Expanding Horizons in Engineering Education:
Anyone, Anywhere, Anytime

REACH OUT

A NEWSLETTER OF CDEEP, IIT BOMBAY

http://www.cdeep.iitb.ac.in

IITBombay
Golden Jubilee 2008
Tryst with Excellence

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For further additions, visit http://www.cdeep.iitb.ac.in/autumn09.html

National Education Mission at IIT Bombay

To improve the levels of education in India, the Ministry of Human Resource Development has launched an ambitious educational mission with an outlay of about Rs. 4,600 cr. This is proposed to be implemented through the use of information and communication technologies. Experts from all colleges and research institutions are invited to write project proposals for funding in order to implement this ambitious project. The following minimum requirements are needed for this purpose: (i) It has to be inter-institutional; (ii) It should be development-oriented, in any general field of college education; (iii) Any material developed through this mission has to be delivered as open source; and (iv) It should belong to one of the sub-missions identified in the mission document, available at www.sakshat.ac.in.

One of the main goals of this mission is to provide 1 Gbps connectivity to each of the 30,000 colleges and research institutions in India. The other main focus area is content generation. IIT Bombay's role in this regard is presented below.

Empowerment of students and teachers through synchronous education: Through a portal, many courses of IIT Bombay, recorded live in classrooms, will be made available to the public. Each of these courses has around forty hours of instruction. Some features of this portal include online and offline interaction between teachers and students, *wikis* that can be used to create e-books and textbook creation depending on the syllabus of a university. Through the EDUSAT network, IIT Bombay is also conducting workshops for college teachers from different parts of the country, along with ISTE certification.

Open source software creation: Some of the activities undertaken in this area include (i) creating educational content around existing open source software, (ii) creating documentation, books and courses in the area of open source software,

(iii) taking necessary steps to include open source software in the syllabi of various universities, (iv) promoting the use of open source/free software through workshops, and (v) promoting the use of open source software in audio/video courses and virtual labs, the other thrust areas of this mission.

IIT Bombay will focus on Scilab and Python in the area of numerical and symbolic computation, and Blender in the area of 3-D animation.

Robot-enhanced teaching of subjects in engineering colleges: The deliverables include (i) successful development/deployment of robotic platforms for enhanced education, (ii) open courseware for Embedded Systems for engineering students based on robots, (ii) web-based recourses to support this courseware, and (iii) deployment of 300 robots in 20 engineering colleges covering 3600 students in the first year itself. As robots will be deployed in the colleges, they will continue to educate many more students in future years.

Virtual labs: One of the shortcomings of distance education is the lack of access to labs for experimental work. IIT Bombay is one of the members in the virtual lab project, coordinated by IIT Delhi. The idea is to establish select state-of-the-art labs at a few locations and to give web access to them for remote operation. Some of the virtual labs at IIT Bombay will be in the areas of control, power systems, micro electronics, CNC, student satellites and bioreactors.

NPTEL: The second phase of the well known NPTEL programme plans to create 600 more courses, jointly with other partners.

We would like to obtain responses from faculty members and students on all of the above topics. Your active participation is welcome in all facets such as course creation, using it in your curriculum, etc. We also have openings for engineers, science graduates and people who have good communication capability. For more details, visit www.cdeep.iitb.ac.in .

VNIT'S EXPERIENCE WITH LIVE EDUSAT TRANSMISSION

Distance Education Programmes are a very good facility for those interested in gaining and updating their knowledge base. This is particularly true in the field of technical education as technological advances are continuously taking place. We are thankful to IIT Bombay, a world class institute in technical education, that has extended its classroom teaching facility to those outside IIT Bombay through its Centre for Distance Engineering Education Programme (CDEEP).

CDEEP started live transmission of courses from IIT Bombay through EDUSAT in January 2008 and the students of Visvesvaraya National Institute of Technology (VNIT), Nagpur, have been attending these live courses. The transmission is of good quality. Viewers are able to see figures and circuit diagrams clearly and the audio clarity makes lectures easy to follow. The online interactive response system is good and allows distant viewers to get the feel of a real classroom with direct access to the instructor.

Transmission problems, if any, are attended to immediately thereby providing sustained quality and confidence in the system. The facility of interaction with other remote centers is also very much appreciated. The schedule of lectures is strictly followed and any rescheduling of classes is given well in advance.

The online chatting facility with IIT Bombay needs to be improved. It is suggested that in case lectures cannot be made available to a Remote Centre due to unavoidable circumstances, then the Centre may be supplied with its recording or a video on demand facility.

These efforts made in distance education will go a long way in improving technical education given to engineering students of the country and also serve as models to local teachers on teaching methodologies.

M. R. Ramteke
Coordinator, CDEEP Remote Centre
VNIT, Nagpur

CDEEP'S RECORDED COURSES

In our last issue (March 2009), we published the first part of our list of Recorded Courses. These are mostly live classroom lectures (approximately 35-40 hours) of a subject taught for one semester. These recorded courses are available on VCDs/DVDs and may be purchased from CDEEP. For more details, visit http://www.cdeep.iitb.ac.in/rec_courses.html.

The next part of this list is given below.

No.	Course name	Course Instructor	Discipline
31.	Database and Information Systems	Prof. S. Sudarshan	Computer Science & Engg.
32.	Theory of Computation	Prof. Krishna S.	Computer Science & Engg.
33.	Applied Algorithms	Prof. Milind Sohoni	Computer Science & Engg.
34.	Formal Specification & Verification of Prog.	Prof. S. Chakraborty	Computer Science & Engg.
35.	Embedded Systems	Prof. Kavi Arya	Computer Science & Engg.
36.	Introduction to Communication Networks	Prof. Kameshwari Chebrolu	Computer Science & Engg.
37.	Power Electronics	Prof. B. G. Fernandes	Electrical Engineering
38.	Broadband Networks	Prof. A. Karandikar	Electrical Engineering
39.	Transmission Lines and EM Waves	Prof. R. K. Shevgaonkar	Electrical Engineering
40.	Wavelets	Prof. V. M. Gadre	Electrical Engineering
41.	Information Theory and Coding	Prof. S. N. Merchant	Electrical Engineering
42.	Communication System & Theory	Prof. S. C. Sahasrabudhe	Electrical Engineering
43.	Digital Communication	Prof. Bikash Kumar Day	Electrical Engineering
44.	Control Engineering	Prof. S. D. Agahe	Electrical Engineering
45.	DSP & Its Application	Prof. V. M. Gadre	Electrical Engineering
46.	Fibre Optics	Prof. R. K. Shevgaonkar	Electrical Engineering
47.	Signals & Systems	Prof. H. Narayanan	Electrical Engineering
48.	Analog VLSI Design	Prof. M. Shojaei Baghini	Electrical Engineering
49.	Matrix Computation	Prof. Harish Pillai	Electrical Engineering
50.	Electrical Machines Analysis and Control	Prof. Mukul Chandorkar	Electrical Engineering
51.	App. of Power Electronics in Power Systems	Prof. B. G. Fernandes	Electrical Engineering
52.	Nano Electronics	Prof. Ram Gopal Rao	Electrical Engineering
53.	Electronics	Prof. M. B. Patil	Electrical Engineering
54.	Electronics	Prof. A. K. Verma	Electrical Engineering
55.	Network Theory	Prof. H. Narayanan	Electrical Engineering
56.	Introduction to Digital Signal Processing	Prof. Preeti S. Rao	Electrical Engineering
57.	Discrete Data Digital Control	Prof. Vishwesh Kulkarni	Electrical Engineering
58.	Statistical Signal Analysis	Prof. U. B. Desai	Electrical Engineering
59.	Image Processing	Prof. Subhasis Chaudhuri	Electrical Engineering
60.	Nonlinear Dynamical Systems	Prof. Madhu Belur	Electrical Engineering

Environmental Geomechanics (CE 641)

Environmental Geomechanics evolves from the engineering philosophy that geotechnical projects must be environment-friendly. It deals with the influence of environmental effects (either man-made or natural) on conventional geotechnical engineering practices. Since rapid and uncontrolled industrialization yields a large amount of hazardous waste (contaminants), this field has been attracting the attention of engineers, researchers and planners.

This course is a blend of geotechnical and environmental engineering and deals with studies related to safe disposal and handling of such hazardous waste, estimation of its spread in the surface and subsurface, methods to contain its spread in the subsurface and development of schemes for remediation of the contaminated land. It also covers the safe transportation and disposal of such waste and development of a suitable strategy for its proper utilization. In order to deal with the concerns raised by these issues, this course highlights the importance and relevance of revising the basic concepts of geotechnical engineering.

The role and importance of parameters and mechanisms that govern the interaction of contaminants with geomaterials (soil and rock mass) and their degradation in the long-run due to the presence of chemicals and/or radio-nuclides in undesirable concentrations and at elevated temperatures is emphasized. However, as contaminant-geomaterial interaction is an extremely slow and complex process, that primarily depends on their physical, chemical and mineralogical properties, it is quite difficult to study this interaction under laboratory or in situ conditions. This calls for resorting to various modeling techniques such as accelerated physical modeling using a geotechnical centrifuge, finite element/difference based numerical modelling and physico-chemico-mineralogical modeling techniques.

The content of this course is mainly based on the research findings of the instructor and his research and poastgraduate students who have been instrumental in developing the Environmental Geotechnics Laboratory. For a virtual visit of the laboratory, please go to www.civil.iitb.ac.in/~dns/envigeotech.html.

This course should be interesting and useful for undergraduate and postgraduate students as well as research scholars of civil engineering.

Prof. D. N. Singh
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Around the world, college radio stations have often gained critical acclaim for their fresh and avant-garde programming. Inspired by this fact, IIT Bombay successfully launched its student radio station in March this year. While the original concept was to create an FM radio frequency, there were many hurdles in getting the required licenses and permissions. Instead, the way forward seemed to be through a Web-based radio station. Unlike a regular radio service, this is an audio broadcasting service transmitted via the internet.

IIT Bombay's web radio is fully run by students, right from content development and production-planning to technical handling. One of the first online Web-based radios in Mumbai, it intends to provide students of IIT Bombay with a platform to voice their opinion and also make them more informed about relevant issues. The campus radio has thus provided a means to bring out the creative side of students. It gives them the opportunity to try out novel ideas for different theme-based shows and also experience the life of a radio jockey. Not just students, but faculty members also are extremely interested in the radio station as they would like to discuss topics related to academics through this new media.

At present, students are keen on a 25% fun-component in their shows as opposed to a format that is solely informative. Broadcasts are in English and Hindi and include interviews, features, reviews, popular lectures, music, campus news, national and international news and coverage of institute events. In fact, two original songs played by IIT Bombay bands are now featured on the website with more compositions waiting in the wings.

All content is pre-recorded before being broadcast over the radio station and a steering committee regulates and scans the content beforehand. Broadcasts are streamed from the state-of-the-art recording studio in the campus. At present, programmes are on the air thrice a week.

CDEEP has indigenously developed the technology behind this radio station and it also provides streaming services for broadcasting the programmes.
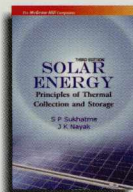
Students in other colleges can now find their own voice by launching such web radios that will give them a platform to air their diverse viewpoints.

USEFUL LINKS

Solar Energy: Principles of Thermal Collection and Storage

S.P. Sukhatme and J.K. Nayak
Third Edition, 2008; Tata McGraw Hill
ISBN (13): 978-0-07-026064-1

The worth of a scientific textbook is determined by its conceptual clarity, sequential arrangement of topics and concise text. Solved examples to illustrate the theory and problems based on data with wide applicability increase its value. *Solar Energy: Principles of Thermal Collection and Storage* is a book that satisfies all these requirements.

The book starts by describing the current world and Indian energy scenarios and discusses various energy sources that can meet these energy requirements. The role of solar energy in meeting a major part of the requirements and the various devices that are now being used, or are likely to play a role in future to meet Indian thermal energy requirements (towards which the book is specifically directed) are introduced in the beginning. The estimation of solar radiation available on tilted collecting surfaces at a given site (a basic input for design of any solar energy system) is discussed in detail. The theory of various solar thermal devices/systems (flat plate collector systems, evacuated tubular based collector systems, concentrating collector systems) for application in different temperature ranges along with the procedure for performance-testing of these devices are dealt with. Thermal storage, an essential component of many thermal energy systems is discussed in detail. The book has a chapter dedicated to indirect solar energy sources and devices along with solar photovoltaic systems. Various methods of economic analysis to ascertain economic viability of solar technologies are also covered.

A significant contribution of this book is that the authors have developed several examples applicable to tropical climates, India in particular, and the book contains many solved examples in addition to exercises for students. On request, the publishers make available to instructors solutions to unsolved exercise problems as well as power point lecture slides.

Two previous editions of this book have proved to be very useful as text books for teaching at the undergraduate and postgraduate level and as reference books for practicing engineers. This well-written and updated edition will undoubtedly continue to play that important role.

Prof. R. L. Sawhney
School of Energy and Environmental Studies
Devi Ahilya University, Indore, MP

Q & A

1. When does the next semester begin?
The next semester begins on July 22, 2009.
2. What are the live courses offered in the next semester?
Please see the box on the first page 'Autumn Semester '09 Courses'. Also, visit http://www.cdeep.iitb.ac.in/autumn _sem_09.html for additions to the list.
3. How can I access archived courses?
They will be available through a portal to be announced on the CDEEP website (http://www.cdeep.iitb.ac.in).

Prof. S. K. Maiti

Prof. Surjya Kumar Maiti obtained his B.E. (Mech.) degree from NIT (formerly R.E. College) Durgapur in 1970 and was awarded the Burdwan University Gold Medal. After working for a brief period with Central Mechanical Engineering Institute (CMERI) Durgapur, Prof. Maiti joined Tata Motors (formerly TELCO) Jamshedpur in 1971. Prof. Maiti received his postgraduate degree from the University of Birmingham and after serving as a research associate at the University till 1974, he returned to Tata Motors as a design engineer. He then moved to IIT Bombay as a faculty member in 1975 and completed his research under the self-guidance scheme of IIT Bombay, receiving his doctorate degree in 1980. Later, in 1981-82, he went to Cambridge University for postdoctoral research .

Prof. Maiti's general interests include stress analysis and design. He is specially interested in fracture of metals, composites, cellular materials and interfaces; modeling of bulk and miniaturized metal forming processes; and development of natural frequency-based methods for health monitoring of railway tracks and pipelines. He has developed a number of analytical and finite element based methods useful in fracture mechanics and introduced the concept of multi-corner singularity finite and boundary elements.

For his contributions to research and education, Prof. Maiti was elected a Fellow of the American Society of Mechanical Engineers in 2008. He is also a Fellow (1997) of the Indian National Academy of Engineering. He received the Excellence in Teaching Award of IIT Bombay in 2006. He has also served as the Head of the Department of Mechanical Engineering (2005-08).

With 104 papers in international journals, Prof. Maiti has been a member of the Editorial Board of the Computational Mechanics Journal during its initial stages. He has also offered consultancy services related to stress analysis, design and finite element analysis to organizations such as Bajaj Auto, Larson & Toubro and BHEL.

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