Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Hingna Road, Wanadongri, Nagpur - 441 110

Post Graduation (M. Tech.)

SoE & Syllabus 2014

2 Semester

Department of Civil Engineering

Structural Engineering

Update on May 2017

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

M. Tech. SCHEME OF EXAMINATION 2014

Department of Civil Engineering

Structural Engineering

Sl. No.	Course Code	Course Title	Contact Hours				Credits	% Weightage				ESE Duration Hrs.
			L	T	P	Total Contact Hrs.		MSE- I	MSE- II	TA	ESE	
I SEMESTER												
1	CV1901	Numerical Methods	3	0	0	3	3	15	15	10	60	3
2	CV1902	Theory of Elasticity and Elastic Stability	3	0	0	3	3	15	15	10	60	3
3	CV1903	Structural Dynamics	3	0	0	3	3	15	15	10	60	3
4	CV1904	Lab: Structural Dynamics	0	0	2	2	1			40	60	
5	CV1905	Matrix Analysis of Structures	3	0	0	3	3	15	15	10	60	3
6	CV1906	Lab: Matrix Analysis of Structures	0	0	2	2	1			40	60	
7	CV1907	Design of Substructures	3	0	0	3	3	15	15	10	60	3
8	CV1908	Research Practice	0	0	2	2	1			100		
Total			**15**	**0**	**6**	**21**	**18**					
II SEMESTER												
1	CV1911	Finite Element Method	3	0	0	3	3	15	15	10	60	3
2	CV1912	Theory of Plates and Shells	3	0	0	3	3	15	15	10	60	3
3	CV1913	Earthquake and wind effects on Structures	3	0	0	3	3	15	15	10	60	3
4	**Professional Elective-I**		3	0	0	3	3	15	15	10	60	3
	CV1914	Advanced Concrete Structures										
	CV1915	Prestressed Concrete										
	CV1916	Composite Structures										
5	**Professional Elective-II**		3	0	0	3	3	15	15	10	60	3
	CV1917	Advanced Steel Structures										
	CV1918	New Engineering Materials										
	CV1919	Smart Structures and Applications										
6	CV1920	Lab: Steel Design Studio	0	0	2	2	1			40	60	
7	CV1921	Lab: RCC Design Studio	0	0	2	2	1			40	60	
8	CV1922	Seminar	0	0	2	2	1			100		
Total			**15**	**0**	**6**	**21**	**18**					
III SEMESTER												
1	**Professional Elective-III**		3	0	0	3	3	15	15	10	60	3
	CV1923	Tall Building										
	CV1924	Design of Environmental Strucutres										
	CV1925	Bridge Engineering										
2	**Professional Elective-IV**		3	0	0	3	3	15	15	10	60	3
	CV1926	Plastic Analysis and Design of Structures										
	CV1927	Seismic Analysis and Design of Structures										
	CV1928	Design of Industrial Structures										
3	CV1929	Project Phase-I	0	0	16	16	8			100		
Total			**6**	**0**	**16**	**22**	**14**					
IV SEMESTER												
1	CV1931	Project Phase- II	0	0	24	24	12			40	60	
Total			**0**	**0**	**24**	**24**	**12**					
Grand Total of Credits							**62**					

Chairperson		**Date of Release**	May 2014	**Applicable for**
Dean (Acad. Matt.)		**Version**	**1**	**AY 2014-15 Onwards**

II SEMESTER

CV1911	Finite Element Method		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
15	15	10	60	100		3 hours

COURSE OBJECTIVE	COURSE OUTCOMES
• To provide the student with knowledge and analysis skills in applying basic laws and steps used in solving the problem by finite element method. • To provide the student the knowledge of various interpolation functions and elements to solve simple problems by finite element method. • To provide the student with some knowledge in ISO parametric transformation. • To provide students the knowledge of mathematical modelling techniques. • To develop the student's skills in applying FEM solution steps by using software.	• An ability to derive element matrix equation by different methods by applying basic laws in structural analysis. • An ability to apply the knowledge of finite element method to solve simple problems. • An ability to extend the knowledge of finite element method to solve complex problems using various elements. • An ability to understand solution and modeling techniques used in finite element method.
PO mapped: a, b, d	

UNIT – I

Principles and discretization, Elements stiffness formulation based on direct and, variational techniques, Rayleigh Ritz Method for Bar and Beam analysis.

UNIT – II

Shape functions, Finite Element Formulation using Cartesian Coordinates, Application to 1D problems, Convergence criteria

UNIT – III

Triangular and Rectangular element formulation using Cartesian Coordinates, Application to 2D stress analysis.

UNIT – IV

Natural coordinates, Numerical integration**,**Isoparametric elements, Application to 1D Problems, Isoparametric elements for two-dimensional stress analysis.

UNIT – V

Shape Functions for three Dimensional Stress analysis, Axi-symmetric Stress Analysis.

UNIT – VI

Modelling techniques and solution techniques, Computer Implementation of FEM Procedure for 1D & 2D problems.

Text Books:

1. Chandrapatla T.R., Belegundu A. D. Introduction to Finite Elements in Engineering, Prentice Hall India, 1991
2. Rajasekaran S, Finite Element Analysis in Engineering Design, S. Chand &Co.Ltd.New Delhi, 1999.

Reference Books:

1. Zienkiewicz O.C. and Taylor R.L., The Finite Element Method (Volume -I), 1st Edition, Tata McGraw Hill Publishing Company Limited, New Delhi, 1989
2. Cook R. D. , Concepts and Applications of Finite Element Analysis, 3rd Edition, Wiley India Text books, Wiley India Pvt Limited, New Delhi, 1989.
3. Krishnamurthi C. S. ,Finite Element Analysis: Theory and Programming , 2nd Edition, Tata McGraw Hill Publishing Company Limited, 1994, Reprint 2005.
4. Bathe K. J., Finite Element Procedure, Prentice-hall of India, New Delhi, 1997.

II SEMESTER

CV1912	Theory of Plates and Shells		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL	ESE DURATION	
15	15	10	60	100	3 hours	

COURSE OBJECTIVES	COURSE OOTCOMES
• To correlate moment curvature relation in pure bending and to derive equation of deflection for circular and thin rectangular plates. • To derive Lagrange's equation and Navier's solution for thin plates. • To explain the concept of finite difference method and its application. • To study the shear deformation theories for plates. • To classify the shells and its geometry and to explain the concept of various theory for shells.	• An ability to correlate moment curvature relation in pure bending. • An ability to derive equations of deflection for thin circular and rectangular plate. • An ability to explain the concept of finite difference method and its application. • An ability to understand the shear deformation theories for plates. • An ability to classify the shells and its geometry and to explain the concept of various theories.
PO mapped: a, b	

UNIT – I
Development of governing differential equations by Kirchoff'stheory with reference to thin rectangular plates with various boundary conditions. Symmetrical bending of laterally loaded circular plates with different boundary conditions.

UNIT- II
Study of Simply supported plates under different loadings.Navier's solution. Introduction to Levis solution.Finite difference method.

UNIT – III
Introduction to shear deformation theories for plates.

UNIT – IV
Classification of Shells.Membrane theory of cylindrical shells with different directrix such as circular, cycloidal, catenary, and parabolic.

UNIT – V
Bending theory of cylindrical shells, Finsterwalde, Schorer's, and D-K-J theory.

UNIT – VI
Approximate analysis of cylindrical shells by beam arch method.

Text Books
1. Timoshenko S.P and Krieger S.W, Theory of Plates and Shells,2nd Edition, McGraw-Hill Book Company, New Delhi, 1970.
2. Chadrashekhara K, Theory of Plates, 1st Edition, Universities Press (India) Ltd, Hyderabad, 2001.
3. Ramaswamy, G.S, Design of Concrete Shells, Krieger Publ. Co., 1984

Reference Books
1. Ramachandran S., Thin Shells (Theory and Problems) 1st Edition, Universities Press (India) Ltd, Hyderabad
2. Szilard R., Theory and Analysis of Plates, Prentice Hall Publication, 1974.
3. Philipee G Ciarlet, Mathematical elasticity Vol.II: Theory of plates, 1st Edition, Elsevier Science B V, 1997.

II SEMESTER

CV1913	Earthquake & Wind Effects on Structures		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL	ESE DURATION	
15	15	10	60	100	3 hours	

COURSE OBJECTIVE	COURSE OUTCOMES
• Understand basic concepts of earthquake engineering • Understand behavior of structural components under earthquake and wind loading • Understand concepts of earthquake resistance design • Understand various codes related to earthquake and wind effects on structures • Understand Wind Characteristics and concept of Mathematical Modeling.	• An ability to apply the knowledge of geological feature, plate tectonics in understanding occurrence of earthquake. • An ability to understand causes and sources of earthquake damages and possible response of structure and system to earthquake. • An ability to understand characteristics of wind and its static and dynamic effects on structures • An ability to understand relevant I.S. codes and philosophy in design of earthquake& Wind resistant structure
PO mapped: a, c, d, e, g	

UNIT – I
Origin of earthquake, Engineering geology of earthquakes, faults, Propagation of earthquake waves, quantification of earthquake (magnitude, energy, intensity of earthquake), Measurement of earthquake (accelerograph, accelogram recording and analysis of earthquake records), determination of magnitude, epicenter distances, Seismicity of the world.

UNIT- II
Causes or sources of earthquake damage, damage due to ground failure, History of past Earthquakes, generation of response spectrum from available earthquake records, Earthquake design spectrum and inelastic spectrum. Evolution of seismic risk.

UNIT – III
Concepts of earthquake resistance design, Design philosophy, four virtues of earthquake resistance design (stiffness, strength, ductility and configuration). Introduction to capacity design concept, Study of IS: 1893, Study of IS: 13920 for analysis and ductile design of RCC structures.

UNIT – IV
Wind Characteristics: Historical Wind Speed Data, Mathematical Models, Wind Speed Map of India, Practical Knowledge of Cyclones and Tornadoes.

UNIT-V
Static Wind effects and Building Codes with particular reference to IS – 875 (Part III).

UNIT-VI
Dynamic Wind Effects: Wind Induced Vibrations, Self excited motion, Analysis for dynamic wind loads, Vibration Control and Structural Monitoring.

Text Books:
1. Kramer, S.L, "Geotechnical Earthquake Engineering", Prentice Hall, New Jersey, 1996.
2. Arya A. S., "Introduction to earthquake engineering structures".
3. C. Scruton, "An Introduction to Wind Effects on Structures", Oxford University Press, Oxford, UK., 1981

II SEMESTER

CV1913	Earthquake & Wind Effects on Structures		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL	ESE DURATION	
15	15	10	60	100	3 hours	

Reference books

1. Murthy, C.V.R, "Earthquake tips", IIT Kanpur documents.
2. Chopra A. K., Dynamics of Structures, Theory & Application to Earthquake Engineering, 2nd Edition., Pearson Education (Singapore) Pvt. Ltd, New Delhi, 1995
3. Dowrick, D.J, "Earthquake Resistant Design for Engineers and Architects", 2nd Edition; 1987
4. Peter Sachs, "Wind Forces in Engineering", Pergamon Press. Oxford UK, 1972
5. Lawson T. V., "Wind Effects on Buildings", Applied Science Publishers, London, UK, 1980
6. Emil Simiu and R. H. Scanlan, "Wind Effects on Structures – An Introduction to Wind Engineering", John Wiley and Sons, New York., 1986
7. Cook, N. J., The designer's guide to wind loading of building structures. Part 1 Background, damage survey, wind data and structural classification. Building Research Establishment, Butterworths, U. K., 1985
8. Cook, N. J., Designer's guide to wind loading of building structures. Part 2: Static structures. Building Research Establishment, Butterworths, U. K., 1990
9. Simiu, E., Scanlan, R. H. Wind Effects on Structures: fundamentals and applications to design. 3rd Edition., John Wiley & Sons, New York, 1996.
10. Dyrbye, C., Hansen, S. O., Wind loads on structures., John Wiley, New York, 1997

Reference IS codes:

IS 1893-2002 Earthquake criteria

II SEMESTER

CV1914	PE-I Advanced Concrete Structures		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
15	15	10	60	100		3 hours

COURSE OBJECTIVE	COURSE OUTCOMES
• To provide the students' knowledge of different types of concrete structures. • To provide the students' knowledge of different types of loading conditions applied on various structures. • To provide the students' knowledge of different methods used for the analysis of multistoried buildings. • To provide the students' knowledge of different codal provisions applicable to design of advanced concrete structures. • To develop the ability for analysis, design and detailing of concrete structures.	• Ability to identify, the type of structure to be used for various site conditions • Understanding professional and ethical responsibilities. This will be accomplished by emphasizing the importance of various codes used for different structures. • An ability to analyze and design advanced concrete structures • An ability to draw RCC detailing and to prepare working drawing.
PO mapped: a, b, f, g	

UNIT – I
Analysis and design of Multistoried buildings, calculation of loads, Approximate analysis, Preliminary sizing, Ductile detailing.

UNIT – II
Analysis and Design of Elevated service Reservoirs, IS Recommendations for wind & earthquake, Ductile detailing.

UNIT – III
Analysis and Design of bridges and Culverts, IRC Recommendations.

UNIT – IV
Analysis and design of Cylindrical Shells, Silos, and Bunkers, IS recommendations.

Text Books:
1. Bhavikatti S. S., Advanced R. C. C. Design Volume-II, New age international publisher, New Delhi, Ist edition - 2006
2. Krishna Raju N, Advanced R. C. C. Design, CSB Publisher and Distributor, New Delhi, 2nd edition-2005
3. Ramaswamy, G.S, Design of Concrete Shells, Krieger Publ. Co., 1984

Reference Books:
1. Johnson and Victor, "Essentials of Bridge Engineering" Oxford and IBH publisher, 1980
2. Jain O.P. and Jai Krishna, Plain and Reinforced concrete structures–Volume –II, Nemchand and brothers, 1987
3. Chattergee, B K, "Theory and design of Concrete Shells" Oxford and IBH publisher, 1978
4. Chen, W.F. and Duan, L. "Bridge engineering Handbook"

II SEMESTER

CV1915	PE-I Prestressed Concrete		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
15	15	10	60	100		3 hours

COURSE OBJECTIVES	COURSE OUTCOMES
• To understand the basic concepts of Prestressed concrete. • To study various devices used for Prestressing. • To analysis and design the basic structural members in Prestressed concrete • To analysis and design the special structures like Prestressed Concrete Pipes, Liquid Storage Tanks and Ring Beams	• An ability to apply basic concepts of Prestressed concrete in construction industry. • Ability to identify, formulate and solve engineering problems pertaining to prestressed concrete. • An ability to understand IS codes related to prestressed concrete. • An ability to design special prestressed structures.
PO mapped: a, b, c, d, f	

UNIT – I

Limit state design of statically determinate prestressed beams - limit state of collapse against flexure, shear, torsion - limit state of serviceability - Design of end block - Anchorage zone stresses for post tensioned members.

UNIT – II

Statically indeterminate structures - analysis and design of continuous beams and frames Choice of cable profile - linear transformation - concordancy.

UNIT – III

Composite sections of prestressed concrete beam and cast in situ RC slab - analysis of stresses - differential shrinkage - deflections - Flexural and shear strength of composite sections - Design of composite sections.

UNIT – IV

Time dependant effects such as creep, shrinkage - Partial prestressing - Limit State design of partially prestressed concrete beams - Balanced moment capacity of rectangular and flanged sections - Crack and crack width computations. Analysis and design of prestressed concrete pipes, tanks, slabs – one way and two way (numerical problems restricted to pipes and tanks only).

Text Books:

1. N. Krishnaraju, Prestressed Concrete, 3rd edition, Tata McGraw Hill Publishing Co., 1995
2. S.K. Mallick and A.P.Gupta, Prestressed concrete, Oxford and IBH Publishing Co., New Delhi.

Reference Books:

1. Lin, T.Y. and Burns, N.H. , Design of Prestressed Concrete Structures, , 3rd edition, John Wiley &Son's, 2004
2. IS : 1343 – 1980, Code of Practice of Prestressed Concrete, Indian Standards Institution.
3. Guyon Y., Prestressed Concrete vol.I and II, Contractors Record Ltd., London.
4. Abels P.W., An Introduction to Prestressed Concrete, Vol.I and II', Concrete Publications Ltd., London.
5. Dayaratnam P. ,Prestressed Concrete Structures, , 5th edition, Oxford & IBH, 1996

II SEMESTER

CV1916	PE-I Composite Structures			L=3	T=0	P=0	CREDITS =3
EVALUATION SCHEME							
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION	
15	15	10	60	100		3 hours	

COURSE OBJECTIVES	COURSE OUTCOMES
• To understand the characteristic of different composite material • To understand the relation of materials and its property • To understand the failure theory of structures • To understand the function of laminated plated under bending and vibration.	• An ability to understand basic concepts and characteristics of Composite materials. • An ability to understand elastic behavior of lamina. • An ability to understand various failure theories. • An ability to analyze laminated plates under Bending and vibration.
PO mapped: a, b, c, g	

Unit I
Introduction: definition, Classification and characteristics of Composite materials, advantages and limitations. Current Status and Future Prospects; Basic Concepts and characteristics: Homogeneity and Heterogeneity, Isotropy, Orthotropy and Anisotropy; Characteristics and configurations of lamina, laminate, micromechanics and macromechanics.

Unit II
Constituent materials and properties ; Elastic behavior of unidirectional lamina: Anisotropic, separately orthotropic and transversely isotropic materials, stress-strain relations for thin lamina, transformation of stress and strain, transformation of elastic parameters ; Strength of unidirectional lamina:

Unit III
Macromechanical failure theories- Maximum stress theory, maximum strain theory, Deviatoric strain energy theory (Tsai-Hill), Interactive tensor polynomial theory (Tsai-Wu); Elastic Behavior of multidirectional laminates: Basic assumptions, Stress-strain relations, load deformation relations, symmetric and balanced laminates, laminate engineering properties ;

Unit IV
Bending and vibration of laminated plates: Governing equations, Deflection of simply supported rectangular symmetric angle-ply, specially orthotropic, anti-symmetric cross-ply laminates ; Recent advances: Functionally graded materials, Smart materials.

Text / Reference Books:
1. R.M. Jones, Mechanics of Composite materials, Taylor and Francis, 1999.
2. M. Daniel and O. Ishai, Engineering mechanics of Composite materials, Oxford university press, 1999
3. P.K. Mallick, Fiber-reinforced Composites, Marcel Dekker Inc, 1988.
4. D. Hull and T. W. Clyne, An introduction to composite materials, Cambridge university press, Second Edition, 1996.
5. J.N. Reddy, Mechanics of laminated composite plates and shells-Theory and Analysis, CRC Press, BocaRaton, Second Edition, 2003.

II SEMESTER

CV1917	PE-II Advanced Steel Structures			L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME							
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION	
15	15	10	60	100		3 hours	

COURSE OBJECTIVES	COURSE OUTCOMES
• To develop the fundamental design philosophies of steel structures • To understand basic principles of reliability based design on steel structures • To have an experience in the complete design of an Industrial building • To learn the analysis and design of Chimney structure • To learn the concept of design of truss bride • To learn analysis and design of storage vessels.	• An ability to understand the relationship between structural analysis and design provisions • An ability to understand the basic principles of reliability based design on steel structures • An ability to apply the provisions of IS: 875 part I to V, IS: 800, and other Indian Standards for columns, beams, beam-columns and connections efficiently
PO mapped: a, b, c, f, g	

UNIT – I
Design of steel industrial buildings

UNIT – II
Design of Steel Storage Vessels

UNIT – III
Design of steel Bridges.

UNIT – IV
Design of steel multistoried building

Reference Book

1. Arya A.S and Ajmani J.L. Design of Steel Structures, Nemchand&bross, Roorkee, new edition
2. Duggal S.K., Design of Steel Structures, McGraw Hill publication, 2007
3. RamChandra Design of Steel structures Vol-I &Vol-II Std. book house / Rajsons Publication Pvt. Ltd.,, Delhi, 2006
4. Gaylords, E.H. &Gaylords, C. N., Design of Steel Structures, Blackwell, 1994.
5. Dayaratnam P., Design of Steel Structures, Wheeler Publications, Allahabad, 1992
6. Ghosh, " Analysis and Design practice of Steel Structure", (Forthcoming), Phi Publisher, New Delhi

II SEMESTER

CV1918	PE-II New Engineering Materials		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
15	15	10	60	100		3 hours

COURSE OBJECTIVES	COURSE OUTCOMES
• Understand various civil engineering materials • Understand various methods of testing of materials • Understand and use various codes related to the civil engineering materials	• To introduce different high-quality materials for civil engineering applications. • To be able to use engineering materials for better and durable Civil Engineering Structures.
PO mapped: a, b, g	

UNIT-I
Steel fiber reinforced concrete, Properties, Aspect ratio, strength and durability.
Fiber reinforced plastics, other types of fibers and their applications.

09 Hrs.

UNIT-II
Light weight concrete, foam concrete,flyash concrete, workability, durability and application.

10 Hrs.

UNIT-III
High-grade concrete, high strength performance concrete, trimix concrete.

New engineering materials like light weight steel profile, aluminum profile, pressed steel sections.

10 Hrs.

UNIT-IV
Introduction to steel concrete composite including infill, encased section, properties of shear connectors, use of IS:11384, IRC 220.

10 Hrs.

Text books:
1. Neville A. M., Properties of Concrete, Pearson Education Limited.
2. Rafatsiddhequi , Special Concretes, Galgotia Publications.
3. M Gambhir, Concrete Technology, Tata Mcgraw Hill Education Private Limited.

Reference books:
1. Mehta P, Concrete Technology, Tata Mcgraw Hill Education Private Limited.
2. Shetty M. S, Concrete Technology, S. Chand Publisher.

II SEMESTER

CV1919	PE-II Smart Structures and Applications		L=3	T=0	P=0	CREDITS = 3
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
15	15	10	60	100		3 hours

COURSE OBJECTIVES	COURSE OUTCOMES
• To understand smart system • To understand characteristics and behavior of smart materials • To understand control system and its applications • To understand modeling of control system and its applications	• An ability to understand passive and active systems. • An ability to understand characteristics and behavior of smart materials • An ability to understand control systems and its applications. • An ability to understand modeling of control systems.
PO mapped: c, d	

UNIT – I

Introduction to passive and active systems – need for active systems– smart systems – definitions and implications - active control and adaptive control systems – examples.

UNIT – II

Components of smart systems– system features and interpretation of sensor data – pro active and reactive systems – demo example in component level – system level complexity Materials used in smart systems – characteristics of sensors – different types smart materials – characteristics and behavior of smart materials – modeling smart materials – examples

UNIT – III

Control Systems – features – active systems – adaptive systems – electronic, thermal and hydraulic type actuators – characteristics of control systems – application examples.

UNIT – IV

Integration of sensors and control systems – modeling features – sensor-response integration– processing for proactive and reactive components – FE models – examples.

References Books

1. Srinivasan, A.V. and Michael McFarland, D., Smart Structures: Analysis and Design, Cambridge University Press, 2000.
2. Yoseph Bar Cohen, Smart Structures and Materials 2003, The International Society for Optical Engineering 2003.
3. Brian Culshaw, Smart Structures and Materials ,Artech House, Boston, 1996.
4. M.V.Gandhi and B.S.thompson, Smart Materials and Structures , Chapman and Hall 1992.

II SEMESTER

CV1920	Lab: Steel Design Studio		L=0	T=0	P=2	CREDITS = 1
EVALUATION SCHEME						
MSE – I	MSE – II	TA	ESE	TOTAL		ESE DURATION
--	--	40	60	100		--

COURSE OBJECTIVES	COURSE OUTCOMES
• To understand the basic concepts and fundamentals of steel design • To provide advanced knowledge of steel structural design and apply the principles to solve a structural steel problem. • To study (modeling, analysis and design) aspects of structures using commercial software.	• An ability to understand the basic knowledge of structural engineering to advanced steel structure • An ability to understand the various parameters considered in analysis of complex structure • An ability to design advanced steel structure • An ability to present analysis and design result in schematic way
PO mapped: a, b, e, f	

Contents

1. Review of IS 800
2. Elementary Design of Beam including open web sections
3. Elementary Design of various types of truss.
4. Design of Plate Girders
5. Structural Fasteners and Connections (Bolted/ Welded Connections all types)

ReferenceBooks:

1. Duggal S.K., Design of Steel Structures, McGraw Hill publication, 2007
2. Arya A.S and Ajmani J.L. Design of Steel Structures Nemchand&bross, Roorkee, New Edition
3. Inglekrik
4. Subramanyam

II SEMESTER

CV1921	Lab: RCC Design Studio		L=0	T=0	P=2	CREDITS = 1
EVALUATION SCHEME						
MSE – I	MSE – II	CA	ESE	TOTAL		ESE DURATION
--	--	40	60	100		--

COURSE OBJECTIVES	COURSE OUTCOMES
• To understand the basic concepts and fundamentals of RCC design • To provide advanced knowledge of RCC structural design and apply the principles to solve a problem. • To study (modeling, analysis and design) aspects of structures using commercial software.	• An ability to demonstrate basic knowledge of structural engineering to advance concrete structure. • An ability to understand the various parameter considered in analysis of complex structures • An ability to design advanced concrete structures • An ability to present analysis and design result in schematic way
PO mapped: a, b, e, f	

PRACTICALS

1. Review of IS 456, IS 962 Basics of Limit State Design (Beams, Columns, Slabs) Design of Multistoried buildings
2. Design for axial force, flexural, shear and combined effects
3. Slabs (one way & two way) and slabs on grades. Preliminary sizing and modeling of RC structures.

Reference Books:

1. Bhavikatti S. S., Advanced R. C. C. Design Volume-II, New age international publisher, New Delhi, Ist edition – 2006
2. Krishna Raju N, Advanced R. C. C. Design, CSB Publisher and Distributor, New Delhi, 2nd edition-2005.

II SEMESTER

CV1922	SEMINAR		L=0	T=0	P=2	CREDITS = 1
EVALUATION SCHEME						
MSE – I	MSE – II	CA	ESE	TOTAL		ESE DURATION
-----	-----	100		100		-----

COURSE OBJECTIVES	COURSE OUTCOMES
• To provide the students the academic environment to carry out literature survey of advanced topics in structural engineering • To provide the students the academic environment for effective communication skills, working independently and in a team and the importance of lifelong learning.	• An ability to understand the importance of lifelong learning. • An ability to understand the advances in structural engineering • An ability to communicate effectively. • An ability to work independently and in a team.
PO mapped: c, d, f, g	

Each Student shall prepare a Paper and present a Seminar based on the reviewed literature from various sources on current topic related to the structural engineering under the guidance of a staff member. The student shall submit typed copy of the paper to the Department. Grades will be awarded on the basis of contents of the paper and the presentation.