2018 - 2019

1.1.3 Average percentage of courses having focus on employability/ entrepreneurship/ skill development offered by the institution during the last five years (10)

Program name	Course name	Course code		Year of Introduction	Link to the
STRUCTURAL	Applied Mathematics	118SET01	Employability - Students will develop skills in mathematics to solve problems	2018-2019	
STRUCTURAL	Advanced Concrete Design	118SET02	Skill Develoment - The course provides knowledge in design of concrete structures which helps in executing projects	2018-2019	
STRUCTURAL	Structural Dynamics	118SET03	Employability - The course develops skills in solving dynamic problems related to structural elements and as a whole	2018-2019	
STRUCTURAL	Theory Of Elasticity And Plasticity	118SET04	Employability - Skills on solving structural elements for various boundary conditions will be developed in this course	2018-2019	
STRUCTURAL	Advanced Concrete Technology	118SEE01	Entrepreneurship - This course develops skills in concreting technology	2018-2019	
STRUCTURAL	Maintenance and Rehabilitation of Structures	118SEE07	Entrepreneurship - Students will develop skill sets regarind the materails and techniques required for maintenance and rehabilitation of structures	2018-2019	
STRUCTURAL	Finite Element Analysis	218SET01	Skill Develoment- This course enhances the skill set related to finite element method of analysing a structure	2018-2019	
STRUCTURAL	Experimental Techniques and Instrumentation	218SET02	Skill Develoment - gain knowledge on the principles of measurements using various electronic and physical testing machines. Also test variuos civil engineering structures using non-destructive testing methodologies	2018-2019	
STRUCTURAL	Design of Bridges	218SEE01	Skill Develoment - This course enhances the skill set in design of structural members in particular the desgin of members in a bridge	2018-2019	
STRUCTURAL	Stability of Structures	218SEE05	Employability - Skills in assessing the stability of structural elements is focused in this course	2018-2019	
STRUCTURAL	Advanced Structural Engineering Laboratory	218SEP01	Entrepreneurship - This laboratory course exposes the students to various techniques and methods availabe for material testing and conducting research which helps them to gain knowledge to become entrepreneurs	2018-2019	
STRUCTURAL	Prefabricated Structures	315SEE01	Skill Develoment-Prefabricated structures is the innovative construction practice and useful for placements	2016-2017	
STRUCTURAL	Pre-stressed Concrete	315SEE03	Skill Develoment - This course enhances the skill set related to desgin of prestressed concrete structures.	2016-2017	
STRUCTURAL	Sub Structure Design	315SEE07	Skill Develoment - This course helps to understand the concepts involved in design of substructures so that a structural engineer can interact with a geotechnical engineer which helps in project execution	2016-2017	
STRUCTURAL	Practical Training (4 Weeks)	315SEP01	Entrepreneurship,Skill develoment - Students will get experience in industry during this course which helps them to identify skill sets required to be developed so that they become employable	2016-2017	
STRUCTURAL	Seminar	315SEP02	Skill Develoment - The course enhances the technical presentation and documentation skills which aids in employability	2016-2017	
STRUCTURAL	Project Work (Phase- I)	315SEP03	Entrepreneurship,Skill develoment - Students develop their skills in doing research or desgin and enchance their technical report writing and presentation	2016-2017	
STRUCTURAL	Project Work (Phase - II)	415SEP01	Entrepreneurship,Skill develoment - Students develop their skills in doing research or desgin and enchance their technical report writing and presentation	2016-2017	

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118SET01	APPLIED MATHEMATICS AND STATISTICS	L	P	T	C
		4	0	0	4

OBJECTIVES:

- To familiarize the students to use Laplace and Fourier techniques to solve boundary value problems.
- To introduce the mathematical techniques in calculus of variations for functionals.
- To understand the eigenvalue problems.
- To introduce the statistical techniques useful in making rational decisions.
- To study randomized block design and latin square design

UNIT-1 ONE DIMENSIONAL WAVE AND HEAT EQUATIONS 9

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

UNIT-2 CALCULUS OF VARIATIONS 9

Concept of variation and its properties – Euler's equation – Functional dependant on first and higher order derivatives – Functionals dependant on functions of several independent variables – Variational problems with moving boundaries.

UNIT-3 EIGEN VALUE PROBLEMS 9

Methods of solutions: Faddeev – Leverrier Method, Power Method with deflation – Approximate Methods: Rayleigh – Ritz Method.

UNIT-4 TESTING OF HYPOTHESIS 9

Sampling distributions - Tests for single Mean, Proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – Chi-square test for goodness of fit – Independence of attributes

UNIT-5 DESIGN OF EXPERIMENTS 9

ANOVA - Completely randomized design – Randomized block design – Latin square design. Control charts for measurements ($\bar{x}$ and R-charts).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Solve the boundary value problems using Laplace and Fourier Transform techniques.

CO.2 Compute maxima and minima of a functional that occur in various branches of engineering disciplines.

CO.3 Acquire the knowledge of solving eigen value problems.

CO.4 Draw inference and make decision through hypothesis testing.

CO.5 Apply the concept of analysis of variance.

REFERENCES:

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1. Sankara Rao, K., "Introduction to Partial Differential Equations", Prentice Hallof India Pvt. Ltd., New Delhi, 2012.
2. Andrews, L.C. and Shivamoggi, B.K., "Integral Transforms for Engineers",Prentice Hall of India Pvt. Ltd., New Delhi, 2011.
3. Rajasekaran.S, "Numerical Methods in Science and Engineering A Practical Approach",
4. A.H.Wheeler and Company Private Limited, 2013.
5. Gupta, A.S., "Calculus of Variations with Applications", Prentice Hall ofIndia Pvt. Ltd., NewDelhi, 2011.
6. Richard L.Burden, J.Dougles Faires and Annette M. Burden, "Numerical Analysis", Tenth Edition, Cengage, 2016. www.cengage.com/international
7. Miller and Freund., "Probability and Statistics for Engineers", Pearson Education, Asia, 7th edition, 2012.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	1	1	-	2	2	1	2	1	1	2	2	3
CO 2	3	2	2	2	1	1	-	2	2	1	1	1	2	2	2
CO 3	2	3	2	1	2	1	1	-	1	1	1	1	2	3	2
CO 4	2	3	2	1	2	1	1	1	-	1	1	1	2	3	2
CO 5	2	3	2	1	2	1	1	1	1	-	1	1	2	3	2

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118SET02 **ADVANCED CONCRETE DESIGN** **L T P C**
3 0 0 3

OBJECTIVES:

- To make the students understand the design philosophy of limit state method
- To make the students be familiar with the limit state design of RCC beams and columns
- To design special structures such as Deep beams, Corbels, Deep beams, and Grid floors
- To design the flat slab as per Indian standard, yield line theory and strip method.
- To design the beams based on limit analysis and detail the beams, columns and joints for ductility.

UNIT-1 Design Philosophy **9**

Limit state design - beams, slabs and columns according to IS Codes. Calculation of deflection and crack width according to IS Code - Design of slender columns

UNIT-2 Design of Special Rc Elements **9**

Design of RC walls - ordinary and shear walls. Strut and tie method of analysis for corbels and deep beams, Design of corbels, Deep-beams and grid floors.

UNIT-3 Flat Slabs and Yield Line Based Design **9**

Design of flat slabs and flat plates according to IS method – Check for shear - Design of spandrel beams - Yield line theory and Hillerborg's strip method of design of slabs.

UNIT-4 Inelastic Behaviour of Concrete Structures **9**

Inelastic behaviour of concrete beams and frames, moment - rotation curves, moment redistribution.

UNIT-5 Ductile Detailing **9**

Concept of Ductility – Detailing for ductility – Design of beams, columns for ductility - Design of cast-in-situ joints in frames – Fire resistance of Reinforced concrete members.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 To know the philosophy of limit state method limit state method

CO.2 To design various concrete structures and structural elements by limit state design and detail the same for ductility as per codal requirements.

CO.3 The students will have confident to design the flat slab as per Indian standard, yield line theory and strip method.

CO.4 To know the inelastic behaviour of concrete structires

CO.5 To design beams and columns for ductility

REFERENCES:

1. Gambhir.M.L. "Design of Reinforced Concrete Structures", Prentice Hall of India, 2012.
2. Purushothaman, P, "Reinforced Concrete Structural Elements: Behaviour Analysis and Design", Tata McGraw Hill, 2008
3. UnnikrishnaPillai and DevdasMenon "Reinforced Concrete Design', Third Edition, Tata McGraw Hill Publishers Company Ltd., New Delhi, 2007.

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4.Varghese, P.C, "Advanced Reinforced Concrete Design", Prentice Hall of India, 2005.
5.Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, 2007.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	2	2	2	2	3	3	2	2	2	2	3	2
CO 2	2	3	3	2	2	1	2	1	1	2	2	2	3	3	2
CO 3	3	3	2	2	1	2	1	2	1	2	1	2	3	2	3
CO 4	3	2	3	3	2	1	2	1	2	1	1	1	2	3	3
CO 5	2	3	2	3	2	3	2	1	2	2	1	2	2	2	3

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118SET03 **STRUCTURAL DYNAMICS** **L T P C**
4 0 0 4

OBJECTIVES

- To expose the students the principles and methods of dynamic analysis of structures
- To prepare the students for designing the structures for wind, earthquake and other dynamic loads.
- To analyse dynamic response of multidegree of freedom systems
- To know the direct integration methods for dynmic response

UNIT-1 Principles of Vibration Analysis **12**

Mathematical models of single degree of freedom systems - Free and forced vibration of SDOF systems, Response of SDOF to special forms of excitation, Effect of damping, Transmissibility.

UNIT-2 Dynamic Response of Two Degree of Freedom Systems **12**

Mathematical models of two degree of freedom systems, free and forced vibrations of two degree of freedom systems, normal modes of vibration, applications.

UNIT-3 Dynamic Response of Multi-Degree of Freedom Systems **12**

Mathematical models of Multi-degree of freedom systems, orthogonality of normal modes, free and forced vibrations of multi degree of freedom systems Mode superposition technique, Applications.

UNIT-4 Dynamic Response of Continuous Systems **12**

Mathematical models of continuous systems, Free and forced vibration of continuous systems, Rayleigh – Ritz method – Formulation using Conservation of Energy – Formulation using Virtual Work, Applications.

UNIT-5 Direct Integration Methods for Dynamic Response **12**

Damping in MDOF systems, Nonlinear MDOF systems, Wilson Theta method, Newmark beta method, step-by-step numerical integration techniques.

TOTAL :60 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

On completion of this course, the student is expected to be able to

CO1 Do vibration analysis of system/structures with single degree of freedom and can explain the method of damping the systems

CO2 Do dynamic analysis of system/structures with Multi degrees of freedom under free and forced vibration

CO3 Derive a mathematical model of continuous system and do a dynamic analysis under free and forced vibration

CO4 know the dynamic response of continuous systems

CO5 Analyse damping in multidegree of freedom systems

REFERENCES:

1. Anil K.Chopra, Dynamics of Structures, Pearson Education, 2007.
2. Leonard Meirovitch, Elements of Vibration Analysis, McGraw Hill, 1986, IOS Press, 2006.
3. Mario Paz, Structural Dynamics -Theory and Computation, Kluwer Academic Publishers, 2004.
4. Roy R.Craig, Jr, Andrew J. Kurdila, Fundamentals of Structural Dynamics, John Wiley & Sons, 2011

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	2	2	1	2	2	2	2	1	1	3	3	2
CO 2	3	2	3	2	3	1	2	2	1	2	2	2	3	2	3
CO 3	3	2	3	2	3	2	2	2	1	2	1	2	3	3	3
CO 4	3	2	3	2	2	1	1	2	1	2	2	2	3	2	2
CO 5	3	2	3	3	1	2	2	2	2	1	1	1	3	3	3

118SET04 THEORY OF ELASTICITY AND PLASTICITY

L	T	P	C
4	0	0	4

OBJECTIVES:

- To understand the concept of 3D stress, strain analysis and its applications to simple problems.
- To understand the application of plane stress and plane strain in a given situation in both cartesian and polar coordinate systems
- To understand torsion problems in circular and non-circular cross-sections
- To analyse beams resting on elastic foundations
- To understand the simple boundary value problems with elasto-plastic and strain hardening properties

UNIT-1 Elasticity **12**

Analysis of stress and strain, Equilibrium equations - Compatibility equations - stress strain relationship. Generalized Hooke's law.

UNIT-2 Elasticity Solution **12**

Plane stress and plane strain - Simple two dimensional problems in Cartesian and polar coordinates.

UNIT-3 Torsion of Non-Circular Section **12**

St.Venant's approach - Prandtl's approach – Membrane analogy - Torsion of thin walled open and closed sections

UNIT-4 Beams On Elastic Foundations **12**

Beams on Elastic foundation – Methods of analysis – Elastic line method – Idealization of soil medium – Winkler model – Infinite beams – Semi-infinite and finite beams – Rigid and flexible – Uniform cross section – Point load and udl – Solution by finite differences.

UNIT-5 Plasticity **12**

Physical Assumptions – Yield criteria – Failure theories – Applications of thick cylinder – Plastic stress strain relationship. Elasto-plastic problems in bending and torsion.

TOTAL : 60 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1 Derive and write the fundamental equations of elasticity describing the linear behavior of element and develop constitutive models based on material behavior

CO2 Demonstrate the application of plane stress and plane strain in a given situation in both cartesian and polar coordinate systems

CO3 Solve torsion problems in circular and non-circular cross-sections

CO4 Analyse beams resting on elastic foundations

CO5 Solve analytically the simple boundary value problems with elasto-plastic and strain hardening properties

REFERENCES:

1. Ansel.C.Ugural and Saul.K.Fenster, "Advanced Strength and Applied Elasticity," Fourth Edition, Prentice Hall Professional technical Reference, New Jersy, 2003.
2. Chakrabarty.J, "Theory of Plasticity", Third Edition, Elsevier Butterworth - Heinmann – UK, 2006.
3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, New Delhi 1988.
4. Slater R.A.C, "Engineering Plasticity", John Wiley and Son, New York, 1977.
5. Timoshenko, S. and GoodierJ.N."Theory of Elasticity", McGraw Hill Book Co., New York, 1988.

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Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	2	1	1	1	2	2	1	1	2	2	3	2
CO 2	3	3	2	1	1	1	1	1	2	2	1	2	3	3	2
CO 3	2	3	2	3	2	1	2	2	2	2	1	2	2	3	3
CO 4	3	3	3	2	3	1	1	1	2	2	2	2	3	2	2
CO 5	2	3	3	3	2	2	2	1	1	2	2	2	3	3	3

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118SEE01 **ADVANCED CONCRETE TECHNOLOGY** **L T P C**
3 0 0 3

OBJECTIVES:

- To study the properties of concrete making materials
- To conduct tests on concrete
- To study the mix design of concrete
- To know about special concretes
- To know the various methods for making concrete.

UNIT-1 Concrete Making Materials **9**

Aggregates classification, IS Specifications, Properties, Grading, Methods of combining aggregates, specified grading, testing of aggregates. Cement, Grade of cement, Chemical composition, testing of concrete, Hydration of cement, Structure of hydrated cement, special cements. Water Chemical admixtures, Mineral admixture.

UNIT-2 Tests On Concrete **9**

Properties of fresh concrete, Hardened concrete, Strength, Elastic properties, Creep and shrinkage – Durability of concrete.

UNIT-3 Mix Design **9**

Principles of concrete mix design, Methods of concrete mix design, IS Method, ACI Method, DOE Method – Statistical quality control – Sampling and acceptance criteria.

UNIT-4 Special Concrete **9**

Light weight concrete, Fly ash concrete, Fibre reinforced concrete, Sulphur impregnated concrete, Polymer Concrete – High performance concrete. High performance fiber reinforced concrete, Self-Compacting-Concrete, Geo Polymer Concrete, Waste material based concrete – Ready mixed concrete.

UNIT-5 Concreting Methods **9**

Process of manufacturing of concrete, methods of transportation, placing and curing. Extreme weather concreting, special concreting methods. Vacuum dewatering – Underwater Concrete.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: To understand concrete making materials
CO2: To conduct tests on fresh, hardened concrete, special concrete concrete
CO3: To carry out the mix design of concrete
CO4: To use special concretes
CO5: To know the various methods of manufacturing of concrete.

REFERENCES:

1. Gambhir.M.L. Concrete Technology, McGraw Hill Education, 2006.
2. Gupta.B.L., Amit Gupta, "Concrete Technology, Jain Book Agency, 2010.18
3. Neville, A.M., Properties of Concrete, Prentice Hall, 1995, London.
4. Santhakumar.A.R. Concrete Technology", Oxford University Press, 2007.
5.Shetty M.S., Concrete Technology, S.Chand and Company Ltd. Delhi, 2003.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	2	1	2	1	2	2	1	1	1	3	2	2
CO 2	3	2	3	2	1	1	2	2	2	1	2	1	3	3	3
CO 3	3	2	3	3	2	1	2	1	2	1	2	2	3	2	2
CO 4	3	2	2	2	3	2	1	1	1	2	2	1	3	2	2
CO 5	2	2	2	3	3	1	1	2	2	1	2	1	3	3	3

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118SEE07 MAINTENANCE AND REHABILITATION OF STRUCTURES **L T P C**
3 0 0 3

OBJECTIVES:

- To study the damages, repair and rehabilitation of structures.
- To study remdial measures of cracks
- To study effect of dampness on structural components
- To understand causes and remidal measures of cracks in steel and concrete structures
- To make understanding of restrengthening of structures

UNIT-1 Introduction **9**

General Consideration – Distresses monitoring – Causes of distresses – Quality assurance – Defects due to climate, chemicals, wear and erosion – Inspection – Structural appraisal – Economic appraisal.

UNIT-2 Building Cracks **9**

Causes – diagnosis – remedial measures – Thermal and Shrinkage cracks – unequal loading – Vegetation and trees – Chemical action – Foundation movements – Techniques for repair – Epoxy injection.

UNIT-3 Moisture Penetration **9**

Sources of dampness – Moisture movement from ground – Reasons for ineffective DPC – Roof leakage – Pitched roofs – Madras Terrace roofs – Leakage of Concrete slabs – Dampness in solid walls – condensation – hygroscopic salts – remedial treatments – Ferro cement overlay –Chemical coatings – Flexible and rigid coatings.

UNIT-4 Distresses and Remedies **9**

Concrete Structures: Introduction – Causes of deterioration – Diagnosis of causes – Flow charts for diagnosis – methods of repair – repairing, spalling and disintegration – Repairing of concrete floors and pavements. Steel Structures : Types and causes for deterioration – preventive measures – Repair procedure – Brittle fracture – Lamellar tearing – Defects in welded joints – Mechanism of corrosion – Design of protect against corrosion – Design and fabrication errors – Distress during erection. Masonry Structures: Discoloration and weakening of stones – Biotical treatments – Preservation – Chemical preservatives – Brick masonry structures – Distresses and remedial measures.

UNIT-5 Strengthening Of Existing Structures **9**

General principle – relieving loads – Strengthening super structures – plating – Conversation to composite construction – post stressing – Jacketing – bonded overlays – Reinforcement addition – strengthening the substructures – under pinning – Increasing the load capacity of footing – Design for rehabilitation.

TOTAL :45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: To point out the causes of distress in concrete, masonry and steel structures.
CO2: To suggest the remedial measures of cracks
CO3: To know effect of dampness on structural components
CO4: To know the causes and remidal measures of cracks in steel and concrete structures
CO5: To know about the restrengthening of structures

At the end of this course students will be in a position to point out the causes of distress in concrete, masonry and steel structures and also they will be able to suggest the remedial measures.

REFERENCES:

1. Allen R.T and Edwards S.C, "Repair of Concrete Structures", Blakie and Sons, UK, 1987
2. Dayaratnam.P and Rao.R, "Maintenance and Durability of Concrete Structures", University Press, India, 1997.
3. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical, UK, 1991.
4. Dodge Woodson.R, Concrete Structures – protection, repair and rehabilitation", Elsevier Butterworth – Heinmann, UK, 2009.
5. Peter H.Emmons, "Concrete Repair and Maintenance Illustrated", Galgotia Publications Pvt. Ltd., 2001.
6. Raikar, R.N., "Learning from failures - Deficiencies in Design, Construction and Service" – Rand D Centre (SDCPL), RaikarBhavan, Bombay, 1987.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	2	2	2	1	1	1	2	2	1	2	2	2	3
CO 2	2	2	2	3	2	2	1	1	2	2	3	2	3	2	3
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CO 4	2	2	3	2	1	2	1	2	1	2	2	1	2	2	3
CO 5	2	3	2	1	2	1	2	1	2	2	1	1	3	3	2

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218SET01	Finite Element Analysis	L T P C
		4 0 0 4

OBJECTIVES

- To study the finite element concept, stress analysis, meshing, nonlinear problems and applications.
- To equip with the Finite Element Analysis fundamentals.
- To formulate the design problems into FEA.
- To perform engineering simulations using Finite Element Analysis software.
- To understand the ethical issues related to the utilization of FEA in the industry.

UNIT-1 FORMULATION OF BOUNDARY VALUES 12

Boundary Value Problems – Approximate Solutions – Variational and Weighed Residual Methods – Ritz and Galerkin Formulations – Concept of Piecewise Approximation and Finite Element – Displacement and Shape Functions –Weak Formulation – Minimum Potential Energy – Generation of Stiffness Matrix and Load Vector – applications to structural engineering.

UNIT-2 STRESS ANALYSIS 12

Two Dimensional problems – Plane Stress, Plane 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 – applications to structural engineering.

UNIT-3 MESHING AND SOLUTION PROBLEMS 12

Higher Order Elements – p and h Methods of Mesh Refinement – ill conditioned Elements – Discretisation Errors – Auto and Adaptive Mesh Generation Techniques -Error Evaluation – applications to structural engineering.

UNIT-4 NONLINEAR, VIBRATION AND THERMAL PROBLEMS 12

Material and Geometric Nonlinearity – Methods of Treatment – Consistent System Matrices – Dynamic Condensation – Eigen Value Extraction - thermal analysis – applications to structural engineering.

UNIT-5 APPLICATIONS 12

Modelling and analysis using latest software – applications to structural engineering.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Develop finite element formulations of single degree of freedom problems and solve them

CO.2 Use finite element analysis programs based upon either "p-method" or "h-method" finite element mathematical formulations

CO.3 Compute the stiffness values of noded elements.

CO.4 Identify the Eigen values of non-linear vibration problems

CO.5 Perform modal analysis to determine its natural frequencies, and analyze harmonically-forced vibrations.

REFERENCES:

1. **S. S. Bhavikatti**, "*Finite Element Analysis*", New Age Publishers, 2007.
2. **David Hutton**, "*Fundamentals of Finite Element Analysis*", Tata McGraw HillPublishing Company Limited, New Delhi, 2005.
3. **Moaveni, S.,** "Finite Element Analysis Theory and Application with ANSYS", Prentice Hall Inc., 2003.

4. **Chandrupatla, R.T. and Belegundu, A.D.,** "Introduction to Finite Elements in Engineering", Prentice Hall of India, 2011.
5. **C. S. Krishnamoorthy,** "Finite Element Analysis: Theory and Programming", Tata McGraw-Hill, 2012.
6. **S.S.Rao,** "The Finite Element Method in Engineering", Elsevier, 2011.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	1	2	3	2	1	1	2	3	2	2	3	3
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CO 3	3	2	3	2	3	2	3	1	2	2	2	1	2	3	2
CO 4	2	2	3	2	3	3	2	1	1	2	2	3	3	2	2
CO 5	3	3	2	2	2	1	2	2	1	3	2	3	2	2	3

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218SET03	Advanced Structural Steel Design	L P T C 3 0 0 0

OBJECTIVES

- To enrich the students on analysis and design of industrial buildings
- To study various connections (welded and riveted) , seated connections (Unstiffened and Stiffened connections) and to design them.
- To focus on the study and design of various steel towers and steel chimneys.
- To study the plastic analysis of steel structures.
- To study the design concepts of light gauge steel structures.

UNIT-1 GENERAL **9**

Analysis and design of Industrial Buildings and bents, Sway and non-sway frames, Design of Purlins, Louver rails, Gable column and Gable wind girder - Design of Moment Resisting Base Plates – Analysis of Gable Frames.

UNIT-2 DESIGN OF CONNECTIONS **9**

Types of connections – Welded and riveted – Throat and Root Stresses in Fillet Welds – Seated Connections – Unstiffened and Stiffened seated Connections – Moment Resistant Connections – Clip angle Connections – Split beam Connections – Framed Connections.

UNIT-3 ANALYSIS AND DESIGN OF STEEL TOWERS AND CHIMNEYS **9**

Analysis and Design of Microwave / Transmission Line Towers - Types of bracing patterns - Sag and Tension calculations. Design of Self-supporting Chimney – Design of Base Plates, Foundations and Anchor bolts and Guyed Steel Chimney - Guy ropes - Stresses due to wind. Along with load calculation - Gust Factor Method.

UNIT-4 PLASTIC ANALYSIS OF STRUCTURES **9**

Introduction, Shape factor, Moment redistribution, Combined mechanisms, Analysis of portal frames, Effect of axial force - Effect of shear force on plastic moment, Connections - Requirement – Moment resisting connections. Design of Straight Corner Connections – Haunched Connections – Design of continuous beams.

UNIT-5 DESIGN OF LIGHT GAUGE STEEL STRUCTURES **9**

Behaviour of Compression Elements - Effective width for load and deflection determination – Behaviour of Unstiffened and Stiffened Elements – Design of webs of beams – Flexural members – Lateral buckling of beams – Shear Lag – Flange Curling – Design of Compression Members – Wall Studs.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Construct industrial buildings for the intended purpose
CO.2 Design different types of steel connections and joints.
CO.3 Have an exposure to design steel tower and chimneys.
CO.4 Design for plasticity.
CO.5 Perform design of light gauge steel structures.

REFERENCES:

- **Subramanian.N**, "*Design of Steel Structures*", Oxford University Press, 2008.
- **Dayaratnam.P**, "*Design of Steel Structures*", A.H.Wheeler, India, 2007.
- **Wie Wen Yu**, "*Design of Cold Formed Steel Structures*", McGraw Hill Book MCompany, New York, 2010.
- **Linton E. Grinter**, "*Design of Modern Steel Structures*", Eurasia Publishing House, New Delhi, 1996.
- **John E. Lothers**, "*Design in Structural Steel*", Prentice Hall of India, 1990.
- **Lynn S. Beedle**, "*Plastic Design of Steel Frames*", John Wiley and Sons, 1990.

CODE BOOKS :

1. IS:800-2007 - Indian Standard Code of Practice for general construction in steel.
2. IS:875 (Part I to V) - Code of Practice for Design loads.
3. IS:801-1975 - Code of practice for use of cold formed light gauge steel structural members in general building construction.
4. IS:811-1987 - Cold formed light gauge structural steel sections.
5. IS:6533-1989 (Part I & II) - Code of Practice for Design and Construction of Steel Chimney.
6. IS:802-1977 - Code of Practice for use of structural steel in Overhead Transmission Line Towers.
7. SP:6 - Handbook on Structural Steel Section.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	3	2	2	2	2	1	1	2	2	1	2	2	3
CO 2	3	3	1	3	2	2	2	2	3	3	1	2	3	2	3
CO 3	2	3	3	2	3	2	3	2	2	3	2	1	2	2	2
CO 4	2	2	3	2	2	3	3	2	3	1	1	2	3	2	3
CO 5	3	2	3	2	3	2	2	2	3	3	1	1	2	3	2

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218SEE05	Stability Of Structures	L T P C 3 0 0 3

OBJECTIVES:

- To study the stability of columns using theoretical and numerical methods.
- To understand the approximate methods and numerical methods of inelastic buckling.
- To get accustomed to beam column behaviour and that of frames.
- To enumerate the lateral buckling, lateral torsional buckling and flexural torsional buckling of beams.
- To study various numerical techniques and energy methods for buckling of thin plates.

UNIT-1 STABILITY OF COLUMNS 9

Fundamental concepts - Elastic structural stability - Structural instability - Analytical methods for the stability analysis, equilibrium, imperfections and energy methods - Non-prismatic columns- Built up columns- Buckling modes Effect of shear on buckling load - Large deflection theory.

UNIT-2 METHODS OF ANALYSIS AND IN ELASTIC BUCKLING 9

Approximate methods – Rayleigh and Galerkin methods – numerical methods – Finite difference and finite Element - analysis of columns – Experimental study of column behaviour – South well plot - Column curves - Derivation of Column design formula - Effective length of Columns - Inelastic behaviour- Tangent modulus and Double modulus theory.

UNIT-3 BEAM COLUMNS AND FRAMES 9

Beam column behaviour- standard cases- Continuous columns and beam columns – Columns on elastic foundation – Buckling of frames – Single storey portal frames with and without side sway – Classical and stiffness methods – Use of Wood's charts.

UNIT-4 BUCKLING OF BEAMS 9

Lateral buckling of beams – Energy method- Application to Symmetric and single symmetric I beams – simply supported and Cantilever beams - Narrow rectangular cross sections- –Numerical solutions – Torsional buckling – Uniform and non-uniform Torsion on open cross section - Flexural torsional buckling – Equilibrium and energy approach.

UNIT-5 BUCKLING OF THIN PLATES 9

Isotropic rectangular plates - Governing Differential equations - Simply Supported on all edges – Use of Energy methods –Numerical Techniques.

TOTAL:45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 Analyse both static and dynamic instabilities, by both theoretical and numerical methods

CO.2 Examine the behaviour of beam columns and frames with and without side sway using classical and stiffness methods.

CO.3 Well versed in the lateral buckling, torsional buckling, Flexural torsional buckling of various beams and non-circular sections.

CO.4 Evaluate buckling of thin plates using energy methods and various numerical techniques.

CO.5 Execute and work out the inelastic buckling using various methodologies.

REFERENCES:

1. **Timoshenko, S., and Gere.,** "Theory of Elastic Stability", McGraw Hill Book Company, 2009.
2. **Chajes, A.** "Principles of Structures Stability Theory", Prentice Hall, 1974.

3. **Ashwini Kumar,** Stability of Structures, Allied Publishers LTD, New Delhi, 2003
4. **Iyenger.N.G.R.,,** "Structural stability of columns and plates", Affiliated East West Press,1986.
5. **Gambhir,** "Stability Analysis and Design of Structures", springer, New York , 2004.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	3	2	3	2	1	1	2	2	1	2	3	2	3
CO 2	3	3	2	3	3	2	2	2	1	1	2	2	3	2	2
CO 3	2	3	3	2	3	2	3	2	2	1	1	1	2	2	3
CO 4	3	2	2	3	3	2	1	2	1	2	2	2	3	3	2
CO 5	2	3	3	2	3	1	2	2	1	1	2	1	2	3	2

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315SEE03 PREFABRICATED STRUCTURES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:

- To understand the principles of prefabrication
- To understand the behaviour of prefabricated structures
- To design prefabricated components and structural connections
- To know about construction of industrialised structures and shall be able to design some of the prefabricated elements
- To gain knowledge in the construction methods using these elements.

UNIT-1 Design Principles **9**

General Civil Engineering requirements, specific requirements for planning and layout of prefabricates plant. IS Code specifications Modular co-ordination, standardization, Disuniting of Prefabricates, production, transportation, and erection, stages of loading and codal provisions, safety factors, material properties, Deflection control, Lateral load resistance, Location and types of shear walls.

UNIT-2 Prefabricated Reinforced Concrete Structural Elements **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, -Connections – Beam to column and column to column.

UNIT-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 behaviour and reinforcement requirements, Deflection control for short term and long term loads, Ultimate strength calculations in shear and flexure.

UNIT-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.

UNIT-5 Industrial Buildings and Shell Roofs **9**

Components of single-storey industrial sheds with crane gantry systems, R.C. Roof Trusses, Roof Panels, corbels and columns, wind bracing design. Cylindrical, Folded plate and hyper-prefabricated shells, Erection and jointing, joint design, hand book based design.

TOTAL:45PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: Understand the basic concepts of prefabrication and their needs in construction industry.
CO2: Knowing the behaviour of prefabricated structures.
CO3: Design the cross section and joints of prefabricated units
CO4: To know about the joints for different structural connections
CO5: To design for abnormal loads in structures

REFERENCES:

1.**Structural Design Manual**, *Precast Concrete Connection Details*, Society for the Studies in the use of Precase Concrete, Netherland BetorVerlag, 1978.
2.**Hass, A.M.** *Precast Concrete Design and Applications*, Applied Science Publishers, 2003.

3.**Promislow, V***Design and Erection of Reinforced Concrete Structures*, MIR Publishers, Moscow.
4.**Gerostiza. C.Z., Hendrikson, C. and Rehat D.R.,** *Knowledge Based Process Planning for Construction and Manufacturing*, Academic Press, Inc., 2009.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	3	2	3	2	2	1	1	2	1	2	3	2	2
CO 2	3	2	3	2	2	1	1	2	2	2	1	1	2	3	2
CO 3	2	3	3	2	3	2	1	2	1	2	1	1	3	3	2
CO 4	2	2	3	2	-	1	1	2	1	1	2	1	2	2	3
CO 5	2	2	3	2	1	1	2	2	1	1	1	1	3	2	2

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315SEE06 PRE-STRESSED CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

COURSE OBJECTIVES

- To understand the behaviour and performance of prestressed concrete structures
- To know about the different methods of prestressing
- To compare the behaviour of prestressed concrete members with that of the normal reinforced concrete structures
- To understand the performance of composite members
- To learn the design of prestressed concrete structures

UNIT-1 Principles of Pre-stressing **9**

Principles of Prestressing - types and systems of prestressing, need for High Strength materials, Analysis methods losses, deflection (short-long term), camber, cable layouts.

UNIT-2 Design of Flexural Members **9**

Behaviour of flexural members, determination of ultimate flexural strength – Codal provisions - Design of flexural members, Design for shear, bond and torsion, Design of end blocks.

UNIT-3 Design of Continuous Beams **9**

Analysis and design of continuous beams - Methods of achieving continuity – concept of linear transformations, concordant cable profile and gap cables

UNIT-4 Design of Tension And Compression Members **9**

Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks - Design of compression members with and without flexure – its application in the design piles, flag masts and similar structures.

UNIT-5 Design of Composite Members **9**

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

TOTAL:45 PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: Design a prestressed concrete beam accounting for losses.
CO2: Design for flexure and shear.
CO3: Design the anchorage zone for post tensioned members and deflection in beams.
CO4: Design composite members and continuous beams.
CO5: Design water tanks, pipes and poles.

REFERENCES:

1.**Krishna Raju,** "*Prestressed Concrete*", Tata McGraw Hill PublishingCo, 2000.
2.**Sinha.N.C. andRoy.S.K**, "*Fundamentals of Prestressed Concrete*",S.Chandand Co., 2008
3. **Liyn.T.Y.** *"Design of Prestressed Concrete Structures"*, John Wiley and SonsInc, 2001.
4.**Evans, R.H. and Bennett, E.W.,** *"Prestressed Concrete*", Champman and Hall, London, 2008.
5.**Rajagopalan.N,** *PrestressedConcrete, Narosa* Publications, New Delhi, 2008.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3	3	2	2	1	1	2	1	1	3	3	2
CO 2	3	3	2	1	1	1	1	1	2	2	1	2	3	3	2
CO 3	2	3	2	3	2	1	2	2	2	2	1	2	2	3	3
CO 4	3	3	3	2	3	1	1	1	2	2	2	2	3	2	2
CO 5	2	3	3	3	2	2	2	1	1	2	2	2	3	3	3

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315SEE12	DESIGN OF SUB STRUCTURE	L T P C 3 0 0 3

OBJECTIVES:

- To study the selection of foundation and bearing capacity of soil
- To study the design of different type of shallow foundations like isolated, raft and combined footing.
- To familiarise with the design of pile foundation and pile caps.
- To design well and caissons foundations.
- To design various types of tower foundations.

UNIT-1 Site Investigation, Selection of Foundation and Bearing Capacity **9**

Objectives – Methods of exploration – Depth of exploration – Sample disturbance – Factors governing location and depth of foundation – In situ testing of Soils – Plate load test – Geophysical methods – Selection of foundation– Bearing capacity of shallow foundations by Terzaghi's theory, Meyerhof's theory, and codal provisions – Bearing capacity of footing subjected to inclined and eccentric loading – Problems – Types of shear failure – General principles of foundation design.

UNIT-2 Design of Shallow Foundations **9**

Types of shallow foundations – General principles of design of reinforced concrete shallow foundations – Structural design of isolated and combined footing – Structural design of rafts by conventional method – Principles of design of buoyancy raft and basement (no design problems).

UNIT-3 Pile Foundation **9**

Pile foundations – Types – General principles of design – Estimation of load capacity of piles by static and dynamic formulae – Detailing of reinforcement as per IS 2911 - Design of pile caps – Settlement analysis of pile groups – Negative skin friction – Pile load tests.

UNIT-4 Well and Caisson Foundations **9**

Well and caisson foundations – Structural elements of Caisson and Well foundations – Elements of well foundation – Forces acting on Caisson and well foundations – Design of individual components of Caisson and well foundation(only forces acting and design principles) – Sinking of well – Shifts and tilts in well foundations – Preventive measures.

UNIT-5 Foundations of Transmission Line Towers **9**

Introduction - Necessary information - Forces on tower foundations - General design criteria - Choice and type of foundation - Design of foundation for transmission towers.

TOTAL:45PERIODS

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO1: Attain the perception of site investigation to select suitable type of foundation based on soil category
CO2: To design different types of shallow foundation.
CO3: To design different types of pile and evaluation of pile group capacity.
CO4: To design different types of well foundation
CO5: To design transmission line tower foundation.

CODE BOOKS:

1.IS 2911: Part 1: Sec 1: 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 1 Driven cast in-situ concrete piles.
2.IS 2911: Part 1: Sec 2: 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 2 Bored cast-in-situ piles.
3.IS 2911: Part 1: Sec 3: 1979 Code of practice for design and construction of pile foundations: Part 1 Concrete piles, Section 3 Driven precast concrete piles.
4.IS 2911: Part 1: Sec 4: 1984 Code of practice for design and construction of pile foundations: Part 1 concrete piles, Section 4 Bored precast concrete piles.
5.IS 2911: Part 2: 1980 Code of practice for designing and construction of pile foundations: Part 2 Timber piles.
6.IS 2911: Part 3: 1980 Code of practice for design and construction of pile foundations: Part 3 Under reamed piles
7.IS 2911: Part 4: 1985 Code of practice for design and construction of pile foundations: Part 4 Load test on piles
8.IS 6403: 1981 Code of practice for determination of bearing capacity of Shallow Foundations

REFERENCES:

1.Tomlinson. M.J. and Boorman, R., "Foundation design and construction", VI edition, ELBS Longman, 2001.
2. Nayak. N.V., "Foundation design manual for practicing engineers", DhanpatRai and Sons.
3. Arora. K.R, "Soil Mechanics & Foundation Engineering", Standard Publishers & Distributors, 2005.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	2	3	3	3	2	1	1	2	2	1	1	3	2	3
CO 2	3	3	2	1	1	1	1	1	2	2	1	2	3	3	2
CO 3	2	3	2	3	2	1	2	2	2	2	1	2	2	3	3
CO 4	3	3	3	2	3	1	1	1	2	2	2	2	3	2	2
CO 5	2	3	3	3	2	2	2	1	1	2	2	2	3	3	3

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315SEP01 **PRACTICAL TRAINING (4 WEEKS)** **L T P C**
0 0 0 1

OBJECTIVES:

- To train the students in the field work so as to have a firsthand knowledge of practical problems related to Structural Engineering in carrying out engineering tasks.
- To develop skills in facing and solving the field problems

The students individually undertake training in reputed industries during the summer vacation for a specified period of two weeks. at the end of training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. the students will be evaluated through a viva-voce examination by a team of internal staff.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 They are trained in tackling a practical field/industry orientated problem related to Structural Engineering.
CO.2 Know the fundamental planning and safety practices commonly implemented on construction sites and the key factor for causing accidents.
CO.3 Understand the requirements for compliance and inspection imposed for the safety in construction site
CO.4 Understand the importance of agencies involved in rescue operation by various case studies.
CO.5 Execute a given site with zero percent accident

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	3	2	3	3	2	1	2	1	2	1	2	3	3	2
CO 2	2	3	3	2	1	1	2	1	2	1	1	1	2	3	3
CO 3	2	2	3	2	1	2	1	2	1	1	2	1	3	2	3
CO 4	3	2	3	2	1	2	2	1	2	1	1	1	3	3	2
CO 5	2	2	1	3	2	1	2	1	1	2	2	1	2	3	3

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315SEP02 **SEMINAR** **L T P C**

0 0 4 2

OBJECTIVES:

- To work on a specific technical topic in Structural Engineering and acquire the skills of written and oral presentation.
- To acquire writing abilities for seminars and conferences.

SYLLABUS:

The students will work for two hours per week guided by a group of staff members. They will be asked to give a presentation on any topic of their choice related to Structural Engineering and to engage in discussion with the audience. A brief copy of their presentation also should be submitted. Similarly, the students will have to present a seminar of not less than fifteen minutes and not more than thirty minutes on the technical topic. They will defend their presentation. Evaluation will be based on the technical presentation and the report and also on the interaction shown dung the seminar.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 The students will be trained to face an audience and to tackle any problem during group discussion in the Interviews.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3	2	1	2	2	1	1	2	2	3	3	2
CO 2	3	2	2	2	1	2	1	1	2	1	1	2	2	3	3
CO 3	2	2	3	3	2	1	2	1	1	2	1	1	3	3	2
CO 4	2	2	3	2	1	1	2	1	2	1	1	2	2	2	3
CO 5	3	2	3	2	2	1	2	1	1	2	1	2	3	3	2

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315SEP03	PROJECT WORK (PHASE – I)	L	T	P	C
		0	0	12	6

OBJECTIVES:

- To identify a specific problem for the current need of the society and collecting information related to the same through detailed review of literature.
- To develop the methodology to solve the identified problem.
- To train the students in preparing project reports and to face reviews and viva-voce examination.

SYLLABUS:

The student individually works on a specific topic approved by faculty member who is familiar in this area of interest. The student can select any topic which is relevant to his/her specialization of the programme. The topic may be experimental or analytical or case studies. At the end of the semester, a detailed report on the work done should be submitted which contains clear definition of the identified problem, detailed literature review related to the area of work and methodology for carrying out the work. The students will be evaluated through a viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 At the end of the course the students will have a clear idea of his/her area of work and they are in a position to carry out the remaining phase II work in a systematic way.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2	2	3	2	1	2	2	1	1	2	2	3	3	2
CO 2	3	2	2	2	1	2	1	1	2	1	1	2	2	3	3
CO 3	2	2	3	3	2	1	2	1	1	2	1	1	3	3	2
CO 4	2	2	3	2	1	1	2	1	2	1	1	2	2	2	3
CO 5	3	2	3	2	2	1	2	1	1	2	1	2	3	3	2

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418SEP01	PROJECT WORK (PHASE – II)	L	T	P	C
		0	0	32	16

OBJECTIVES

- To solve the identified problem based on the formulated methodology.
- To develop skills to analyze and discuss the test results, and make conclusions.

The student should continue the phase I work on the selected topic as per the formulated methodology. At the end of the semester, after completing the work to the satisfaction of the supervisor and review committee, a detailed report should be prepared and submitted to the head of the department. The students will be evaluated through based on the report and the viva-voce examination by a panel of examiners including one external examiner.

COURSE OUTCOMES:

After undergoing the course, the students will have ability to

CO.1 On completion of the project work students will be in a position to take up any challenging practical problem and find better solutions.

Course Outcomes	Programme Outcomes (PO's)												(PSO's)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	2	3	3	3	2	2	2	1	1	2	2	1	3	2	2

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