OUR INTELLECTUAL PILLARS

1. **Er. Sohan H. Lal Swamy**
    Chairman
    The Institution of Civil Engineers (India)
    New Delhi.

2. **Prof. V.N. Rajasekharan Pillai**
    Former Vice-Chancellor
    Indira Gandhi National Open University
    Maidan Garhi,
    New Delhi-110 068.

3. **Mr. Ashok K Mittal**
    Chancellor
    Lovely Professional University
    Lovely Campus, Jalandhar-Ludhiana G.T.
    Road, Near Chaheru Railway Bridge
    Phagwara, Punjab 144402

4. **Dr. D.P. Ghosh**
    Ex- Professor , Dept. of Civil Engineering
    IIT, Kharagpur
    West Bengal

5. **Prof. K.G. Sharma**
    Professor, Dept. of Civil Engineering
    IIT Delhi, Hauz Khas
    New Delhi.

6. **Prof. Ravi Sinha**
    Professor, Dept. of Civil Engineering
    IIT, Mumbai, Powai
    Mumbai.

7. **Dr. G.L. Asawa**
    Ex-Professor
    Department of Civil Engineering
    IIT , Roorkee- 247 667
    Uttarakhand

8. **Prof. Anjan Dutta**
    Prof. Dept. of Civil Engineering & Dean
    Institute Works
    IIT, Guwahati-781 039
    Assam

9. **Dr. L.S. Ramachandra**
    Professor & Head, Deptt. of Civil
    Engineering
    IIT, Kharagpur
    West Bengal-721302

10. **Prof. Raja Gopala**
    Professor, Dept. of Civil Engineering
    IIT, Madras
    Chennai-600 036

11. **Prof. C.V.R. Murty**
    Professor
    Department of Civil Engineering
    IIT, Madras
    Chennai-600 036

12. **Dr. P.P. Mujumdar**
    Professor and Chairman
    Department of Civil Engineering
    Indian Institute of Science
    Bangalore-560 012
    Karnataka

13. **Dr. Subhash Chandra Mishra (F.I.E)**
    Retd. Dean
    College of Engineering and Technology
    Bhubaneswar.
    Orissa

14. **Prof. Satish Khanna**
    Professor, Department of Architecture
    School of Planning and Architecture
    New Delhi

15. **Prof. R.S. Sharma**
    Ex- Professor, Dept. of Civil Engineering
    (and Practicing Architect)
    College of Technology, Pantnagar
    Uttrakhand

16. **Dr. S.S. Kang**
    Professor
    Punjab Agricultural University
    Ludhiana
    Punjab

17. **Dr. S.D. Sharma**
    Former Dean
    Post Graduate Faculty cum Director
    Resident Instructions
    Orissa University of Agriculture and
    Technology,Bhubaneswar
    Orissa

The Institution of Civil Engineers (India)

The Civil Engineer News Letter is the Official Publication of The Institution of Civil Engineers (India).

(Registered under Societies Registration Act, XXI of 1860).

Chairman of the Institution
Er. S. L. Swamy

The Civil Engineer-News Letter contains the news of Institution of Civil Engineers (India) unless it is stated that an article or a letter does not represent the ICE(I)'s views.

Notice of change of address must be received in the Offices of the Institution of Civil Engineers (India) Regd. Off. or Delhi Off.: 'Career House' 4, East Park Road, Karol Bagh, New Delhi-110 005.

Website : www.ice.net.in
E-Mail : info@ice.net.in

IN THIS ISSUE...

The Institution of Civil Engineers (India)

From the Editor-in-Chief's Desk

This is the first issue of 2012 of "The Civil Engineer" in your hands. The issue contains interesting articles on (i) **"Slurry Infiltrated Fibrous Reinforced Concrete (SIFCON)" (ii) "Simplified Method for Computation of Structural –Displacements".** The first article "Slurry Infiltrated Fibrous Reinforced Concrete" deals with SIFCON by indicating the Composition of SIFCON, Process of making SIFCON, Design Principles, and Factors affecting the efficiency of SIFCON, Advantages,Disadvantages, Usage/Application area etc. The other article "Simplified Method for Computation of Structural –Displacements" deals with its Introduction, Proposed Analytical Method, Procedural Steps, Applications and the same has been concluded well. The articles are quite informative and readers will surely find them interesting.

ICE (I) had introduced test booklet in the Examination for attempting objective type questions on OMR sheets. Since many of the candidates were not able to provide the requisite information correctly, therefore, an article on **"Attempting Test Booklet in ICE (I) Examinations"** has been given in this issue. A copy of the OMR sheet has also been provided indicating the right or wrong way to attempt the OMR sheet. The candidates are advised to go through the details so that there is no problem in providing the right information during the Examination.

ICE(I) is member of the **"ASIAN CIVIL ENGINEERING COORDINATING COUNCIL" (ACECC)** .The 22nd meeting of the Executive Committee of ACECC was held in Tokyo, Japan on 1st & 2nd March 2012. This was the occasion when there was interaction of ICE(I) with many countries. ICE (I) also entered into MoU with **Philippine Institute of Civil Engineers, & Mongolian Association of Civil Engineers (MACE).** After this MoU the concerned institutions have resolved to work for Civil Engineering and particularly for Civil Engineering profession, international harmony and friendship.

ICE (I) has introduced **Alumni Association.** This issue also contains the list of the members of the Alumni Association who have sought Membership with ICE (I) so far. The list will be updated from time to time.

The issue also contains Notification about **AutoCAD training.** In this age of Science and Technology it is very much necessary that the knowledge of the engineering students has to be up-to-date. Since Computer Aided Design (CAD) is value added course therefore, ICE (I) has decided to make it a compulsory component for all T.Engg/AMICE (Civil Engineering/Architecture Engineering) candidates. This will be an online course and would be introduced from July 2012. Functional details and the subsidized fee structure will be notified in due course.

For detailed study about the articles and other information given above readers are advised to go through them. I have been impressing upon earlier also we should get some feedback from our readers and also questions, if they have any, so that we are able to answer their queries.

With my best regards.

Er. S.L Swamy
Chairman

Achievement is not always success while reputed failure often is. It is honest endeavor, persistent effort to do the best possible under any and all circumstances.

From the Editor's Pen

Civil Engineer news letter has also grown over the years. As each issue is rich in its form and contents readers are finding it interesting and they look forward to the next issue with curiosity. It is true that candidates pursuing different courses with ICE (I) have access to the study material. The articles on various topics of interest as contained in the news letter supplement their knowledge and instill confidence in them to deal with a particular issue. This is a good habit whether we read news papers or watch T.V. or read some additional books, it definitely adds to our knowledge and we become more confident in our approach. Knowledge gained from various sources does not go waste. One may be facing interviews for employment or awaiting promotions. More the exposure more the confidence one will have. It is a competitive world and one should not under estimate the knowledge of others. Yes, one should not have over confidence too. One is a learner and learning is a continuous process which should not stop.

Many of you have joined ICE (I) only with the hope of reviving your studies for rising in life. This is a good approach to keep earning and learning together for those who started their career through various constraints. Let your goal be clear. There will be speed breakers on the way and you will have to cross many bridges in the journey of life .Keep your cool and achieve the goal. You must set yourself a clear specific and precise target and also a dead line to make it. If a goal does not have a deadline the thing you consider your goal is nothing more than a fantasy. By having a clear goal you know clearly in which direction to channel and focus all your energies and you finally succeed. When you do not have a clear target your energy is squandered. You should have the goal carved in your mind so that whenever you think, you think about it, you live with it, you eat with it and you sleep with it.

You have our support and best wishes in your endeavor to achieve the goal you have set for yourself.

Prithipal Singh
Secretary General

Character isn't inherited. One builds it daily by the way one thinks and acts thought by thought, action by action.

SLURRY INFILTRATED FIBROUS REINFORCED CONCRETE (SIFCON)

GENERAL

Slurry Infiltrated Fibrous Reinforced Concrete (SIFCON) is a relatively new high performance and advanced material and can be considered as a special type of Steel Fiber Reinforced Concrete (SFRC).The technique of infiltrated layers of steel fibers with Portland cement based materials was first proposed by Haynes (1968).Lankard (1979) modified the method used by Haynes and proved that if percentage of steel fibers in cement matrix could be increased, one could get a material with very high strength properties which he christened as SIFCON.

WHAT IS SIFCON?

SIFCON is unique construction material possessing high strength as well as large ductility and far excellent potential for structural applications when accidental (or) abnormal loads are encountered during services SIFCON also exhibit new behavioral phenomenon, that of "Fiber lock" which believed to be responsible for its outstanding stress-strain properties. The matrix in SIFCON has no coarse aggregates, but a high cementitious content. However, it may contain fine (or) coarse sand and additives such as fly ash, micro silica and latex emulsions. The matrix fineness must be designed so as to properly infiltrate the fiber network placed in moulds, since otherwise, large pores may form leading to substantial reduction in properties. A controlled quantity of high range water reducing admixtures (super plasticizer) may be used for improving flowing characteristics of SIFCON. All steel fiber types namely straight, hooked and crimped can be used. The fibers are subjected to frictional and mechanical interlock in addition to the bond with the matrix. The matrix plays the role of transferring the forces between fibers by shear, but also acts as bearing to keep fibers interlock.

COMPOSITION OF SIFCON

Proportions of cement and sand generally used for making SIFCON are 1:1, 1:1.5 (or) 1:2 cement slurry alone have some applications. Generally, fly ash (or) silica fume equal to 10 to 15% by weight of cement is used in mix. Water cement ratio varies between 0.3 to 0.4. Percentage of super plasticizers varies from 2 to 5% by weight of cement. The percentage of fibers by volume can be anywhere from 4 to 20% even though the current practical ranges from 4 to 12%.

PROCESS OF MAKING SIFCON

The process of making SIFCON is different, because of high steel fiber content. While in SFRC the steel fibers are mixed intimately with wet (or) dry mix of concrete, prior to mix being poured into forms. SIFCON is made by infiltrating low viscosity cement slurry in to a bed of steel fibers "pre packed" in forms (or) moulds.

DESIGN PRINCIPLES

The design methods for SIFCON members must take into account their application (or) end, the property that needs to be enhanced, minimum proportion, strength as well as its constructability and service life.

In general, a high strength SIFCON mix can easily be designed and obtained with virtually any type of steel fibers available today, if slurry is also of high strength like conventional concrete, the strength of slurry is a function of water-cement ratio, because the slurry mixes used in SIFCON usually contain significant percentages of fly ash (or) silica fume (or) both. The term "water-cement plus admixtures" is used when designing slurry mix. In addition, the ratio of "admixtures to cement" is also an important parameter in design of SIFCON higher volume percentages of fibers need lower viscosity slurry to infiltrate the fibers thoroughly. Generally, higher the slurry strength greater is SIFCON strength.

FACTORS AFFECTING THE EFFICENCY OF SIFCON

There are four variables to consider when evaluating a SIFCON specimen. They are:-

   (1) Slurry strength
   (2) Fiber volume
   (3) Fiber alignment
   (4) Fiber type

"Cement slurry" greatly affects the behavior of SIFCON specimens because the slurry is the back bone of specimen. The elastic moduli, tensile strength and compressive strength of slurry affect the behavior of composite SIFCON matrix. Fiber pullout strength is lest one variable that depends upon slurry compressive strength.

"Fiber volume" depends upon fiber type and vibration effort. Smaller (or) Shorter fibers will pack denser than longer fibers. Higher fiber volume can be achieved with added vibration time.

"Fiber alignment" greatly affects the behavior of a SIFCON specimen. Fibers can be aligned normal to loading (or) parallel to loading. The ultimate strength, ductility and energy absorption are all affected by fiber alignment.

"Fiber types" are mainly 2 types. They are:-
(1)   Steel fibers (2) Glass fibers
Steel fibers come in three main shapes and several sizes and strengths. The shapes are hooked, crimped and deformed with various aspect ratios (l/d). The most popular steel fiber is Dramix fiber (hooked) made by Bekaert Corporation. Glass fibers were generally rod like in shape with various lengths, diameters and strengths.

ADVANTAGES OF SIFCON

(1)SIFCON possess excellent durability, energy absorption capacity, impact and abrasion resistance and toughness.
(2)Modulus of elasticity (E) values for SIFCON specimens is more compared with plain concrete.
(3) SIFCON exhibits high ductility.
(4) The limitation in SFRC that is balling problem of steel fibers with increase in fiber volume is overcomes by SIFCON, because of its fiber alignment.
(5) Deflection for SIFCON will be very less compared to conventional and will act as rigid body.

DISADVANTAGES OF SIFCON

Inspite of unique properties of SIFCON it doesn't have much limitations. Uniformity and quality control of fiber distribution in addition to high placement cost associated with manual addition of fibers, restricted wide applications of these composites.

USAGE /APPLICATION AREA

SIFCON has properties like ductility, crack resistance, penetration and impact resistance very high compared to other materials like SFRC, concrete it is best suited to applications in following areas:-
(1)   Pavement rehabilitation and pre cast concrete products.
(2)   Overlays, bridge decks and protective revetments.
(3)   Seismic and explosive resistant structures.
(4)   Security concrete applications.(safety vaults, strong rooms)
(5)   Refractory applications. (soak-pit covers, furnace lintels, saddle piers)
(6)   Sea protective works.
(7)   Military applications such as anti-missile hangers, underground shelters.
(8)   Aerospace launching platforms.
(9)   Repair, rehabilitation and strengthening of structures.
(10) Concrete mega structures like offshore and long span structures, solar towers.

REFERENCES

1. Slurry Infiltrated Reinforced Concrete (SIFCON)–An Experimental Study by Dr.Aswath M.U.,professor in Civil Engineering,BIT,Banglore-4, Sreenivas S.R.,Consulting Engineer(Former PG Student BIT)
2. Andrzej Market Brandt 'Cement based composite materials, mechanical; properties and performance'.

'Normal and High Volume Steel Fibre Concrete Composites for Special Applications' **by Dr. V.S. Parameswaran**, President & Chief Executive, Design Technology Consultants, Chennai Chief Executive, International Centre for FRC Composites (ICFRC), Chennai, Former Director, SERC & Past President, ICI.

Badam Sundara Rao.V.Ravindra,
Research Scholar, Department of Civil Engineering,
JNT University, Kakinada

ATTEMPTING TEST BOOKLET IN ICE(I) EXAMINATIONS

Candidates appearing for ICE (I) examinations are given test booklets during the examination to enable them to answer questions asked for. From winter 2011 Examinations. OMR sheet was introduced in the test booklet.OMR Sheet is a specially designed sheet for attempting objective Type Questions (Multiple Choice Questions) & also True/False Questions. This sheet is read by Optical Mark Recognition software. Since this sheet is evaluated by software & not manually, it is utmost necessary that candidates in their own interest fill in various columns of the OMR Sheet very meticulously and answer the questions as instructed. Sample of an OMR Sheet with various columns to be filled in as explained below.

(a)   **Date of Examination:** It is to be filled in Ink Pen by showing specific Date of examination e.g. 4th June 2012 under DD MM YY .

D	D	M	M	Y	Y
0	4	0	6	1	2

(b)   **Test Booklet No. :** It is to be filled in Ink Pen. Test Booklet Number is printed in the right hand corner of the Test Booklet supplied to the candidate.

(c)   **City of Examination Center:** Here the Candidate has to write the name of city where the examination is being conducted. Please write the city of examination center only & not the full name of the Examination Center. e.g.

Delhi

(d)   **Roll No. :** Roll No. at the Top in Blocks has to be written in Ink Pen. This has also to be written by darkening the respective row under each digit in different columns. If the Roll No. is 512098 then 5 in First Column, 1 of Second column,2 of Third column, 0 of Fourth column, 9 of Fifth column,8 of Six column has to be darkened.

(e) **Membership No. :** Membership at the Top in Blocks has to be written in Ink Pen. This may also be written by darkening the respective row under each digit in different columns as explained for Roll No.viz:

Membership No. (In 5 Digit)				
6	5	5	2	1
①	①	①	①	●
②	②	②	●	②
③	③	③	③	③
④	④	④	④	④
⑤	●	●	⑤	⑤
●	⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨	⑨
⓪	⓪	⓪	⓪	⓪

(f) **Paper Code :** Paper Code as indicated in the Text Booklet should be filled in Ink Pen in Top Blocks. It has to be filled by darkening the respective circles e.g. BC 2.1, Darken BC then 2 in first column, 1 in second column. For example BCO 3.21is to be written by darkening BCO and then 3 in First column, 2 in Second column, 1 in Third column.

Paper Code						
BC			2	.	1	
TA	◯		①		●	①
TC	●		②		②	②
AA	◯		③		③	③
AC	◯				④	④
BA	◯				⑤	⑤
BAO	◯				⑥	⑥
BC	●				⑦	⑦
BCO	◯				⑧	⑧
					⑨	⑨
					⓪	⓪

Paper Code						
BCO			3	.	2	1
TA	◯		①		①	●
TC	◯		●		②	②
AA	◯		●		③	③
AC	◯				④	④
BA	◯				⑤	⑤
BAO	◯				⑥	⑥
BC	◯				⑦	⑦
BCO	●				⑧	⑧
					⑨	⑨
					⓪	⓪

NOTES:

i. Candidate should not forget to put his/her signature in Pen in the space provided.

ii. Candidate should get his OMR sheet signed by the Invigilator present in the Examination Hall. This is to be done in Pen.

iii. Attempt the question of MCQ. In front of the Question No. Darken the appropriate alphabet as the answer to the question.

iv. Attempt the questions of T/F in front of the Question No. Darken the appropriate alphabets T for True/ F for False.

Do's

1. Fill the answer within the circle provided.

2. Use Pen/HB Pencil as instructed to fill the appropriate column.

3. For darkening always use HB Pencil.

4. Read carefully the instructions in the Test booklet.

5. Fill the answer of the question by completely darkening the circle of the option, so that the alphabet inside the circle is not visible.

6. Candidates are to fill their Roll Number from left to right.

Roll No. (In 6 Digit)

5	1	2	0	9	8

Don't s

1. Don't fold /tear off the OMR sheet.

2. Use of any other writing instrument other than HB pencil shall invalidate the answer.

3. Test Booklet will be processed by electronic means. Invalidation of Answer Scripts due to incomplete or incorrect filling of the Test Booklet will be the sole responsibility of the candidate.

4. Do not make any stray mark anywhere on the OMR sheet.

5. Darken only one circle for answer of each question as shown in the example below. If one darkens more than one circle, the answer will be treated as wrong.

Example Wrong Methods

CORRECT METHODS

Note:

The candidates appearing for the examinations of ICE (I) should carefully note the above so that they are able to fillup the columns of the OMR sheet properly and correctly and there is no problem in reading the OMR sheet. Copy of the OMR sheet (Annexure "A") may please be seen to familiarize its structure and use.

Paras Dugar
Controller of Exam
ICE(I)

THE INSTITUTION OF CIVIL ENGINEERS (INDIA)

OMR SHEET   **This sheet should not be torn off from the Test Booklet.**

IMPORTANT INSTRUCTIONS

1. Use Black HB Pencil to darken the appropriate circle. which must be completely filled.
2. Darken ONLY ONE CIRCLE completely for each question. Do not make any other type of mark on the OMR sheet.
3. Example Wrong Method .
4. Example Right Method . ●
5. Do not fold or crush the OMR sheet on any side or corner.

Date of Examination

0 4 0 6 1 2

Test Booklet No.

2 0 0 0 0 1

City of Exam. Centre

Delhi

Roll No.

5 1 2 0 9 8

Membership No.

6 5 5 2 1

Paper code

BC 2.1

Signature of the Candidate

Hemant

Signature of the Invigilator

Nitin Pal

Section - A (Multiple Choice Questions)

1	●	B	C	D	11	A	B	C	●	21	●	B	C	D	31	●	B	C	D	41	●	B	C	D
2	A	●	C	D	12	A	B	●	D	22	A	●	C	D	32	A	●	C	D	42	A	●	C	D
3	A	B	●	D	13	A	●	C	D	23	A	B	C	●	33	A	B	C	●	43	A	B	●	D
4	●	B	C	D	14	●	B	C	D	24	A	B	C	●	34	A	B	C	●	44	A	B	C	●
5	A	●	C	D	15	A	●	C	D	25	A	B	●	D	35	A	B	●	D	45	A	B	●	D
6	A	B	C	●	16	A	B	●	D	26	A	●	C	D	36	A	B	●	D	46	A	●	C	D
7	A	●	C	D	17	A	B	●	D	27	●	B	C	D	37	A	B	C	●	47	●	B	C	D
8	●	B	C	D	18	A	B	●	D	28	A	●	C	D	38	●	B	C	D	48	●	B	C	D
9	A	●	C	D	19	A	B	●	D	29	A	B	●	D	39	A	●	C	D	49	A	B	●	D
10	A	B	●	D	20	A	B	C	●	30	●	B	C	D	40	●	B	C	D	50	A	B	C	●

Section - B (True/False)

| 1 | ● | F | 3 | T | ● | 5 | ● | F | 7 | ● | F | 9 | T | ● |
| 2 | T | ● | 4 | ● | F | 6 | T | ● | 8 | ● | F | 10 | T | ● |

NOTIFICATION
AUTO CAD TRAINING

ICE (I) provides opportunity for the completion of Associate Membership course (Equivalent to Degree) and T. Engg (Equivalent to Diploma) to the candidates registered with ICE(I) . Apart from the normal course of studies it also ensures that the candidates get sufficient academic input in various forms to equip them with additional knowledge for betterment of their career and employment.

Computer Aided Design (CAD) involves creating computer model defined by geometrical parameters. These models typically appear on a computer monitor as two or three dimensional representation of a part or a system of part which can be readily altered by changing relevant parameters. CAD system enables designers to view objects under a wide variety of representation and to test these objects by stimulating real world conditions. The primary objective of the course is to familiarize the candidates with the concepts and applications of the essential functions and Auto Cad Civil 3D/Revit Architecture.

CAD being a value added course is being introduced in ICE (I) as a compulsory component for all T.Engg. / AMICE (Civil Engineering / Architectural Engineering candidates (including those who will be required to undergo practical training and project after Winter 2011 Examination). This course will be an online course and the same will be introduced from July 2012.

ICE (I) will be entering into Technical Collaboration with renowned Auto CAD Company and would be issuing certificates in collaboration with the same.

Functional details and the subsidized fee structure will be notified in due course.

This is for information of all concerned.

Secretary General

SIMPLIFIED METHOD FOR COMPUTATION OF STRUCTURAL-DISPLACEMENTS

Determination of nodal and/or member-displacement plays an important role in structural analysis. These values are required for checking the serviceability-criterion during a design process and during the analysis of hyper-static structures, determination of nodal-displacements is essential in the computation of member stiffness and/or flexibility. Moreover, the classical methods of structural analysis like method of consistent-deformations etc are purely based upon nodal-displacements produced by member and/or nodal loads where these are required to supplement the equilibrium conditions. Available techniques for displacement computations are either mathematically cumbersome or are too long that increases the time involved in the analysis significantly. A simplified method is proposed in the present article which requires only exact bending moment diagram for the given load and very low level mathematics is involved in the remaining procedure.

1. INTRODUCTION:

Structure is an assembly of interconnected members/elements which transfer the applied load from point-of-application to any other point-of-interest without loosing their integrity and at the same time, satisfying the prescribed codal requirements of serviceability. And during this process, it undergoes significant displacements depending upon the material as well as geometrical properties of members it composed of. Determination of these displacements remains the top priority of engineers/ mathematicians since the start of the structural engineering.

As a result, number of analytical methods was proposed by different researchers mainly based upon either energy-principle like virtual work and/or displacement method, strain energy method, complementary and potential energy methods, and method of least-work etc or kinematic hypothesis that during bending of beam, plane section through a beam remains plane and deflections due to the

bending are determined from the deformation taking place along a span. Governing differential equation for the deflection of beam-element is used to supplement the above hypothesis. Double Integration method, Singularity function method, Moment-area method, Conjugate-beam method etc. are based upon latter approach.

The initial work on these two approaches, by coincidence, started during the same period of time and evolved with time. Basic methods improved significantly to reduce the time involved in the computations. Moment-area and Conjugate-beam method is the outcome of these research efforts. During the same period, number of alternate approaches was proposed to simplify the structural analysis. Maxwell's reciprocal theorem, Betti's theorem, Castigliano's theorem, unit-load method etc significantly reduces the analysis-time.

With the availability/invention of better materials and improved construction-techniques, structural arrangements, now-a-day, are become highly redundant. Analysis of these structures requires determination of nodal-displacement -as a compatibility-equation in method of consistent-deformation   to supplement the equilibrium-conditions and as influence-coefficient in matrix-methods of analysis.

All the available methods in the literature are highly mathematically involved and consume a significant amount of time in the determination of nodal-displacements. Proposed method can help the analyst to get an accurate value of displacement produced in the structure with little efforts.

2. PROPOSED ANALYTICAL METHOD:

The method proposed in the present article is fundamentally based upon strain-energy principle. This principle is simplified to an extent that there is no need to calculate the strain energy stored in the beam-element. In the earlier basic method, strain-energy function is used to calculate displacements produced by given load and this procedure involve the process of integration and partial-differentiation of moment field in the form of strain energy.

The strain-energy, dU stored in a beam-element of small incremental length, dx by a kinematically admissible moment-field, M_x

$$dU = \frac{1}{2EI}\left\{\int M^2 x\,dx\right\}$$

Castigliano's theorem can be used to calculate the deflection and rotation produced by moment-field, M_x. The displacement, Δ along a force, F can be calculated by taking a partial-derivative of strain energy, U w.r.t. force, F.

$$\Delta = \frac{dU}{dF} = \frac{1}{EI}\left\{\int M_x dx\left(\frac{dM_x}{dF}\right)\right\}$$

In the above expression, $(\int M_x\, dx)$ represents the area of bending moment diagram, A and second term, (dM_x/dF) gives the value of bending moment produced at the center of gravity of area, A by a unit load acting at the point of displacement, Δ. The above expression can be written in modified form,

$$\Delta = \frac{A}{EI}\Theta$$

Where, A is the area of bending moment diagram produced by an external loading and Θ is the bending moment produced at c.g. of area, A by a unit-load acting at point-of-displacement.

3. PROCEDURAL STEPS:

The modified equation can be used to determine the displacement at any point of the structural member, provided that the bending moment diagram due to external load should be known to the analyst. Then, he/she can very easily determine the deflection and/or rotation at any point of structural member by placing a unit force and/or unit-moment at point of interest and finding a value of bending moment produced by above unit-load at c.g. of bending-moment-diagram (BMD) drawn for the external load. In short, following recommended procedure should be followed for displacement computations.

a) Draw the BMD due to the external load.

b) Find the area, A of the above drawn BMD and locate its center of gravity (c.g.).

3.1 Deflection: For determining the deflection, following procedure can be used.

c) Place a unit-force in the direction of expected deflection at point-of-interest. e.g. place vertical unit-force for the vertical deflection and horizontal unit-force for the horizontal deflection.

d) Determine the bending moment due to the above placed unit-load (step-c) at the c.g. of area, A calculated in step (b). This bending moment is represented by symbol, Θ.

e) Deflection, Δ in the direction of unit-load will be

$$\Delta = \frac{A}{EI}\Theta$$

3.2 Rotation: In addition to steps (a) and (b), following procedure can be used.

f) Place a unit-moment in the direction of expected rotation at point-of-interest.

g) Determine the bending moment due to the above placed unit-moment *(step-f)* at the c.g. of area, A calculated in step (b). This bending moment is represented by symbol, Θ_r.

h) Rotation, ϑ in the direction of unit-moment will be

$$\theta = \frac{A}{EI}\Theta_r$$

4. APPLICATIONS:

This method can be used for the computations of displacement for the statically determinate as well as redundant structures. The members may be prismatic and non-prismatic in nature. Multiple member-loading and joint-loading can also be tackled very conveniently.

4.1 Redundant-Structure : For the redundant structures, analysis should be performed to determine the redundant-forces and the BMD should be plotted accordingly which can be used in the calculation of area, *A*. This BMD area can be divided into number of simpler geometrical shapes, say area *A₁, A₂, A₃............Aₙ.* Then, bending moment due to unit-load (placed at point-of-interest) should be calculated at the c.g. of all the areas *A₁, A₂, A₃............Aₙ,* represented by *Θ₁, Θ₂, Θ₃,........Θₙ* then,

$$\Delta\, and\,/\,or\,\theta = \sum_{i=1}^{n} \frac{A_i}{EI}\Theta_i$$

4.2 Multiple Loads: If the beam is subjected to more than one load case, BMD should be drawn for each load separately. Area *A₁, A₂, A₃......Aₙ* should be determined for all the BMD's and above expression can be used by taking the corresponding values of *Θᵢ.* (BM at the c.g. of respective areas)

4.3 Non-Prismatic Sections: If the member is non-prismatic in nature, draw the BMD due to the external load(s); ignoring the non-prismaticity of the member. Divide the BMD into number of smaller areas *A₁, A₂, A₃............Aₙ* at each point of discontinuity in EI. Then, again find the bending moment, *Θᵢ* at c.g. of each area *A₁, A₂, A₃............Aₙ* due to unit-load. The subdivided areas *A₁, A₂, A₃............Aₙ* should be divided by corresponding value of *EI* before multiplication with *Θᵢ .* And following expression can be used.

$$\Delta\, and\,/\,or\,\theta = \sum_{i=1}^{n} \frac{A_i}{EI}\Theta_i$$

5. Examples: Following typical examples are selected to illustrate the numerical applications of

the generalized/simplified method.

5.1 Find the deflection and rotation at the free end of cantilever of length, L subjected to point-load, P at free end. Take EI as unity.

a) Deflection *(Δ):* Draw the BMD due to external load, find the area of BMD and locate its c.g.
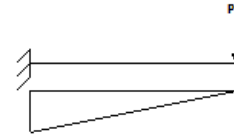
Maximum BM = $P \times L$

Area of BMD, $A = \dfrac{P \times L \times L}{2}$

c.g. of area, *A* from free end $= \dfrac{2L}{3}$

Therefore, BM at c.g. of above area, *A* due to the unit-vertical load placed at the free end of cantilever, $\Theta = 1 \times \dfrac{2L}{3} = \dfrac{2L}{3}$

or vertical deflection at free-end

$= \dfrac{P \times L \times L}{2} \times \dfrac{2L}{3} = \dfrac{PL^3}{3}$

b) Rotation *(ϑ):* Area of BMD due to external load will be same as in part (a).

now, place unit-moment at free end of cantilever and BM at the c.g. above area, $A,\ \Theta_r = 1$

or rotation at free-end $= \dfrac{P \times L \times L}{2} \times 1 = \dfrac{PL^2}{2}$

6. CONCLUSIONS:

Using proposed generalised method, we can determine the displacements at any point-of-interst for all types of structural arrangements as briefed below:
1. Statically determinate structures.
2. Redundant Structures.
3. Prismatic as well as Non-prismatic sections.
4. Members subjected to multiple-joint and member-loads.

*The views expressed by the author are his own

Er. Harvinder Singh, Associate Professor, GNDEC, Ludhiana
Er. Rajinder Ghai, SDO, Irrigation Department, Punjab Govt.

The Institution of Civil Engineers (India)
Date Sheet for Summer -2012 Examination

Date & Day		Forenoon Session (10.00 AM to 1.00 PM)		Afternoon Session (2.00 PM to 5.00 PM)
08-June-12 Friday	TC 1.5	Engineering Drawing	TC 2.5	Basic Structural Design
	TA 1.5	Engineering Drawing	TA 2.5	Theory of Structures
	TC 2.10	Engineering Graphics & Design	AC 1.5	Reinforced Concrete Structures and Advanced Concrete Technology
	TA 2.11	Engineering Graphics & Design	AA 1.5	Reinforced Concrete Structures and Advanced Concrete Technology
	BC 2.5	Environmental Engineering	BCO 3.9	Traffic Engineering
	BA 2.5	Environmental Engineering	BAO 3.6	Disaster Management for Buildings
09-June-12 Saturday	TC 1.6	Engineering Chemistry	AC 1.6	Design of Steel Structures
	TA 1.6	Engineering Chemistry	AA 1.6	Design of Steel Structures
	TC 2.6	Environmental Engineering	BAO 3.7	Advanced Comp. Application for Arch.
	TA 2.10	Environmental Engineering	BAO 3.8	Climatology and Architecture
	BCO 3.7	Building Science	TA 2.6	Estimation and Costing
	BAO 3.1	Elements of Town Planning and Architecture	BCO 3.10	Highways and Railways Engineering

Notes: -

a. ICE (I) has the right to change the schedule of paper/s on account of unavoidable circumstances.
b. Candidates must carry the Membership Card & Admit Card to seek entry to the Examination Hall.
c. The Examination Hall will be opened 15 minutes before the time specified for the commencement of the Examination.
d. Candidates can be allowed entry to the Exam Hall within 30 minutes of the start of the Exam.
e. Candidate is not allowed to leave the Examination Hall before the expiry of 60 minutes of the start of the Exam.
f. Candidates using unfair means shall be dealt with as per rules of ICE(I) in this behalf.
g. The result of the examination is likely to be declared within eight weeks of the last examination is over.
h. Candidates are required to bring their own drawing board/instrument box for Engineering Graphics & Design paper.
i. Only Non-Programmable Calculators and **ORIGINAL** Standard, Design-Data Books, Log Tables are permitted in the Examination Hall.
j. Candidate is not allowed to carry mobile phones in the Examination Hall.

TC : T. Engg. (Civil)	AC : AMICE(Civil) Section A	BC : AMICE(Civil) Section B	BCO : AMICE(Civil) Section B (Optional)
TA : T. Engg. (Arch.)	AA : AMICE(Arch.) Section A	BA : AMICE(Arch.) Section B	BAO : AMICE(Arch) Section B (Optional)

Date & Day	Forenoon Session (10.00 AM to 1.00 PM)		Afternoon Session (2.00 PM to 5.00 PM)	
04-June-12 Monday	TC 1.1	Basic Civil Engineering	TC 2.7	Construction Technology
	TA 1.1	Basic Architectural Engineering	TA 2.1	History of Architecture
	TC 2.1	Surveying	AC 1.1	Advanced Engineering Mathematics
	TA 2.7	Surveying and Levelling	AA 1.1	Advanced Engineering Mathematics
	BC 2.1	Applied Hydraulics and Fluid Machines	BCO 3.14	Pollution and Control Engineering
	BA 2.1	Professional Practice and Arch. Engg.	BAO 3.2	Rehabilitation of Structures
	BCO 3.1	Advanced Design of Reinforced Concrete Structures		
05-June-12 Tuesday	TC 1.2	Technical Writing	TC 2.8	Estimation, Costing and Specifications
	TA 1.2	Technical Writing	TA 2.8	Architectural Design and Graphics
	TC 2.2	Fluid Mechanics and Machinery	AC 1.2	Advanced Strength of Materials
	TA 2.2	Free Hand Drawing and Painting	AA 1.2	Advanced Strength of Materials
	BC 2.2	Machine Foundations	BCO 3.21	Ground Water Hydrology
	BA 2.2	Finishes, Materials and Specifications	BAO 3.3	Advanced Architectural Design
	BCO 3.2	Advanced Design of Steel Structures		
06-June-12 Wednesday	TC 1.3	Engineering Physics and Applied Mechanics	TC 2.9	Civil Engineering Designs
	TA 1.3	Engineering Physics and Applied Mechanics	TA 2.9	Building Material and Science
	TC 2.3	Soil Mechanics	AC 1.3	Computer Progamming and Numerical Methods
	TA 2.3	Building Construction	AA 1.3	Computer Programming and Numerical Methods
	BC 2.3	Advanced Reinforced Concrete Design	BCO 3.24	Water Resource Management
	BA 2.3	Building Services	BAO 3.4	Interior Design
	BCO 3.3	Prestressed Concrete Structures		
07-June-12 Thursday	TC 1.4	Engineering Mathematics	TC 2.4	Mechanics of Solids
	TA 1.4	Engineering Mathematics	TA 2.4	Structural Mechanics
	TC 2.11	Fundamentals of Civil Engineering	AC 1.4	Foundation Engineering
	TA 2.12	Fundamentals of Arch. Engineering	AA 1.4	Foundation Engineering
	BC 2.4	Optimization in Structural Design	BCO 3.12	Bridge Engineering
	BA 2.4	Advanced Structural Design	BAO 3.5	Landscape Architecture

OUR PARTNERS TO CONDUCT PRACTICALS & SUBMISSION OF PROJECT REPORTS

(AICTE approved Institutions In different States/Cities)

✓ Andhra Pradesh
(1) Chaitanya Engineering College, Chaitanya Valley, Kommadi, Madhurawada, Visakhapatnam - 530041, Andhra Pradesh
(2) Koneru Lakshmaiah College of Engineering, Green Fields, Vaddeswaram, Guntur Distt.- 522502 Andhra Pradesh
(3) Kakatiya Institute of Technology & Science. Opp. Yerragattu Hillock, Vill-Bheemaram, Mandal-Hasanparthy, Warangal - 506015, Andhra Pradesh
(4) Sri Venkateswara College of Engineering & Technology, Chittor, Andhra Pradesh
(5) Chaitnaya Bharathi Institute of Technology, Chaitanya Bharathi, P.O. Gandipet, Hyderabad - 500075, Andhra Pradesh
(6) Govt. Polytechnic, Masabtank, Hyderabad-28, Andhra Pradesh
(7) Rajeev Gandhi Memorial College of Engg. & Tech. N.H.-18, Kurnool District, Nandyal-518501, Andhra Pradesh
(8) Mumtaz College of Engg. & Technology Malakpet, Hyderabad- 36, Andhra Pradesh
(9) KLR College of Engg. & Tech. Khammam District, Paloncha Andhra Pradesh
✓ Assam
(1) Assam Engineering College Jalukabari, Guawhati-781018, Assam
(2) Jorhat Engineering College, Government of Assam, Jorhat-785007, Assam

✓ Bihar
(1) RP Sharma Institute of Technology, Patna, RPS Complex, Bailey Road (West) Danapur Patna - 801503 Bihar
(2) Netaji Subhas Institute of Technology, Amhara, Bihta, Patna- 801118 Bihar
✓ Chattisgarh
(1) Ashoka Institute of Technology & Management, Gram-Torankata, Post-Somni, G.E. Road, Rajnandgaon-491441, Chhattisgarh
(2) Dignity College of Architecture NH-6, Anjora, Opposite Govt. Veterinary Hospital, Durg-491001 Chhattisgarh
✓ Delhi
(1) Chhotu Ram Rural Institute of Technology & Pharmacy, Kanjhawala, (Ghevra), Delhi-110081
✓ Gujarat
(1) L. D. College of Engineering, Government of Gujarat, Near Navranpura, Ahmedabad - 380015, Gujrat
(2) Government Engineering College, Shamlaji Road, Modasa - 383315, Gujarat
(3) Sree Tapi Brahmcharyashram Sabha College of Diploma Engineering Opp. Spinning Mill,Varachha Road, Surat - 395006, Gujarat
(4) Sardar Vallabhbhai Patel Institute of Technology, PO. Box No. 22, District – Anand, Vasad-388306,Gujarat

✓ **Haryana**
(1) M.M. Engineering College, M.M. Group of Institutions, Mullana Distt. Ambala, Haryana
(2) **Lingaya's Institute of Management & Technology,** Nauchauli, Old Faridabad, Jasana Road, Faridabad - 121002, Haryana
(3) **Haryana College of Technology & Management,** P.O.Box No.44 Ambala Road, Kaithal - 136027, Haryana
(4) Sat Kabir Institute of Technology & Management, Vill. Ladrawan, Teh. Bahadurgar Dist. Jhajjar, (Near Qutubgarh-Delhi Border), Haryana-124507
(5) NCR Polytechnic, Vill.-Kulasi, Bahadurgarh, Jhajjar, Haryana

✓ **Himachal Pradesh**
(1) MIT College of Engineering & Management Bani (Barsar) Distt. Hamirpur Himachal Pradesh-174384
(2) Baddi University of Engineering Science & Technology Makhnumajra, Nalagarh, District-Solan, Baddi Highway, Solan-173101, Himachal Pradesh
(3) Himachal Institute of Engineering and Technology Vidyanagar (Near Central University, Shahpur, District- Kangra-176223 Himachal Pradesh

✓ **Jammu & Kashmir**
(1) National Institute of Technology & Science, Indira Nagar, P.O. Miran Sahib, Jammu - 181001, Jammu & Kashmir
(2) Institute of Engineering & Computer Sciences, Purkhoo Camp, Domana,Jammu- 181001, Jammu & Kashmir
(3) Government College of Engineering & Technology, Old University Campus, Canal Road Jammu-180004, Jammu & Kashmir
(4) Royal Polytechnic College 55-Gogji Bagh, Srinagar-190001, Jammu & Kashmir
(5) SSM College of Engineering & Technology Parihaspora, Pattan, Baramulla Srinagar-193121 Jammu & Kashmir

✓ **Jharkhand**
(1) Government Polytechnic P.O.- B. Polytechnic, Dhanbad-828130 Jharkhand
(2) Cambridge Institute of Technology Tatisilwai, Ranchi-835103, Jharkhand
(3) Government Polytechnic Ranchi-834001, Jharkhand
(4) Mining Institute, P.O. - B. Polytechnic, Dhanbad-828130, Jharkhand

✓ **Karnataka**
(1) Anjuman Engineering College Anjumanbad, P.O.Box No.24 Bhatkal - 581320 Karnataka
(2) Bapuji Institute of Engineering & Technology, Post Box No. 325, Davangere-577004 Karnataka

✓ **Kerala**
(1) Matha College of Technology, Manakkappadi, N. Paravur, Ernakulam-683511 Kerala
(2) Mangalam College of Engineering Mangalam Campus,Ettumanoor Kottayam- 686631 Kerala
(3) MES College of Engineering, Kuttippuram Thrikkanapuram P.O., Malappuram District. -679573 Kerala

✓ **Madhya Pradesh**
(1) Shri G.S. Institute of Technology & Science, 23, Park Road, Indore, Madhya Pradesh
(2) Rishiraj Institute of Technology, Village- Revati, Sanwar Road, Indore, Madhya Pradesh
(3) Mansarovar Institute of Science & Technology Mansarovar Campus, Kolar Road, Bhopal- 462042, Madhya Pradesh
(4) Govt. Polytechnic College Shahdol, Madhya Pradesh

(5)	**Jawaharlal Institute of Technology,** "Vidya Vihar" Borawan, Tehsil Kasrawad, Distt. Khargone - 451228, Madhya Pradesh	

| **(6)** | **Lakshmi Narain College of Technology,** Kalchuri Nagar, Raisen Road, P.O. Kolua, Bhopal - 462021, Madhya Pradesh |

(2) Krupajal Engineering School
Prasanti Vihar, Pubasason,Kausalya Ganga
Bhubaneswar – 751002
Orissa

(3) KIIT University,
AT/PO. : KIIT, Bhubaneshwar - 751024,
Orissa

(5) Jawaharlal Institute of Technology,
"Vidya Vihar" Borawan,
Tehsil Kasrawad, Distt.
Khargone - 451228,
Madhya Pradesh

(6) Lakshmi Narain College of Technology,
Kalchuri Nagar, Raisen Road, P.O. Kolua,
Bhopal - 462021,
Madhya Pradesh

(7) NRI Institute of Technology & Management,
Near Railway Bridge, Jhansi Road, Gwalior,
Madhya Pradesh

(8) Truba Institute of Engineering & Information Technology, Karond Gandhi
Nagar By Pass Road,
Bhopa, Madhya Pradesh

✓ **Maharashtra**

(1) Pravara Rural Engineering College,
Loni, A/P. Loni-413736, Tal. Rahata,
Dist. Ahmednagar,
Maharashtra

(2) Mahatma Gandhi Missions,
Jawaharlal Nehru Engineering College,
N-6, CIDCO, Aurangabad - 431003,
Maharashtra

(3) G.H. Raisoni College of Engineering,
CRPF Gate No. 3, Hingna Road,
Digdoh Hills, Nagpur - 440016,
Maharashtra

(4) Kavikulguru Institute of Technology and Science,
Ramtek - 441 106, Nagpur,
Maharashtra

(5) Bharati Vidyapeeth University College of Engineering,
Pune-Satara Road,
Dhankawadi Pune - 411043 ,
Maharashtra

(6) Aurangabad College of Engineering
Gut No. 52, Tuljapur Shivar, (Savangi)
Jalgaon Road, Aurangabad-431008
Maharashtra

✓ **Orissa**

(1) Dhaneshwar Rath Institute of Engineering & Management Studies,
(Diploma Wing), Kairapari,
Kotsahi (Tangi), Cuttack - 754022,
Orissa

(2) Krupajal Engineering School
Prasanti Vihar, Pubasason,Kausalya Ganga
Bhubaneswar – 751002
Orissa

(3) KIIT University,
AT/PO. : KIIT, Bhubaneshwar - 751024,
Orissa

(4) Black Diamond College of Engineering & Technology,
Jharsuguda (BDCET)
At : Balijori, L & T Dhutra Road,
Jharsuguda,
Orissa-768202

(5) Sanjay Memorial Institute of Technology,
Chandipadar, Via : Bhattakumarada,
Berhampur,
Dist.-Ganjam-761003 ,
Orissa

(6) Gopal Krishna College of Engineering & Technology,
I.E.M., Gourahari Vihar,
P.O.-Raniput, Jeypore, Koraput,
Odisha-764005

(7) Orissa Engineering College,
Nabajyoti Vihar, Nijigarh Kurki,
P.O.-Harirajpur, Jatni,
Bhubaneswar-752050,
Orissa

(8) Suddhananda Engineering & Research Centre,
At-Nachhipur, P.O. : Bhatapatana,
Bhubaneswar, Dist : Khurda,
Orissa -752115

(9) Raja Kishore Chandra Academy of Technology (Polytechnic),
At/Po : Nilgiri, Dist : Balasore,
Balasore-756040, Orissa

✓ **Punjab**

(1) Lovely Institute of Technology (Architecture),
Jalandhar-Ludhiana, G.T.Road, Near Chehru
Railway Bridge, Phagwara,
Kapurthala-144402,
Punjab

(2) Desh Bhagat Engineering College,
Amloh Road, Mandi Gobingarh,
Punjab

(3) Guru Nanak Dev Engineering College,
Gill Road, Ludhiana,
Punjab

✓ Rajasthan

(1) Sri Balaji College of Engineering & Technology,
Benad Road (Dadi Ka Phatak),
Jaipur - 302013, Rajasthan

(2) College of Engineering and Technology,
Bikaner, Kani Industrial Area,
Pugal Road, Bikaner-334005,
Rajasthan

(3) Aayojan School of Architecture
ISI-4, RIICO Institutional Block
Sitapura, Goner RoadJaipur-302022
Rajasthan

(4) Aryabhatta College of Engineering and Reasearch Centre
Ajmer- 305001
Rajasthan

(5) Saraf Institute of Engineering & Technology
Tibbi Road- Extension, Hanumangarh Town
Rajasthan-335513

(6) Siddhi Vinayak Engineering & Management College
E-I, B-1, M.1.A., Institution Area
Alwar-301001
Rajasthan

Uttrakhand

(1) Dehradun Institute of Technology,
Mussoorle-Diversion Road,
P.O. - Bhagwantpur, Dehradun, Uttrakhand

(2) Drona's College of Management & Technical Education
Opposite Rajpur, Bypass,
Sahastradhara Road, PO : Gujarada
Dehradun-248001
Uttrakhand

✓ Uttar Pradesh

(1) Bundelkhand Institute of Engineering & Technology,
Kanpur Road, Jhansi - 284128,
Uttar Pradesh

(2) Radha Govind Engineering College,
Anuyogipuram ,Near Medical College Garh
Road, Meerut - 250004,
Uttar Pradesh

(3) Gandhi Polytechnic,
Muzaffarnagar, Uttar Pradesh

(4) Hewett Polytechnic, Lucknow,
Mahanagar, Lucknow,
Uttar Pradesh

(6) Lucknow Polytechnic Lucknow,
Abhiyantrik Upnivesh,
Krishna Nagar, Kanpur Road, Lucknow
Uttar Pradesh

(7) Sevdie Institute of Management & Technology, (S.I.M.T),
Chinhat Deva Road, Lucknow,
Uttar Pradesh

(8) North India Institute of Technology
7th km Bundki Road,Najibabad
Dist. Bijnor,Bijnor-246763
Uttar Pradesh

(9) Devprayag Institute of Technical Studies,
Devprayag Technical Campus, Phaphamau,
Allahabad, Uttar Pradesh

(10) Jaswant Singh Bhadauria Institute of Technology
Kosi Khurd Bharatpur Road
Mathura- 281005, Uttar Pradesh

(11) Sunderdeep College of Architecture
NH-24, Sunder Deep Nagar
Delhi-Hapur Road Dasna
Ghaziabad-201001
Uttar Pradesh

(12) Goel Institute of Technology & Management
Lucknow -Faizabad Road, Near Indiara Canal
Lucknow-227105
Uttar Pradesh

(13) M G Institute of Management & Technology
8th Km. Mile Stone from Amausi Airport,
Lucknow-Kanpur Highway, Banthara,
Lucknow-227101
Uttar Pradesh

✓ West Bengal

(1) North Calcutta Polytechnic,
15, G.M. Lane, Kolkata-700002,
West Bengal

(2) Camellia School of Engineering & Technology,
Nadibhag, P.O.-Kajipara, Barasat,
Kolkata-700124, West Bengal

(3) JIS College of Engineering,
Block "A" Phase-III, Kalyani, Nadia,
West Bengal-741235

(4) Rajmati Prichand Bothra Memorial Jiaganj
College of Engineering & Technology (RPBM)
At - Hatibhjan, PO. Jiagan, Dist. –
Murshidabad-742123,
West Bengal

(5)	**Narula Institute of Technology**
	81, Nilgunj Road, Agarpara,
	Kolkata-700109
	West Bengal

(6)	**Sanaka Educational Trust's Group of Institutions**
	B-150, Columbia Street, Bidhan Nagar,
	P.O. Malandighi, P.S. Kanksa, Burdwan
	Durgapur-713212

(7)	**The New Horizons Institute of Technology**
	Phase-II, City Centre, South G.T. Road
	Durgapur-713208, District.- Burdwan,
	West Bengal.

(8)	**Ideal Institute of Engineering**
	Kalyani Shilpanchal,
	P.O. & P.S. – Kalyani
	Dist.- Nadia
	West Bengal-741235

ABSTRACT

S. No.	State	No. of MoUs
1.	Andhra Pradesh	9
2.	Assam	2
3.	Bihar	2
4.	Chhattisgarh	2
5.	Delhi	1
6.	Gujarat	4
7.	Haryana	5
8.	Himachal Pradesh	3
9.	Jammu and Kashmir	5
10.	Jharkhand	4
11.	Karnataka	2
12.	Kerala	3
13.	Madhya Pradesh	8
14.	Maharashtra	6
15.	Orissa	9
16.	Punjab	3
17.	Rajasthan	6
18.	Uttarakhand	2
19.	Uttar Pradesh	12
20.	West Bengal	8
	Total	**96**

ADD TO YOUR VOCABULARY

- **Abney Level**
  Hand –held level used in surveying to determine elevations and slope angles.

- **Back Filling**
  Brickwork used between structural members or covering the outside curved surface of an arch.

- **Camber**
  The slightly arched form or convex curvature provided in beams to compensate for dead load deflection, in general, a structure built with perfectly straight lines appears slightly sagged.

- **Datum Plane**
  A real or assumed thing, used as a basis for calculations or measurements, as a level from which elevations and depths are measured in surveying.

- **Eaves**
  The underside of a sloping roof projecting beyond the wall of a building.

- **Fatigue**
  The tendency of a member to fail at a lower stress when subjected to cyclical loading than when subjected to static loading.

- **House Drain**
  A horizontal sewer piping within a building, which receives waste from the soil stacks.

- **Intrados**
  The curve defining the interior surface of the arch; also known as soffit.

- **Keystone**
  The symmetrically shaped, wedge-like stone located in a head ring course at the crown of the arch; the final stone placed, thereby closing the arch.

- **Landscape**
  The area surrounding a home, which consists of grass, plantings, etc.

- **Neutral Axis**
  The internal axis of member in bending along which the strain is zero; on one side of the neutral axis in the fibers are in tension, on the other side the fibers are in compression.

- **Orientation**
  The positioning of a house on a lot in relation to the sun, wind, view and noise.

Professional Vistas

- **Recognition by Govt. of India, Ministry of Human Resource Development, Department of Higher Education**
  vide Gazette Notification No. F.24/1/2007-TS.III Dated 06.11.2007.

- **Recognition by Association of Indian Universities (AIU)**
  vide letter No. EV/III (366)/2008/71 Dated 11.04.2008.

- **Recognition by All India Council for Technical Education (AICTE)**
  vide letter No. Eqvi./AB/Gen.Corr./2008-09 Dated 16.09.2008.

- **Recognition by Union Public Service Commission (UPSC)**
  vide letter No. F.2/1/2007-EIB Dated 30. 06.2009.

- **Recognition for GATE by National Coordinating Board-Gate, Deptt. of Education, MHRD, GoI.**

- **Recognition by Government of Goa**
  vide letter No.12/11/87-PER/Vol.II Dated 06.03.2008.

- **Recognition by Directorate of Technical Education, Haryana**
  vide letter No.351-53/Dev. Dated 13.06.2008.

- **Recognition by Government of Kerala**
  vide letter No.3946/GI/08/H. Edn Dated 08.07.2008

- **Recognition by RITES Limited**
  vide letter No. RITES/RI/RCED/Misc/2008 Dated 14.07.2008.

- **Recognition by Delhi Development Authority (DDA)**
  vide letter No.F.7(98)2008/PBI/2399 Dated. 20.08.2008.

- **Recognition by Government of Meghalaya**
  vide letter No. FDN.156/2001/249-A Dated 21.08.2008.

- **Recognition by IRCON INTERNATIONAL LIMITED**
  vide letter No. IRCON/HRM/31/28/728 Dated 01.09.2008.

- **Recognition by Directorate General Border Roads**
  vide letter No. 13616/Gen/Rect /DGBR/97/E1A Dated 21.10.2008.

- **Recognition by Government of National Capital Territory of Delhi**
  vide letter No.1(1)/2008-DD/SB/1520/5609 Dated 29.10.2008.

- **Recognition by Shapoorji Pallonji & Co. Ltd.**
  vide letter No. Nil Dated 30.10.2008.

- **Recognition by Government of Andhra Pradesh**
  vide letter No. 10232/EC.2/2008-02 Dated 05.11.2008.

- **Recognition by Administration of Daman & Diu (UT)**
  vide letter No. 10.2 (PART-IV) EST-GP/2008-09/797 Dated 11.11.2008.

- **Recognition by CPWD- Central Public Works Department, Government of India**
  vide letter No.A-12021/1/2006-EC VI/74-75 Dated 19.01.2009.

- **Recognition by Visvesvaraya Technological University, Karnataka**
  vide letter No. VTU/Aca/OS-GC/2009-10/2118 Dated 04.06.2009

- **Recognition by Government of Nagaland**
  vide letter No. IT/10-1/04 Dated 30.07.2009

- **Recognition by Government of Uttarakhand, PWD, Pauri Garhwal**
  vide letter No.1011/20(15) E.A.-Parv./09-10 Dated 06.09.2009.

- **Recognition by Government of Chhattisgarh, Department of Technical Education,** Manpower Planning, Science & Technology, Mantralaya, D.K.S Bhavan, Raipur
  vide letter No.F-14/07/42 Dated 11.05.2010.

- **Recognition by Government of Punjab, Technical Education and Industrial Training, Punjab Chandigarh.**
  vide letter No.1362 Dated 24.06.2010.

- **Rural Electrification Corporation Limited (A Government of India Enterprises)**
  vide letter No. REC/ED(HR)/Trg./2010-11/ Dated 10.08.2010

- **Cement Corporation of India Ltd. (A Government of India Enterprises)**
  vide letter No. PD/HRD/6/6/2010/6119 Dated 12.08.2010

- **Recognition by Delhi Metro Rail Corporation Ltd.**
  vide letter No DMRC/O&M/HR/2010
  Dated 20.08.2010

- **Recognition by Oil and Natural Gas Corporation Ltd. Rectt. Section, Tel Bhawan, Dehradun**
  vide letter No. 7(2)/PR-Rectt./2010
  Dated 26.08.2010

- **Recognition by Anna University Chennai, Chennai-600025**
  vide letter No.2664?AU/DD1-DAC/2011/F21
  Dated 07.01.2011

- **Recognition by Government of West Bengal, Directorate of Technical Education & Training, Kolkata**
  vide letter No.728 TET
  Dated 28.03.2011

- **Recognition by Government of Karnataka**
  Vide Govt. order No. ED 21 UTV 2012
  Dated 09.03.2012

[TO BE PUBLISHED IN PART-1 SECTION –I OF GAZATTE OF INDIA]

Government of India
Ministry of Human Resource Development
Department of Higher Education
* * * * * *

Shastri Bhawan, New Delhi,
the 6th November, 2007

NOTIFICATION

No.F.24 – 1 / 2007 – TS.III. On the recommendations of the High Level Committee for recognition of Educational Qualifications in its meeting held on 22nd May 2007, the Government of India has decided to give recognition to the Section A & B of Associate Membership course, equivalent to Degree and Part – I & II of Technician Engineers (T) equivalent to Diploma in Civil Engineering and Architecture Engineering Courses conducted by the Institution of Civil Engineers (India), Ludhiana (Punjab) as per syllabus approved by All India Council for Technical Education (AICTE) w.e.f. the academic session 2007 – 2008 for the purpose of employment to the posts and services under Central Government in the appropriate field. It is subject to the conditions that the total number of candidates who can be admitted for the said examination would not exceed the authorized strength of the concerned Institutions with which Institution of Civil Engineers (India), Ludhiana (Punjab) has entered into Memorandum of Understanding (MOUs). A review in respect of recognition of educational qualifications shall be made by Ministry of Human Resource Development after one year through All India Council for Technical Education (AICTE).

(RAVI MATHUR)
Joint Secretary to the Government of India
Tel: 2338 1097

To

The Manager,
Government of India Press,
Faridabad.

..contd./-

Professional Vistas

(भारत के राजपत्र के भाग–। खण्ड–। में प्रकाशन के लिए)
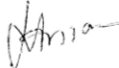
भारत सरकार

मानव संसाधन विकास मंत्रालय

उच्चतर शिक्षा विभाग

शास्त्री भवन, नई दिल्ली

6 नवम्बर, 2007

अधिसूचना

सं.एफ. 24–1/2007–टी.एस.।।। शैक्षणिक योग्यताओं को मान्यता प्रदान करने के लिए उच्च स्तरीय समिति की दिनांक 22 मई, 2007 की बैठक में की गई सिफारिशों के आधार पर भारत सरकार ने उपर्युक्त क्षेत्र में केन्द्रीय सरकार की सेवाओं तथा पदों पर रोजगार देने के उद्देश्य से शैक्षणिक सत्र, 2007-08 से सिविल इंजीनियरी संस्थान (भारत), लुधियाना (पंजाब) के अखिल भारतीय तकनीकी शिक्षा परिषद द्वारा अनुमोदित पाठ्यचर्या अनुसार संचालित सिविल इंजीनियरी और वास्तुकला इंजीनियरी पाठ्यक्रमों में एसोशिएट सदस्यता पाठ्यक्रम की धारा (क) और (ख) को डिग्री के समकक्ष और तकनीकी इंजीनियरों (त) के भाग । और ।। को डिप्लोमा के समकक्ष मान्यता प्रदान करने का निर्णय लिया है। यह मान्यता इस शर्त के अधीन होगा कि अभ्यर्थियों की कुल संख्या उक्त परीक्षा के लिए सम्बन्धित संस्थान की अधिकृत दाखिला क्षमता से अधिक नहीं हो जिसके साथ सिविल इंजीनियरी संस्थान (भारत), लुधियाना (पंजाब) ने संगम ज्ञापन किया है। मानव संसाधन विकास मंत्रालय एक वर्ष के बाद अखिल भारतीय तकनीकी शिक्षा परिषद के माध्यम से शैक्षणिक योग्यताओं की मान्यता की पुनरीक्षा करेगा।

(रवि माथुर)

संयुक्त सचिव, भारत सरकार

दूरभाषः 23381097

सेवा में,

प्रबंधक

भारत सरकार प्रैस

फरीदाबाद।

SNIPPETS

RENEWAL OF CORPORATE MEMBERSHIP OF ICE(I)

Many of the Corporate Members of ICE(I) are not renewing their Membership regularly. They are requested to renew their Membership regularly by paying the annual subscription fee promptly. If Membership is not renewed the following action shall be initiated:

1. On non-renewal of Membership for two years, the membership may be suspended

&

2. If Membership is not renewed for three years, the Membership may be cancelled and the certificate surrendered to ICE (I).

NATIONAL WORKSHOP ON DOCUMENTATION OF SIKKIM EARTHQUAKE, 2011

Dr. S.D. Sharma , Director (Academic) ICE (I) attended the National Workshop on Documentation of Sikkim Earthquake, 2011 organized by the National Institute of Disaster Management on February 9,th 2012 at NIDM Conference Hall, New Delhi.

LAST DATE FOR ENROLMENT

15th April, 2012 is the last date for Enrolment for Associate Membership Examination [AMICE(I)] & Technician Membership Examination [T. Engg.] for June 2012 Examination.

ICE (I) SUMMER -2012 EXAMINATION

ICE (I) Summer -2012 Examination will start from 4th June, 2012. **Detailed Date Sheet** is available in the current issue of the Civil Engineer News Letter on **page No. 21-22** and also on the Website : www.ice.net.in

NOTICE OF CHANGE OF ADDRESS

Notice of change of address must be received in the Offices of the Institution of Civil Engineers (India) Delhi Off.: 'Career House' 4, East Park Road, Karol Bagh, New Delhi-110005 so that News Letter and other correspondences can be promptly delivered.

GOVERNMENT OF KARNATAKA RECOGNISES EXAMINATIONS CONDUCTED BY ICE (I)

Government of Karnataka gave recognition to the Section A & B of Associate Membership Course equivalent to Degree and Part-I & II of the Technician Membership (T. Engineering) equivalent to Diploma in Civil Engineering and Architecture Engineering Courses conducted by the Institution of Civil Engineers (India), Ludhiana (Punjab) as per syllabus approved by AICTE and also as per the conditions already stipulated and to be stipulated by Government of India as well as AICTE from time to time for the posts and services under Government of Karnataka in the appropriate field vide Govt. order No. ED 21 UTV 2012 dated 09.03.2012

ICE(I)Enters into MOU with Philippine Institute of Civil Engineers & Mongolian Association of Civil Engineers

ICE (I) has entered into MOU with Philippine Institute of Civil Engineers & Mongolian Association of Civil Engineers. These Institutions have agreed to the following.

1. Each organization will recognize and respect the standards of the other organization.
2. Agree to work in harmony and mutual respect for the betterment of members in both organizations.
3. Exchange relevant research, publications and professional practice notes.
4. Co-operate in the provision of continuing Professional Development (CPD) to members.
5. Maintain communication between the two organizations via correspondence and official visits to assist in closer co-operation and cultural understanding.
6. Work towards establishing a formal reciprocity agreement in the future

These Institutions recognize the importance of efficient and high standard national associations for the civil engineering and in particular the civil engineers profession, which work together in international harmony and friendship.

ARTICLES INVITED FOR " THE CIVIL ENGINEER" NEWSLETTER

ICE(I) invites articles on Civil Engineering and Architecture Engineering related to the Diploma & Degree Programme of ICE (I) for publication in the Newsletter on their acceptance. All concerned with ICE (I) are welcome to send their contributions.

ALUMNI ASSOCIATION OF ICE(I)

It is always a matter of prestige to complete one's education through a reputed Institution and it is also necessary to maintain continuity with one's Alma-mater. That is why there are Alumni Associations in every Institution to reciprocate the information from both ends.

Need has been felt for long that ICE (I) which coordinates various activities at the National and International level should have involvement of its Non-Corporate Members. This enables the members not only to get the updates from the Institution but also an opportunity to attend various Conferences, Workshops, etc. organized by the Institution. Similarly ICE (I) would like to sponsor Non-Corporate Members for their participation in the National and International Conferences to give better exposure to them. The Non-Corporate Members also have their communication address updated by informing all changes in their contact details so that the information/documents reach them from time to time. The Alumni Association would also give opportunity to interact with Fellow Members on many occasions to take advantage of such meetings and use of contacts at various places at National and International level.

The pass outs who have done their Associate Membership course from ICE (I) would find it interesting and would be keen to join such a platform being provided by ICE (I).

The prescribed proforma for joining the Alumni Association of ICE(I) may please be filled up and sent to ICE (I) for further necessary action & also for use in the Directory of Alumni Members which will be distributed to Non-Corporate/ Corporate Members for their information and necessary action.

Secretary General

The Institution of Civil Engineers (India)

Regd. Office: 'Career House' Bindra Complex, Model Town, Ludhiana (Punjab),
Delhi office: 'Career House' 4, East Park Road, (Near New Rohtak Road),Karol Bagh, New Delhi-110005
Email: info@ice.net.in Website: www.ice.net.in

ALUMNI MEMBERSHIP FORM

1. Name   : _____

2. Father's Name   : _____

3. Course Completed from   : Course : _____
    ICE(I) with details

    Membership No. : _____

    Roll No. : _____

    Session of Passing : _____

4. Contact details   : e-mail id : _____

    Telephone Nos. : Office : _____

    Residence : _____

    Mobile : _____

5. Present Occupation with   :
    Designation & Office Address   _____

6. Correspondence Address   : Residence: _____

_____
_____

7.   Any special Achievement /   :   _____
Awards   _____
_____

Dated……………   Signature of the Member

LIST OF MEMBERS OF THE ALUMNI ASSOCIATION OF ICE(I)- MARCH 2012

S.No	Member ship No.	Candidate's Name	Designation	Office Address
1	50263	Shradha Nand Bansal	CEO	L & Q Surveys (P) Ltd. XV-5352/A, Shora Kothi Pahar Ganj, New Delhi-55
2	50997	Vinod Kumar Joshi	Assistant Engineer in Govt. Dept	NA
3	51023	Amit Chauhan	Senior Engineer,	AFCONS Infrastructure Limited, Afcons House, 16 Veera Desai Road, Andheri(W) Mumbai
4	51296	Santosh Kumar Sahu	Sub Engineer	Lailunga, CG
5	50141	Pyare Lal	Junior Engineer	Irrigation & Public Health Div, Jawali,(HP)
6	52923	Raman Sharma	Junior Engineer	Garrison Engineer Chandi Mandir Cantt. Panchkula
7	50092	Jai Shanker Prasad Keshari	Dy. Manager	P&C Complex, PHED -II, NHPC Ltd, PO - Nagwain, Dist Mandi (HP
8	55165	Harminder Singh	Manager (Civil)	M/s National Fertilizers Ltd, Bathinda
9	51840	Satyendra Prasad	Junior Engineer	HQ- CWE, 153 Ashok Marg, Mhow, Indore
10	50060	Virinder Kumar Rattanpal	Junior Engineer	C/o PHE, Sub Div, Gandhinagar, Jammu
11	50830	Raghunath Routray	Foreman	Archaeological Survey of India, Bhubaneswar Circle, Satya Nagar, Bhubaneswar
12	51948	Lotliker Deepak Anand	Assistant Engineer	Pandit Jawahrlal Nehru Stadium, Sports Authority of Goa, Fatorda 403602
13	50115	Devendra Singh Rana	Propriter Architectural Services	D.S. Rana & Associates, 19-c, Subhash Road, Dehradun-248001

14	57041	Vivek Sharma	Additional Assitant Engineer	Irrigation Construction Division, Kalsi (Ambari), Dehradun, UK
15	55162	Vijay Kumar Garg	Assistant Engineer	DWD Irrigation Dept. Executive Engineers Drg. Div. Ludhiana (Punjab)
16	51650	Dinesh Kumar Awasthi	Assistant Manager	RITES Ltd. Plot-1, Sector 29, Gurgaon, (HR)
17	50198	Dinesh Kumar Pacholi	Consulting Engineer & Valuer	15, Prachi Vill, Friends Colony, Udaipur
18	51378	Kuldeep Kumar	Junior Engineer	NHPC Ltd. Parbati II, HE Projects, Power House Complex, Sainj, Kullu (HP) 175134
19	51618	Anurag Agarwal	Junior Engineer	Serving in State Govt. Deptt (Peyjal Nigam) Executive Engineer, PIU-2,UUSDIP, C-Block, New ISBT Complex, Dehradun
20	51977	Challa Ravi Kumar Babu	Architectural Consultant & Builder	Flat No. 302, City Plaza, Opp Andhra Sports, Dalagardens, Visakhapatnam
21	50493	Basudeba Satapathy	Director	Vidyarthee Institute for Technological Studies IM-40205
22	53794	Rajesh	Planning Manager	Vill. Samoor, Distt, Una (HP)
23	50055	Sushil Bazaz	Junior Engineer	R.C.C Lower Div-I, Kathua, J &K
24	50049	Satish Kumar	Junior Engineer	Irrigation, Div No.II, Jammu, J&K
25	50051	Vidya Dhar	Junior Engineer	Town Drainage Division, Jammu, C/o Transport Nagar Narwal (Jammu
26	50120	Abdul Aziz Ahmed	Junior Engineer	DRDA, Barpeta, Assam
27	50808	Ved Prakash	Assistant Engineer	Ghaziabad Development Authority, Vikash Path Ghaziabad
28	51965	MD Tajammul Hasan	Junior Engineer	SSA, Dhanbad
29	50125	Kichin Chandra Das	Junior Engineer	C.E. PWD (B), Assam, Chandmari, Guwahati
30	50122	Dilip Kr. Nath	Junior Engineer	PWD (B), Assam Guwahati-3
31	50124	Tarun Sarma	Junior Engineer	The Chief Engineer, PWD Building, Assam, Chandmari, Guwahati-3
32	50260	Lallan Prasad	Project Manager	M/s Siddhi Vinayaka Enterprises Pvt. Ltd. Bajapi Chambers Rajendra Nagar Chowk, Bilaspur CG
33	52600	Anil Kumar	Junior Engineer	MES (Min of Defence, C/o GE (I) 873 EWS 56 APO
34	51858	Amit Kumar	Junior Engineer	MNREGA (Dhanbad Block)
35	52920	Joginder Singh	Junior Engineer	Garrison Engineer (Air Force) MC, Chandigarh, Military Engineer Services, -160003
36	52073	Ravindra Kumar Alawat	Assistant Engineer	BHEL PSNR, Plot No. 25, Sec-16 A, Noida-201301
37	52145	Anil Kumar	Additional SDO	Haryana Irrigation Deptt., Indri W.S. Division,
38	52927	Manjit Singh	Senior Technician	Water Suppy & Sanitation, Sub Division No.2, Mukerian Dist, Hoshiarpur, PB

ICE(I) ENTERS INTO MOU WITH PHILIPPINE INSTITUTE OF CIVIL ENGINEERS

Both the Institutions agreed to the following.

1. Each organization will recognize and respect the standards of the other organization.
2. Agree to work in harmony and mutual respect for the betterment of members in both organizations.
3. Exchange relevant research, publications and professional practice notes.
4. Co-operate in the provision of continuing Professional Development (CPD) to members.
5. Maintain communication between the two organizations via correspondence and official visits to assist in closer co-operation and cultural understanding.
6. Work towards establishing a formal reciprocity agreement in the future

Both the ICE (I) and PICE recognize the importance of efficient and high standard national associations for the civil engineering and in particular the civil engineers profession, which work together in international harmony and friendship.

ICE (I) Enters into

MOU with

Mongolian Association of Civil Engineers

Both the Institutions agreed to the following.

1. Each organization will recognize and respect the standards of the other organization.
2. Agree to work in harmony and mutual respect for the betterment of members in both organizations.
3. Exchange relevant research, publications and professional practice notes.
4. Co-operate in the provision of continuing Professional Development (CPD) to members.
5. Maintain communication between the two organizations via correspondence and official visits to assist in closer co-operation and cultural understanding.
6. Work towards establishing a formal reciprocity agreement in the future

Both the ICE (I) and MACE recognize the importance of efficient and high standard national associations for the civil engineering and in particular the civil engineers profession, which work together in international harmony and friendship.

Giani Devi Memorial ITI was inaugurated at Abohar, Fazilka, Punjab on 4ᵗʰ Oct 2011, by Chief Guest, Dr. Basant Garg, Deputy Commissioner of Police, Fazilka. Dr. Mahindra Kumar Rinwa, Ex MLA Fazilka and Er. S. L. Swamy, Chairman, ICE(I) graced the occasion as Guests of Honour.