair of straight lines which

are called the asymptotes of the hyperbola. The equation of a hyperbola is equivalent to the equation of a pair of straight lines. This will be clear from the fact that the hyperbola physically becomes a pair of straight lines, when the cutting plane passes through the apex of the double cone. Conversely, an inclined straight line (asymptote), when rotated about a vertical axis always creates a hyperbolic profile. This is demonstrated in this exhibit by a straight line which traces a hyperbola as the line rotates about the vertical axis. You may observe the above phenomena by pressing the switch and holding it. *This model helps students to understand the formation of hyperbola and its geometrical properties.*

2. Free Open Source Software (FOSS)

“In India, open source software will have to come and stay in a big way, for the benefit of our billion people”, said Dr A P J Abdul Kalam.

This will come true only when higher educational institutions in India give a thrust to using LINUX OS based FOSS as tools, in curriculum.

If we compare the Indian scenario with what’s happening abroad, students in many other countries make significant contributions to FOSS; but in India, many of our students have not even heard about this technology stack. As most of the contributions to FOSS come from the academic community, the Indian students should also be given the same level of opportunity to learn/work on FOSS tools/technologies, and eventually contribute to it.

At present, the students of reputed research institutes of national importance have already got the opportunity and they use LINUX OS and FOSS in learning and research. But students of rural colleges are also to be taken care of, in this regard, to hone their perceptual and analytical skills in mathematics.

Practical exposure gives an unparalleled edge to math learning and Mathlab, unlike conventional chalk and talk method, offers highly engaging learning experience through interactive formats like Geogebra, R, Python, Scilab, Octave, Latex, Libre Office and hands-on programming enriches the learner’s academic experience. Further, Mathlab provides ICT enabled teaching along with conventional method. Optimum utilization of available FOSS is also made possible.

- Practical classes in Mathematics have been introduced for B.Sc., Mathematics, Physics, Chemistry, B.Com., and M.Sc., Mathematics students by redesigning the curriculum to enhance the teaching-learning methods in Mathematics. (Autonomous system contributes a lot to this flexibility). As mathematics is a tool provider through its models, FOSS like Geogebra, R, Python, Scilab, Octave, Latex, Libre Office, PSPP etc., are taught to model real life problems and solve them. The list of practicals is framed based on the theory syllabus so that the students are able to enjoy hands-on experience in what they learn theoretically.
- Two and three dimensional mathematical models are used in teaching which facilitate the learning capacity of the slow learners too. Most of the models have been prepared after visiting Visvesvaraya Museum in Bangalore. Further, a competition was conducted on preparation of working mathmodels for students during 2015–16 and video footage also was taken on the same. Based on these concepts, it is proposed to prepare few more models and establish Mathematics Activity Centre.
- A Knowledge Resource Centre has been established with the following Educational Contents (offline):
 - i. 15,000+ PDF Lectures for 380+ NPTEL Video Courses

- ii. 9000+ Khan Academy Maths and Science Videos
- iii. 600+ Free E-Books
- iv. 700+ Spoken Tutorial Videos by IIT-Bombay
- v. 2400+ MIT Open Courseware materials
- Spoken Tutorial Online Courses offered by IIT Bombay, funded by National Mission on Education through ICT, MHRD, GoI have been included as Self-Learning papers in the curriculum with 5 credits per paper from 2016 – 17 onwards (<http://spoken-tutorial.org>).

Scalability

- Practical sessions obliterate the phobia for Math, making more students opt for Mathematical Sciences and related disciplines
- Higher prospects for postgraduation and further research in mathematical sciences
- The high-end research pursuits of the alumni in national level research institutes like Ramanujan Institute for Advanced Study in Mathematics, NITs and State Universities
- Attainment of four dimensional growth – Teaching, Learning, Understanding and Applications of Mathematics

3. Extension Activity

Extension Activity – One Day Free Training Camp for Government School Children

Department of mathematics organizes an extension activity on mathematical models for the benefit of teachers and students of neighbouring government schools, every year. The school students are given hands-on training on mathematical models and FOSS in Ramanujan Mathlab and Research Centre and also the charts and models prepared by our III B.Sc., (Mathematics) students.

Salient Features of the Extension Activity

- Teaching Mathematics through Mathmodels enhances the enthusiasm of the students in learning mathematics
- Quick understanding
- Visual aids make teaching mathematics easy
- Retaining facts with long term memory is possible

All Mathmodels are used for this purpose. A video about the life of Srinivasa Ramanujan, is also shown to the school students as part of this programme. The effort was well received by the teachers and school children.





