SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)

SYLLABUS

For

MASTERS IN TECHNOLOGY

(STRUCTURAL ENGINEERING)

Course Code: MTCES

Department of Civil Engineering

Faculty of Engineering

Duration of Course: 2Year
Examination Mode: Semester
Examination System: Grading

Swami Vivekanand University, Sironja, Sagar (M.P.)

2016-2017

Swami Vivekanand University, Sagar(M.P.)

MTCES-0101 - Advance Mathematics

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0101	Advance Mathematics	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Numerical solution of Partial Differential Equation (PDE): Numerical solution of PDE of hyperbolic, parabolic and elliptic types by finite difference method.

Unit 2 **MARKS 14**

Integral transforms: general definition, introduction to Mellin, Hankel and Fourier transforms and fast Fourier transforms, application of transforms to boundary value problems in engineering.

Unit 3 **MARKS 14**

Integral equations: Conversion of Linear Differential equation (LDE) to an integral equation (IE), conversion of boundary value problems to integral equations using Green's function, solution of Integral equation, IE of convolution type, Abel's IE, Integro differential equations, IE with separable variable, solution of Fredholm Equation with separable kernels, solution of Fredholm and Volterra equations by method of successive approximations.

Unit 4 **MARKS 14**

Calculus of Variation: Functionals and their Variational, Euler's equation for function of one and two independent variables, application to enggneerin problems.

Unit-5 **MARKS 14**

FEM: Variational functionals, Euler Lagrange's equation, Variational forms, Ritz methods, Galerkin's method, descretization, finite elements method for one dimensional problems.

TEXT BOOKS:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
3. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH

Reference Books:

1. CF Froberg, Introduction to numerical analysis.
2. SS Sastry, Introductory methods of numerical analysis
3. Krasnove, Kiselevanded Makarenho, Integral equations
4. Buchanan, Finite element Analysis (schaum Outline S), TMH
5. Krishnamurthy, Finite element analysis, TMH
6. Numerical Methods in engineering, Salvadori and Baron
7. Theory and problems of Numeric analysis (Schaum Outline S), Schied, TMH

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MTCES-0102 - STRENGTH OF MATERIALS & THEORY OF ELASTICITY

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0102	STRENGTH OF MATERIALS & THEORY OF ELASTICITY	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Plane Stress & Plane Strain: Plane Stress, Plane Strain, Stress and Strain at a points, Differential equations of equilibrium, constitutive relation : ansisotropic materials Linear elasticity; Stress, strain, constitutive relations; Boundary conditions, Compatibility equation, stress function.

Unit 2 **MARKS 14**

Two Dimensional Problems in Rectangular Co-ordinates: Solutions by Polynomials ,Saint-VenantOsPrinciple, Determination of displacements, bending of beams, solution of two dimensional problemin Fourier series

Unit 3 **MARKS 14**

Two Dimensional Problems in Polar Coordinates : General equations in Polar coordinates, Pure bending of curved bars, displacements for symmetrical stress distributions, bending of curved bar, stress distribution in plates with circular holes, stresses in a circular disc general solution.

Unit 4 **MARKS 14**

Analysis of stress and strain in Three Dimensions : Principal stress and strain, shearing stress and strains, elementary equation of equilibrium , compatibility conditions, problems of elasticity involving pure bending of prismatic bars.

Unit 5 **MARKS 14**

Torsion of Prismatic Bars : Torsion of prismatic bars, membrane analogy, torsion of a bar of narrow rectangular cross section, torsion of rectangular bars, solution of torsional problem, torsion of rolled section, torsion of hollow shafts and thin tubes, torsion buckling torsional flexural buckling.

TEXT BOOKS:

1. IYENGER N.G.R., STRUCTURAL STABILITY OF COLUMNS & PLATES ".
2 . SOM BY R.K.BANSAL.

References :

1. TIMOSHENKO, S.P. , THEORY OF ELASTICITY
2. TIMOSHENKO, S.P., THEORY OF ELASTIC STABILITY

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MTCES-0103 - Advance Structural Analysis

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0103	Advance Structural Analysis	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

MatrixMethod (FlexibilityMethod) : Force methods, Basic Concepts, evaluation of flexibility, transformation, analysis of a single member of different types, transformation of single member.

Unit 2 **MARKS 14**

Applications to plane and space structures with pin joints and rigid joints, energy approach in flexibilitymethod, effect of support displacement and transformation

Unit 3 **MARKS 14**

Matrix Method (stiffness Method): Displacement methods, Basic concepts, Evaluation of stiffness coefficients, Direct stiffness method.

Unit 4 **MARKS 14**

Energy approach in stiffness method. Code No. approach for global stiffnessmatrix, effect of support displacement and temperature.

Unit 5 **MARKS 14**

Symmetrical & anti-symmetrical problems, Stiffness of plane & space frames solution of problems, comparison of force and displacementmethods of solution

TEXT BOOKS:

1. C.S. Reddy , Basic Structural Analysis ,TMH, Publishers
2. W Wearer Jr. & James M. Gere, Matrix Analysis of Framed Structures,CBS Pub.

REFRNCE BOOKS:

1. Rajsekeran, Sankarsubramanian, Computational structural Mechanics, PHI
2. Pandit, Structural Analysis: a matrix approach, TMH

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MTCES-0104 - Design of Concrete Structures

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory					Practical					
		L	T	P	C	Max (a)	Min (b)	MST (c)	TW(d)	Total (e = a+c+d)	Max (f)	Min (g)	LW (h)	Total (i= f+h)		
MTCES-0104	Design of concrete structures	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 MARKS 14

Earthquake and wind effects on structures, loads on structures, reinforced concrete design of flat slabs, grid floors, deep beams, design of buildingOs load bearing and framed structures, design of foundations, seismic analysis.

Unit 2 MARKS 14

Design of ground and elevated water tanks, design of bridge decks.

Unit 3 MARKS 14

Pre-stressed concrete: analysis and design of sections under flexure using limit state approach, anchorage zone and end block design,

Unit 4 MARKS 14

Composite construction, introduction to statistically indeterminate pre-stressed concrete structures.

Unit 5 MARKS 14

Silos and bunkers, JanseenOs and AiryOs theory, rectangular bunkers with sloping bottoms and with high side walls, battery of bunkers.

TEXT BOOKS:

1. Jaikrishna,Chandrasekaran, Elements of earthquake engineering.
2. Shah and Karve, Text book of reinforced concrete

REFRENCES:

1. Punamia, RCC designs
2. IS-456, -875, -1893, -1984
3. Krishna Raju, Prestressed concrete.
4. Varghese, Advanced RC Designs, PHI
5. Everard, Theory and problems of RC design (ShaumOs Outline S), TMH

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MTCES-0105 - Computer Aided Design

Course code	Title of the paper	Periods Per week				Distribution of Marks										Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)			
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)					
MTCES-0105	Computer aided design	3	1	-	4	70	28	20	10	100	-	-	-	-		100	3 Hrs

Unit 1 **MARKS 14**

1 Cpp programming language: Basics of programming, loops, decisions, structures, functions, objects/ classes, arrays.

Unit 2 **MARKS 14**

Overloading, inheritance, virtual functions and pointers, object oriented programming, Turbo Cpp features and programming.

Unit 3 **MARKS 14**

structure engineering problems programming.

Unit 4 **MARKS 14**

Computer Aided drafting, 2-D and 3-D drawings, Introduction to CAD software, drawing of buildings.

Unit 5 **MARKS 14**

Introduction to computer graphics, 3-D modeling software and analysis software.

TEXT BOOKS:

1. Robert Lafore, Object oriented programming in CPP
2. E. Balaguruswamy, Programming in C

REFRENCE BOOKS:

1. Syal and Gupta, Computer programming and engineering analysis.
2. AutoCAD, SolidEdge,Cadlab software and Manuals

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MTCES – 0106 LAB-I CONCRETE

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory					Practical					
		L	T	P	C	Max (a)	Min (b)	MST (c)	TW(d)	Total (e = a+c+d)	Max (f)	Min (g)	LW (h)	Total (i= f+h)		
MTCES -0106	CONCRETE	-	-	6	6	-	-	-	-	-	90	36	60	150	150	-

Unit 1

Cpp programming language: Basics of programming, loops, decisions, structures, functions, objects/ classes, arrays.

Unit 2

Overloading, inheritance, virtual functions and pointers, object oriented programming, Turbo Cpp features and programming, structure engineering problems programming.

Unit 3

Computer Aided drafting, 2-D and 3-D drawings, Introduction to CAD software, drawing of buildings.

Unit 4

Introduction to computer graphics, 3-D modeling software and analysis software

Reference Books:

1. Robert Lafore, Object oriented programming in CPP
2. E. Balaguruswamy, Programming in C
3. Syal and Gupta, Computer programming and engineering analysis.
4. AutoCAD, SolidEdge, Cadlab software and Manuals.

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MTCES-0107- LAB-II CAD

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0107	CAD	-	-	6	6	-	-	-	-	-	90	36	60	150	150	-

(A) Construction Materials: Unit-I

Stones : Occurrence, varieties, Characteristics and their testing, uses, quarring and dressing of stones. Timber : Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, Alternate materials for shuttering doors/windows, Partitions and structural members etc. Brick and Tiles: Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table, Flooring tiles and other tiles and their characteristics.

Unit-II

Advance Construction Materials : Use of fly ash in mortars, concrete, Fly ash bricks, stabilized mud blocks, non-erodible mud plinth, D.P.C. materials, Building materials made by
Industrial & agricultural waste, clay products P.V.C. materials, advance materials for flooring, doors & windows, facia material, interiors materials for plumbing, sanitation & electrification.

(B) Construction Techniques:

Unit-III

Foundation: Type of soils, bearing capacity, soil slablisation and improvement of bearing capacity, settlement and safe limits. Spread foundations, wall footings, grillage, foundations well foundation, causes of failure and remedial measures; under reamed piles, foundation on shrinkable soils, black cotton soil, timbering for trenches, dewatering of foundations. Hyperbolic parabolied footing, Brick arch foundation. Simple methods of foundation design, Damp proof courses, Repairs Techniques for foundations.

Unit-IV

Masonry and Walls : Brick masonry, Bonds, Jointing, Stone masonry, casting and laying, masonry construction, Brick cavity walls, code provisions regarding load bearing and non load bearing walls. Common defects in construction and their effect on strength and performance of walls, designed Brick masonry, precast stone masonry block, Hollow concrete block, plastering and pointing, white and color washing, distempering, dampness and its protection, Design of hollow block masonry walls. Doors, Windows and Ventilators: Types based on material etc., size location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames. Stairs types, rule of proportionality etc., Repairs techniques for masonry, walls, doors & windows.

Unit-V

Floors and Roofs : Types, minimum thickness, construction, floor finishes, Flat roofs,
RCC jack arch, reinforced brick concrete, solid slab and timber roofs, pitched roofs, false ceiling, roof coverings, Channel unit, cored unit, Waffle unit, Plank and Joist, Brick panel, L-Panel, Ferrocement roofing units, water proofing .Services : Water supply & Drainage, Electrification,
Fire protection, thermal insulation, Air Conditioning, Acoustics & Sound insulation, Repairs to damaged & cracked buildings, techniques and materials for low cost housing., Repairs techniques for floors & roofs.

References:

Grading IVth Semester w.e.f.2011-12
1. Mohan Rai & M.P. Jai Singh; Advance in Building Materials & Construction,.
2. S.C. Rangwala; Engineering Materials
3. Sushil Kumar; Building Construction,
4. B.C. Punmia; Building Construction ,.
5. Building Construction, Metchell
6. Construction Technology, Chudley R.
7. Civil Engineering Materials, N. Jackson.
8. Engineering Materials, Surendra Singh.

List of Experiments:

1. Tests on Bricks
2. Tests on Aggregates
3. Tests on Cement
4. Determination of compressive strength of concrete with different cement grades.
5. Determination of workability of concrete by slump test
6. Determination of workability by compacting factor apparatus.
7. Determination of workability by Vee Bee consistometer.
8. Nondestructive testing of concrete by Rebound hammer test
9. Nondestructive testing of concrete by ultrasonic Method.
10. Test for the effect of admixtures on the concrete compressive strength
11. Testing of microconcrete
12. Design of concrete mix.

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MTCES-0201 - STRUCTURAL DYNAMICS

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0201	STRUCTURAL DYNAMICS	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 MARKS 14

Single Degree of Freedom System: Free and forced vibrations, Linear Viscous Damper, Coulomb Damper: Response to harmonic excitation, rotating unbalance and support excitations, Vibration isolation and transmissibility, single degree of freedom system as vibro-meter and accelerometer, response to periodic and arbitrary excitation.

Unit 2 MARKS 14

Duhamel's integral. Impulse response function, Laplace transforms Fourier transform methods. Frequency response function. Phase-Plane Techniques. Critical Speed of rotors. Energy methods, RayleighOs method, Equivalent viscous damping.

Unit 3 MARKS 14

Two Degree of Freedom System. Matrix Formulation, Free Vibration, Beat phenomenon. Principle of damped and un-damped vibration absorbers.

Unit 4 MARKS 14

Multi Degree of Freedom System: Matrix formulation, stiffness and flexibility influence coefficients, eigenvalue problem, normal modes and their properties.Matrix iteration technique for eigenvalue, and eigen vectors, Free and forced vibration by modal analysis.

Unit-5 MARKS 14

Continuous System: Axial vibration of bar, torsion of shafts, transverse vibration of strings and bending vibration beams. Forced vibration. Normal mode method. LagrangleOs equation. Approximate methods of Rayleigh-Ritz, Galerkin etc.

TEXT BOOKS:

1. J M Biggs, Introduction to structural dynamic

Reference Books:

1.RW Clough, J Penzien, Dynamics of structures
2.D G Fertia, Dynamics and vibration of Structures

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MTCES-0202 - FEM IN STRUCTURAL ENGINEERING

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0202	Fem In Structural Engineering	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Introduction to Finite Element Method: General Applicability and Description of Finite Element Method Comparison with other methods.

Unit 2 **MARKS 14**

Solution of Finite Element Method: Solution of Equilibrium Problems, Eigen value problems, propagation problems, computer implementation of Gaussian eliminations, CholeskiOs decomposition, JocobiOs and Ranga Kutta Method.

Unit 3 **MARKS 14**

General Procedure of Finite Element Method: Descretization of the domain, Selection of Shapes, Types and Number of elements, node numbering technique, Interpolation Polynomials, their selection and derivation in terms of global and local coordinates, Convergence requirements. Formulation of Element Characteristic matrices and vectors, Variational approach. Assembly of Element matrices and Vectors and Derivation system equations, computation of element resultants.

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Unit 4 **MARKS 14**

Iso-parametric Formulation: Lagrange and Hermite interpolation functions, Isoparametric Elements, Numerical Integration.

Unit 5 **MARKS 14**

Static Analysis: Formulation of equilibrium equation, Analysis of truss, Frames, Plane Stress and Plane Strain Problems Plates and Shells.

Reference Books:

1.Weaver, Johnson, Finite element and structural analysis
2.HC Martin, Matrix structural analysis

TEXT BOOKS:-

1. CF Abel, CS Desai, Finite element methods
2. Buchanan, Finite element Analysis (schaumOutline S), TMH

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MTCES-0203- ADVANCED CONCRETE TECHNOLOGY

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0203	ADVANCED CONCRETE TECHNOLOGY	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Cement & its properties, properties of fresh concrete compaction of concrete, curing of concrete.

Unit 2 **MARKS 14**

Properties of hardened concrete, strength characteristic, shrinkage, creep, durability, fattier.

Unit 3 **MARKS 14**

Permeability& durability of concrete is detail. Special concrete and their properties.

Unit 4 **MARKS 14**

Concrete at low & high temp. Air entrained concrete, high performance concrete.

Unit 5 **MARKS 14**

Mix Design, Non destructive Testing of Concrete.

Reference Books:

1. A.M. Nobille, Concrete Technology , ELBS, London
2. M.L. Gambir, Concrete Technology, Tata Mc Graw Hill Book Co.

TEXT BOOKS:-

1. Peurifoy R.L., Construction Planning Equipment & Methods, TMH
2. Verma Mahesh, Construction Equipments and its Planning & Application,Metropoliton Book Company N.Delhi.

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MTCES-0204- EXPERIMENTAL STRESS ANALYSIS

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0204	Experimental Stress Analysis	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Introduction to stress analysis by strain measurement, mechanical strain gages, Moire fringe method, Brittle coatings for stress indication, circuitry for resistance strain gages, calibrating strain gages, temperature compensation of circuitry, indication and recording equipments, unbalance of bridge systems, balanced bridge Systems, reference bridge systems, constant current strain indicators, multichannel Recording systems.

Unit 2 **MARKS 14**

Introduction to stress analysis by photo elasticity, optical theory, stress optical relationship, equipment and models, static stress analysis (2-D, 3-D techniques), stress analysis by photo elastic strain gages.

Unit 3 **MARKS 14**

Conditions for crack growth, fracture mechanics and strength of solids, stress and Displacement fields in the vicinity of crack tip, the Griffith Orowan-Irwin concept, Stable and unstable crack growth, the integral variation principle in crack theory, Some more model representations, cracks in linearly elastic bodies.

Unit 4 **MARKS 14**

Stress intensity factor, basic numerical methods for calculating the stress intensity factor, calculation of stress intensity factor for double cantilever beam specimen by FEM.

Unit 5 **MARKS 14**

Solution of some plane and three dimensional problems, constructional crack arrest, system of cracks, stress intensity factors for some practical important cases, shell with a crack trajectory.

REFERENCE BOOKS:

1. Dove, Adams, Experimental stress analysis and motion
2. Heteny, Experimental stress analysis

TEXT BOOKS:-

1. Dally, Rilay, Experimental stress analysis
2. VZ Panon, M Morozove, Elastic-plastic fracture mechanics

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MTCES-0205 - THEORY OF PLATES & SHELLS

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory					Practical					
		L	T	P	C	Max (a)	Min (b)	MST (c)	TW(d)	Total (e = a+c+d)	Max (f)	Min (g)	LW (h)	Total (i= f+h)		
MTCES-0205	THEORY OF PLATES & SHELLS	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

Unit 1 **MARKS 14**

Theory of Plates: Bearing of long rectangular plates to the cylindrical surface with different edge conditions. Pure bending of plates-Differential equations of equilibrium.

Unit 2 **MARKS 14**

Theory of small deflections of laterally loads plates. Boundary conditions,momentcurvature relationship.

Unit 3 **MARKS 14**

Analysis of rectangular plates, Napier's and levy solutions, exact theory of plates, symmetrical bending of circular plates, continuous rectangular plates

Unit 4 **MARKS 14**

Special and approximate methods of theory of plates, singularities, use of influence surfaces, use of infinite integrals and transforms, strain energy methods, experimental methods.

Unit 5 **MARKS 14**

Theory of Shells: Classification of shells, Gaussian curvature, General theory of cylindrical shells, membrane theory and bending theory for cylindrical shells, long and short shells, shells, shells with and without edge beams, Fourier loading.

TEXT BOOKS:

1. S Timoshenko, SWoinowaskyK, Theory of Plates and Shells

REFRENCE BOOKS:

1. S Timoshenko,SWoinowaskyK, Theory of Plates and Shells

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MTCES – 0206 LAB-II (INSTRUMENTATION)

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES -0206	LAB-II (INSTRUMENTATION)	-	-	6	6	-	-	-	-	-	90	28	60	150	150	3 Hrs

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MTCES-0207- LAB-IV (STRUCTURAL SOFTWARE ENGINEERING)

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0207	Lab-Iv (Structural Software Engineering)	-	-	6	6	-	-	-	-	-	90	28	60	150	150	3 Hrs

Unit 1

Cpp programming language: Basics of programming, loops, decisions, structures, functions, objects/ classes, arrays.

Unit 2

Overloading, inheritance, virtual functions and pointers, object oriented programming, Turbo Cpp features and programming, structure engineering problems programming.

Unit 3

Computer Aided drafting, 2-D and 3-D drawings, Introduction to CAD software, drawing of buildings.

Unit 4

Introduction to computer graphics, 3-D modeling software and analysis software

Reference Books:

1. Robert Lafore, Object oriented programming in CPP
2. E. Balaguruswamy, Programming in C

TEXT BOOKS:-

3. Syal and Gupta, Computer programming and engineering analysis.
4. AutoCAD, SolidEdge, Cadlab software and Manuals.

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(ELECTIVE I) MTCES-0301(A)
Advanced FEM and Programming

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0301(A)	Advanced FEM and Programming	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

UNIT 1. **MARKS 14**

Iso-parametric formulation for plate and shell elements; various types of elements ; Hybrid elements.

UNIT 2. **MARKS 14**

FEM in dynamic problems, consistent mass matrix; Vibration of bars, beams and plate elements.

UNIT 3. **MARKS 14**

FEM in buckling problems, geometric matrix, buckling of struts and plate elements.

UNIT 4. **MARKS 14**

Structural modeling by FEM for structures such as shear walls, core walls, bridges and cooling towers.

UNIT 5. **MARKS 14**

Computational aspects; interpretation of results; comparision with other methods.

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MTCES-0301(B) Advanced Foundation Engineering

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0301(B)	Advanced Foundation Engineering	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

UNIT 1 **MARKS 14**

Deep Open Cuts: Introduction, Types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, interlock stresses. Soil Exploration: Introduction, Methods of exploration, Direct Methods and techniques of exploration, Methods of boring types of samples, Disturbance of soil sample, Soil samplers and sampling techniques, Ground water observations, Boring records, Spacing and depth of bore holes, Indirect methods of soil exploration, Penetration tests, Geophysical methods, Dynamics methods, Sequence of exploration programs.

UNIT 2 **MARKS 14**

Shallow Foundations: Introduction, General Requirements, Depth of foundation, Bearing capacity, Eccentric Inclined loads, Bearing capacity of stratified soils, Settlement of footings, Settlement of footings from constitutive laws, Settlement and tilt of eccentrically loaded footings, Allowable settlement, Plate bearing test, Standard penetration test Effect of water table, shallow foundation classification, Modulus of sub-grade reaction, Beams on elastic foundation, Raft foundation.

UNIT 3 **MARKS 14**

Pile Foundation: Introduction, Uses of piles, Types of piles, pile drivers, Bearing capacity of piles, Static analysis, Pile load test, Dynamic methods, Other methods, 24 Negative skin friction, Pile group, Ultimate bearing capacity of pile groups, Settlement of pile group,Influence of pile cap. Laterally loaded piles, Ultimate resistance, Elastic methods, Pile groups under lateral load, batter pile under lateral load, Batter pile groups under inclined loads, pile under dynamic loads.

UNIT 4 **MARKS 14**

Coffer Dams: Introduction, types of Coffer Dams, Design data for cellular cofferdam, Stability analysis of cofferdam, Interlock stresses.

UNIT 5 **MARKS 14**

Machine Foundations : Introduction, Criteria for satisfactory action of a machine foundation,Definitions, Degrees of freedom of a block foundation, Analysis of block foundation, Theory of linear weightless spring, Equivalent soil springs, Vertical vibration, Rocking vibration,Vibration in shear, Simultaneous rocking sliding and vertical vibrations for a foundation,Indian standard on design and construction of foundations for reciprocating machines,Foundations for impact type machines, Indian Standard on design and construction of foundations for impact type machines, Analysis of block foundation based on elastic half space theory

TEXT BOOKS:

1. Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.
2. Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , NewYork

Reference Books

1. Krishna Raju, Prestressed concrete.
2. Varghese, Advanced RC Designs, PHI

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(ELECTIVE II) MTCES-0302(B)
Stability Theory in Structural Engineering

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0302(B)	Stability Theory in Structural Engineering	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

UNIT 1 **MARKS 14**

Concepts of Stability, Euler Buckling Load, Critical Load of Laced, Battened and Tapped columns, Inelastic Buckling of column.

UNIT 2 **MARKS 14**

Torsional Buckling, Torsional Flexural Buckling.

UNIT 3 **MARKS 14**

Lateral Instability of Beams, Beam Columns.

UNIT 4 **MARKS 14**

Local Buckling and post buckling behaviour of plates.

UNIT 5 **MARKS 14**

Application of Energy method and matrix method in stability problems.

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MTCES-0302(B) Design of Tall Structures

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0302(B)	Design of Tall Structures	3	1	-	4	70	28	20	10	100	-	-	-	-	100	3 Hrs

UNIT 1 **MARKS 14**

Behavior of tall structures under static and dynamic loads, model analysis.

UNIT 2 **MARKS 14**

Characteristics of Wind and Earthquake Forces. Gust Factor and Karman Vortices. Approximate and Regorlons Methods of analysis for wind and Earthquake Forces.

UNIT 3 **MARKS 14**

Shear walls, Frame Structures, Coupled shear walls, Tabular Structures, Ductility and reinforcement details at joint.

UNIT 4 **MARKS 14**

Criteria for design of Chimneys, T.V. Towers and other Tall Structure

UNIT 5 **MARKS 14**

Modeling of tall structures, case studies.

TEXT BOOKS:

1 Bowles, Foundation: Analysis and Design, McGraw Hill Book CO. Inc.

2 Peck , R.B. , W.E. Hanson and T.H. Thornburn, Foundation Engineering, Wiley , NewYork

Reference Books

1 Ranganathan, R. Reliability Analysis and Design of Structures, TMH
2. Rao. S.S. Reliability Based Design , McGraw Hill Book CO. Inc.
3. Ghosh , D.I., A Primer of Reliability Theory, john Wiley , New York
4. Lewis, E.E., Introduction to Reliability Engineering , John Wiley New Y

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MTCES-0303 Project

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0303	Project	-	-	4	4	-	-	-	-	-	100	30	-	100	100	-

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MTCES-0304 Dissertation Part-I
(Literature Review/Problem Formulation/Synopsis)

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES-0304	Dissertation Part-I	-	-	8	8	-	-	-	-	-	120	48	80	200	200	

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MTCES-0401 Dissertation Part-II

Course code	Title of the paper	Periods Per week				Distribution of Marks									Grand Total (j= e+i)	Duration of Exam
						Theory		MST (c)	TW(d)	Total (e = a+c+d)	Practical		LW (h)	Total (i= f+h)		
		L	T	P	C	Max (a)	Min (b)				Max (f)	Min (g)				
MTCES -0401	Dissertation Part-II	-	-	20	20	-	-	-	-	-	300	120	200	500	500	-