

## Introduction

An important initiative has been taken by IIT Bombay and IIT Kharagpur to work with Engineering Colleges of India to enhance the teaching skills of our faculty colleagues in core Engineering and Science subjects by conducting ISTE Short Term Training Programme (STTP) under Train Ten Thousand Teachers (T10KT) project using 353 established remote centres across India. It has been a mandate through this funded project from the National Mission on Education using ICT (NMEICT) of MHRD to train 1,50,000 teachers in 15 such training programmes. Participating teachers attend live lectures at a remote center close to their own college, and also attend tutorial and lab sessions conducted in the same centers. The lecture transmission and live interaction takes place in distance mode using A-VIEW technology through internet at the selected remote centers across the country.

Since December 2009, a number of two-week ISTE STTP were conducted on various Engineering subjects. We have reached out to more than **1,00,000** teachers and helped them to enhance their teaching skills in these subjects.

In order to run these STTP at selected remote centres, we invite expert faculty members from various remote centres to a five-day Coordinators' training programme held at IIT Kharagpur or at IIT Bombay, at least two months before the main STTP. The trained Coordinators then act as Workshop Coordinators during the main STTP liaising between the participants at their Remote Centers and IIT Kharagpur / IIT Bombay from where the interactive lectures are transmitted live. During the main STTP, the workshop Coordinator at every center supervises the tutorials and laboratories. All the lectures and tutorial sessions are recorded at IIT Kharagpur or at IIT Bombay. The final edited audio-visual contents, along with other course material are released under Open Source. The contents can be freely used later by all teachers, students and other learners.

In the backdrop of the success of these STTP, we now announce another 6 day ISTE STTP on **Introduction to Structural Engineering** during **first week of January, 2016** under **Blended MOOCs** ( Massive Open Online Courses) model. Here,

1. The participating teachers will complete the equivalent of two-week full time work online, spread over 6 physical weeks where video lectures and assignments will be uploaded beforehand.
2. After completing the online assignments spread over 4 to 5 weeks the participants will assemble at the selected Remote Centers for 6 days face to face interaction and lecture sessions through A-VIEW and will complete team assignments, tutorials, quizzes etc.
3. Offline assignments will be uploaded and the participants will have to complete these assignments within a stipulated time.
4. There will also be a system of students' feedback in the Main STTP.

## Course Justification

Structural Analysis and design are the fundamentals for establishing safe and stable structural systems. Graduates in Civil Engineering must develop an understanding of Structural analysis and design to make them capable of designing real life structures. Hence it is imperative that the students are exposed to (a) Fundamentals of Structural Analysis; (b) Fundamentals of Reinforced concrete design; (c) Fundamentals of steel design.

## Course Overview

In any undergraduate programme in Civil Engineering, the students are expected to be exposed to three or more courses in the area of structural Analysis and design. However, it is presumed that before taking these courses, the students are already exposed to basic Strength of Materials (SoM) and Advanced Strength of Materials courses. It is intended that the fundamentals of structural analysis for determinate and indeterminate structural systems, methodologies such as Matrix method of structural analysis and basic concept in Finite element analysis will be covered in the programme. It is also intended that the design of structural systems using two age old material such as concrete and steel will be covered in the programme. The design approaches along with the usage of specification of Indian Standards will be introduced in the course.

## Course Objective

It is expected that on completion of the programme, the learners will gain knowledge in the following areas:

1. Will understand the fundamental approaches in analysing a structural system, obtain concepts on the methodologies of structural analysis that are adopted normally.
2. Though a number of materials have been introduced in the civil engineering industry, still the industry depends heavily on the two age old material namely concrete and steel. One of the objectives of the programme is to make the learners acquainted with the concept of designing structural elements using concrete and steel.
3. The whole course is divided into three main modules namely Analysis, concrete design and steel design and the exposure on these areas will be given.

## Course Modules

### Module – A

Basic concept of stress, strain and their relationships (Recapitulations from SoM) – Bending of beams - Determinate and Indeterminate systems – Force and Displacement based methods – Analysis of Trusses and Frames with appropriate examples – Moment distribution and Slope deflection methods with appropriate examples – Introduction to the Matrix method of structural analysis – Concepts in the analysis methodologies – Energy and Variational approaches – Introduction to Finite element method – concepts on Influence lines for moving loads.

### Module – B

Prescriptive versus Performance based design - concepts of limit state and probability of failure – Limit state design – comparison with working stress method – design of structural elements (Beams, Slabs, Columns, footings) – design of staircase, design of retaining walls, water tanks.

### Module – C

Introduction to steel systems – Connections – Element design – concept of buckling – Concept of lateral buckling – Built up sections – Detailing.

## Duration and Venue

**Duration :** The duration of the workshop is 6 working days. It will start on Monday 4th January, 2016 at 9:00 AM and will end on Saturday 9th January, 2016. The participants must report to the respective remote centres by 8:00 AM on 4th January, 2016.

## Teaching Faculty

**Prof. S. K. Bhattacharyya**, Department of Civil . IIT Kharagpur.

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**Prof. Baidurya Bhattacharya**, Department of Civil . IIT Kharagpur.

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**Dr. Sushanta Chakraborty**, Department of Civil . IIT Kharagpur.

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## Eligibility

The participants must be a regular / visiting faculty in Engineering Degree College / Polytechnic. They must have at least B.Tech degree in Civil Engineering / Construction Technology / Infrastructural Engineering or equivalent. They should be teaching in Civil Engineering or allied departments, where subjects such as Structural Analysis, Reinforced Concrete design and Steel Structural designs are taught.

## Who may benefit

The workshop is likely to benefit regular/visiting faculty colleagues who are teaching subjects like Structural Analysis, Reinforced Concrete design and Design of Steel structures.

## Note

Please note that this ISTE STTP is conducted under the CEP IIT Kharagpur. Live recording of the course and other created contents will be released under Open Source through a portal. The recorded CD/DVD of the course lectures will be available for distribution, at cost, to any individual or institution. All participants are required to sign an undertaking for such release of contents contributed by them during and after the STTP. The recognition and citation will naturally be made for all contributors.

## Course Fee

Since the workshop is funded by the National Mission on Education through ICT (MHRD, Government of India), there is **no course fee for participation.**

## Accommodation and other Support for outstation Participants

Remote Centers are being funded to provide tea/lunch on each day of the workshop, and for accommodation, wherever available, for a limited number of outstation participants. **Travel expenses up to Rs. 1000/- one way and one-time will be reimbursed against proof of actual expenditure, for participants beyond a distance of 100 Km from the Remote Centre.**

## How to Apply

**Those wishing to attend this course should register online <http://www.nmeict.iitkgp.ernet.in/structuralmain.php> Online registration opens on 12th October, 2015**

## Remote centers (ID: 1157 )

The Sona Nodal center was inaugurated by Dr.J. Abdul Kalam in the year 2009. Sona College was chosen as a remote center by IIT Bombay when the initiation to conduct live lectures through distant mode was taken. Since December 2009, more than 10 ISTE workshops have been successfully conducted through the distance mode. The unique feature of Sona nodal center is that the live lecture will be made available in a multiple window display with four LCDs. This kind of facility is available in only very few centers.

## Workshop coordinator

Mr.K.Thulasiraman, Dept. of Civil

**Mobile:9944137118**

## Remote Center Coordinator:

Mr.S.David Samuel Azariya, Dept. of IT

**Mobile: 9843790325**

**Two Week ISTE STTP  
on  
INTRODUCTION  
TO  
STRUCTURAL ENGINEERING  
at  
Sona College of Technology  
Department of Civil Engineering  
Salem, Tamil Nadu**

**Under the  
National Mission on Education through  
ICT  
(MHRD, Govt. of India)**

**January 4-9, 2016**



**Indian Institute of Technology  
Kharagpur– 721302  
India**