

Specifications and Guidelines for Preparation of Bachelor of Technology Project Report

A Project Report Submitted
in Partial Fulfillment of the Requirements
for the Degree of
BACHELOR OF TECHNOLOGY

by
Rajinder Pal Singh
(63121)
Gurmeet Singh
63245
Jasmeet Guggi
63303
Ranjeeta Kaur
63524
Manpreet Singh
63625



Department of Civil Engineering
INDIAN INSTITUTE OF TECHNOLOGY KANPUR
Kanpur 208016, INDIA

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Abstract

The undergraduate program of study requires that each student conducts an engineering project in their area of engineering and submits a report on it in consultation with the faculty member(s) supervising the same. The Bachelor's Project is included in the curriculum with a view to synthesise the education gathered during the various courses credited by the student during the undergraduate program at IIT Kanpur. Creating a report of the project is part of the training of skill building of the student on of technical communication. Here the emphasis is on presenting a technical matter in an objective *written* form.

This document is a record of the requirements for preparation of the Report of the *Bachelor of Technology Project* submitted at the end of the undergraduate program of study. It prescribes typical contents that a *Bachelor of Technology Project Report* usually should contain, and provides the format of its presentation. Some guidelines are mandatory to follow during the preparation of the report, while the others help in improving the presentation of the work accomplished in the project.

All students pursuing *Bachelor of Technology Projects* are urged to read the contents and form of this document carefully, and prepare their *Bachelor of Technology Project Report* as prescribed. It is hoped that this document will lead to a modest beginning in the Institute towards imparting education in professional written presentations.

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Acknowledgments

This document is prepared by the inspiration received from Professor Pramod Bahadur Shreshtha, Head, Department of Mechanical Engineering, Institute of Engineering (Pulchowk Campus), Tribhuvan University, Kathmandu (Nepal). Many colleagues at IIT Kanpur have carefully read and improved the document; their contributions are gratefully acknowledged.

C.V.R.Murty

Certificate

It is certified that the work contained in this report titled "*Specifications and Guidelines for Preparation of Bachelor of Technology Project Reports*" is the original work done by *Rajinder Pal Singh(63121)*, *Gurmeet Singh (63245)*, *Jasmeet Guggi (63303)*, *Ranjeeta Kaur (63524)*, and *Manpreet Bagga (63625)*, and has been carried out under our supervision.

Joginder Sodhi, Nemchand Vij, Ramandeep Ahluwalia and C. V. R. Murty
Project Supervisors
Department of Civil Engineering
Indian Institute of Technology
Kanpur
Kanpur 208016



17 June 2006

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List of Symbols

Symbol Description

A_{st}	Area of steel reinforcement bars on tension face
A_{sc}	Area Of steel reinforcement bars on compression face
A_{sv}	Area of two legs of the closed stirrups
b	Breadth of rectangular beam section
d	Effective depth of rectangular beam section
d'	Effective cover on compression face
$f_{c,ave}$	Average compressive stress in concrete
f_{sc}	Stress in steel on the compression side
f_y	Characteristic strength of steel reinforcement bars
S_v	Spacing of the stirrups
X_u	Depth of neutral axis from compression face
\bar{x}	Depth of centroid of the compression block in concrete
τ_c	Shear strength offered by concrete

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The undergraduate engineering education at IIT Kanpur is embodied with three facets, namely, *primary understanding*, *detailed study* and *application*. Students are given basic education, provided detailed background in one chosen area of engineering, and finally shown how to apply these concepts. With the above spirit, the *Bachelor of Technology Project* plays an important role of synthesising the various elements of undergraduate education.

Students are posed with **one** comprehensive real-life engineering problem that involves 3-4 facets of the engineering specialisation chosen by the students. In about 10 months, all students of the graduating class work in teams and arrive at different proposals as engineering solutions to the problem posed to them. The methods and skills applied shall be based on the engineering education acquired by them during the Bachelor of Technology Program at IIT Kanpur.

This team approach of problem solving on a *competitive* platform is intended to prepare the students for addressing an engineering problem in a turnkey sense, as is the case in the engineering profession.

1.1 Purpose of This Document

This document, henceforth referred to as the *Manual*, presents the general and specific requirements for the preparation of the *Bachelor of Technology Project Report*. It presents guidelines for arrangement of the contents of the report. Detailed accounts on possible styles, structures and presentations of technical reports are available in literature [e.g., PH, 1989]. The purpose of this *Manual* is to maintain uniformity in the project reports submitted by individual students of various disciplines across IIT Kanpur.

1.2 Project Report Submission

For the purposes of examination and record, three copies of the report are required to be submitted to the Convener, DUGC of the Department to which the students' group belongs. Also, the students are required to submit to the Central Library of the Institute, soft copies of the *Bachelor of Technology Project Report* in PDF format. The Project Supervisors are required to ensure that the *specifications and guidelines* as prescribed in this *Manual* are adhered to by the students while preparing the *Bachelor of Technology Project Report*.

The *Bachelor of Technology Project Report* Evaluation Committee will examine the report, and use it as an input for evaluating the quality of the project work done by the students.

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Guidelines for Arrangement of Contents

The *Bachelor of Technology Project Report* consists of three parts, namely (a) preliminary pages, (b) main body, and (c) appendices. Parts (a) and (b) above are mandatory in all reports. In some *Bachelor of Technology Project Reports*, where vast amount of raw data is generated or used, the main body is kept brief by including only the representative and critical data derived from the raw data. However, the detailed account of the raw data can be included in the part (c) for purposes of reference and record.

2.1 Preliminary Pages

This manual has all its preliminary pages in the formats in which preliminary pages are required in the *Bachelor of Technology Project Report*.

2.1.1 Title Page

The first page of the report is the *Title Page*. It contains the title of the report at the top, followed by the partial fulfillment clause, the degree for which the report is submitted, the authors with their role numbers (placed in the order of the role numbers), the Institute logo, the name of department and Institute to which it is submitted, and the month and year of submission.

2.1.2 Abstract Page

The second page of the report contains the abstract of the report in a maximum of 250 words. The text should be in single spacing.

2.1.3 Certificate Page

A certification from the Project Supervisors, stating that the contents of the report are based on the work done by the students under their supervision, constitutes the next page. A text of the same is shown on page iii of this document.

2.1.4 Acknowledgments Page

The authors of the report may include warm acknowledgments in recognition of the support and help rendered by different persons and organisations in the conduct of the project.

2.1.5 Table of Contents

For the ease of readily reaching the different sections of the report, a complete table of contents should be included indicating the sections and the corresponding page numbers.

2.1.6 List of Tables and Figures

For quick access to the tables referred to in the text, a list of tables and figures is essential. These lists are made on separate pages and should follow the Table of Contents page.

2.1.7 List of Symbols

The various symbols used in the body of the text are defined in detail on the first instance of their occurrence. However, a separate list of the brief definitions of all symbols should be included for easy comprehension of the report; should the symbol appear at a location far away from where it has been defined first, this list will be a great help. Some symbols appearing in this manual and their brief definitions are presented in the *List of Symbols* on page viii. As shown, the English alphabet based symbols appear first and then the Greek alphabet based symbols.

2.2 Main Body

The author must provide the content of the Bachelor of Technology Project in the main body of the text. In general, it may contain the following sections: (a) introduction of the subject matter of the project, (b) status of the work done in this areas - problems, and issues involved, (c) relevance, motivation and objectives of the present work, (d) detailed literature review of the past work of relevant to the topic of project at hand, (e) formulation and testing of the analytical model, (f) analysis and design of the system, (g) analysis, design and conduct of the experimental part of the study, if any,(h) analysis of the experimental and analytical data, (i) validation of the data gathered from analysis, design and experiments, (j) discussion of results, (k) concluding remarks, and (l) recommendations for future work, if applicable.

Any past work quoted in the report shall be properly cited. And, a list of all references cited in the report shall be provided at the end of the main text of the report.

2.3 Appendices

The appendices play an important role of record keeping of the valuable data gathered for and during the project. The appendices may contain different types of data, *e.g.*, questionnaire and survey forms, raw experimental data, raw analytical data, drawings, computer program listings, and detailed derivations of certain expressions used in the main body of the report.

2.4 Closing Remarks

This manual gives only basic requirements for preparing the project reports. In addition to the points mentioned in this document, the report should be easy to read and pleasant in appearance. Several aspects of report writing, *e.g.*, style of writing and presentation, are not discussed in this document. Guidance may be obtained from standard literature on the subject matter of the report.

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Chapter 3

Specification for Report Format

In general, the reports submitted by the different students of the Institute must bear a uniform style and format; even within a report, adopting an identical style and format throughout the report, will lead to an easily readable document. The specifications mentioned in this chapter are mandatory in the preparation of the report. The Institute shall not accept a report that does not adhere to these specifications.

3.1 Preparation of Manuscript

The report shall be typeset on any electronic medium with uniform sized and spaced characters, lines and margins on every page. The font used shall be "**Verdana**" for the entire text in the report, irrespective of whether it appears in the text, figures, tables or appendices.

The report shall be free from typographical errors and hand-written correction. The "spell-check" facility available with the word processors should be utilized for this purpose. The use of tape as an adhesive is not permitted. All photographs shall be pasted with a good quality adhesive applied at the back side of the photographs.

The matter shall be printed on good quality white sheets either by laser printers. The pages may be printed back to back. In such a case, care must be taken to ensure that the paper quality is not too translucent to show the material on the backside, and mirror margins are used to ensure same distance of the leading and finishing text from the edge of the page.

All copies of the report shall be clear, adequately dark and even. Again, when pages are photocopied back to back, care must be taken to ensure that the paper quality is not too translucent to show the material on the backside.

3.2 Sizes and Margins

The finished size of the report shall be that of an A4 page, *i.e.*, 210mm×297mm (8.27 inches × 11.69 inches). The margins at the top, bottom and outside shall be 25mm (1 inch), while that in the inside shall be 32mm (1.27 inches). These limits are applicable for the entire report, including pages having tables and figures.

Footnotes, if required, are permitted only in the bottom margin area. The format of the footnotes is demonstrated at the bottom of this the page¹. In case, more than a line is required for accommodating the footnotes, the bottom margin on that page may be increased.

Any subheading placed near the bottom of the page, shall have at least two lines of text following it on that page; else, it must be started on the next page. The text in all tables and figures shall conform to the same requirements as applicable to the running text.

3.3 Style of Writing

All text shall be cast in third person singular. The sentences shall be kept in passive voice. Personal opinions, thoughts and feelings shall not be included in the report, however valid, important and correct they may be.

3.4 Page Numbering

The report is printed with back to back pages. Beginning with the first page of Chapter 1, all pages of the report including the appendices shall be numbered sequentially in Arabic numerals, *e.g.*, 1,2,3,... The pages preceding Chapter 1, which are referred to as the preliminary pages, shall be numbered in lower case Roman numerals, *e.g.*, i,ii,iii,... In this regard, the title page (the first page inside the front cover) is considered to be having number i; this number is, however, not printed on the title page.

All page numbers shall be placed in the lower outside corner of the page in the footer area at the bottom the page; the number shall be right justified to the available footer text area on the odd pages (right hand side pages) and left justified to the available footer text area on the even pages (left hand side pages).

The font type for page number shall be same as that of the text in the whole report, *i.e.*, Verdana. The font size, however, shall be 10pt and in bold style.

3.5 Font, Line Spacing and Justification

The font size and style to be used on the *Title Page* are different for different line. The title of the report at the top of the page will be in 16pt, bold style. The partial fulfillment clause is in 12pt, regular style. The degree for which the report is submitted is in 12pt, bold capital style. The author name is 12pt, bold style with first letters in capitals, and their role numbers in 12pt, regular style. The name of department

to which the report is submitted is in 12pt, bold style. The name of the institute to which it is submitted is in 12pt, bold capital style. And, the month and year of submission is in 12pt, regular style. The line spaces between the above items shall be adjusted for aesthetic appeal.

The font size in the whole report is 12pt for all text in the preliminary, main and appendices pages. Some text in the tables and the figures may have smaller fonts, but not smaller than 8pt. However, the titles of the tables and figures shall be in 12pt. The chapter title is in 16pt, bold style. The line showing the chapter number is in 14pt, regular style. First level sub-headings are in 12pt, bold style with first letter capitals. The second level subheadings are in 12pt, bold style, and the third level sub-headings in 12pt, bold style in italics. In the chapter titles, headings and sub-headings, where first letters are in capitals, words, such as "of", "a", "an" and "the", are in lower case.

All text in the report shall be in single spacing with each line 12pt thick. One blank line of 12pt size is provided after every paragraph. Before every first heading, two blank lines are provided each of 12pt size, and before every first and second level sub-headings, one blank line of 12pt size. No space shall be left between the headings & sub-headings and the text that follows them. Between the line having the ruler under the chapter number and chapter title, one blank line is provided of 12pt size. The entire text shall be double justified to the width of the available textbox after removing the margins.

3.6 Equations, Tables and Figures

All equations, tables and figures shall be prepared on electronic media. Equations are embedded in the text at the appropriate locations. Equations shall be placed with one tab from the left margin of the active text. Each equation shall be assigned a number, which is placed in right end of the line in parentheses. For example, the ultimate bending moment capacity M_u and ultimate shear force capacity V_u of an under-reinforced reinforced concrete cross-section are given by:

$$M_u = f_{c,ave} b x_u \bar{x} + f_{sc} A_{sc} (x_u - d') + 0.87 f_y A_{st} (d - x_u) \quad (3.1)$$

and

$$V_u = \tau_c b d + \frac{0.87 f_y A_{sv} b}{s_v}, \quad (3.2)$$

where b and d are breadth and effective depth of the rectangular section, respectively; d' is effective cover on compression face; s_v is spacing of the stirrups; x_u is depth of neutral axis from compression

face; \bar{x} is depth of centroid of the compression block in concrete; A_{st} and A_{sc} are areas of steel reinforcement bar on tension and compression faces, respectively; A_{sv} is area of two legs of the closed stirrups; f_y is characteristic strength of steel reinforcement bars; f_{sc} is stress in steel the compression side; and $f_{c,ave}$ is average compressive stress in Concrete; and τ_c is the shear strength offered by concrete.

Tables are placed immediately following the paragraph in which their reference is made. Between two consecutive tables or two consecutive figures, two single line spaces are provided (each of 12pt thickness). All tables bear a number and a caption. The number and caption of a table precede a table. No space is provided between the table caption and the table itself. If there is not much place in that page to accommodate the table, it must appear at the top of the next immediate page. Table 3.1 demonstrates this; the table list the quantities of material used in structural elements of a building when different grades of concrete are used.

Table 3.1: Quantities of Materials Used in the Designs with Different Grades of Concrete.

Members	Steel (kg)			Concrete (m³)		
	M20	M25	M30	M20	M25	M30
<i>Slabs</i>	4632	4632	4632	145.7	145.7	145.7
<i>Beams</i>	22137	21980	21980	104.1	104.1	145.7
<i>Columns</i>	16485	16014	15622	89.1	89.2	89.2
<i>Footings</i>	8871	8557	9420	133.9	126.0	118.2

Hand drawn figures are not acceptable. Figures formally drafted with Indian ink, may be included in the report. Just as the tables, figures also are placed immediately following the paragraph in which their reference is made. All figures shall bear a caption placed below the figure; there shall be a single line space in between the figure and its caption. Please see Figures 3.1 and 3.2 for a demonstration of the same. Again, if there is not much place in that page to accommodate the figure, they must appear at the top (or after a table there if any) of the next immediate page. Table 3.1 demonstrates this. Photographs, when use in figures, are securely pasted on the page using good quality photo-mounting cement applied at the back side of the photo. Mounting corners, tape or staples are not allowed.

The title of the tables and captions of figures shall be in 12pt, in regular style, except the word "Table" and "Figure" and the numbers of the table and figure, respectively, which are in bold. The text of the

title of tables and captions of figures are double justified. The first letters the principal words (*i.e.*, nouns, pronouns, verbs, adverb, and adjectives) are in capitals.

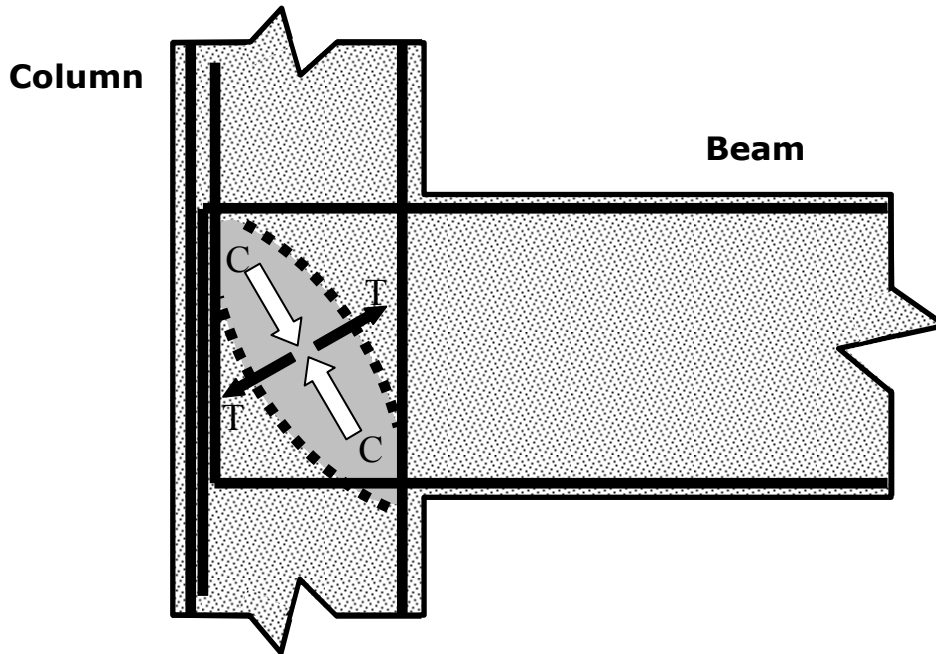


Figure 3.1: Diagonal compression and tension fields in an exterior RC beam-column joint.

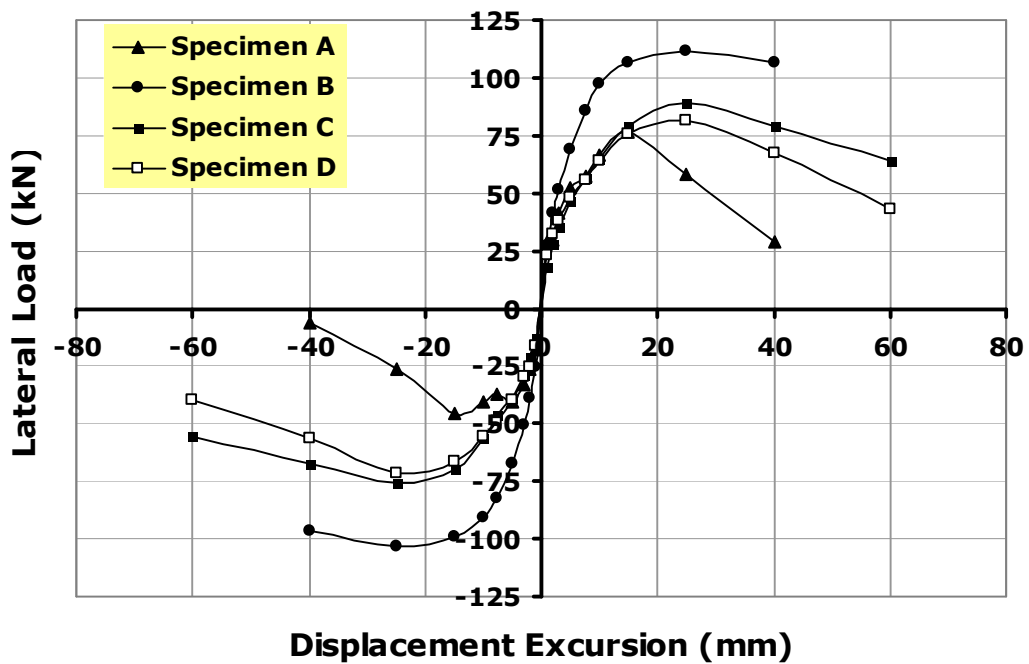


Figure 3.2: Backbone load-displacement curves of four specimens considered in a study on structural testing of beam-column joints.

All equations, tables and figures are numbered chapter-wise in Arabic numerals. They are numbered sequentially in the order of their first appearance. Equations, tables and figures are referred as Eq.(3.1), Table 3.1 and Figure 3.1, respectively

3.7 Symbols

All symbols used in the text are listed alphabetically and defined in the *List of Symbols* in the preliminary pages of the report. First, all the uppercase symbols are listed, then lowercase symbols, and finally the Greek symbols (in the Greek alphabetical order).

3.8 References

All formal literature used in the project work is referred to at the appropriate locations in the text. The citation placed in square brackets consists of last name followed by a comma and the year of publication of that reference. This reference shall be placed at the appropriate location in the sentence, but before the full stop. For example, the text presented in this document is derived from two other documents available [IITK, 1982; IOE, 1999].

When there are two authors, the last name of the first author is followed by an "and" and the last name of the second author; this is then followed by a comma and the year of publication [e.g., Paulay and Priestly, 1992]. When the number of authors is more than two, the citation has the last name the first author followed by "*et al*", a comma and the year of publication [e.g., Arlekar *et al*, 1997]. However, the entire list of authors is provided in the reference included in the list of *References*. The formats are different for referring to research papers [e.g., Jain and Navin, 1995], design codes [e.g., IS:456, 1984], text books [e.g., Paulay and Priestley, 1992] and computer programs [e.g., CSI, 1999].

The list of references is arranged in alphabetical order as shown in the list of *References* at the end of this *Manual*. All references are in single spacing with second and subsequent lines indented forward by 5mm. Only those references cited in text are included in the list of references.

3.9 Appendices

Each appendix starts on a fresh page. Each appendix is identified by capital letters of English alphabet in the sequence of their appearance. The sub-sections in the appendices shall be numbered with the first letter being that of the English alphabet corresponding to that appendix. Please see Appendix A for examples.

All specifications applicable for the main text of the report are equally applicable to the appendices too. When appendices are making the report voluminous, they may be printed in reduced font size to limit the size of the report; in such cases, the font size is not smaller than 8pt.

3.10 Printing and Binding

The three copies of the report are to be submitted in the hard bound form. The paper quality is white bond paper, at least of $80g/m^2$ quality. The front cover of the bound volume bears the same material as the *Title Page* of the report. The cover of the report is in light sky blue colour. On the cover of the report along its thickness, the following matter shall be placed: students name, report title (abbreviated, if required), degree name, department, and year of graduation.

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This is the last chapter of the report. This chapter is usually very brief, with precise statements that summarise and conclude the report.

4.1 Summary

This section summarises the project. It has the objective of the study undertaken, the methodology adopted and the work accomplished. The above items are very concisely described here; details are not provided.

4.2 Concluding Remarks

Since *Bachelor of Technology Projects* hold the philosophy of *synthesis* of knowledge acquired during the undergraduate program, the work conducted for the project is not, expected to have “research-type” conclusions that may have significant bearing on the state-of-the-art or of-practice. However, concluding remarks on the salient observations made from the project work are recapitulated in this section. If there are specific recommendations for future work in the subject matter discussed, the same may be made here.

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References

- Arlekar,J.N., Jain,S.K., and Murty,C.V.R, (1997), "Seismic Response of RC Frame Buildings with Soft First Storey," *Proceedings of the CBRI Golden Jubilee Conference on Natural Hazards in Urban Habitat*, 10-11 November 1997, New Delhi, pp 13-24, Tata McGraw Hill Publishing Company Ltd., New Delhi.
- CSI, (1999), *SAP2000 Integrated Finite Element Analysis and Design of Structures*, Users Manuals, Computer and Structures Inc., Berkeley, California, USA.
- IITK (1982), "THESIS GUIDE: Specifications and Guidelines Regarding Thesis Preparation," Post-Graduate Office, Indian Institute of Technology Kanpur, India.
- IOE, (1999), 'Guidelines for the, Preparation of Final Year Project Report Department of Mechanical Engineering, Institute of Engineering (Pulchowk Campus), Tribhuvan University, Nepal.
- IS:456-1978, (1996), *Indian Standard Code of Practice for Plain and Reinforced Concrete*, Bureau of Indian Standards, New Delhi.
- IS:875(Part 2)-1987, (1987), *Indian Standard Code of Practice for Design Load (other than Earthquake) for Building Structures*, Bureau of Indian Standards, New Delhi.
- Jain,S.K., and Navin,R., 1995, "Seismic Overstrength in Reinforced Concrete Frames," **Journal of Structural Engineering, ASCE**, Vol. 32, No. 1, pp 17-32. Paulay,T., ,and Priestley M.J.N., 1992, *Seismic Design of Reinforced Concrete and Masonry Buildings*, John Wiley and Sons, New York, NY, USA.
- PH, (1978), *Prentice Hall Author's Guide*, Prentice-Hall,Inc., Englewood Cliffs, NJ, USA.

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List of Structural Engineering Courses Offered at IIT Kanpur

Structural Engineering is one of the major streams of study in the Department of Civil Engineering at IIT Kanpur. The stream deals with the designing and constructing the built environment. At the undergraduate level, most basic courses are taught. However, at the post-graduate level, the courses reflect the background of the faculty members currently employed at the institute and who are formally trained for conducting research in *Structural Engineering*.

A.1 Courses Taught

Undergraduate education in the Department of Civil Engineering at IIT Kanpur has a strong component of structural courses. The undergraduate students also have the option of crediting some of the advanced courses of the graduate program in structural engineering as electives. These courses are listed in the sub-sections below.

A.1.1 Undergraduate Courses

The undergraduate courses offered in the stream of Structural Engineering are categorised into two sets, namely compulsory and electives. These are:

Compulsory Courses –

- CE 222 : Structural Analysis
- CE 251 : Construction Materials
- CE 321 : Design of Steel Structures
- CE 322 : Design of Reinforced Concrete Structures

Elective Courses –

- CE 354 : Computer Aided Design in Civil Engineering
- CE 421 : Structural Design III
- CE 422 : Advanced Structural Mechanics
- CE 423 : Introduction to Earthquake Engineering
- CE 424 : Special Topics In Structural Design
- CE 452 : Principles of Construction Management
- CE 454 : Concrete Engineering
- CE 455 : Vibration of Elastic system

A.1.2 Graduate Courses

The post-graduate courses offered in the stream of Structural Engineering also are categorised into two sets, namely compulsory and electives. These are:

Compulsory Courses –

- CE620 : Structural Dynamics
- CE621 : Advanced Structural Analysis
- CE622 : Theory of Plates and Shells
- CE722 : Structural Mechanics and Stability

Elective Courses –

- CE 625 : Advanced Design of Masonry Structures
- CE 626 : Advanced Design of Reinforced Concrete Structures
- CE 629 : Earthquake Analysis & Design of Structures
- CE 721 : Random Vibrations
- CE 723 : Durability of Concrete Structures
- CE 724 : Advanced Design of Steel Structures

A.2 Course Contents

The contents of the course in Civil Engineering at IIT Kanpur are reviewed about once every ten years. However, changes in the post-graduate curriculum are made even more frequently. A brief account of the contents of undergraduate courses mentioned above is:

CE 222 : STRUCTURAL ANALYSIS

- 3-1-0-0 [5 Credits]
- Introduction to Structural Analysis
- Analysis of Statically Determinate Structures
- Moving loads
- Analysis of Statically Indeterminate Structures

CE 251 : CIVIL ENGINEERING MATERIALS

- 3-0-3-0 [5 Credits]
- Engineering Properties of CE Materials
- Concrete
- Steel
- Masonry
- Bituminous Mixes
- Other CE Materials

CE 321 : DESIGN OF STEEL STRUCTURES

- 3-1-0-0 [5 Credits]
- Introduction to Steel and Steel Structures
- Introduction to Design of Steel Structures
- Working Stress Design of Structural Components
- Working Stress Design of Connections
- Plastic Design

CE 322 : DESIGN OF REINFORCED CONCRETE STRUCTURES

- 3-1-0-0 [5]
- Introduction to Concrete Structures
- Introduction to Design of Reinforced Concrete Structures
- Working Stress Design of Structural Components
- Limit State Design of Structural Components
- Capacity Design Concepts

CE 354 : COMPUTER AIDED DESIGN AND EXPERIMENTS IN
CIVIL ENGINEERING

3-0-3-0 [5]

Automation in Design

Automation in Experiments

Automation in Computations

CE 421 : DESIGN OF STRUCTURAL SYSTEMS

3-0-0-0 [4]

Design of Prestressed Concrete Structures

Design of Masonry Structures

Design of RC Elevated Water Tanks

Design of Bridges

CE 422 : ADVANCED STRUCTURAL ANALYSIS

3-0-0-0 [4]

Matrix Methods of Structural Analysis

Introduction to Dynamics of structures

CE 423 :: INTRODUCTION TO EARTHQUAKE ENGINEERING

3-0-0-0- [4]

Physics of Earthquakes

Structural Response

Philosophy of Earthquake Resistant Design

Earthquake, Resistant Design and Construction

Structural Control

CE 424 : STRUCTURAL DESIGN STUDIO

3-0-0-0 [4]

Structural Analysis, Design, Detailing and Construction Drawing of 3 of the following structures: Multi-storey RC Frame Buildings, Steel Antenna/HT Open Web Towers, Railway/Highway Bridge, Elevated Water Tank, Multi-Storey Reinforced Masonry Building, and RC Chimney.

CE 452 : PRINCIPLES OF CONSTRUCTION MANAGEMENT

3-0-0-1-[4]

Introduction to Construction Equipments and Their Use

Introduction to Construction Management

Financial and Economic Issues

Contract Management

Interdisciplinary Nature of Modern Construction

Case Studies

CE 454 : CONCRETE ENGINEERING

2-0-3-0 [4]

Review of properties of fresh and hardened concrete

Fundamental Concrete Science

Special concretes

Special construction methods with Concrete

Special Reinforcing Materials

Case studies (Laboratory studies)

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