CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Scheme of Teaching & Examination

M.E. (Civil) with Specialization in Structural Engg.

III SEMESTER

S. No.	Board of Study	Subject Code	Subject	Periods per Week			Scheme of Examination			Total Marks	Credit L+(T+P)/2
							Theory / Practical				
				L	T	P	ESE	CT	TA		
1	Civil Engg.	550311 (20)	Structural Dynamics	3	1		100	20	20	140	4
2	Refer Table III		Elective III	3	1		100	20	20	140	4
3	Civil Engg.	550321 (20)	Preliminary work on Dissertation	-	-	28	100	-	100	200	14
4	Civil Engg.	550322 (20)	Seminar Based on Dissertation	-	-	3	-	-	20	20	2
Total				**6**	**2**	**31**	**300**	**40**	**160**	**500**	**24**

L- Lecture T- Tutorial
P- Practical , ESE- End Semester Exam
CT- Class Test TA- Teacher's Assessment

Table III

ELECTIVE III

S.No.	Board of Study	Subject Code	Subject
1	Civil Engg.	550331 (20)	Optimization Techniques
2	Civil Engg.	550332 (20)	Theory of Plates and Shells
3	Civil Engg.	550333 (20)	Pre-Stressed Concrete

Note (1) - 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college in a Particular academic session .

Note (2) - Choice of elective course once made for an examination cannot be changed in future examinations.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M.E. III** Branch: **Civil Engineering**
Subject: **Structural Dynamics** Code: **550311 (20)**
Total Theory Periods: **40** Total Tutorial Periods: **12**
Total Marks in End Semester Exam: **100**
Minimum number of class tests to be conducted: **02**

UNIT I: BASIC CONCEPTS
Types and sources of dynamic loads, Methodology for dynamic analysis, Study of IS-1893,fundamentals of rigid and deformable dynamics.

UNIT II: SINGLE DEGREE OF FREEDOM SYSTEMS
Free and forced response, effect of damping, Analysis of undamped and viscously damped single degree of freedom. Response of single degree freedom systems to Harmonic loading, support motions and Transmissibility, Duhamel's integral.

UNIT III: MULTI –DEGREE OF FREEDOM SYSTEMS
Free vibrations of lumped mass multi degree freedom systems, analysis of undamped and viscously damped multi degree of freedom. Rayleigh's method, Orthogonality criteria.

UNIT IV: IDEALIZATION OF STRUCTURES
Mathematical models, Mode superposition methods, Distributed mass properties.

UNIT V: APPLICATION TO EARTHQUKE ENGINEERING
Introduction to vibrations due to earthquake, Response spectra. Response spectrum method for seismic design of structures.

Text books:

1. Chopra, A. K., Dynamics of Structures - Theory and Applications to Earthquake Engineering, Second Edition, Prentice Hall, 2001.

2. Rao, S. S., Mechanical Vibrations, Third Edition, Addison-Wesley Publishing Co., 1995

Reference Books:

1. Clough, R. W., and J. Penzien, Dynamics of Structures, Second Edition, McGraw-Hill, 1993.

2. Mario Paz, Structural Dynamics – Theory and Computations, Third Edition, CBS publishers, 1990.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M.E. III**
Branch: **Civil Engineering**
Subject: **Optimization Techniques**
Code: **550331 (20)**
Total Theory Periods: **40**
Total Tutorial Periods: **12**
Total Marks in End Semester Exam: **100**
Minimum number of class tests to be conducted: **02**

UNIT I: OPTIMIZATION TECHNIQUES
Basic Concepts and introduction of engineering optimization, single-variable optimization, Multivariable optimization with no constraints, equality constraints and inequality constraints.

UNIT II: LINEAR PROGRAMMING
Basic concepts of Linear programming, Applications of Linear Programming, standard forms of a Linear programming problems, solution of a system of linear simultaneous equations, Decomposition principle, Quadratic programming.

UNIT III: NON LINEAR PROGRAMMING
Basic concepts of Non-linear programming, Uni-modal function, Elimination methods, Interpolation methods, classification of unconstrained minimization methods- Direct search methods, Indirect search methods, characteristics of a constrained problem-Direct methods, Indirect methods.

UNIT IV: GEOMETRIC PROGRAMMING
Unconstrained minimization problem, constrained minimization, Applications of Geometric programming.

UNIT V: SPECIAL OPTIMIZATION TECHNIQUES
Separable programming, transformation of a non-linear function to separable form, multi objective optimization, calculus of variations, optimal control theory.

Text Books:

1. Rao S.S., Engineering Optimization Theory and Practice, New Age Publishers, Delhi
2. Deb K., Optimization for Engineering Design, Algorithms & examples, Prentice Hall of India, Delhi

Reference Books:

1. Arora J.S., Introduction to optimum Design, TMH, Delhi
2. Fox R.L., Optimization methods for Engineering Design, Addison Wesley Publishing

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M.E. IIII**
Branch: **Civil Engineering**
Subject: **Theory and Plates and Shells**
Code: **550332 (20)**
Total Theory Periods: **40**
Total Tutorial Periods: **12**
Total Marks in End Semester Exam: **100**
Minimum number of class tests to be conducted: **02**

UNIT I: BASIC CONCEPTS
The fundamental elasticity equations. Theory of elasticity and real structures. The fundamental elasticity problems. Boundary conditions. Compatibility equations. Applications.
Calculation of displacement components. The plane stress and plane strain problem.

UNIT II: ANALYSIS OF PLATES
Equation of equilibrium and deformation of plates, Bending of rectangular plates and circular plates.

Energy method, finite difference and finite element methods for solution of plate bending problems.

UNIT III: FOLDED PLATES
Analysis and design of folded plates, Detailing of Reinforcement in folded plates.

UNIT IV: ANALYSIS OF SHELLS
Geometry of shells, Classification of Shells, membrane theory of circular and cylindrical shells, Introduction to the bending theory of shells.

UNIT V: CYLINDRICAL SHELLS
Analysis and design of cylindrical shells, Detailing of Reinforcement in shells.

Text Books:
1. Timoshenko S.P. and Woinoswski-Krieger S., Theory of Plates and Shells. McGraw-Hill.
2. Gould Philipp L., Analysis of Shells and Plates. Springer Verlag New York.

Reference Books:
1. Reddy J. N.,Theory and Analysis of Elastic Plates. Taylor and Francis, London.
2. Szilard R., Theory and Analysis of Plates. Prentice-Hall, Englewood Cliffs.

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: **M.E. III**
Branch: **Civil Engineering**
Subject: **Pre-stressed Concrete**
Code: **550333 (20)**
Total Theory Periods: **40**
Total Tutorial Periods: **12**
Total Marks in End Semester Exam: **100**
Minimum number of class tests to be conducted: **02**

UNIT I: INTRODUCTION AND CODAL PROVISIONS

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

UNIT II: DESIGN PRINCIPLES

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

UNIT III: DESIGN OF COMPRESSION MEMBERS

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

UNIT IV: CONTINUOUS BEAMS

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

UNIT V: COMPOSITE BEAMS

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

Text Books:

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

Reference Books:

1. T.Y.Lin, Design of Prestressed Concrete Structures, John Wiley and Sons, Inc.
2. Evans, R.H. and Bennett, E.W., Prestressed Concrete, Champman and Hall, London.