

IRVINE INSTITUTE OF TECHNOLOGY (IIT)  
PROFESSIONAL ENGINEERING DEVELOPMENT PUBLICATIONS (PEDP)  
C.V. Chelapati, Ph.D., P.E., F. ASCE., President  
8659 Research Drive, Suite 200, Irvine, CA 92618

Tel 949-585-9137, Fax 949-585-9126  
[info@irvine-institute.org](mailto:info@irvine-institute.org)    [www.irvine-institute.org](http://www.irvine-institute.org)

16 Hour Structural Engineer (SE) License Seminars

Introduction:

Administration of SE licensing by various States is now a national issue. SE License is a 'title' to show others that one has adequate knowledge in the broad field of Structural Engineering Practice. Unfortunately, the two day exam specifications are very broad. The 80 questions morning multiple choice AM exam includes both building and bridge related topics. The afternoon long hand 8 problems contain two problems in each of the four materials of construction.

Obtaining a license somehow without knowing a subject is a very dangerous proposition in one's career and this is especially true with the introduction of ASCE 7-05 and ASCE 7-10 specifications and its accompanying guides on Seismic, Wind and Snow loads. The new ASCE-10 specification along with its guides may be more than 1300 pages.

NCEES 2011 Examinations:

NCEES has been taking over the examination portion of the Professional Engineer license in USA. Most examinations are now in Multiple Choice Format. 40 questions during AM and 40 questions during PM. The exam scope is generally vast. Detailed topics that will be covered in the exams are published. In many cases a Design Standard list used for the exams is also published. Exams are given twice a year once in April and once in October of each year.

For year 2011, NCEES combined SE I and SE II exams into one two (2) eight hour exams. The morning (AM) part of each exam contains 40 – 6 minute – multiple choice problems covering a vast area including analysis and design in various materials – Concrete, Steel, Timber, and Masonry. The afternoon (PM) part covers four long hand problems in Concrete, Steel, Timber and Masonry.

The first 8 hour exam covers buildings subjected to Vertical and Incidental Lateral loads for 8 hours and the second 8 hour exam covers buildings subjected Lateral Loads – Wind and Seismic. These exams need not be taken simultaneously but it is highly recommended that one take both exams at the same time.

The current NCEES SE exams are designed not only for 'Building' engineers but also for 'Bridge' engineers. The morning breadth portion of the exam thus includes both building and bridge problems. Thus for those Building engineers taking the breadth exam must also be familiar with Influence lines and AASHTO specifications.

For the afternoon 'depth' portion there are different exams for buildings and bridges.

The specifications for the 16 hour SE examination effective 2011 can be seen in NCEES website [www.ncess.org](http://www.ncess.org). Since the exams are watered down with a vast increase in scope ranging from Analysis to Design with all structural materials they do not require a great amount of in-depth knowledge.

Structural Engineering profession involves the design of all types of structures and for the licensing purposes; they are divided into Buildings and Bridges. Buildings are mostly in the Civil Side while bridges are in the public sector. These structures are subjected to routine 'loads' as well as extreme loads as those occur in strong earthquakes and severe wind storms. At this point in time, we have good information on how strong and severe these loads are. Unfortunately, at this time, the buildings are not designed to stand up for strong earthquakes. If designed per code, the structure may not collapse causing human casualties but cause serious economic loss to individuals, companies, state and federal buildings. One must understand that code designed buildings are for minimum standards and to prevent 'total collapse' and to save lives. That is the reason; there will be over \$100 billion of damage due to strong earthquakes striking populated regions in California since they are designed for minimum life-safety standards.

The university education provides only about three or four required courses to graduate with a degree in Civil Engineering. Structural Analysis and Reinforced Concrete are generally required courses, Indeterminate Structures, Steel Design. Timber Design and Masonry Design are optional courses. The textbooks for each of the subjects are in the range of 700 to 1000 pages. It is simply not possible to cover this vast subject matter in one material in one semester 45 hour courses. So even though one might have taken a course, it does not necessarily mean that one knows complete designs and specially with changing codes.

So it is time for those sitting for these exams to prepare well and know the subject in addition to passing the exam. Knowing the subject well means that one will be more useful to their employers after learning the subject and passing the exam. Please look at Reference List for the SE exam. It is very important to build up your library at the same time you are preparing for the exam. It will be very difficult to follow the codes if you do not have a fundamental knowledge of the subject matter and do not know the 'logic' behind the codes.

The following tables show the examination specifications and the IIT SE Seminars. The seminars designed for 16 hour SE license exam cover the subject matter in two 33 hour seminars – one covering vertical and incidental lateral loads and one covering lateral loads – wind and seismic. Even though one can take the two exams separately, it is suggested that one takes both the exams to get experience even if not prepared well.

Prepare well for the exams. Learn the subject well. Take the two exams at the same time. SE License Review Manuals in 10 volumes covers CA SE Exam problems and solutions developed by expert practitioners. They contain more than 680 problems and solutions. These problems cover the California SE Exams (Long Hand Four Part 16 hours) from 1971-1995. These are covered in 10 volumes containing over 4,000 pages. These problems cover many real world situations commonly encountered by Structural Engineers in their practice. These are not 'textbook' problems. One can almost guarantee that the NCEES exam problems will be similar if not easier. Going over these problems covers a wide range of situations one could pose in the exams. The codes used to solve these problems were those at the time of the examinations. In the seminars we present, some of the problems may be used to illustrate the concepts and recast using the new codes. There are no plans to revise these volumes to new codes. One should buy these manuals if some of the problems are used by the instructors. One should buy the SE manuals, if a person does not have adequate practice in designing with a particular material of construction.

The seminars are given live from Irvine and broadcast nationwide-worldwide. The seminar instructors are scholars and practicing experts in their field. All seminars are archived and can be referred at a later date for review. IIT strongly believes that one will pass the exams after taking its seminars, since they learn the subject matter during the seminars. IIT (CSULB) has been offering these high quality seminars under the guidance of C.V. Chelapati since 1973. As such, IIT guarantees the registrants who take our seminars will pass the exam the first time they take the exam. Or they will have access to free archives for next 12 months.

NCEES SE 16 Hour Sample Questions and Solutions:

This publication was published in November 2010. This is a required publication for all registrants of IIT – SE16 Seminars. Please read the introduction pages describing the exam carefully. The morning breadth portion of the exam involves both building structures and bridge structures. As such it is very important for those taking the SE 16 hour exam specializing in Buildings to buy AASHTO – LRFD – PE publication. Many sample problems refer to this AASHTO document. For the afternoon problems, the exam is divided into Buildings and Bridges.

Friday Exam – Vertical  
Forces

Saturday Exam – Lateral  
Forces

Breadth – Buildings and Bridges

Breadth – Buildings and Bridges

Depth – Buildings

Depth – Buildings

Depth – Bridges

Depth – Bridges

## CALIFORNIA STRUCTURAL ENGINEER (SE) LICENSE EXAMINATIONS AND SEMINARS

### Geological Setting:

State of California straddles San Andreas Fault bounding Pacific and North American fault. California is the third largest state in the United States and both Los Angeles and San Francisco metro areas are in its path. It has suffered damage due to several large earthquakes including 1907 San Francisco Earthquake. As the metro and other areas are close to faults, the potential for very large damage is enormous running into several hundred billion dollars. This cover this great damage is beyond the reach of State of California. Only US has the capacity to help in these potential great hazards under the guidance and leadership of FEMA.

### 1933 Long Beach Earthquake:

This is the first major earthquake after 1907 earthquake. The epicenter of 1933 Long Beach earthquake is off the coast near Huntington Beach. SEAOC took leadership role and thorough International Building Code (IBC) developed specifications to reduce the hazards due to earthquakes. These codes were modified every three years with the lessons learned by earthquakes during that time. State of California also set up licensing regulations for those wishing to participate in reducing the earthquake hazards. Passing of State Developed Examinations was required to get an SE license.

### California Structural Engineer (SE) License Examinations:

The original CA 16 hour - four part examination is now made into two 8 hour examinations. There were many changes to the exam. Presently, SE exams are under the auspices of NCEES.

### **Development of UBC and IBC Codes:**

The first edition of UBC code was published in 1927 and a new edition was published every 3 years until 1997. When started, the UBC codes were empirical in nature and the code emphasis was placed on earthquake performance of buildings since California in US is an "Earthquake Country". Codes were changed generally after each earthquake occurrence incorporating the lessons learned in that earthquake. The predominant criteria underlying the present code is Life Safety and the avoidance of total collapse of the building. The main thrust of the codes came into effect after 1933 Long Beach Earthquake.

Until year 2000, there were three building code councils (UBC, SBC and NBC) in USA. But UBC was the only one concerned mostly with earthquakes.

Major understanding of the earthquakes and the response of buildings to earthquake motions was developed only after the advent of digital computers during the later part of 1950's and with the understanding of Structural Dynamics. Computational schemes were developed at major universities (University of Illinois, UC Berkeley, Caltech, University of Michigan and MIT) for the response of structures using 'Main Frame Digital Computers'. The country slowly began to understand that earthquakes are natural to planet Earth due to its tectonic movements with a history of millions of years. Then in 1971, San Fernando Valley Earthquake occurred and all the engineering tools were in place. There was a lot of damage to buildings and bridges in that area. Not only the State of California but the Federal Government also was involved, since the State of California like any other State in trouble goes to Federal Government for disaster relief funds. The economic losses now run into billions of dollars and each State can no longer handle these huge losses.

Applied Technology Council (ATC) was created under the auspices of SEAOC and received funds from Federal Government. A state of the art document ATC-3 was developed in 1978 with the participation of engineers from all parts of USA. Earthquake scenarios for the whole of United States were developed by the Federal Government with funding from Federal Emergency Management Agency (FEMA). The ideas in ATC-3 were later modified and adapted by SBC and NBC. Some of the ideas were also incorporated into UBC.

In year 2000, all three code councils were united into one code council known as International Code Council (ICC) and International Building Code (IBC) 2000 was published. Due to some unfortunate political issues, IBC was not adapted by State of California while others States did. Finally reason prevailed and IBC Codes were adapted in State of California. Beginning 2008 all State of California PE and SE examinations will use IBC 2006. CBC 2007 is based on IBC 2006.

During the period of 1971-1995, many editions of UBC codes were used for the SE examination problems and the last one used was UBC 1991. The UBC codes were published every three years; the last published one is UBC 1997. Although the SE examination uses a specific code as prescribed by examination specification, a practicing structural engineer must be familiar all codes both current and past codes during his or her practice.

California must continue to give exams to qualify engineers practicing their profession in its State. However, the exams have become arbitrary to some extent with constant changes and Dr. C.V. Chelapati discontinued the review courses for the SE exam beginning Spring 2002. However, the SE examination system is now settled on their scope and will use ICC codes beginning year 2008 and Irvine Institute of Technology (IIT) plans to offer SE Review seminars along with their PE (Civil) seminars.

## **Past SE License Seminars (1975-2002) and SE Manuals Volumes I through X published by PEDP:**

Dr. C.V. Chelapati has been in the forefront of the development of PE/SE License Examination Seminars and has offered these programs since 1973. PE/SE license review manuals and workbooks developed for these seminars are published by Professional Engineering Development Publications (PEDP). SE License Seminars for the Structural Engineering community were offered during 1975 – 2002 while at California State University, Long Beach and after retirement under Continuing Professional Education Institute (CPEI) and Irvine Institute of Technology (IIT). During this time, ten volumes of Structural Engineer (SE) License Review Manuals were developed and published covering all the codes that were published during that time. Over 25,000 engineers across California and nation have taken these seminars. One could by a copy of the past SE examination problems prior to 1995. Several codes were used during those years and the last one used was UBC 1991. The 'official' solutions for these problems were 'secret'. SE Examination Problems cover a wide variety of practical situations. This material is invaluable to any structural engineer as they have to know not only the current codes as required for the examinations but also the previous codes as they review in their practice previously made calculations.

The 10 volume California SE License Manuals – Fifth Edition covering all of State of California SE Exam Problems from year 1971 to 1995 (25 years) problems will be used as a reference. These are very good practice type of problems developed by eminent California Structural Engineers for the State of California SE Examinations. These are not text book type small problems but comprehensive problems discussing a practical situation occurring or occurred in practice. The solutions to these problems given in the SE manuals were developed by expert California Structural Engineers, practitioners and scholars. The solutions to the problems reflect the way a problem should be solved and provide excellent guidance to those 'entering' into Structural Engineering Profession. SE Volumes I through X will only be available for purchase but not given with planned SE seminars.

In any problem the important items are

1. The statement of a realistic problem and how the method of solution is developed.
2. The application of applicable codes.
3. The time it takes to solve a problem

### SE License Examination Seminars

Irvine Institute of Technology offers their comprehensive review seminars for SE-V & SE-L for both Fall and Spring exams. These will be offered live in Irvine but webcast live worldwide through Internet. In addition, all the programs are 'archived' and can be

accessed via the internet 24/7, so that any one from any part of the world can attend/review the material presented live at Irvine. These review courses are offered on Tuesdays and Thursdays during the evenings from 6:30 pm to 9:30 pm. The attached spreadsheet shows the dates and topics covered in each session.

### **Benefits of attending the Seminars:**

The seminar fee includes not only lectures by experts but also the designs using current codes. These seminars are comprehensive and of a practical nature and fast moving. These are in no way similar to graduate/undergraduate courses offered at various universities. It is highly encouraged that all examinees attending National SE II and California SE take the seminars developed by IIT, hear noted experts and practitioners and scholars in Structural Engineering Profession.

All seminars are Webcast and candidates who cannot attend on-site live seminars can take the seminar live from their home or office (off-site Live). All seminars are also archived and stored on servers for future reference and review. For those who do not have time to sit through on-site or off-site live seminars, can take the seminars off-site archived from anywhere 24/7. Registrants enrolled in 8659 - Live or Off-Site Live can also review the archived video/audio/manuals on file servers at a later date for review before the examinations. Please view the sample Webcast on the website [www.irvine-institute.org](http://www.irvine-institute.org).

Structural Engineering Profession is exacting since any failure to follow the Codes and interpret them correctly will cause serious damage not only for the candidate but also to the company they serve. With the current technology, there is really no excuse for anyone not to take the comprehensive seminars offered by IIT which are now available nationwide 24/7.

Dr. C.V. Chelapati, President of Irvine Institute of Technology (IIT) is an educator and has been providing the most comprehensive review seminars of their kind in USA since 1973 while employed at California State University, Long Beach and later through IIT. Over 25,000 engineers have already taken these seminars.

We do not consider it wise for the candidates to try to 'somehow' pass the exam with minimum preparation and without listening to experts. The cost for the seminars is very minimal when compared to the life-long benefits it provides.

Study well and pass the examination during the first time and good luck.

There are many publications including AASHTO ones you need for the exam. The SE exam content is very broad with half of the exam containing Multiple Choice Exams. The sample exam problems given in NCEES - SE16 should be your guide to pass the exam.

In the afternoons, there will be one long problem (1 hour) in each of the four materials. Since there will be one problem in each material, if you miss that problem the chances are that you will fail.

The ten volumes set is a great reference material containing problem and solutions to over 25 year of CA exam, with solutions developed by expert practitioners. You should order volumes in those materials that you do not practice, since you will have similar problems in the exam although the codes will be different.

You cannot take only one of the seminars; since the same faculty teaches both seminar and we cannot really divide the seminars into vertical and lateral. Hopefully, those who take our seminars and study will pass the exam. If one does not pass they will be given free access to the archives of the seminars they took for next 12 months. If one wishes to have archives to current seminars that they have not taken, they will have to pay 50% of the registration fees for the first time and 25% of the registration fees.

### **Registration Information**

- All registrations are processed online through [www.irvine-institute.org](http://www.irvine-institute.org)
- Early registration is highly recommended; classes may close early if filled or get cancelled for low enrollment.
- Seminar fees must be pre-paid by one of the following methods: check, money order, VISA or MasterCard
- **\$50.00 fee will be charged on any checks returned for insufficient funds.**
- **\$50.00 late fee will be charge if enrollment is less than one week before the class start.**
- Manuals are shipped to registrants at the time their enrollment or order is processed. If there is not enough time to ship before the start of seminars, manuals can either be picked up the first day of seminars or earlier at 8659 Research Drive.
- IIT reserves the right to accept registrations and may reject applications from troublesome candidates.
- Both archived and web-casted classes may be subjected to technical difficulties beyond our control. No refunds will be given for minor technical problems, and IIT will do everything in IIT's power to correct the problems as fast as possible.

### **Guaranteed Pass Policy**

- IIT guarantees that students will pass the exam if they attend seminars and receive a Certificate of Completion. Students who fail the exam the first time they take it will be given free access to archives of the same seminar for one year. Students may also re-enroll in the

current seminar, if they wish to, by paying a reduced are rate of 50% for the first time and 25% for the second time.

### **Cancellation Policy**

- Any cancellation of a seminar must be made, in writing, before the first class meeting and is subject to a 25% processing charge that will be deducted from the refund of the seminar fee.
- Refunds: No refunds will be issued after the manuals have been distributed and the seminar has begun. Students can choose to attend the same seminar the following semester it is offered if they are unable to attend the initial seminar they registered for. No refunds will be processed 30 days past the registration date.
- Low enrollment seminars may be cancelled.

### **Changes to Schedule**

- Although it is not our desire to change schedules, due to circumstances beyond our control, there exists a possibility of a schedule change. In the event of such a change, we will make every effort to notify participants in advance.
- Registrants assume the responsibility of calling the office to find out if changes have occurred if they are absent.

### **Certificate of Completion**

- Participants are required to sign the attendance record for every class session to document their participation in the course.
- A Certificate of Completion will be awarded at the end of the seminar. Each registrant must attend the required number of class meetings as shown below, and must return a completed class evaluation at the end of the seminar in order to receive the certificate.

Seminar Days:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Required Days:	10	10	9	8	7	7	6	6	5	4	4	3	2	2	1

### **Book Return Policy**

- Any book returns must be claimed within 15 days of shipment arrival. Claims for shortages or damage must be made within 5 days of receipt of merchandise.
- All books must be returned (either brought back directly to IIT or shipped back prepaid) in new, resalable condition within 15 days. No refunds will be given for books already opened from the original packaging, damaged, used, or marked up in any way.

- A copy of a sales receipt, paid invoice, or other proof of purchase must accompany the shipment of all returns. Unauthorized returns will be delayed in processing and may not be accepted for credit and/or may get returned to the customer.
- All book returns are subject to a restocking fee of 25% of the original selling price.

### **Privacy Statement**

- All information supplied by participants will be maintained for a period of seven years. No release of any information will be done without the expressed written consent of the participant.

### **Classroom Rules**

- “Loaner” manuals are not available.
- Videotaping and/or audio recording are prohibited.

### **Hours of Operation**

- All weekend classes are from 9:00 a.m. to 12:00 noon and 1:00 p.m. to 4:00 p.m. unless otherwise noted. All weekday classes are from 6:30-9:30pm.
- Complimentary coffee breaks are from 10:30 a.m. to 10:45 a.m. and from 2:30 p.m. to 2:45 p.m. Lunch breaks are from 12 noon to 1 p.m.