1. Introduction

IIT Bombay has conducted many large-scale teacher training workshops under the Train 10,000 Teachers (T10KT) programme, sponsored by the National Mission on Education through ICT (NMEICT), MHRD, Govt. of India, and trained over 2,00,000 teachers.

Another successful technology developed at IIT Bombay is Spoken Tutorial, using which about 50 lakh students have been trained on various ICT topics. The effectiveness of this method can be seen from the testimonials available here: https://spoken-tutorial.org/testimonials/media. The Spoken Tutorial project is also implemented successfully at IIT Bombay, with funding from NMEICT, MHRD.

It is now proposed to offer the highly effective Spoken Tutorial based ICT training to a large number of teachers, across the country, through the T10KT methodology, with **Scilab** training being taken up next.

Scilab is a Free/Libre and Open Source Software (FLOSS), created mainly for numerical computations. It uses the state of the art numerical libraries, such as LINPACK, EISPACK and LAPACK, and hence, its results are highly reliable. Scilab implements the user friendly language, similar to the one used in the popular software Matlab. But unlike Matlab, Scilab can be freely downloaded, freely copied, freely modified and also freely distributed. Naturally, Scilab can be used absolutely free of cost, unlike Matlab, which can be extremely expensive, especially to the industry. Scilab comes with a graphical programming interface Xcos, which is similar to Simulink. A good knowledge of Scilab will help improve the employment potential of your students.

The FOSSEE (Free/Libre and Open Source Software for Education) project at IIT Bombay ((https://fossee.in) has been promoting Scilab, and other FLOSS software, such as Python, OpenFOAM, eSim, Osdag, OpenModelica, DWSIM & R, and Open Source hardware, such as Arduino and OpenPLC. FOSSEE is also funded by NMEICT, MHRD. Government of India has mandated the use of open source software.

The Scilab workshop is organised by the **T**eaching **L**earning **C**entre (TLC) at IIT Bombay, funded by the *Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT)*, MHRD, Govt. of India. As Spoken Tutorial method offers hands on practice, with 100% active learning, those who undergo this training will be able to start using Scilab immediately after the workshop. They will also be able to conduct Scilab workshops for their students, using Spoken Tutorials, on their own, without requiring any help from anyone else.

The one day Scilab workshop will be conducted on **Saturday, 4 May 2019,** through Remote Centres of IIT Bombay. The medium of instruction for this workshop is English. Language dubbed Spoken Tutorials in Hindi and a few other languages will also be available.

2. Methodology of the Workshop

It will be a one day workshop, on 4 May 2019. All participants will have to go to their chosen Remote Centre. They will learn Scilab through Spoken Tutorials, with help from Coordinators, already trained for this purpose at IIT Bombay. As the learning will happen only through carefully designed Spoken Tutorials designed and developed at IIT Bombay, the quality of learning will be very high. All the participants, from all the Remote Centres, will be able to interact with the Scilab team at IIT Bombay, ask them questions, etc., through the video conferencing software A-VIEW. There will be about 4 hours available for Scilab training and 2 hours for interactions.

3. Outline of the workshop

The workshop will have two parts:
(a) About 3.5 hours will be used in Learning Scilab from Spoken Tutorials.
(b) About 30 minutes will be used to learn about the excellent Scilab content, developed by FOSSEE.

3(a). Learning Scilab from Spoken Tutorials

Depending on the level of the user, one can learn any/all of the topics mentioned below. If one cannot complete all the topics, one can complete them later on, through self-learning, as all required Spoken Tutorials are freely available.

Basic level: Getting started with Scilab, Vector Operations, Matrix Operations, Conditional branching, Iterations, Scripts and Functions, Plotting 2D graphs, Introduction to Xcos.
Intermediate level: File handling, User defined input and output, Integration, Solving non-linear equations, Linear equations - Gaussian methods, Linear equations - Iterative Methods, Interpolation, ODE Euler methods, and ODE Applications.
Advanced level: Optimization Using Karmarkar Function, Digital Signal Processing, Control systems, Discrete systems, Calling User Defined Functions in XCOS, and Simulating a PID controller using XCOS.

3(b). Useful Scilab content developed by FOSSEE

A major problem with open source software is the lack of documentation. A solution to this problem is the Textbook Companion (TBC). A Scilab TBC is a collection of Scilab code for all solved examples of standard textbooks. The FOSSEE team has coordinated the creation of Scilab TBC for 600 books in science and engineering, all branches, with Scilab code for about 75,000 examples. Such a large collection is not available for any other software, including commercial ones. Students and faculty from various parts of the country have created this collection. FOSSEE provides a handsome honorarium to any one who creates TBC.

One may use the Scilab TBC (1) to understand the steps of examples (2) to do what if studies by changing parameters (3) to locate the syntax for a command and (4) to locate all examples that use a particular command, and so on. Scilab TBC are available at https://scilab.in/Completed_Books, absolutely free of cost. Scilab TBC is also hosted on the cloud.

The FOSSEE Team also helps colleges migrate their labs to Scilab. This allows colleges that cannot afford Matlab to run their labs with Scilab. Codes of migrated labs are available at https://scilab.in/lab_migration/completed_labs.

The FOSSEE Team has also developed a few useful toolboxes, available at https://scilab.in/fossee-scilab-toolbox. We invite talented people to join us in improving these toolboxes and to develop new toolboxes. We have also created a cloud version of Xcos and 130 Xcos examples that can run on this cloud. Depending on the time available, one can try out all of the above.

4. Teaching faculty

Prof. Kannan Moudgalya, Principal Investigator, TLC (ICT), Spoken Tutorial and FOSSEE projects
FOSSEE Team members, IIT Bombay

5. Course Fee

Every participant has to pay Rs. **100** as the course fee to IIT Bombay at the time of online registration. On the day of the workshop, i.e., **on 4 May 2019**, they have to pay Rs. **400** to the Remote Centre that they would be attending, to defray the cost of organising the workshop, lunch, and coffee/tea. Please note that the registration fee once paid is neither refundable nor adjustable under any circumstances.

6. Who should attend?

As this workshop is not subject-specific, teaching faculty from all domains (engineering, sciences), and polytechnic colleges, and PGT of schools, can attend. Teachers registered in a Masters or a PhD programme, during their employment as a teacher, can also participate.

7. Criteria for issuing Certificates

E-certificate will be provided to the participants after successful completion of the workshop and filling up the feedback form.

8. Duration and Venue

The workshop will be conducted on Saturday, **4 May 2019 from 9.30 AM to 6.00 PM** at Remote Centres of IIT Bombay. This workshop will be conducted through a blended mode, using both live video conferencing facility (A-VIEW) and hands-on sessions using Spoken Tutorials. A detailed workshop schedule will be available soon.

9. How to apply?

Enrollment will be strictly online, and no other mode of application will be entertained. **The last date of registration is 30 April 2019, 12.30 pm.** The URL for registration is: http://www.it.iitb.ac.in/nmeict/announcements.html

Register on the Spoken Tutorial Website:
1. Before the workshop, participants should register on https://spoken-tutorial.org/
2. Fill up the registration form and submit.
3. An email will be received.
4. The account should be activated by clicking the link in the email.
5. The Username and Password should be noted. This is an extremely important step.
6. One needs the above information to post questions on the forum, which will be explained at the time of the workshop.

Note

- Neither IIT Bombay nor the Remote Centre will bear the travel expense of the participating representatives. There shall also be no accommodation provided to the participants.
- All participants are required to bring **ear phones**, as they will have to listen to video tutorials. Without ear phones, the workshop will not at all be effective.
- Computers to practise Spoken Tutorials and to do Scilab programming will be available at the Remote Centres. But if they wish, participants can bring their own laptops with Scilab installed.

10. Prerequisite for the Scilab Workshop

You must see the four short videos given by Prof. Kannan Moudgalya about Scilab and its benefits.

Click **here** to watch on Youtube.
Click **here** to download the videos. It is mandatory to see all the given videos before the workshop.

11. Address for communication

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