SRI VENKATESWARA UNIVERSITY: TIRUPATI

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Course

M.Tech CIVIL ENGINEERING

(STRUCTURAL ENGINEERING)

Choice Based Credit System (CBCS)

Academic Year 2017-2018

Vision:

Vision of the Civil Engineering Department is to produce globally competitive and committed Civil Engineers with ethical values to cater to the needs of the society and strive for sustainable development through research and innovation.

Mission:

To impart quality education with the support of state-of-art Infrastructure and Faculty.

To inculcate inquisitiveness, infuse training and research for the societal development.

To address growing needs of sustainable infrastructure development.

To provide technical advice and support to the industry.

To provide awareness of global economic problems and contribute to Nation building.

To provide entrepreneurial skills for the upliftment of the country.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

a. To provide students with the fundamental, technical knowledge and skills in mathematics, sciences and engineering to recognize, analyze and solve complex problems in the areas of Structural, Geotechnical, Hydraulics and Water Resources, Transportation and Environmental engineering.

b. To provide students with individual working skills and practical experience and to fulfill their professional duties and communicate effectively in teamwork, ethical thinking, technical leadership, and lifelong learning.

c. To make the students responsible professionals to work in various positions in industry or government and/or succeed in graduate or other professional organizations.

d. To train the students to become engineers, managers, scientists, researchers and innovators and make substantial contributions to the society.

e. To guide the students to use modern tools to solve complex engineering problems

f. To make the students to strive for the improvement of the quality of life and improve the standard of living by providing environmental sustainability.

PROGRAM OUTCOMES (POS):

After completion of the program graduates will be able to

1. Apply the knowledge of science, mathematics, and engineering principles for developing problem solving attitude.
2. Identify, formulate and solve engineering problems in the domain of structural engineering field.
3. Use different software tools for Analysis and Design structural engineering domain.
   Design and conduct experiments, analyse and interpret data, for development of simulation experiments.
4. Function as a member of a multidisciplinary team with sense of ethics, integrity and social responsibility.

PROGRAM SPECIFIC OUTCOMES (PSOs)

1. To prepare programme graduates with foundation knowledge to perform analysis and design various structures and participate in quality control systems.
2. T o provide programme graduates with entrepreneur skills to take up individual projects or work in teams in the field of structural engineering and in multidisciplinary environments.
3. To inculcate in programme graduates an interest towards research work in the relevant domain or appropriate domains for providing sustainable solutions to the Civil Engineering Problems.

Department of Civil Engineering, SVU College of Engineering (Autonomous), Tirupati.
Scheme of Instruction for Choice Based Credit System (With effect from the academic year 2016-17)
M.Tech. I SEMESTER (Structural Engineering)

Course No.	Name of the Course	L	T	P	S	Credits	I Test	II Test	Conti-nuous Assess-ment	End Semester Examination		Total Marks
										Hrs.	Marks	
CEMAC501	Advanced Engineering Mathematics	4	--	--	--	4	20	20	--	3	60	100
CESEC 502	Theory of Elasticity	4	--	--	--	4	20	20	--	3	60	100
CESEC 503	Matrix Methods of Structural Analysis	4	--	--	--	4	20	20	--	3	60	100
CESEC 504	Advanced Prestressed Concrete	4	--	--	--	4	20	20	--	3	60	100
	Elective – I	4	--	--	--	4	20	20	--	3	60	100
	Elective – II	4	--	--	--	4	20	20	--	3	60	100
	Audit Course	(As mentioned in the regulations)										
CESEP 507	Advanced Structural Engg. (Practical)	--	--	3	--	2	--	--	40	3	60	100
	Seminar -I	--	--	--	2	1	--	--	100	--	--	100
						27						

ACADEMIC YEAR – 2017-18
M.Tech. Geotechnical Engineering II Semester
(Subjects, Electives, Labs offered)

M.Tech. II SEMESTER (Structural Engineering)

II SEMESTER												
CESEC 601	Finite Element Structural Analysis	4	--	--	--	4	20	20	--	3	60	100
CESEC 602	Theory of Plates	4	--	--	--	4	20	20	--	3	60	100
CESEC 603	Structural Dynamics	4	--	--	--	4	20	20	--	3	60	100
CESEC 604	Advanced Structural Concrete Design	4	--	--	--	4	20	20	--	3	60	100
	Elective – III	4	--	--	--	4	20	20	--	3	60	100
	Elective – IV (OPEN ELECTIVE)	4	--	--	--	4	20	20	--	3	60	100
	Audit Course	(As mentioned in the regulations)										
CESEP 607	Computing Techniques (Practical)	--	--	3	--	2	--	---	40	3	60	100
	Seminar – II	--	--	--	2	1	--	--	100	--	--	100
	Comprehensive Viva-Voce	--	--	--	--	2	--	--	--	--	100	100
						29						

III and IV SEMESTERS												
CESEJ 01	Dissertation Work	--	--	--	--	24	--	--	70*		30	100
	* Dissertation work is to be initiated in the third semester itself and distribution of marks is as listed in regulations											

ACADEMIC YEAR – 2017-18
M.Tech. Structural Engineering I Semester
(Subjects, Electives, Labs offered)

CEMAC501 ADVANCED ENGINEERING MATHEMATICS

(Common to all specializations)

L + T / week	: 3+1 Hrs	Sessional Marks	:20+20
University Exam	: 3 Hrs	End Exam Marks	: 60

Course Objectives: This Course Will Enable Students:

- With calculus of variation, numerical methods of solving ordinary and partial differential equations.
- To impart knowledge in basic concepts of finite element methods and applications.

UNIT – I
PARTIAL DIFFERENTIAL EQUATIONS
Formation by elimination of arbitary constants and arbitrary functions – Solutions of equations by the methods of separation of variables in case of simple boundary conditions pertaining to (i) one dimensional wave equation and (ii) two dimensional wave equation satisfied by vibrating membrane (No numerical problems).

UNIT -II
SPECIAL FUNCTIONS
Gamma and Beta functions Bessel - function - Lengendre polynomials – Recurrence relations for Jm(x) and Pn(x), Orthogonality of Lgendre Polynomials – Rodrigues formula.

UNIT -III
STATISTICS
Emperical distributions – Log-normal – Binomial, poisson, gamma, extreme value and uniform distributions -Estimation of parameters by metod of moments and maximum likely hood methods - Multiple correlation and regression.

UNIT – IV
COMPLEX VARIABLES & LAPLACE TRANSFORMS
Complex variables – Cauchy – Reimann equations – Laplace equation –Conformal transformations including Joukowski's and Schwaz and Christoffel transformations.
Laplace transformation of Impluse function (Dirac-Delta function) and its applications to differential equation.

UNIT – V
NUMERICAL METHODS
Numerical solutions of partial differential equations – Laplace and poisson equations by ieteration method, heat equation by Schmidt method.

Reference Books :

1. Dr. B.S. Grewal, Higher Engineering Mathematics.
2. S.C. Guptha, V.K. Kapur Foundations of Mathematics Statistics.

Course Outcomes :

1. This part extends our ability to analyze Partial differential equations.
2. The students become familiar with the special functions of differential equations to engineering problems.
3. The student becomes conversant with the fundamentals of Statistics.
4. The student becomes familiar with the Complex numbers and elementary functions of complex variable and is able to understand the basics of Laplace transforms and their applications.
5. The student gets familiarity in using mathematical tools such as directional derivatives and divergence play significant roles in many applications.

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	1							
CO2			2					
CO3							1	
CO4			2					
CO5			1					

CESEC 502 THEORY OF ELASTICITY

L + T / week	: 3+1 Hrs	Sessional Marks	:20+20
University Exam	: 3 Hrs	End Exam Marks	: 60

Course Objectives: This Course Will Enable Students:

- To make students understand the principles of elasticity.
- To familiarize students with basic equations of elasticity
- To expose students to two dimensional problems in Cartesian and polar coordinates.
- To make students understand the principle of torsion of prismatic bars.

UNIT – I

Definition and notation of stress. Components of stress and strain. Generalised Hooke's Law. Stress and strain in three dimensions. Stress components on oblique plane. Transformation of stress components under change of co-ordinate system.

Principal stresses and principal planes. Stress invariants. Mean and deviator stress. Strain energy per unit volume. Distortion strain energy per unit volume. Octahedral shear stress. Strain of a line element.Principal strains, Volumetric strain.

Equation of equilibrium and compatibility in cartesian co-ordinates in three dimensions.

UNIT – II

TWO DIMENSIONAL PROBLEMS IN ELASTICITY :

Plane stress and plane strain situations. Equalibrium equations. Compatibility equation. Saint Venant's principle. Uniqueness of solution. Stress components in terms of Airy's stress functions. Application to cantilever, simply supported and fixed beams with simple loading.

UNIT – III

SOLUTION OF PROBLEMS IN POLAR CO-ORDINATES :

Equilibrium equations. Stress strain components. Compatibility equation. Applications using Airy's stress function in Polar co-ordinates for stress distributions symmetric about an axis. Effect of hole on stress distribution in a plane in tension, stresses due to load at a point on a semi-infinite straight boundary, stresses in a circular disc under diametric loading.

UNIT – IV

TORSION :

Stress function method of solution method of solution. Torsion of Circular and elliptical bars. Thin walled tubes-applications. Prandtl's membrane analogy solution of torsion of rectangular bars by (1) Rayleigh Ritz method (2) Finite difference method.

UNIT – V

BEAMS ON ELASTIC FOUNDATION :

Beams of infinite and finite lengths with single point load, two point loads and u.d.l.

REFERENCES :

1. Theory of Elasticity by Timishanko and Goodier.
2. Applied Elasticity by Wang.
3. Applied stress Analysis by Sadhu Singh.
4. Beams on Elastic Foundation by Hetenyi.

Course outcomes:
1.Applying the concepts of various stresses, strains and torsion in problems related to elasticity.
2. Applying the principles of theory of elasticity in designing the beams, curved sections etc.,

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1		**2**						
CO2			**1**					

CESEC 503 MATRIX METHODS OF STRUCTURAL ANALYSIS

L + T / week	: 3+1 Hrs	Sessional Marks	:20+20
University Exam	: 3 Hrs	End Exam Marks	: 60

Course Objectives: This Course Will Enable Students:

- To understand the static and kinematic indeterminacy of the structures
- To understand the concepts of matrix methods of analysis of structures
- To understand the analysis of continuous beams.
- To understand the analysis of rigid and pin jointed frames

UNIT – I

CHARACTERISTICS OF STRUCTURES :

Methods of structural analysis – Static and kinematic indeterminancy of the structures – Principles of Superposition – Flexibility and stiffness matrices – Stiffness and flexibility of systems and elements – Computing displacements and forces from virtual work. Computing stiffness and flexibility coefficients.

ENERGY CONCEPTS IN STRUCTURES :

Strain energy in terms of stiffness and flexibility matrices – Properties of stiffness and flexibility matrices -Interpretation of coefficients – Betti's law – Other energy thorems using matrix notation.

UNIT -II

TRANSFORMATION OF INFORMATION IN STRUCTURES :

Transformation of system forces to element – Element flexibility to system flexibity – system displacements to element displacements – Element stiffness to system stiffness – Transformation of forces and displacements in general – Stiffness and flexibility in general – Normal coordinates and orthogonal transformation.

UNIT – III

THE FLEXIBILITY METHOD :

Statically determinate structures – Indeterminate structures – Choice of redundants – Transformation to one set of redundants to another – Internal forces due to thermal, expansion and lack of fit. Reducing the size of flexibitilty matrix – Application to pin-jointed plane truss – Continuous beams- frames – Grids.

Problems solving by Computer (Not for Examination)

UNIT – IV

THE STIFFNESS METHOD :

Introduction – Development of the stiffness method – Stiffness matrix for structures with zero force at same coordinates – Analaging between flexibility and stiffness – Lack of fit – Application of stiffness approach to pin-jointed plane and space trusses.

UNIT – V

THE STIFFNESS METHOD :

Continuous beams – Frames- Grids – Static condensation technique – Choice of method – Direct Stiffness Approach. Problems solving by Computer (Not for Examination)

REFERENCES :

1. Rubeinstein, M.F. “Matrix Computer Analysis of Structures”,Prentice Hall International INC, Canada.
2. Gere, J.M. And Weaver, W.W.”Analysis of Framed structrues”.
3. Livesely, R.K. “Matrix Methods in Structural Analysis”.
4. Mallick, S.K and Rangasamy, K.S. “Introduction to Matrix Analysis of Structures”.
5. Elements of Matrix and Stability Analysis of Structures by V.K.Manicka Selvam, Khanna Publishers, Delhi.

Course Outcomes (CO): Student will be able to

1. Distinguish determinate and indeterminate structures.
2. Identify the method of analysis for indeterminate structures
3. Apply matrix methods of analysis for continuous beams
4. Apply matrix methods of analysis for rigid and pin jointed frames.

CO-PO MAPPING

CLO	**PO1**	**PO2**	**PO3**	**PO4**		**PSO1**	**PSO2**	**PSO3**
CO1	**1**							
CO2			**2**					
CO3						**2**		
CO4				**2**				

CESEC 504 ADVANCED PRE-STRESSED CONCRETE

L + T / week	: 3+1 Hrs		Sessional Marks	:20+20
University Exam	: 3 Hrs		End Exam Marks	: 60

Course Objectives: This Course Will Enable Students:

- Familiarize students with concrept of prestressing and analysis of prestress
- Design and analysis of pretension and post tensioned concrete members
- Determination of deflections of prestressed members
- To calculate the losses of prestress,creep and shrinkage

UNIT – I

Losses in prestress – Estimation of the loss of prestress due to various causes like Elastic shortening of concrete – Creep of concrete – Shrinkage of concrete – Relaxation of steel – Slip in anchorage – Friction in tendon and duct etc.

UNIT – II

Design of prestressed beams in flexure – Design for shear and torsion – Pre tensioned and post tensioned – Types of rectangular and flanged sections.

UNIT – III

Advantages and Disadvantages of Continuity – Primary and Secondary momemts – Elastic analysis of continuous beams – Linear transformation – Concordant cable profile – Design of Continuous beams and portal frames.

UNIT – IV

Design and provision of prestressed concrete slabs – Circular slabs- Two way slabs – Flats slabs.

UNIT – V

Types of composite construction – Stress distribution in composite construction – Differential shrinkage – Analysis of stresses – Design of simple composite sections – Circular prestressing – Design of prestressed concrete pipes.

Text

T.Y.Lin Ned. H. Burns, Design of pre-stressed concrete structures, John Wiley& Sons.

References:

1. James R. Libby, Modern Pre-stressed Concrete, Design Principles and Construction methods, Van Standard Rainford Co., New York.
2. Krishna Raju.N Prestressed Concrete , Tata McGraw Hill.
3. Arthur H Nilson, Design of Pre-stressed Concrete, John Wiley & Sons.

Course Outcomes: At the end of the course, students will be able to

1. Learns to design and conduct experiments to get high strength concrete.

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	2							

CESEP 507 ADVANCED STRUCTURAL ENGINEERING (PRACTICAL)

Practicals/Week : 3Hrs | Sessional Marks : 40
University Exam : 3Hrs | End Exam Marks : 60

Course Objectives: The students will acquire knowledge about

- To learn the principles of workability in cement concrete.
- To learn the preliminary tests on aggregates like flakiness test, elongation test, specific gravity, bulk density fineness modulus.
- To know the compression test, Young's modulus test procedures
- To learn the mix design procedure

CONCRETE : Properties and testing of fresh and hardened concrete,concrete mix design,destructive testing of concrete-core testing-pullout test,nonn-destructive testing of concrete.

REINFORCED CONCRETE: under reinforced and over-reinforced beams,colums under eccentric loading,prestressed concrete:study of equipment used for prestressing.

STEEL: Testing of steel beams and columns under static loading including measurements of strains(using eccentric resistance strain guages).

Course Outcomes: At the end of the course, students will be able to

1. Assess the workability of cement concrete and its suitability, quality of concrete
2. Assess the quality of fine and coarse aggregates after testing the aggregates according to IS• specifications.
3. Test the quality of cement concrete by conducting compressive strength on concrete cubes.
4. Design different grades of mix design

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	1							
CO2							2	
CO3								2
CO4	2							

CESEC 601 FINITE ELEMENT STRUCTURAL ANALYSIS

L+ T/ week : 3+1 Hrs   Sessional Marks : 40
University Exam : 3 Hrs   End Exam Marks : 60

Course Objectives: This Course Will Enable Students:

- To provide an overview and basic fundamentals of Finite Element Analysis.
- To introduce basic aspects of finite element theory, including domain discretization, interpolation, application of boundary conditions, assembly of global arrays, and solution of the resulting algebraic systems.
- To explain the underlying concepts behind variational methods and weighted residual methods in FEM.
- Formulate simple structural problems in to finite elements

UNIT-I

BASIC EQUATIONS OF SOLID MECHANICS

Review of equlibrium conditions, strain-displacement relations, stress-strain relations, principle of virtual work-Stationery potential energy and variational formulation,Approximate methods-Rayleigh-Ritz weighted residual (Galerkin)

UNIT-II

FINITE ELEMENT METHOD

Displacement model-shape functions-Lagrange and Serendipity elements,element properties-Isoparametric elements-numerical integration,technique,assemblage of elements and solution techniques for static analysis.

UNIT-III

ANALYSIS OF FRAMED STRUCTURES

2D and 3D truss and beam elements and applications.Analysis of plane stress/strain and axisymmetric solids,triangular,quadrilateral and isoparametric elements,incompatible models.

UNIT-IV

THREE DIMENSIONAL STRESS ANALYSIS

Isoparametric eight and twenty noded elements.Analysis of plate bending basic equations of thin plate theory.Reissner-Mindlin theory plate elements and applications.

UNIT –V

ANALYSIS OF SHELLS

Degeneratred shell elements, Finite element programming and FEA software.

APPLICATION TO STRUCTURAL ENGINEERING PROBLEMS

PRACTICALS (not for examination)

Introduction of structural Analysis software Programming in Excel for model analysis-Modelling using STAAD, ANSYS and SAP and dynamic analysis-RCC and Steel design-Finite element modeling.

REFERENCES

1. Cook,R.D.,Malkus, D.S., and Plesha,M.E, "concepts and applications of finite element analysis",3rd Edition,John Wiley & Sons,1989.
2. Chandrupatla.T.R. And Belegundu,A.D, "Introduction to finite element method ",Prentice Hall,1991.
3. Bathe,K.J., "Finite element procedures in engineering analysis", Prentice Hall,Englewood Cliffs,NJ,1982
4. Abel and Desai, "Introduction to Finite element method".
5. C.S.Krishna Murthy, "Finite element anlysis".
6. P.Seshu, "Finite element analysis", PHI.
7. S.S. Bhavikatti, "Finite element analysis", NEW AGE INTERNATIONAL.

Course Outcomes (CO): Student will be able to

1. Analyse and build FEA models for various Engineering problems.
2. Able to identify information requirements and sources for analysis , design and evaluation
3. Use professional-level finite element software to solve engineering problems.
4. Interpret results obtained from FEA software solutions, not only in terms of conclusions but also awareness of limitations.

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	2							
CO2			2					
CO3			2					
CO4						1		

CESEC 602 THEORY OF PLATES

L+ T/ week : 3+1 Hrs   Sessional Marks : 40
University Exam : 3 Hrs   End Exam Marks : 60

Course Objectives: This Course Will Enable Students to

- Introduce with concept of plate theory,the behaviour and analysis
- Knowledge about classification of shell surfaces
- To analyse the plate with different boundary conditions
- To understand the classical theory oh shells based on the kirchoff-love assumptions

UNIT-I

PLATES:

CYLINDRICAL BENDING OF PLATES : Differntial equation of cylindrical bending of plates,Uniformly loaded rectangular plates with simply supported and built-in edges.

PURE BENDING: Slope and Curvature; moment-curvature relations,Strain energy.

UNIT-II

LATERALLY LOADED RECTANGULAR PLATES : The differential equation of the deflected surface,boundary conditions,solution of simply supported rectangular plates under various loading conditions viz. Sinusoidal load, uniformly distributed load,hydrostatic pressure,Navier and Levy type solutions with various boundary conditions.

UNIT-III

CIRCULAR PLATES: Symmetrical bending oc circular plates- Differential equation,Uniformly loaded and concentrically loaded plates; plates loaded at the centre.

BENDING OF PLATES UNDER COMBINED ACTION OF LATERAL AND INPLANE LOADS

Differential Wquation- Simply supported rectangular plates.

UNIT-IV

SPECIAL AND APPROXIMATE METHODS : Energy Methods- Finite Difference and Finite Element Methods.

UNIT-V

ANISOTROPIC PLATES : Orthotropic plates and grids- Large deflection theory.

References :

1. Theory of plates and Shells by Timoshenko.S & Kreiger
2. Theory and analysis of plates by Szilard.E.
3. Advanced RC Design by Krishna Raju, N.

Course Outcomes: At the end of the course, students will be able to

1. Assess the strength of plate panels under point,linearly varying and uniformly distributed loads
2. Analyze plates under different boundary conditions by various classical methods and approximated methods
3. Be Familiar with classification of shells and classical shell theories and apply them in engineering design
4. Expose to single curved shells, doubly curves shells and cylindrical shell

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	1							
CO2		2						
CO3							2	
CO4						1		

CESEC 603 : STRUCTURAL DYNAMICS

L+ T/ week : 3+1 Hrs	Sessional Marks : 40
University Exam : 3 Hrs	End Exam Marks : 60

Course Objectives: This Course Will Enable Students to

- Determine vibration characteristics of structures like frequency,amplitude,impedence and time
- period Differentiate the response of single and multi degree of freedom systems
- Determine the response of structures for pulse excitation like blast load
- Differentiate the response of Multi Degree of Freedom systems

UNIT-I

SINGLE DEGREE OF FREEDOM SYSTEM

SDOF – D' Alembert's principle – Lumped Mass – Equation of Motion for various SDOF systems - Free Vibration of undamped system – Free vibration of viscously damped system – Damping in structures

UNIT-II

Base Excited systems – Forced vibration system – Steady State Response to Harmonic Forces – Duhamel's Integral.

UNIT-III

MULTI-DEGREE OF FREEDOM SYSTEM

Free and Forced Vibrations of Lumped MDOF Systems – Equations of Motion – Two Degree of Freedom Systems – Three Degree Freedom system – Natural Frequencies and Mode Shapes – Orthogonality Relationships of Normal Modes.

UNIT-IV

APPROXIMATE METHODS OF COMPUTING NATURAL FREQUENCIES

Ralyeigh's method – Dunkrley's Method – Stodala – Holzer Method – Ralyegh – Ritz Method.

UNIT-V

DYNAMICS OF CONTINUOUS SYSTEMS

Vibration of Flexural Beams – Governing Equation of Motion – Free Vibration of Beams – Forced vibration.

BASE EXCITED SYSTEMS

Formulation of equations of motion for SDF and MDF systems- Concept of spectral quantities- Response spectrum

REFERENCES :

1. Mario Paz, and William Leigh – Structural Dynamics – CBS Publishers.
2. Roy R Craig – Structural Dynamics – John Wiley & Sons.
3. A.K.Chopra – Dynamics of Structures Theory and Application to Earthquake Engineering – Pearson Education.
4. Clough and Penzien – Dynamics of Structures – McGraw Hill

Course Outcomes: At the end of the course, students will be able to

1. To design the seismic forces of the structures as per the geographical conditions
2. Write equation of motion for single and multi degree of freedom systems
3. Understand the impact of damping on charecterstics of vibrating system
4. Gain Knowledge about arbitary and pulse excitation
5. Understand applications of Numerical methods in dynamics
6. Analyse in various theories of failure and plasticity

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	1							
CO2	2							
CO3				1				
CO4		2						
CO5							2	
CO6						2		

CESEC 604 ADVANCED STRUCTURAL CONCRETE DESIGN

L + T / week :3+1 Hrs Sessional Marks : 20+20
University Exam : 3 Hrs End Exam Marks: 60

Course Objectives: This Course Will Enable Students:

- To design of reinforced concrete beam
- To design of reinforced concrete slab
- To analyze and design of multi storey building and Industrial Building
- To design special structures such as Deep beams,Corbels and Grid Floors

UNIT – I

ESTIMATION OF CRACK WIDTH AND REDISTRIBUTION OF MOMENTS IN REINFORCED CONCRETE BEAMS :

Factors affecting crack width in beams - Calculation of crack width – Emperical method – Estimation of crack width in beams by IS 456 – Shrinkage and thermal cracking – Redistribution of moments in a fixed beam and a two- span continuous beam – Advantage and disadvantages of moment redistribution.

UNTI – II

DESIGN OF RIBBED (VOIDED) SLABS & GRID FLOORS :

Analysis of the ribbed slabs for moment and shear – Design for shear - Deflections – Arrangement of reinforcements.

Analysis of grid floors by Timoshenko's plate theory, stiffness matrix method – Equating joint deflections – Detailing of steel.

UNIT – III

DESIGN OF DEEP BEAMS :

Deep beams by IS 456 – Detailing of deep beams.

DESIGN OF SIMPLY SUPPORTED & CONTINUOUS RC PREFABRICATED STRUCTURES -

Long wall and cross wall large panel buildings-One way and two way pre fabricated slabs.Framed buildings with partial and curtain walls, connections-Beam to column and column to column.

UNIT – IV

DESIGN OF PLAIN CONCRETE WALLS :

Braced and unbraced walls – Eccentricities of vertical loads – Emperical design method (walls carrying axial load) – Design of wall for In-plane horizontal forces.

DESIGN OF SHEAR WALLS :

Classification of shear walls – Loads in shear walls – Design of rectangular and flanged shear walls – Moment of resistance of rectangular shear walls.

UNIT- V

SEISMIC EVALUATION AND RETROFITTING OF RC AND MASONARY BUILDINGS :

Condition assessment – Field assessment – ND evaluation.

Source of weekness in RC frames – Retrofitting strategies for RC Building – Structural level (Global) and Member level (Local) Retrofit methods.

Failure modes of masonary buildings – Methods for Retrofit of Masonsry building – Repairs – Local Retrofitting and Global Retrofitting.

REFRENCES :

1) P.C. Varghese, "advanced Reinforced Concrete Design", Prentice-Hall of India, Private Ltd.,New Delhi.

2) P.C. Varghese, "Limit State Design of Reinforce Concrete", Prentice-Hall of India, Private Ltd., New Delhi.

3) Krishna Raju, "Advanced Reinforced Concrete Design – SI Units" CBS, New Delhi, 1986.

4) Blume, J.A., Newmark, N.M. And Corning, L.M. "Design of Multi-Storey Reinforced Concrete Buildings for Earth Quake Motion", Portland Cement Association, Chicago, 1961.

5) Pankaj Agarwal, "Earthquake Resistant Structues", Prentice-Hall of India, Private Ltd., New Delhi.

Course Outcomes: At the end of the course, students will be able to

1. Able to calculate and analyse the crack widths
2. Able to design the shear walls and ribbed floors

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	2							
CO2			1					

CESEP 607 COMPUTING TECHNIQUES (PRACTICAL)

Practicals/Week : 3Hrs Sessional Marks : 40
University Exam : 3Hrs End Exam Marks : 60

Course Objectives:

- To learn the software applications in structural engineering.
- To learn the analysis of plane, space truss and frames subjected to different types of
- loadings.
- To draw the detailing of RCC members and to learn the estimations.
- To study the design concepts of steel members like truss, beams and columns.

Syllabus:

Use of spread sheets Software like MATLAB, Statistical Software,AUTOCAD and FEM Software, etc.

Course Outcomes:

1. Understand the software usages for structural members.
2. Able to analyse plane, space frames and dynamic response and natural frequency for beams and frames.
3. Able to design, detailing and estimations of RC members.
4. Able to design the steel members like truss, beams and columns.

CO-PO MAPPING

CLO	PO1	PO2	PO3	PO4		PSO1	PSO2	PSO3
CO1	1							
CO2		2						
CO3			2					
CO4		1						