VINAYAKA MISSION'S RESEARCH FOUNDATION
DEEMED UNIVERSITY, INDIA

FACULTY OF ENGINEERING, TECHNOLOGY AND MANAGEMENT SCIENCES

VMKV ENGINEERING COLLEGE, SALEM
&
AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI

DEPARTMENT OF CIVIL ENGINEERING

M. E – STRUCTURAL ENGINEERING – 2 Years
(FULL TIME)

CURRICULUM AND SYLLABUS
2012

INDEX

ABOUT THE COURSE

The post graduate course M.E. Structural Engineering deals with entirely the design and analysis of Civil Engineering structures. The course aims at motivating Civil Engineers with zeal of newly adopted methods in Civil Engineering Design. The course elaborates the Limit state Design of structures in the core subject framed as "Reinforced Concrete Structures" which exploits the safety and serviceability requirements of design. The concrete technology reveals the latest plasticizers and super plasticizers used there by projecting upon new techniques and current trends used in the construction industry. For ex. The Bandra – Worli Project, the concrete used was M60 where the W/C ratio was lesser by means of artificial plasticizers.

Even pulverized fly ash has its own applications. The Theory of plates projects the special elements in civil engineering field such as folded plates, flat plates and the shell structures. The folded plates in particular have both the advantages of the plates and shells.

The Aseismic design of structures which had been framed as an elective in the course throws light upon the detailing and designing aspects of earth quake resistant structures. The need for those structures has been felt from the very early times in the field of Civil Engineering.

The structural Engineer has his own responsibilities for developing earthquake resistant design of structures and the current industry is paved with smart structures which will respond according to the nature.

The subject "Maintenance and Rehabilitation of structures" has got its reputation over the most wanted civil engineering aspect of developing structure even from Historical remnants.

"Prestressing is a boon to the Civil Engineering Field" The concept of prestressing had been a gift to the structural Engineers. The Prestressed structures such as numerous fly over's across India particularly by Gammon India Limited would surely prove that the structural Engineers dominate and rule the Civil Engineering Field. VASAI Creek Bridge in Mumbai is made of Prestressed Box girder Bridges. JJ Fly over in Mumbai has its aesthetic appearance in all the civil engineering magazines.

A prestressed Water tank will have its life for more than 200 years as the researchers say!

E.S. Reports , say that by providing slots across the junction of beam column joints, the triaxial stresses are converted to bi axial stresses there by improving the performance of the (A further research is encouraged in this field currently).

The course enlightens the Civil Engineers with the development of recent trends in the construction field currently. We wish you a bright and innovative future.

CURRICULUM

OBJECTIVES

i) KNOWLEDGE

"Knowledge is Power" the saying pays an active attention by bringing out the essence of life. " You become what you think!" said, Vivekananda. Still then it could be well felt that most of us worship the great men who told the sayings but don't follow them. Is not that true? Human beings are in a wild struggle for the want of money, bread and happiness. But do we achieve the things that we long for in our life? Life is not meant to search but to enjoy. Enjoyment should be the fullest up to the brim. Engineering is always a joy when learned with enthusiasm, the eager to learn, the love to conquer humanity, will drive the life a more meaningful one. Knowledge makes you sharp, brings elation to the brain. Civil engineering is perhaps the broadest of the engineering fields, for it deals with the creation, improvement, and protection of the communal environment. Intelligent hard work never fails. A thirst for knowledge, a drive to win, a passion to achieve can always be accompanied of having sound knowledge in what ever field you choose. Just remember Darwin's theory of survival of the fittest. If you want to survive enter this competitive world with your brain and get ready for a high tech environment of Civil Engineers.

ii) SKILLS

Are you really skilled? What do you mean by skill then? Perhaps it nothing but proficiency and excellence in what ever you start with .You need virtue of scientific education and training in the field of Engineering to develop the Engineering skills. Every Engineer has the role to play. For instance a simple train journey to work or school illustrates the number of different kinds of engineers who have involved in some way in making the journey possible. Mechanical and electrical engineers have involved with the design of locomotives and coaches. Civil Engineers with the design and construction of railway tracks, bridges and station buildings; Electronics engineers with the design and installation of communication facilities; Computer Engineers with automatic control and regulation of movement of trains; Chemical engineers with the production of paints and Diesel. Rapid movement of new technologies and new construction

techniques and materials has implications upon all branches of engineering. No one is born skilled; It's the Education that nourish him.

iii) INTERPRETATION

It was the interpretation that had led man to this extent to rule this world and to some extent he had conquered time also. The Engineering science has no end at all. Fire was the first interpretation of man. Today he makes the computers interpret humans. Civil Engineering has been redefined with the advent of Finite element analysis softwares like NASTRAN, ANSYS other packages like STAAD pro, SAP, STRUDS etc., It's an interesting thing to note down that Artificial intelligence has come down with flying colours for Civil Engineering that for constructing a bridge or fly over, it has been made possible that about 200 designs can be done at a moment and the appropriate can be chosen at interest.

It's not what field you choose upon but how do you interpret. The engineering interpretation of Tsunami has ended up with an innovative design of folded plate design that could keep the people at comfort. Folded plates offer the combined advantages of both plates and shells. Some times folded plates are called as prismatic shells. All structural theories distinguish sharply between the structures having small deflections and those having large deflections. For the former the law of superposition is applicable while for the latter the so – called "Structural theories of second order "must be used. One of the most important bridge structures, "Howrah Bridge" is made fully of rivets and no where it has bolts and nuts. How enthusiastic the designer was? How creative? One of our Civil Engineering staffs often uses to say "Design starts from the top while Construction from the bottom!" Our aim is create innovative, creative and dignified Structural Engineers. We wish you to achieve the aim by joining hands with us.

DURATION OF THE COURSE

2 YEARS

COURSE OF STUDY

MASTER OF ENGINEERING – STRUCTURAL ENGINEERING

(FULL TIME)

CURRICULUM

SEMESTER I

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Applied Mathematics	3	1	0	4
2		Matrix Computer Methods of Structural Analysis	3	1	0	4
3		Elective I	3	0	0	3
4		Structural Dynamics	3	1	0	4
5		Theory of Elasticity and Plasticity	3	1	0	4
6		Elective II	3	0	0	3
		Total	18	4	0	22

SEMESTER II

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Concrete Structures	3	1	0	4
2		Experimental Techniques and Instrumentation	3	1	0	4
3		Elective III	3	0	0	3
4		Finite Element Analysis	3	1	0	4
5		Steel Structures	3	1	0	4
6		Elective IV	3	0	0	3
		Total	18	4	0	22

SEMESTER III

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Elective V	3	0	0	3
2		Elective VI	3	0	0	3
3		Elective-VII	3	0	0	3
4		Industrial Training	0	0	6	2
5		Project Work - Phase - I	0	0	6	2
		Total	9	3	12	16

SEMESTER IV

SL.No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1		Project Work – Phase II	0	0	24	12

Total Credits: 76

LIST OF ELECTIVES

SL.No.	COURSE CODE	L	T	P	C
THEORY					
1	Soil Structure Interaction	3	0	0	3
2	Aseismic Design of Structures	3	0	0	3
3	Computer Aided Design	3	0	0	3
4	Concrete Technology	3	0	0	3
5	Design of Bridges	3	0	0	3
6	Design of Foundation Structures	3	0	0	3
7	Design of Shell and Spatial Structures	3	0	0	3
8	Design of Steel Concrete Composite Structures	3	0	0	3
9	Design of Structures for Dynamic Loads	3	0	0	3
10	Design of Tall Buildings	3	0	0	3
11	Disaster Resistant Structures	3	0	0	3
12	Environmental Engineering Structures	3	0	0	3
13	Industrial Structures	3	0	0	3
14	Maintenance and Rehabilitation of Structures	3	0	0	3
15	Offshore Structures	3	0	0	3

16	Optimization in Structural Design	3	0	0	3
17	Prefabricated Structures	3	0	0	3
18	Prestressed Concrete	3	0	0	3
19	Stability of Structures	3	0	0	3
20	Theory of Plates	3	0	0	3
21	Wind and Cyclone effects on Structures	3	0	0	3
22	Cyber Security	3	0	0	3

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		APPLIED MATHEMATICS	3	1	0	4

OBJECTIVE:

- To familiarize the students in the field of differential and elliptic equations to solve boundary value problems associated with engineering applications.
- To expose the students to variational formulation and estimation theory techniques and their applications to obtain solutions for buckling, dynamic response, heat and flow problems of one and two dimensional conditions
- Acquire skills in handling situations involving more than one random variable and functions of random variables
- Have a fundamental knowledge of the Laplace transform methods and Fourier transforms methods
- Understand and characterize phenomena which evolve with respect to time in probabilistic manner.

1. TRANSFORM METHODS 9

Laplace transform methods for one-dimentional wave equation - Displacements in a long string – longitudinal vibration of an elastic bar - Fourier transforms methods for one-dimentional heat conduction problems in infinte and semi-infinite rod.

2. ELLIPTIC EQUATIONS 9

Laplace equation - Properties of harmonic functions - Fourier transform methods for Laplace equation.

3. CALCULUS OF VARIATIONS 9

Variation and its properties - Euler's equation - Functionals dependant on first and higher order derivatives - Functionals dependent on functions of several independent variables - Some applications - Direct methods – Ritz and Kantorovich methods.

4. PROBABILITY AND RANDOM VARIABLES 9

Probability Random variables Moments - Moment Generating Function - Standard distributions - Functions of random variables - Two dimentional random variables - Correlation and regression.

5. ESTIMATION THEORY 9

Principals of least squares - Multiple and partial correlation and regression - Estimation of parameters – Maximum Likelihood Estimates - Method of moments.

Total Hours 45

References:

1. Sankar Rao, K., Introduction to Parial Differntial Equations, Prentice Hall of India, New Delhi, 1995.
2. Sneddon, I.N., Elements of Partial Differential Equations, Mc Graw Hill, 1986.
3. Elsgolts, L., Diffenential Equations and Calculus of Variations , Mir Publishers, Moscow, 1966
4. Gupta, S.C., & Kapoor, V.K., Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Reprint 1999.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		MATRIX COMPUTER METHODS OF STRUCTURAL ANALYSIS	3	1	0	4

OBJECTIVE:

- This course is in continuation of Structural Analysis – Classical Methods.
- At the completion of the course the students would have knowledge of Advanced methods of Matrix methods 2D and 3D Analysis are covered.
- Advanced topics of Space Structures are covered.Computer Applications and use of Computer packages
- At the completion of the course the students would have knowledge of Computer applications and use of Computer packages
- At the end of the semester, the student shall be having a good understanding of all the analysis of large structures and sub-structuring static condensation procedure

1. INTRODUCTION AND DISPLACEMENT METHOD-2D ANALYSIS 9

Introduction to Matrix Methods - displacements formulation analysis of continuous beams - co-ordinate transformations - rigid and pin jointed plane-frames.

2. FORCE METHOD 9

Matrix flexibility methods - general formulation - application to plane rigid frames - plane trusses .

3. DISPLACEMENT METHOD-3D ANALYSIS 9

Displacement method for three dimentional Structure - Coordinate transformations - analysis of space trusses and space frames.

4. COMPUTERISATION 9

Computer Applications and use of Computer packages - Programming techniques and problems.

5. SPECIAL PROBLEMS 9

Analysis of large structures - sub-structuring static condensation procedure - Simple problems only.

Total Hours 45

References:

1. Coates, R.C., Coutie. M.G., and Kong, F.K., Structural Analysis, John Wiley and Sons, 1979.
2. McGuire, W., and Gallagher, R.H., Matrix Structural Analysis, John Wiley and Sons, 1979.
3. John L.Meek., Matrix Structural Analysis , Mc Graw Hill Book Company, 1971.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		ELECTIVE – I	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		STRUCTURAL DYNAMICS	3	1	0	4

OBJECTIVE:

- To expose the students the principles and methods of dynamic analysis of structures and to prepare them for designing the structures for wind, earthquake and other dynamic loads.
- Students will be introduced to Mode superposition techniques, Numerical integration procedures
- At the completion of the course the students would have learnt about Eigen values problems and orthonormality of modes
- At the end of this course the student is expected to understand Modeling - free and forced vibration of bars and beams.
- To provide the technical of analyzing the wind, and earthquake impact.

1. PRINCIPLES OF DYNAMICS 9

Formulation of equations of motion by different methods, single degree of freedom systems, free and forced response, effect of damping.

2. MULTIDEGREE OF FREEDOM SYSTEMS 9

Formulation of structure property matrices, Eigen values problems, Modes shapes and orthonormality of modes, Approximate methods of extraction of eigen values.

3. DYNAMIC RESPONSE OF MDOF SYSTEMS 9

Mode superposition techniques, Numerical integration procedures.

4. CONTINUOUS SYSTEMS 9

Modeling - free and forced vibration of bars and beams.

5. .APPLICATIONS 9

Idealisation of structures to mathematical models, examples of wind, earthquake and impact.

Total Hours 45

Text Books:

1. Roy R.Craig, Jr., Structural Dynamics - An Introduction to computer methods , John Wiley & Sons, 1981.

References:

1. Clough R.W and Penzien,J., Dynamics of Structures , Mc Graw Hill, 1975.
2. Paz Mario, Structural Dynamics, Academic Press, 1985.
3. Anderson R.A., Fundamentals of vibration, Amerind Publishing Co., 1972.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		THEORY OF ELASTICITY AND PLASTICITY	3	1	0	4

OBJECTIVE:

- To understand the concept of Torsion of non-circular section , rectangular section and hollow thin walled sections
- At the end of the semester, the student shall have a clear concept of Knowledge on the stress strain relationship and Hooke's law,
- After studying this course, students will be able to have a clear understanding of the Two dimensional problems
- To provide an overall perspective to the students on the use of Energy methods
- To impart knowledge on Flow rule and Elastic plastic problems of beams in bending

1. ANALYSIS OF STRESS AND STRAIN **9**

Analysis of stress and strain, stress strain relationship. Generalized Hooke's law. Plane stress and plane strain.

2. 2D PROBLEMS **9**

Two dimensional problems in Cartesian and polar co-ordinates for simple problems.

3. TORSION **9**

Torsion of non-circular section - methods of anlaysis - membrane analogy - torsion of thin rectangular section and hollow thin walled sections.

4. ENERGY METHODS **9**

Energy methods - principle of virtual work - energy theorem - Rayleigh Ritz methods - Finite Difference
method.

5. INTRODUCTION TO PROBLEMS IN PLASTICITY **9**

Physical assumption - criterian of yielding, yield surface, Flow rule (plastic stress strain relationship). Elastic plastic problems of beams in bending - plastic torsion.

Total Hours 45

References:

1. Timoshenko, S. and Goodier T.N. "Theory of Elasticity", McGraw Hill Book Co., Newyork, II Edition 1988.
2. Chwo P.C. and Pagano, N.J. "Elasticity Tensor, Dyadic and Engineering applications", D.Van Nestrand Co., In Co., 1967.

3. Chenn, W.P. and Henry D.J. "Plasticity for Structural Engineers", Springer Verlag Newyork 1988.
4. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, New Delhi 1988.
5. Verma, PDS, "Theory of Elasticity", Vikas Publishing Pvt. Ltd. New Delhi -1997.
6. Sadhu Singh, "Theory of Plasticity", Khanna Publishers, New Delhi 1988.
ACI 318 -77 Building code of Requirements for reinforced concrete, American concrete Institution, Detroit.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
I		ELECTIVE – II	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		CONCRETE STRUCTURES	3	1	0	4

OBJECTIVE:

- To familiarize the students in the field of limit state design of beams – slabs and column
- To study the behaviour, analysis and design of R.C. structures.
- At the completion of the course the students would have knowledge of Design of flat slabs and flat plates and Hillerberg method of design of slab
- At the end of the semester, the student shall be having a good understanding of Inelastic behavior of concrete beams
- To Educate the students in the area of fire resistance and field control of concrete

1. OVERALL REVIEW **9**

Review of limit state design of beams – Slabs and columns according to IS 456-2000- Calculation of deflection and crack width according to IS 456-2000.

2. DESIGN OF SPECIAL RC ELEMENTS **9**

Design of Slender columns- Design of Rc Walls – Ordinary and shear walls – Design of Corbels – Deep – beams and grid floors.

3. FLAT SLABS AND FLAT PLATES **9**

Design of flat slabs and flat plates according to ACI method – Design of shear load – reinforcement and edge(spandrel) beams – Yield line theory and Hillerberg method of design of slabs

4. INELASTIC BEHAVIOUR OF CONCRETE BEAMS **9**

Inelastic behavior of concrete beams – moment – rotation curves – moment redistribution – Baker's method of plastic design – design of cast-in-situ joints in frames.

5. GENERAL **9**

Detailing for ductility – fire resistance of building – field control of concrete

Total Hours 45

Text Books:

1. Purushothaman, P< Reinforced Concrete Structure Structural Elements: Behaviour Analysis and Design, Tata Mc Graw Hill, 1986.
2. Varghes, P.C., Limit State Design of Reinforced concrete, Prentice Hall of India, 1995.
3. Krishna raju, N.Advanced Reinforced Concrete Design, CBS Publishers and distributors, 1986

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		EXPERIMENTAL TECHNIQUES AND INSTRUMENTATION	3	1	0	4

OBJECTIVE:

- To learn the principles of measurements of static and dynamic response of Structures and carryout the analysis of results.
- To understand the concept of Vibration meter – Seismographs – Vibration Analyzers
- At the end of the semester, the student shall have a clear concept of Knowledge on the Principles of Pressure and flow measurements,
- After studying this course, students will be able to have a clear understanding of the crack observation and measurement, an damage assessment
- To impart knowledge on load testing on structures,

1. FORCE AND STRAIN MEASUREMENTS 9

Strain gauges, principle, types, performance and uses. Photo elasiticity –principle And applications –Moire Fringes – Hydraulic Jacks and pressure gauges- Electronic load cells-Proving Rings-Calibration of Testing Machines.

2. VIBRATION MESEARUMENTS 9

Characteristics, of Structural Vibrations- Linear Variable Differential Transformer (LVDT)-Transducers for velocity and acceleration measurements. Vibration meter – Seismographs – Vibration Analyzer – Display and recording of signals Cathode ray Osscilloscope – XY Plotter – Chart Plotters – Digital data Acquisition systems.

3. ACOUSTICS AND WIND FLOW MEASURES 9

Principles of Pressure and flow measurements- pressure transducer – sound level meter-venturimeter and flow meters – wind tunnel and its use in structural analysis – structural smodeling – direct and indirect model analysis.

4. DISTRESS MEASUREMENTS 9

Diagnosis of distress in structures – crack observation and measurement – corrosion of reinforcement in concrete – Half cell, construction and use – damage assessment – controlled blasting for demolition.

5. NON DESTRUCTIVE TESTING METHODS 9

load testing on structures, Buildings, bridges and towers-Rebound Hammer-acoustic emission-ultrasonic testing principles and application-holography-use of laser for structural testing-Brittle coating.

Total Hours 45

References;

1. Sadhu Singh – Experimental stress Analysis, Khanna Publishers, New Delhi, 1996.
2. J.W. Dalley and W.F. Riley, Experimental Stress analysis, McGraw-Hill Book Company, New York 1991.
3. L.S. Srinath et.al, Experimental Stress analysis, Tata McGraw-Hill Company, New Delhi 1984. R.S. Sirohi, H.C Radhakrish

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		ELECTIVE – III	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		FINITE ELEMENT ANALYSIS	3	1	0	4

OBJECTIVE

- To study the energy principles, finite element concept, stress analysis, meshing, nonlinear problems and applications.
- To expose the students the principles and methods of dynamic analysis of structures and to prepare them for designing the structures for wind, earthquake and other dynamic loads.
- Students will be introduced to Mode superposition techniques, Numerical integration procedures
- At the end of this course the student is expected to understand nonlinear and vibration problems
- At the completion of the course the students would have learnt about Application of Thermal analysis

1. INTRODUCTION **9**

Boundary Value Problem - Approximate Solution - Variational and Weighted Residual Methods - Ritz and Galerkin Formulations - Concepts of Piecewise Approximation and Finite Elements - Displacement and Shape Functions - Weak Formulation - Minimum Potential Energy - Generation of Stiffness Matrix and Load Vector.

2. STRESS ANALYSIS **9**

Two Dimentional problems - Plane Stress, Plain Strain and Axisymmetric Problems - Triangular and Quadrilateral Elements - Natural Coordinates - Isoparametric Formulation - Numerical Integration - Plate Bending and Shell Elements - Brick Elements - Elements for Fracture Analysis.

3. MESHING AND SOLUTION PROBLEMS **9**

Higher Order Elements - p and h Methods of refinement - IIL conditioned Elements - Discretisation Errors - Auto and Adaptive Mesh Generation Techniques - Error Evaluation.

4. NONLINEAR AND VIBRATION PROBLEMS **9**

Material and Geometric Nonlinearity - Methods of Treatment - Consistent System Matrices - Dynamic Condensation - Eigen Value Extraction.

5. THERMAL ANALYSIS **9**

Application to Thermal analysis Problems.

Total Hours 45

References:

1. Bathe , K.J., Finite Elements Procedures in Engineering analysis, Prentice Hall Inc., 1995.
2. Zienkiewicz, O.C, and Taylor, R.L., The Finite Elements Methods , Mc Graw Hill , 1987.
3. Chandrupatla, R.T. and Belegundu, A.D ., Introduction to Finite Elements in Engineering, 2nd Edition, Prentice Hall of India, 1997.
4. Moaveni,S., Finite Element Analysis : Theory and Application with ANSYS, Prentice Hall Inc., 1999.
5. ana, Mechanical Measurements, New Age International (P) Limited, 1997.
7. F.K.Garas, J.L. Clarke and G.S.T Armer, Structural Assessment Butterworths London, 1987.
8. D.E. Bray and R.K. Stanely, Non – destructive Evaluation, McGraw-Hill Publishing company New York-1989

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		STEEL STRUCTURES	3	1	0	4

OBJECTIVE:

- To study the behaviour of members and connections, analysis and design of steel towers, chimneys.
- To study the Design framed beam connections
- To expose the students in the **design of connections**
- To study the analysis and design of steel towers
- At the end of this course the student is expected to understand Shape factor - Moment redistribution
- At the completion of the course the students would have learnt about local bucking and lateral bucking

1.GENERAL **9**

Design of members subjected to lateral loads and axial loads - Analysis and design of Industrial buildings and bents - Sway and non-sway frames - Design of Purlins, Louver rails, Gable column and Gable wind grider - Analysis of Gable Frames check for deflection.

2. DESIGN OF CONNECTIONS **9**

Types of connections - Design framed beam connections - Seated beam connections - Unstiffened, Stiffened seat connections, Conitinuous beam-to-beam connections and continuous beam-to-column connection both welded rivetted.

3. ANALYSIS AND DESIGN OF STEEL TOWERS **9**

Analysis and design of Transmission Line Towers Types of bracing patterns - Sag and Tension calculations - Design of self supporting chimney(lined and unlined) and guyed steel stacks - Stresses due to wind and earthquake forces - Design of foundations - Along with loads - calculation Gust Factor Method.

4. PLASTIC ANALYSIS OF STRUCTURES **9**

Introduction - Shape factor - Moment redistribution - Static, Kinematic and Uniqueness theorems – Combined mechanism - Analysis of single bay and two bay portal frames - Methods of plastic moment distribution – Effect of axial force and shear force on plastic moments - Connections Moment resisting connection - Design of continuous beams.

5. DESIGN OF LIGHT GAUGE STEEL STRUCTURES **9**

Types of cross sections - local bucking and lateral bucking - concepts of Effective width - Design of compression and tension members, Beams, Deflection of beams and design of beam webs. Combined stresses and connections, wall studs.

Total Hours 45

References:

1. Horne, M.R., and Morris, L.J., Plastic Design of Low -rise frames, Granada Publishing Ltd., 1981.
2. Salmon, C.G., and Johnson, J.E. Steel Structure -Design and Behaviour, Harper and Row, 1980.
3. Dayarathnam, P., Design of Steel Structure, A.H.Wheeler, 1990.
4. Kuzamanovic,B.O. and Willems,N., Steel Design for Structural Engineers, Prentice Hall, 1977.
5. Wie - Wen Yu., Cold-formed Steel Structures, McGraw Hill Book Company, 1973.
6. William McGuire, Steel Structures, Prentice Hall, Inc., Englewood Cliffs, N.J.1986.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
II		ELECTIVE – IV	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
III		ELECTIVE – V	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
III		ELECTIVE – VI	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
III		ELECTIVE – VII	3	0	0	3

The Elective Subject Can be Selected from Elective List

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
III		SEMINAR AND TRAINING	3	0	0	3

(Training to be undergone after II semester)

PURPOSE

To provide practical exposure in Civil Engineering related organizations.

OBJECTIVES

- Students have to undergo three – week practical training in Civil Engineering related organizations so that they become aware of the practical applications of theoretical concepts studied in the class rooms.
- Students have to undergo three-week practical training in Civil Engineering related organizations of their choice but with the approval of the department.
- At the end of the training student will submit a report as per the prescribed format to the department.

ASSESSMENT PROCESS

- This course is mandatory and a student has to pass the course to become eligible for the award of degree.
- The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made.
- Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
IV		Project Work	0	0	24	12

LIST OF ELECTIVES

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - SOIL STRUCTURE INTERACTION	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the behavior of soil structure interaction.
- To expose the students the principles and methods of soil-foundation interaction and to prepare them for Isotropic elastic half space, Analysis of beams
- Students will be introduced to Analysis of finite plates, rectangular and circular plates, and Numerical analysis of finite plates.
- At the end of this course the student is expected to understand Load distribution in groups with rigid cap.
- At the completion of the course the students would have learnt about Application of Solutions through influence charts.

1. SOIL-FOUNDATION INTERACTION 9

Introduction to soil-Foundation interaction problems, soil behaviour,Foundation behaviour, Interface behaviour,Scope of soil foundation interaction analysis,soil response models,Winkler,Elastic continuum, Two parameter elastic models,Elastic plastic behaviour,Time dependent behaviour

2. BEAM ON ELASTIC FOUNDATION- SOIL MODELS 9

Infinite beam,Two parameters,Isotropic elastic half space,Analysis of beams of finite length,Classification of finite beams in relation to their stiffness

3. PLATE ON ELASTIC MEDIUM 9

Infinite plate,Winkler,Two parameters,isotropic elastic medium,Thin and thick plates,Analysis of finite plates,rectangular and circular plates,Numerical analysis of finite plates,simple solutions

4. ELASTIC ANALYSIS OF PILE 9

Elastic analysis of single pile,Theoretical solutions for settlement and load distributions,analysis of pile group,Interaction analysis, Load distribution in groups with rigid cap.

5. LATERALLY LOADED PILE 9

Load deflection prediction for laterally loaded piles,Subgrade reaction and elastic analysis,Interaction analysis,Pile raft system, Solutions through influence charts

Total Hours 45

References:

1. Selva durai, A.P.S.., Elastic Analysis of Soil Foundation Interaction,Elsevier,1979
2. Poulos, H.G., and Davis,E.H., Pile Foundation Analysis and Design, John Wiley,1980
3. Scott,R.F.,Foundation Analysis,Prentice Hall,1981
4. Structure Soil Interaction - State of Art Report,Institution of Structural Engineers,1978.
5. ACI 336, Suggested Analysis and Design Procedures for combined footings and Mats, American Concrete Institute, Delhi,1988

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C

		ELECTIVE - ASEISMIC DESIGN OF STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the effect of earthquake and Seismic forces, analysis and design of cyclic load resistant Structures.
- To expose the students the principles and methods of Steel and Prestressed Concrete elements for design concepts.
- Students will be introduced to Building systems frames, shear walls, Braced Frames, Combinations.
- At the end of this course the student is expected to understand Performance of Regular Buildings 3 D Computer Analysis of Building Systems.
- At the completion of the course the students would have learnt about Application of special problems and case studies.

1. INTRODUCTION **9**

Elements of Engineering Seismology - Theory of Vibration - Response Spectrum.

HISTORICAL

Indian Seismicity - Earthquake History - Behaviour of Structres in the past Earthquakes.

2. DESIGN CONCEPTS **9**

Seismic Design Concepts - Cyclic load behaviour of RC, Steel and Prestressed Concrete elements – Design spectrum - Principles of capacity design.

3. CODAL PROVISIONS **9**

Provisions of Seismic Code (IS 1893) - Building systems frames, shear walls, Braced Frames, Combinations - Torsion.

4. DESIGN AND DETAILING **9**

Performance of Regular Buildings 3 D Computer Analysis of Building Systems (Theory Only) - Design and Detailing of frames - Shear walls and Frame walls.

5. SPECIAL PROBLEMS AND CASE STUDIES **9**

Structural Configuration - Seismic performance - Irregular Buildings - Soil performance, Modern Concepts – Base Isolation - Adoptive system - Case studies.

Total Hours 45

References:

1. Course Notes "Design of Reinforced Concrete Building", IIT, Kanpur, June 1999.
2. Bungale S.Taranath "Structural Analysis and Design of Tall Buildings" McGraw Hill Book Company, New York, 1999.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C

		ELECTIVE - COMPUTER AIDED DESIGN	**3**	**0**	**0**	**3**

OBJECTIVE:

- To learn the principles of Computer graphics, Structural analysis, Finite element analysis and Application packages, Optimization and Artificial intelligence.
- To expose the students the principles and methods of Analysis through application packages.
- Students will be introduced to Computer aided design of steel and RC Structural elements.
- At the end of this course the student is expected to understand CPM and PERT applications Genetic algorithm and applications.
- At the completion of the course the students would have learnt about Principles of neural network.

1. COMPUTER GRAPHICS 9

Graphic primitives - Transformations - Basics of 2-D drafting - Modeling of curves and surfaces - Solid modeling - Graphic standards - Drafting software packages and usage.

2. STRUCTURAL ANALYSIS 9

Computer methods of structural analysis - Finite Element programming - Analysis through application packages.

3. STRUCTURAL DESIGN 9

Computer aided design of steel and RC Structural elements - Detailed drawing - Bill of materials.

4. OPTIMIZATION 9

Linear programming - Simplex algorithm - Post-optimality analysis - Project scheduling - CPM and PERT applications Genetic algorithm and applications.

5. ARTIFICIAL INTELLIGENCE 9

Introduction - Heuristic search - knowledge based expert systems - Architecture and applications of KBES - Expert system shells - Principles of neural network.

Total Hours 45

References:

1. C..S.Krishnamoorthy and S.Rajeev, Computer Aided Design, Narosa Publishing House, New Delhi, 1991.
2. H.B.Harrison, Structural Analysis and Design Vol.I & II, Pergamon Press, 1991 E.Hinton and D.R.J.Owen, Finite Element Programming, Academic Press 1977.
3. Billy E.Gillet, Introduction to Operations Research, A computer oriented algorithmic approach, Tata McGraw Hill 1982.
4. Richard Forsyth (Ed.), Expert System Principles and Case studies - Chapman & Hall.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C

		ELECTIVE - CONCRETE TECHNOLOGY	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the properties of materials, tests and mix design for concrete.
- To expose the students the principles and methods of Variability of concrete strength.
- Students will be introduced to Principles of concrete mix design.
- At the end of this course the student is expected to types of concrete.
- At the completion of the course the students would have learnt about concreting methods.

1. CONCRETE MAKING MATERIALS **9**

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified gradings, Testing of aggregates, Fibers. Cement, Grade of cement, Chemical composition, Testing of concrete, Hydration of cement, Structure of hydrated cement, Special cements - Water Chemical admixtures, Mineral admixture.

2. CONCRETE **9**

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage, Variability of concrete strength.

3. MIX DESIGN **9**

Principles of concrete mix design, Methods of concrete mix design, Testing of concrete.

4. SPECIAL CONCRETE **9**

Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Polymer Concrete, Super plasticized concrete, Epoxy resins and screeds for rehabilitation - Properties and Applications - High performance concrete.

5. CONCRETING METHODS **9**

Process of manufacturing of concrete, methods of transportation, placing and curing - Extreme weather concreting, special concreting methods, Vaccum dewatering - underwater concrete, special from work.

Total Hours 45

References:

1. Neville, A.M., Properties of Concrete , Pitman Publishing Limited, London.
2. Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi.
3. Rudhani G., Light Weight Concrete Academic Kiado, Publishing Home of Hungarian Academy of Sciences, 1963.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C

		ELECTIVE - DESIGN OF BRIDGES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the loads, forces on bridges and design of several types of bridges.
- To expose the students the principles of short span bridges.
- Students will be introduced to long span girder bridges.
- At the end of this course the student is expected to design of prestressed concrete bridges .
- At the completion of the course the students would have learnt about bearings, substructures and footings for bridges.

1. INTRODUCTION 9

Classification, investigations and planning, choice of type, I.R.C.specifications for road bridges, standard live loads, other forces acting on bridges, general design considerations.

2. SHORT SPAN BRIDGES 9

Load distribution theories, analysis and design of slab culverts, tee beam and slab bridges.

3. LONG SPAN GIRDER BRIDGES 9

Design principles of continuous bridges, box girder bridges, balanced cantilever bridges.

4. DESIGN OF PRESTRESSED CONCRETE BRIDGES 9

Design of plate grider bridges

5. BEARINGS, SUBSTRUCTURES AND FOOTINGS FOR BRIDGES 9

Total Hours 45

References:

1. Raina V.K. "Concrete Bridge Practice" , Tata McGraw Hill Publishing Company, New Delhi, 1991.
2. Krishnaraju, N., "Design of Bridges" Oxford and IBH Publishing Co., Bombay, Calcutta, New Delhi, 1988
3. Bakht, B. and Jaegar, L.G., "Bridge Analysis simplified", McGraw Hill, 1985.
4. Ponnuswamy, S., "Bridge Engineering", Tata McGraw Hill, 1989
5. Derrick Beckett, "An introduction to Structural Design of Concrete Bridges", Surrey University Press, Henley Thomes, Oxford Shire, 1973.
6. Taylor, F.W., Thomson, S.E., and Smulski E., "Reinforced Concrete Bridges", John Wiley and Sons, New York, 1955.
7. Edwin H.Gaylord Jr., Charles N.Gaylord, James, E.,Stallmeyer "Design of Steel Structures" McGrew Hill International Editions, 1992.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF FOUNDATION STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- Study the behaviour and design of Machine foundation and Tower foundation.
- Study the Shallow and Deep foundation.
- To expose the students the principles of beams on elastic foundations.
- Students will be introduced to different types of piles and design of pile caps.
- At the end of this course the student is expected to foundations for bridges and machines.
- At the completion of the course the students would have learnt about Structural design of supports for foundation.

1. INTRODUCTION 9

Design of Soil Investigation report for design of foundation structures. General principles of design of reinforced concrete shallow and deep foundations.

2. DESIGN OF SHALLOW AND DEEP FOUNDATIONS 9

Shallow foundations - Beams on elastic foundations - Design of rafts, buoyancy - rafts and basement design

3. DEEP FOUNDATIONS 9

Load carrying capacity of different types of piles and detailing of reinforcements according to IS2911 - Design of pile caps

4. FOUNDATIONS FOR BRIDGES AND MACHINES 9

Foundations for bridges - well and caisson foundations - General principles, planning and design of machine foundations.

5. TOWER FOUNDATIONS 9

Design of foundations for towers - Structural design of supports for foundation excavation design of ground anchors.

Total Hours 45

Text Books:

1. Thomlinson, M.J. and Boorman.R., "Foundation design and construction", ELBS Longman VI edition, 1995.
2. Nayak, N.V., "Foundation Design manual for practising Engineers", Dhanpat Rai and Sons, 1982.
3. Winterkorn H.F., and Fang H.Y., "Foundation Engineering Hand book - Van Nostrard - Reinhold - 1976.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF SHELL AND SPATIAL STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- Study the behaviour and design of shells, folded plates, space frames and application of FORMIAN software.
- To expose the students the principles of design of folded plates.
- Students will be introduced to general principles of design Philosophy and Behaviour.
- At the end of this course the student is expected to Analysis of space frames.
- At the completion of the course the students would have learnt abo**ut** Fully stressed design with deflection constraints.

1. MEMBRANE THRORY OF SHELLS 9

Classification of shells - Types of shells - Structural action - Membrane theory - Shells of revolution and shells of translation - Examples - Limitations of membrane theory.

2. DESIGN OF FOLDED PLATES 9

Folded Plate structures - structural behaviour - Types - Design by ACI - ASCE Task Committee method.

3. SPACE FRAME - DESIGN PHILOSOPHY 9

Space frames - configuration - types of nodes - general principles of design Philosophy - Behaviour.

4. ANALYSIS OF SPACE FRAMES 9

Analysis of space frames - Formex Algebra, FORMIAN - Detailed design of Space frames

5. OPTIMASATION 9

Optimization by structural theorems - Maxwell, Mirchell and Heyman's Theorems for trusses and frames - Fully stressed design with deflection constraints - Genetic Algorithm.

Total Hours 45

References:

1. Wilhelm Flügge, Stresses in shells, Springer - Verlag
2. Timoshenko, S. Theory of Plates and Shells, McGraw Hill, 1990
3 Ramasamy, G.S., Design and Construction of Concrete Shells Roofs, CBS Publishers, 1986
4. Principles of Space Structures by Dr.N.Subramanian - 1999, Wheeler Publishing Co.
5. Proceedings of International Conference on Space Structures, Anna University, November 1997.
6. Uri Krish, Optimum Structural Design, McGraw Hill Book Co. 1981

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF STEEL CONCRETE COMPOSITE STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To develop an understanding of the behaviour and design study of Steel concrete To expose the students the principles of design of folded plates.
- To expose the students the principles of Behaviour of composite beams.
- Students will be introduced to general principles of design of connections.
- At the end of this course the student is expected to Behaviour of box girder bridges.
- At the completion of the course the students would have learnt abo**ut** Concrete composite construction in buildings.

1. INTRODUCTION 9

Introduction to steel - Concrete composite construction - Theory of composite structures - Introduction to steel - Concrete - Steel sandwich construction.

2. DESIGN OF COMPOSITE MEMBERS 9

Behaviour of composite beams - Columns - Design of composite beams - Steel - Concrete composite columns - Design of composite trusses.

3. DESIGN OF CONNECTIONS 9

Types of connections - Design of connections in the composite structures - Shear connections - Design of connections in composite trusses.

4. COMPOSITE BOX GRIDER BRIDGERS 9

Introduction - Behaviour of box girder bridges - Design concepts.

5. GENERAL 9

Case studies on steel - Concrete composite construction in buildings - Seismic behavior of composite structures.

Total Hours 45

References:

1. Johnson R.P., Composite structures of steel and concrete, Blackwell Scientific Publications (Second Edition), UK, 1994.
2. Owens, G.W. and Knowels.P. Steel Designers manual (Fifth edition), Steel Concrete Institute (UK), Oxford Blackwell Scientific Publications, 1992.
3. Workshop on Steel Concrete Composite Structures, conducted at Anna University, 2000.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF STRUCTURES FOR DYNAMIC LOADS	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the concept of dynamic loads and Design of wind speeds.
- To study the theory of Aeroelastic and Aerodynamic effects.
- To expose the students the principles of earthquakes.
- Students will be introduced to general principles of Design of bulidings for blast and impact as per BIS codes of practice.
  .
- At the end of this course the student is expected to design against wind.
- At the completion of the course the students would have learnt abo**ut** Ductility of the material and the structure.

1. INTRODUCTION 9

Factors affecting design against dynamic loads - Behaviour of concrete, steel, masonry and soil under impact and cyclic loads - Recap of Structural dynamics with reference to SDOF, MDOF and continuum systems – Ductility and its importance.

2. DESIGN AGAINST EARTHQUAKES 9

Earthquake characterisation - Response spectra - seismic coeffcient and response spectra methods of estimating loads - Response of framed, braced frames and shear wall buildings - Design as per BIS codes of practice - Ductility based design.

3. DESIGN AGAINST BLAST AND IMPACT 9

Characteristics of internal and external blast - Impact and impulse loads - Pressure distribution on buildings above ground due to external blast - underground explosion - Design of bulidings for blast and impact as per BIS codes of practice.

4. DESIGN AGAINST WIND 9

Characteristics of wind - Basic and Design wind speeds - Effect of premeability of the structure – pressure coefficient - Aeroelastic and Aerodynamic effects - Design as per BIS code of practice including Gust Factor approach - tall buildings, stacks and
chimneys.

5. SPECIAL CONSIDERATIONS 9

Energy absorption capacity - Ductility of the material and the structure - Detailing for ductility - Passive and active control of vibrations - New and favourable materials.

Total Hours 45

References:

1. Bela Goschy, " Design of Building to withstand abnormal loading ", Butterworths, 1990.
2. Paulay, .T. and Priestly, .M.N.J., " A seismic Design of Reinforced Concrete and Masonry building ", John Wiley and Sons, 1991.

3. Dowling, .C.H., " Blast vibration - Monitoring and control ", Prentice Hall Inc., Englewood Cliffs, 1985.
4. Kolousek, .V. et al., " Wind effects on Civil Engineering Structures ", Elsevier, 1984.
5. Concrete Structures under Impact and Impulsive Loading, Synthesis Report CEB, Lousanne, Germany, 1988.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DESIGN OF TALL BUILDINGS	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the behaviour, analysis and design of tall structures. .
- To study the theory of combinations of loading working stress design.
- To expose the students the principles o**f** behaviour of various structural systems.
- Students will be introduced to general principles of Factors affecting growth.
- At the end of this course the student is expected to analysis and design.
- At the completion of the course the students would have learnt abo**ut** stability of tall buildings.

1. DESIGN CRITERIA 9

Design philosophy, Loading, Sequential loading, materials - high performance Concrete - Fiber reinforced Concrete - Light weight Concrete - Design mixes.

2. LOADING AND MOVEMENT 9

Gravity Loading : Dead and live load, methods of live load reduction, Impact, gravity loading, construction loads. Wind loading : Static and dynamic approach, Analytical and wind tunnel experimental method. Earthquake loading : Equivalent lateral force, modal analysis, combinations of loading working stress design, Limit state design, plastic design.

3. BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS 9

Factors affecting growth, Height and Structural form. High rise behaviour, Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall-frames, tubulars, cores, futrigger - braced and hybrid mega system.

4. ANALYSIS AND DESIGN 9

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of building as total structural system considering overall integrity and major subsystem interaction, Anlysis for member forces, drift and twist, computerised general three dimentional analysis. Structural elements : Sectional shapes, properties and resisting capacity, design, deflection, cracking, prestressing, shear flow. Design for diffenential movement, creep and shrinkage effects, temperature effects and fire resistance.

5. STABILITY OF TALL BUILDINGS 9

Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-Delta analysis, simultaneous first-order and P-Delta analysis, Translational, Torsional instability, out of plum effects, stiffness of member in stability, effect of foundation rotation.

Total Hours 45

Text Books:

1. Taranath B.S., Structural Analysis and Design of Tall Building, McGraw Hill, 1988.

References:

1. Dr. Y.P.Gupta, Editor. Proceedings National Seminar on High Rise Structures - Design and Construction practices for middle level cities Nov. 14 -16, 1995, New Age International Limited, Publishers, Madras - 20.
2. Wilf gang Schuller, High Rise Building Structures, John Wiley and Sons, 1977.
3. Bryan stafford Smith, Alexcoull, Tall Building Structures , Analysis and Design,

John Wiley and Sons, Inc., 1991.
4. T.Y.Lin, D.Stotes Burry, Structural Concepts and system for Architects and Engineers. John Wiley, 1988.
5. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1986.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - DISASTER RESISTANT STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the Philosophy for design to resist earthquake, cyclone and flood. .

- To study the Safety analysis and rating.
- To expose the students in the methods of **strengthening** for different disasters.
- At the end of this course the student is expected to know about impact on disaster reduction.
- At the completion of the course the students would have learnt abo**ut** Ground improvement techniques

1. BEHAVIOUR OF LIFE-LINE STRUCTURES 9

Philosophy for design to resist earthquake, cyclone and flood - National and International codes of practice – By - Law of urban and semi-urban areas - Traditional and modern structures.

2. COMMUNITY STRUCTURES 9

Response of dams, bridges, buildings - Strengthening measures - Safety analysis and rating – Reliability assessment.

3. REHABILITATION AND RETROFITTING 9

Testing and evaluation - Classification of structures for safety point of view - methods of **strengthening** for different disasters - qualification test.

4. DETAILING OF STRUCTURES AND COMPONENTS 9

Use of modern materials and their impact on disaster reduction - Use of modern analysis, design and construction techniques optimisation for performance.

5. DAMAGE ASSESSMENT OF STRUCTURES 9

Damage surveys - Maintenance and modifications to improve hazard resistance - Different types of foundation and its impact on safety - Ground improvement techniques.

Total Hours 45

Text Books:

1. V.Moskvin , et.all Concrete and Reinforced Concrete - Deterioration and Protection - Mir Publishers - Moscow 1980.
2. R.T.Allen and S.C.Edwards, Repair of Concrete Structures, Blakie and Sons, U.K 1987.

References:

1. Proceedings IABSE 14th Congress "Civilisation through Civil Engineering" New Delhi, May 1992.
2. Raiker R.N.Learning from failures Deficiencies in Design, Construction and Service , R & D Center (SDCPL) Raiker Bhavan, Bombay , 1987.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - ENVIRONMENTAL ENGINEERING STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the concept of Design Of Pipes.
- To study the Analysis And Design Of Water Tanks .

- To expose the students in design of Underground reservoirs and swimming pools.
- Students will be introduced to repair and rehabilitation methods for Masonry
- At the end of this course the student is expected to design against wind.
- At the completion of the course the students would have knowledge on structures use in water and sewerage works

1. DESIGN OF PIPES 9

Structural design of a) Concrete b) Prestressed Concrete c) Steel and
d) Castiron piping mains, sewerage tanks design - anchorage for pipes - massive outfalls - structural design and laying - hydrodynamic considerations. Advances in the manufacture of pipes.

2. ANALYSIS AND DESIGN OF WATER TANKS 9

Design of concrete roofing systems a) Cylindrical b) Spherical and c) Conical shapes using membrane theory and design of various types of folded plates for roofing with concrete. IS Codes for the design of water retaining structures. Design of circular, rectangular, spherical and Intze type of tanks using concrete. Design of prestressed concrete cylindrical tanks - Economic analysis - introduction to computer aided design and packages.

3. DESIGN OF SPECIAL PURPOSE STRUCTURES 9

Underground reservoirs and swimming pools, Intake towers, Structural design including foundation of water retaining structures such as settling tanks, clarifloculators, aeration tanks etc. - effect of earth pressure and uplift considerations - selection of materials of construction.

4. REPAIR AND REHABILITATION OF STRUCTURES 9

Diagonising the cause and damage, identification of different types of structural and non-structural cracks - repair and rehabilitation methods for Masonry, Concrete and Steel Structures.

5. EXPOSURE ON STEEL , LATTICE STRUCTURES USED IN WATER AND SEWERAGE WORKS 9

Total Hours 45

Text Books:

1. Reinforced Concrete by P.Dayaratnam.
2. Prestressed Concrete by Krishna Raju, Tata McGraw Hill Publishing Co. 2nd Edition 1988.
3. Reinforced Concrete by N.C.Sinha & S.K.Roy - S.Chand and Co. 1985.

References:

1. Hulse R., and Mosley, W.H., " Reinforced Concrete Design by Computer ", Macmillan Education Ltd., 1986.

2. Ramaswamy, G.S., " Design and Construction of Concrete shell roofs ", CBS Publishers, India, 1986.
3. Green, J.K. and Perkins, P.H., " Concrete liquid retaining structures ", Applied Science Publishers, 1981.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - INDUSTRIAL STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the Industries and Industrial structures. .
- To study the Roofs for Industrial Buildings.

- At the end of this course the student is expected to understand power plant structures

- At the completion of the course the students would have learnt about techniques for repair
- at the completion of the course the students would have learnt about power transmission structures
- To study the Tower Foundations

1. PLANNING AND FUNCTIONAL REQIREMENTS 9

Classification of Industries and Industrial structures - planning for Layout Requirements regarding Lighting, Ventilation and Fire Safety - Protection against noise and vibration - Guidelines from Factories Act.

2. INDUSTRIAL BUILDINGS 9

Roofs for Industrial Buildings - Steel and RC - Folded Plates and Shell Roofs - Gantry Girders - Design of Corbels and Nibs - Machine Foundations.

3. POWER PLANT STRUCTURES 9

Bunkers and Silos - Chimneys and Cooling Towers - High Pressure boilers and piping design - Nuclear containment structures.

4. POWER TRANSMISSION STRUCTURES 9

Cables - Transmission Line Towers

5. SUBSTATION STRUCTURES 9

Tower Foundations - Testing Towers.

Total Hours 45

References:

1. Procs. Of Advanced course on Industrial Structures, Structural Engineering Research Centre, 1982.
2. P.Srinivasulu and C.V.Vaidyanathan, Handbook of Machine Foundations, Tata McGraw Hill 1976.
3. S.N.Manohar, Tall Chimneys - Design and Construction, Tata McGraw Hill, 1985.
4. A.R.Santhakumar and S.S.Murthy, Transmission Line Structures, Tata McGraw Hill, 1992.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - MAINTENANCE AND REHABILITATION OF STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the damages, repair, rehabilitation of structures

- To study the Effects due to climate, temperature, chemicals, wear and erosion.
- To expose the students in the Maintenance Preventive measures on various aspects Inspection and testing techniques.
- At the end of this course the student is expected to understand Special concretes and mortar, concrete chemicals
- At the completion of the course the students would have learnt about techniques for repair

1. GENERAL **9**

Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.

2. INFLUENCE ON SERVICEBILITY AND DURABILITY **9**

Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

3. MAINTENANCE AND REPAIR STRATEGIES **9**

Definitions : Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration - testing techniques.

4. MATERIALS FOR REPAIR **9**

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete.

5. TECHNIQUES FOR REPAIR **9**

Rust eliminators and polymers coating for rebars during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

EXAMPLES OF REPAIR TO STRUCTURES

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure. Engineered demolition techniques for Dilapilated structures - case studies

Total Hours 45

Text Books:

1. Denison Campbell, Allen and Harold Roper, " Concrete Structures ", Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
2. R.T.Allen and S.C.Edwards, " Repair of Concrete Structures ", Blakie and Sons, UK, 1987.

References:

1. M.S.Shetty, " Concrete Technology - Theory and Practice ", S.Chand and Company, New Delhi, 1992.
2. Santhakumar, A.R., " Training Course notes on Damage Assessment and repair in Low Cost Housing ", " RHDC-NBO " Anna University, July, 1992.

3. Raikar, R.N., " Learning from failures - Deficiencies in Design ", Construction and Service - R & D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
4. N.Palaniappan, " Estate Management, Anna Institute of Management ", Chennai, 1992.
5. Lakshmipathy, Metal Lecture notes of Workshop on " Repairs and Rehabilitation of Structures ", 29 - 30th October 1999.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - OFFSHORE STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the concept of wave theories, forces and design of jacket towers, pipes and cables**.**
- To understand the concept of Wind forces, wave forces
- After studying this course, students will be able to have a clear understanding on foundation modeling, structural modeling
- To provide an overall perspective to the students on foundation analysis and dynamics of offshore structures.
- To impart knowledge on Design of platforms, helipads, Jacket tower and mooring cables and pipe lines

1. WAVE THEORIES 9

Wave generation process, small and finite amplitude wave theories.

2. FORCES OF OFFSHORE STRUCTURES 9

Wind forces, wave forces on vertical, inclined cylinders, structures - current forces and use of Morison equation.

3. OFFSHORE SOIL AND STRUCTURE MODELING 9

Different types of offshore structures, foundation modeling, structural modeling.

4. ANALYSIS OF OFFSHORE STRUCTURES 9

10Static method of analysis, foundation analysis and dynamics of offshore structures.

5. DESIGN OF OFFSHORE STRUCTURES 9

Design of platforms, helipads, Jacket tower and mooring cables and pipe lines .

Total Hours 45

References:

1. Chakrabarti, S.K. Hydrodynamics of Offshore Structures, Computational Mechanics Publications, 1987.
2. Thomas H. Dawson, Offshore Structural Engineering, Prentice Hall Inc Englewood Cliffs, N.J. 1983
3. API, Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms, American Petroleum Institute Publication, RP2A, Dalls, Tex.
4. Wiegel, R.L., Oceanographical Engineering, Prentice Hall Inc, Englewood Cliffs, N.J. 1964.
5. Brebia, C.A.Walker, S., Dynamic Analysis of Offshore Structures, New-nes Butterworths, U.K. 1979.
6. Reddy, D.V. and Arockiasamy, M., Offshore Structures, Vol.1, Krieger Publishing Company, Malabar, Florida, 1991.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - OPTIMIZATION IN STRUCTURAL DESIGN	**3**	**0**	**0**	**3**

OBJECTIVE:

- To understand the concept of Linear Programming methods for plastic design of frames
- After studying this course, students will be able to have a clear understanding of the

Linear Programming methods

To study the optimization methodologies applied to structural engineering

- To provide an overall perspective to the students on the use of Energy methods
- To impart knowledge on Optimization by structural theorems,

1. INTRODUCTION 9

Basic concepts of minimum weight, minimum cost design, Objective function, constraints, classical methods.

2. OPTIMIZATION TECHNIQUES AND ALGORITHMS 9

Linear programming, Integer Programming, Quadratic Programming, Dynamic Programming and Geometric Programming methods for Optimal design of structural elements.

3. COMPUTER SEARCH METHODS 9

Linear Programming methods for plastic design of frames, Computer search methods for univariate and multivariate Minimization.

4. OPTIMIZATION THEOREMS 9

Optimization by structural theorems, Maxwell, Mitchell and Heyman's Theorems for trusses and frames, fully stresses design with deflection constraints, optimality criterion methods.

Total Hours 36

References:

1. Spunt, Optimum Structural Design, Civil Engineering and Engineering Mechanics Services, Prentice-Hall, New Jersey 1971.
2. S.S.Rao, Optimization Theory and Applications, Wiley Eastern Limited, New Delhi, 1977.
3. Uri Krisch, Optimum Structural Design, McGraw Hill Book Co. 1981.
4. Richard Bronson, Operation Research, Schaum's Outline Series, McGraw Hill Book Co, Singapore, 1983.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - PREFABRICATED STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To Study the design principles, analysis and design of elements
- To familiarize the students in the field of prefabricated structures

- To study the Types of floor slab**,** Stairs and Roofs.
- At the completion of the course the students would have knowledge on types of wall joints and load bearing walls
- To Educate the students in the area of Design of R.C. Roof Trusses, Roof Panels,

1. DESIGN PRINCIPLES 9

Modular co-ordination, standardization, Disuniting, of Prefabricates, production, transportation, erection, stages of loading and codal provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls.

INTRODUCTION

General Civil Engineering requirements, specific requirements for planning and I layout of prefabricates plant. IS Code specifications.

2. REINFORCED CONCRETE 9

Prefabricated structures - Long wall and cross-wall large panel buildings, one way and two way prefabricated slabs, Framed buildings with partial and curtain walls, single storey industrial buildings with trusses and shells, Crane-gantry systems.

3. FLOORS, STAIRS AND ROOFS 9

Types of floor slabs, analysis and design example of cored and panel types and two-way systems, staircase slab design, types of roof slabs and insulation requirements, Description of joints, their behavior and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.

4. WALLS 9

Types of wall panels, Blocks and large panels, Curtain, Partition and load bearing walls, load transfer from floor to wall panels, vertical loads, Eccentricity and stability of wall panels, Design Curves, types of wall joints, their behaviour and design, Leak prevention, joint sealants, sandwich wall panels, approximate design of shear walls.

5. DESIGN OF INDUSTRIAL BUILDINGS 9

Components of single-storey industrial sheds with crane gantry systems, Design of R.C. Roof Trusses, Roof Panels, Design of R.C.crane-gantry girders, corbels and columns, wind bracing design.

DESIGN OF SHELL ROOFS FOR INDUSTRIAL SHEDS

Cylindrical, Folded plate and hypar-prefabricated shells, Erection and jointing, joint design, hand book based design.

Total Hours 45

References:

1. B.Lewicki, Building with Large Prefabricates, Elsevier Publishing Company, Amsterdam/ London/ New York, 1966.

2. Koncz.T., Manual of Precast Concrete Construction, Vol.I II and III, Bauverlag, GMBH, 1971.
3. Structural Design Manual, Precast Concrete Connection Details, Society for the Studies in the use of Precase Concrete, Netherland Betor Verlag, 1978.
4. Lasslo Mokk, Prefabricated Concrete for Industrial and Public Sectors, Akademiai Kiado, Budapest, 1964.
5. Murashev.V., Sigalov.E., and Bailov.V., Design of Reinforced Concrete Structures, Mir Publishers, 1968.
6. CBRI, Building Materials and Components, 1990, India.
7. Gerostiza. C.Z., Hendrikson, C., Rehat D.R., Knowledge Based Process Planning for Construction and Manufacturing, Academic Press, Inc., 1989.
8. Warszawski, A., Industrialization and Robotics in Building - A managerial approach, Harper & Row, 1990.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - PRESTRESSED CONCRETE	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the Principle of prestressing, analysis and design of prestressed concrete structures**.**
- To familiarize the students in the field of design principles
- To study the Design of compression members with and without flexure.
- At the completion of the course the students would have knowledge on Application of prestressing in continuous beams
- At the end of the semester, the student shall be having a good understanding of Special structures
- To Educate the students in the area Design Of Special Structures

1. INTRODUCTION AND CODAL PROVISIONS 9

Principles of Prestressing - types and systems of prestressing, need for High Strength materials, Analysis methods losses, deflection (short-long term), camber, cable layouts. Behaviour under flexure - codal provisions (IS, British ACI and DIN), ultimate strength.

2. DESIGN PRINCIPLES FOR FLEXURE SHEAR BOND AND END BLOCKS 9

Design of flexural members, Design for Shear, bond and torsion. Design of End blocks and their importance Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks.

3. DESIGN OF COMPRESSION MEMBERS 9

Design of compression members with and without flexure - its application in the design piles, flagmasts and similar structures.

COMPOSITE BEAMS

Composite beams - analysis and design, ultimate strength - their applications. Partial prestressing - its advantages and applications.

4. CONTINUOUS BEAMS 9

Application of prestressing in continuous beams, concept of linear transformation, concordant cable profile and cap cables.

5. DESIGN OF SPECIAL STRUCTURES 9

Special structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles.

Total Hours 45

Text Books:

1. Prestressed Concrete by Krishna Raju, Tata McGraw Hill Publishing Co. 2nd Edition, 1988.
2. Fundamentals of Prestressed Concrete by N.C.Sinha & S.K.Roy S.Chand & Co., 1985.

References:

1. T.Y.Lin, Design of Prestressed Concrete Structures, John Wiley and Sons, Inc 1960.
2. Leonhardt.F., Prestressed Concrete, Design and Construction, Wilhelm Ernst and Shon, Berlin, 1964.

3. Freyssinet, Prestressed Concrete
4. Military Engineers Hand Book
5. Evans, R.H. and Bennett, E.W., Prestressed Concrete, Champman and Hall, London, 1958.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - STABILITY OF STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the concept of buckling and analysis of structural elements.

- To understand the concept of Combined torsional and flexural buckling.
- At the end of the semester, the student shall have a clear concept of Knowledge on Lateral buckling of beams,
- After studying this course, students will be able to have a clear understanding of Buckling of thin plates
- To impart knowledge on Iterative procedure and Finite element formulation.

1. INTRODUCTION **9**

Concept of stability, approaches to stability analysis, characteristics of stability problems.

COLUMNS

Buckling of columns with various end conditions, imperfect columns, Elastically supported columns, non - prismatic columns, Built-up columns, Inelastic buckling, Experimental study of column behaviour, Emperical column formulae. Buckling of bars on elastic foundations, Large deflection of buckled bars.

2. BEAMS - COLUMNS **9**

Beam-column theory, Application to buckling of frames.

3. TORSIONAL BUCKLING **9**

Combined torsional and flexural buckling.

LATERAL BUCKLING

Lateral buckling of beams, pure bending of simply supported beam and cantilever, numerical solutions.

4. PLATES **9**

Buckling of thin plates, various edge conditions, Inelastic buckling, post buckling strength.

5. APPROXIMATE METHODS **9**

Energy methods, Iterative procedure and Finite element formulation.

Total Hours 45

References:

1. Allen, H.G., and Bulson, P.S., Background to Buckling, McGraw Hill Book Company, 1980.
2. Smitses, Elastic Stability of Structures, Prentice Hall, 1973.
3. Timoshenko, S., and Gere., Theory of Elastic Stability, McGraw Hill Book Company, 1961.
4. Brush and Almorth.,Buckling of Bars, Plates and Shells, McGraw Hill Book Company, 1975.
5. Chajes, A. Principles of Structures Stability Theory, Prentice Hall, 1974.
6. Ashwini Kumar, Stability Theory of Structures, Tata McGraw Hill Publishing Company Ltd., New Delhi, 1985.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - **THEORY OF PLATES**	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the behavior and analysis of thin plates and the behavior of anisotropic and thick plates.
- To understand the concept of Navier solution and Levy's methods,
- At the end of the semester, the student shall have a clear concept of Knowledge on Symmetical bending of circular plates
- After studying this course, students will be able to have a clear understanding of Finite difference and Finite element methods.
- To impart knowledge on Orthotropic plates and grids

1. LATERALLY LOADS PLATES 9

Thin Plates with small defection. Laterally loaded thin plates, governing differential equation, various boundary conditions.

2. RECATANGULAR PLATES 9

Recangular plates. Simply supported rectangular plates, Navier solution and Levy's methods, Rectangular plates with various edge conditions.

3. CIRCULAR PLATES 9

Symmetical bending of circular plates, plates on elastic foundation.

4. SPECIAL AND APPROXIMATE METHODS 9

Energy methods, Finite difference and Finite element methods.

5. ANISOTROPIC PLATES AND THICK PLATES 9

Orthotropic plates and grids, moderately thick plates.

Total Hours 45

References:

1. Szilard, R., Theory of Analysis of Plates, Prentice Hall Inc.
2. Timoshenko, S. and Krieger S.W. Theory of Plates and Shells , McGraw Hill Book Company, New york.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - WIND AND CYCLONE EFFECTS ON STRUCTURES	**3**	**0**	**0**	**3**

OBJECTIVE:

- To study the concept of wind effects, analysis and design of structures.
- To provide the technical know-how of analyzing the Wind Tunnel Studies, Types of tunnels,
- At the end of this course the student is expected to understand wind effects on Rigid structures and Flexible structures
- To study the cyber design principles
- To study the effect of Cyclone on structures, .
- study the concept of wind effects, analysis and design of structures.

1. INTRODUCTION 9

Introduction, Spectral studies, Gust factor, Wind velocity, Methods of measurements, variation of speed with height, shape factor, aspect ratio, drag effects.

2. WIND TUNNEL STUDIES 9

Wind Tunnel Studies, Types of tunnels, Modeling requirements, Interpretation of results, Aero-elastic models.

3. WIND EFFECT 9

Wind on structures, Rigid structures, Flexible structures, Static and Dynamic effects, Tall buildings, chimneys.

4. DESIGN PRINCIPLES 9

Application to design, IS 875 code method, Buildings, Chimneys, Roofs, Shelters.

5. CYCLONE AND DESIGN 9

Cyclone effect on structures, cladding design, window glass design.

Total Hours 45

Text Books:

1. Cook. N. J., The Designer's Guide to Wind Loading of Building Structures, Butterworths, 1989.
2. Kolousek., et.al., Wind Effects on Civil Engineering Structures, Elsevier Publications, 1984.

References:

1. Peter Sachs, Wind Forces in Engineering, Pergamon Press, New York, 1972.
2. Lawson T.V., Wind Effects on Building Vol. I and II , Applied Science Publishers, London, 1980.

SEMESTER	COURSE CODE	COURSE TITLE	L	T	P	C
		ELECTIVE - CYBER SECURITY	**3**	**0**	**0**	**3**

OBJECTIVE

- To study the cyber Security Fundamentals.
- To expose the students the principles and methods of Self Replication Malicious code

- At the completion of the course Students will be introduced defense and analysis techniques
- At of the end this course the student is expected to understand Tunneling techniques
- At the completion of the course the students would have learnt about Application of Misdirection, Reconnaissance, and disruption methods

UNIT I CYBER SECURITY FUNDAMENTALS

Network and security concepts – basic cryptography – Symmetric encryption – Public key Encryption – DNS – Firewalls – Virtualization – Radio Frequency Identification – Microsoft Windows security Principles.

UNIT II ATTACKER TECHNIQUES AND MOTIVATIONS

Antiforensics – Tunneling techniques – Fraud Techniques - Threat Infrastructure.

UNIT III EXPLOITATION

Techniques to gain a foot hold – Misdirection, Reconnaissance, and disruption methods.

UNIT IV MALICIOUS CODE

Self Replication Malicious code – Evading Detection and Elevating privileges – Stealing Information and Exploitation.

UNIT V DEFENSE AND ANALYSIS TECHNIQUES

Memory Forensics – Honeypots – Malicious code naming – Automated malicious code analysis systems – Intrusion detection systems – Defense special file investigation tools.

TEXT BOOK

1. James Graham, Richard Howard and Ryan Olson, “Cyber Security Essentials”, CRC Press, Taylor & Francis Group, 2011.

REFERENCE BOOKS

1. By Dan Shoemaker, Ph.D., William Arthur Conklin, Wm Arthur Conklin, “Cybersecurity: The Essential Body of Knowledge**”,** Cengage Learning, 2012.

2. Ali Jahangiri, “Live Hacking: The Ultimate Guide to hacking Techniques & Counter measures for Ethical Hackers & IT Security Experts”, 2009.

CAREER OPPORTUNITIES

Our Honourable President's dream of an " Employment to all " would surely be boosted up by our ultimate aim of our highly motivated course on Civil Engineering as well as the Post graduate courses on all the fields of Civil Engineering.

"Look before you Leap" , the saying is not meant for civil engineering courses. You can leap in to Civil Engineering courses! We will train you to look up things in life.

Earn while you learn has become an old saying such that some practicing civil engineers are " Learning while they earn". Its only in our Civil Engineering field this target is achieved.

Popular giants in Construction industries such as Gammon India Limited, L & T, Paharpur Cooling Towers, CRN, URC Const (P) Ltd, are offering good employment to our Civil Engineers.

Apart from above our post graduate students are from PWD (Doing M.E., Structural Engineering , M.E. Environmental Engineering , M.E., Soil Mechanics and Foundation Engineering, M.E., Urban and Transportation Engineering) and the practising Diploma Holders (Doing part time B.E. Civil) are being given a well refined environment for their study. We honour their enthusiasm. We provide a qualified and dignified Engineering Education that most of our students put their feet in to research works and reputed Multi national companies.

The future is in the hands of Civil Engineers and Earth quake Engineers who would do a prompt design for the changing environment. The Structural Engineers play a vital role especially in India as the earthquake prone zones are being revised by our mother nature.

Innovative Engineers are at need from Civil Engineering Field for the want of designing smart structures.

Environmental Engineers are having a great demand in future . The new revised design for the seismic zones has created an urge for the structural engineers and huge structures like

“Folded plate structures” will rule the future world. Ample and abundant opportunities are waiting for the Civil Engineers.

“What you sow is what you Reap”. So we call you to sow the seeds of Civil Engineering to reap a better tomorrow. Its only in Civil Engineering field that you create structures. So we would rather say “ A Civil Engineer is next to Brahma in creation” Get ready for a high tech environment with SMART STRUCTURES, ASEISMIC DESIGN of structures for a better India.