About BMTPC

The Building Materials & Technology Promotion Council (BMTPC) is an autonomous organisation under the aegis of the Ministry of Housing & Urban Poverty Alleviation, Govt.of India. BMTPC has been playing a proactive role in the area of disaster mitigation and management. Noteworthy contributions made by BMTPC are the publication of the Vulnerability Atlas of India and the Landslide Hazard Zonation Atlas of India and retrofitting of various life-line structures such as schools, hospitals etc. BMTPC has always been in the forefront in educating and creating mass awareness amongst common men and publishing Guidelines, brochures, pamphlets etc. for improving Earthquake and Cyclone/Wind Resistant Housing. These documents have served as important tools for safety against natural hazards for all stake holders involved in disaster mitigation & management. The Council is also involved in construction of cost-effective disaster resistant model houses and retrofitting of existing buildings besides helping State/UT Govts. in modifications of their Building Byelaws.

About DEPARTMENT OF EARTHQUAKE ENGINEERING at IIT ROORKEE

The Department of Earthquake Engineering at IIT Roorkee was established in 1960 as School of Research and Training in Earthquake Engineering. The Department has provided yeomen service in teaching, research, training and rendered advice in the field of Earthquake Engineering for the last 50 years. The Department has four main sections: (i) Seismic Instrumentation, (ii) Engineering Seismology and Seismotectonics, (iii) Soil Dynamics, and (iv) Structural Dynamics. It offers three M.Tech. programs in Earthquake Engineering with specialization in Structural Dynamics, Soil Dynamics, and Seismic Vulnerability and Risk. It also offers Ph.D. programmes in all discipline of earthquake engineering. The Department has played crucial role in development of seismic design codes in India, and has intensive interaction with the industry.

About NORSAR

NORSAR is an independent research foundation specialized in seismological research and engineering services relevant for the society. During the last decade NORSAR has become increasingly engaged in seismic risk and vulnerability research and development aimed at societal units like cities and municipalities. By combining civil engineering and earth scientist competence, NORSAR has developed a unique environment for such earthquake hazard, vulnerability and risk evaluations. These efforts have over the past years included seismic hazard and risk projects in many earthquake exposed countries, including Guatemala, Nicaragua, El Salvador, Pakistan, India, or entire Central Asia.
Since 2010, NORSAR in collaboration with Standard Norway (the national standardization institution of Norway) conduct training courses on the application of Eurocode 8 for the Norwegian consultancy industry.

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Indo-Norwegian Training Programme

Seismic Design of Multi-storey Buildings: IS 1893 vs. Eurocode 8

May 26 - 28, 2014
(Non-Residential)

at
Casuarina Hall
India Habitat Centre
New Delhi

for
Structural and Geotechnical Engineers, Architects, Practitioners, Designers

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NORWEGIAN EMBASSY

Background

Currently, India is undergoing a rapid phase of urban development resulting in a large number of multi-storey building projects which are coming up, not only in the big cities but also in moderate towns. In the era of globalization, many such projects are designed and executed by multinational companies based on international codes and practices, especially related to seismic-resistant buildings. It is therefore desirable that structural engineers of India get familiar with provisions of international standards. As far as seismic resistant design is concerned, India has its own set of standards/codes for design and construction. However, provisions of these codes were not specifically developed for multi-storey buildings and do not cater to many crucial aspects of seismic design of such buildings. Therefore, structural engineers should be introduced to other international seismic building codes. As Eurocode 8 is one of the more recent and one of the most applied international seismic design codes, the focus of the proposed training programme is on a comparative study and understanding of the underlying principles of both the Indian code IS 1893 and Eurocode 8 with respect to the design of multi-storey buildings in seismic regions.

WHO SHOULD ATTEND?

The course is specifically targeted to Structural and Geotechnical Engineers, Architects, Practitioners, Designers in public and private sectors. The emphasis will be on real-life problems and tackling them through hands-on training and the participants are therefore encouraged to bring their real-life problems for discussion. In addition to practicing engineers, a few seats will be available to post-graduate and research students, who want to have an exposure to these issues in design of multi-storey buildings. The participants are recommended to bring their laptop computers with structural design software being used by them, for hands-on training sessions.

COURSE FEE

The registration fee for the course is Rs.5,000.00 per participant, inclusive of the course registration fee, training material, lunches and refreshments, etc. In case of students, the fee is Rs.1,000.00. The participants have to make their own arrangements for stay in Delhi.

COURSE FACULTY

The lectures will be delivered by the experienced faculty from NORSAR, Norway, Department of Earthquake Engineering IIT Roorkee and BMTPC. Faculty from some other institutes, having experience in modelling and analysis of multi-storey buildings will be involved in hands-on training sessions. The course will be conducted in an interactive mode and the participants will be encouraged to discuss their problems/queries encountered during practice.

The Course

COURSE CONTENTS

1. **Seismic hazard assessment:**
   - the phenomenology of the natural hazard earthquakes
   - seismological parameters, terminology
   - seismic zonation
   - DSHA, PSHA and risk-targeted hazard assessment
   - representation and application in design of multi-storey buildings, issues related with long-period structures
2. **Site amplification:**
   - site amplification effects
   - site classification concepts and their limitations
   - recent trends/concepts and other codes (IBC, NZS)
3. **Lessons from past earthquakes, damage behavior:**
   - behaviour of multi-storey buildings during past earthquakes
   - experiences from India and other earthquake-affected areas worldwide
   - specific issues related to Indian construction

T1. Hands-on training:

   - site classification based on geotechnical parameters, average $v_{s(,30)}$, N_{SPT}
   - generation of design response spectra (horizontal/vertical, acceleration/displacement)

4. **Structural systems for multi-storey buildings in reinforced concrete and steel:**
   - behavior under lateral loads
   - beam-column frames, frame-shear walls, concentrically and eccentrically-braced steel frames, slab-column (flat slab) systems
5. **Principles and philosophy of Earthquake Resistant Design:**
   - strength, overstrength and ductility
   - load and resistance factors and response reduction (behaviour) factors
6. **Basic concepts of structural dynamics:**
   - concept of response spectrum
   - mode superposition
   - selection and scaling of design ground motions
   - spectrum-compatible ground motions
7. **Modelling of building structures:**
   - effective stiffness of RC members
   - modelling of shear walls, floor diaphragms, foundations, beam-column joints, flat slab systems, URM infills, P-Delta effects

T2. Hands-on training:

   - modelling training on SAP 2000 Nonlinear/ETABS, common pitfalls and checks, RC frame/shear wall

8. **Structural analysis methods:**
   - static and dynamic analysis
   - consideration of multiple components of ground motion
   - torsional effects, irregularities
9. **Design and detailing of RC frame and frame shear wall buildings**
   - capacity design of beams, columns, and shear walls
   - reinforcement detailing in beams, columns, beam-column joints and shear walls
   - safety of URM infills
10. **Design of other systems**
    - flat slab structures: enhancing punching shear capacity, drift checks, need for primary lateral load-resisting elements, proportioning of shear walls and shear wall cores
    - eccentrically braced steel frames: model design guidelines, proportioning of links and other members

T3. Hands-on training:

   - equivalent static force method
   - modal response spectrum method
   - time history analysis

COURSE COORDINATORS AND PRINCIPAL INSTRUCTORS

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