Syllabi Book

For Post Graduate Course

Department of Civil Engineering
Faculty of Technology
Dharmsinh Desai University
Nadiad – 387 001, Gujarat, India.
http://www.ddu.ac.in

COURSE STRUCTURE

FOR POST GRADUATE PROGRAM IN CIVIL-STRUCTURAL ENGINEERING

w.e.from 2010-11

Legend:		COMMON

SEM.	Sr. No.	CODE No.	SUBJECT	WORK LOAD		MARKS					CREDIT STRUCTURE		
				Th	T/L	Th	Sess	TW	Pract	Total	L	P	Total
Sem-I	1	MS 134	Advanced Structural Mechanics	3	1	60	40	25	25	150	3	0.5	3.5
	2	MS 139	Advanced Foundation Engineering	3	0	60	40	-	-	100	3	0	3
	3	MS 137	Num. Methods & Applications to Structural Engg.	1	4	-	-	50	100	150	1	2	3
	4	MS 140	Finite Element Methods	3	0	60	40	-	-	100	3	0	3
	5	MS 138	Structural Design Practice – I	1	4	-	-	50	100	150	1	2	3
	6	MS 136	Seminar-1	0	2	-	-	50	-	50	0	1	1
			TOTAL	**11**	**11**	**180**	**120**	**175**	**225**	**700**	**11**	**5.5**	**16.5**
Sem-II	1	MS 238	Applications of Plates and Shell & Str. Stability.	3	1	60	40	25	25	150	3	0.5	3.5
	2	MS 234	Dynamics and EQ Engineering	3	1	60	40	25	25	150	3	0.5	3.5
	3	MS 243	Soil Structure Interaction	3	0	60	40	-	-	100	3	0	3
	4	MS 237	Structural Design Practice – II	1	4	-	-	50	100	150	1	2	3
	5	MS 236	Seminar-2	0	2	-	-	50	-	50	0	1	1
	6		Elective Paper :	3	1	60	40	25	25	150	3	0.5	3.5
		MS 242	1. Prestressed Concrete										
		MS 239	2. Advanced Concrete Technology										
		MS 240	3. Bridge Engineering										
		MS 241	4. Structural Optimization & Reliabli										
			TOTAL	**13**	**9**	**240**	**160**	**175**	**175**	**750**	**13**	**4.5**	**17.5**
Sem-III	1	MS 311	Dissertation based on Research Work or based on Field Data Part-1		15			**125**	**225**	**350**			8
	2	MS 312	Seminar -3		4			**50**					2
			TOTAL		**19**			**175**	**225**	**350**			**10**
Sem-IV	1	MS 411	Dissertation based on Research Work or based on Field Data Part-2		15			**150**	**300**	**450**			10
	2	MS 412	Seminar -4		4			**50**					2
			TOTAL		**19**			**200**	**300**	**450**			**12**

COURSE STRUCTURE FOR

POST GRADUATE PROGRAM IN CIVIL-GEOTECHNICAL ENGINEERING

wef 2010-11

Legend:		COMMON

SEM.	Sr. No.	CODE No.	SUBJECT	WORK LOAD		MARKS					CREDIT STRUCTURE		
				Th	T/L	Th	Sess	TW	Pract	Total	L	P	Total
Sem-I	1	MG 105	Soil Engineering – I	3	1	60	40	25	25	150	3	0.5	3.5
	2	MS 139	Advanced Foundation Engineering	3	0	60	40	-	-	100	3	0	3
	3	MG 107	Num. Methods & Applications to Geotechnical Engg.	1	4	-	-	50	100	150	1	2	3
	4	MS 140	Finite Element Methods	3	0	60	40	-	-	100	3	0	3
	5	MG 108	Subsurface Explorations and Geotechnical Testing Practice	1	4	-	-	50	100	150	1	2	3
	6	MG 109	Seminar-1	0	2	-	-	50	-	50	0	1	1
			TOTAL	**11**	**11**	**180**	**120**	**175**	**225**	**700**	**11**	**5.5**	**16.5**
Sem-II	1	MG 213	Soil Engineering – II	3	1	60	40	25	25	150	3	0.5	3.5
	2	MG 217	Soil Dynamics & EQ Geotechnical Engg.	3	1	60	40	25	25	150	3	0.5	3.5
	3	MG 221	Reinforced Earth and Geotextiles	3	0	60	40	-	-	100	3	0	3
	4	MS 243	Soil Structure Interaction	3	0	60	40	-	-	100	3	0	3
	5	MG 216	Seminar-2	0	2	-	-	50	-	50	0	1	1
	6		Elective Paper	3	1	60	40	25	25	150	3	0.5	3.5
		MG 218	1. Environmental Geotechnology										
		MG 219	2. Rock Mechanics										
		MG 220	3. Geophysical Explorations										
		MG 214	4. Earth Dam Engineering										
			TOTAL	**15**	**5**	**300**	**200**	**125**	**75**	**700**	**15**	**2.5**	**17.5**
Sem-III	1	MG 311	Dissertation based on Research Work or based on Field Data Part-1		15			**125**	**225**	**350**			8
	2	MG 312	Seminar -3		4			**50**					2
					19			**175**	**225**	**350**			**10**
Sem-IV	1	MG 411	Dissertation based on Research Work or based on Field Data Part-2		15			**150**	**300**	**450**			10
	2	MG 412	Seminar -4		4			**50**					2
			TOTAL		**19**			**200**	**300**	**450**			**12**

MS 134 - ADVANCED STRUCTURAL MECHANICS

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Review of concepts: basic concepts of structural analysis; basis for principal of virtual work; principal of virtual force-standard and matrix formulation; force method for analyzing skeletal structures; principle of virtual displacements – standards and matrix formulation; displacement method for analyzing skeletal structures; Extension of displacement method to the generalized stiffness method; basic concepts associated with computer implementation of stiffness method.
One dimensional beam element: Basis for cross-sectional level formulation of flexibility and stiffness: Guass-Quadrature Numerical Integration scheme: Flexibility approach for determining elements stiffness; Stiffness approach for determining element stiffness; special consideration of shear effects in stiffness approach; Consideration of torsional effects for thin walled member – inclusive of torsional bending; special considerations for finite joints (both rigid and flexible);consideration of local load (inclusive of temperature) effects; formulation of geometric stiffness due to axial force; linearised buckling analysis.
Simplification to reduce computational efforts in analysis: sub-structure analysis (static condensation) symmetry considerations in structures.

Books:

1. Matrix Analysis of Framed Structure - Gere & Weaver
2. Structural Analysis - Ghali & Nevelle
3. Computer Analysis of Structural Systems - Fleming J.F.
4. Non-linear Structures - Majid

MS 139 - ADVANCED FOUNDATION ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	0	60	40	0	0	100	3	0	3

Planning of subsoil exploration of mojor civil engineering projects, sampling methods interpretation on field and laboratory data, plate load and pile load tests, exploration of test data for actual foundations, shallow and deep footings, design of isolated and combined footing, proportioning of footings for equal settlement, various methods of craft design, floating foundations, analysis and design of pile foundation, raker piles, bored piles. Negative skin friction in piles, group action in piles, design of piles cap foundation subjected to eccentric loads, pull-out resistance of foundation structures, theory of subgrade reaction, anchored bulkheads, cassions and cofferdams, well foundation.

Books:

1. Analysis and design of foundation - J. Bowles
2. Soil mechanics & foundation engg. vol-II - V.N.S. Murthy
3. Principles of foundation Engg. - Braj Das
4. Foundation Engineering - M.J. Tomlinson

MS 137 - NUMERICAL METHODS & APPLICATIONS TO STRUCTURAL ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
1	4	-	-	50	100	150	1	2	3

Advanced Matlab Applications for :

Solution of non – linear algebraic equations, , numerical solutions of ordinary differential equations and partial differential equations, its applications to structural engineering problems. Solution of Eigen value problems, iterative methods & transformation methods. Use of software for transformation methods. Computer oriented algorithms

Correlation and regression, Principles of least squares
Euler's equation -Functional dependant on first and higher order derivatives

Laplace transform methods, Laplace equation -Properties of harmonic functions -Fourier transform methods for Laplace equation.

Application : Excel spread sheets for the design of (1) Structural elements like slabs, beams, columns, isolated, combined and raft footings, steel connections and members etc. Software Usage: Modeling, analysis and design using professional software like STAAD, STRAP, STRUDS, RISA 3D as Group exercise

Reference Books:

1) Numerical Methods for Engineers — Chapra and Canane
2) Numerical methods in Engineering — Salvadori & Baron

MS 140 - FINITE ELEMENT METHOD

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	0	60	40	-	-	100	3	0	3

Linear elasticity; stress, strain ,constitutive relations; Boundary conditions; Description of an elasticity problem as a boundary value problem, Plane stress, strain, axial symmetric problems. Introduction to plasticity, Yield condition; ideal elasto-plastic material. Principles of Discretization, element stiffness mass formulation based on direct, variation principles, hybrid stress and mixed approaches, shape functions and numerical integration, convergence; Displacement formulations for rectangular and isoperimetric elements for two dimensional and axi-symmetric stress analysis.

Reference Books:

1. Finite Element Analysis - Krishnamurthy
2. Finite Element Method - Desai & Ables
3. The Finite Element Method - Rockey, Evans & others
4. The Finite Element Method - Zienkiewicz
5. Concepts and Application of Finite Element Analysis - Cook

MS 138 - STRUCTURAL DESIGN PRACTICE – I

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
1	4	-	-	50	100	150	1	2	3

Loads on structures: Earthquake forces on Frames.
Reinforced concrete:
Complete design and structural detailing of structures, viz.

Design of grid floors, deep beams, Design of shear wall, Design of material retaining structures, silos, bunkers, Water Tanks, Chimney, Multistory buildings, Earthquake Resistant Design, machine foundation

Check for serviceability limits, analytical calculations for deflection, crack width, fire resistance, Detailing of RC Structures.

Books:

- Manual of Limit State Design, Variyani and Radhaji, CBS Publishers, New Delhi
- Reinforced Concrete Design. – Pillai & Menon
- Elements of earthquake engineering - Jaikrishna & Chandrasekaran
- Illustrated Design of G + 3 Building - Shah & Karve
- Advanced R.C. Design - Krishna Raju
- Plain & Reinforced Concrete Vol. II - Jain & Jaikrishna

MS 238 - APPLICATIONS OF PLATES AND SHELLS AND STRUCTURAL STABILITY

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Thin plate: small deflection theory, plate equation. Applications of Navier's solution, Levy's solution, Tables & Charts for solution of rectangular and circular plates with,

Shell behaviour, shell surfaces and characteristics, classification of shells equilibrium equations in curvilinear co-ordinates. Stress-strain & force displacement relations. Membrane analysis of shells of revolution and cylindrical shells under different loads.
Applications of membrane solution of elliptic paraboloids and hyperboloids. Solution of some typical problems.

Concept of stability, static dynamic and energy criterion of stability, flexibility and stiffness criteria, buckling, snap-through and post-buckling, Applications of solutions for for stability of columns, beams, Beams – Column, plates and simple shells. Stiffness, methods applied to stability problems.

Books:

1. S.P.Timoshenko and Woinowsky-Krieger, Theory of Plates and shells. Mcgraw Hill Internal, New Delhi.
2. W.T. Marshall, Design of cylindrical shell roofs, E and N Spon, London
3. Design & construction of concrete shell roofs - Ramaswamy, G. S.
4. Buckling of bars, plates and shells Don O. Brush and B. O. Almorth
5. Theory of elastic stability S. P. Timoshenko and J.M. Gere
6. Buckling of bars, plates and shells Don O. Brush and B. O. Almorth
7 Theory of elastic stability S. P. Timoshenko and J.M. Gere

MS 234- DYNAMICS AND EARTHQUAKE ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

SDOF Systems: Equation of motion, free vibration, harmonic load, evaluation of damping, periodic load, general load (time-domain, frequency domain) response spectrum load.
MDOF systems: Structural matrices, undamped free vibrations; generation of damping matrix; mode superposition analysis; practical considerations.
Characterisation of ground motion; earthquake intensity and magnitude; recording instruments and baseline correction; predominant period and amplification through soil; Earthquake spectra for elastic and in-elastic systems, idealization of structural systems for low, medium and high rise building; effect of foundation/soil on earthquake response; Codal provisions.

Books:

1. Dynamics and Vibration of Structures - Demeter G.Fertis
2. Introduction to Structural Dynamics - John M.Biggs
3. Structural Vibrations - Theory and - Mario Paz Computation
4. Structral Dynamics - Clough & Penzien
5. Elements of earthquake engineering - Jaikrishna & Chandrasekaran

MS 243 - SOIL STRUCTURE INTERACTION

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	0	60	40	-	-	100	3	0	3

Critical study of conventional methods of foundation design; Nature of complexities of soil structure interation; Application of advanced techniques of analysis such as the finite element method, finite differences, relaxation and interation for the evalution of soil-structure interaction for different types of structures under various conditions of loading and subsoil characteristics; Preparation of comprehensive design oriented computer programs for specific problems. Interaction problems based on the theory of sub-grade reaction such as beams, footings, rafts bulkheads etc, Analysis of different types of framed structures founded on stratified natural deposits with linear and non-linear stress-strain characteristics.
Determination of axial and lateral pile capacities; group action of piles considering stress-strain characteristics of real soils.

Books:

1 Analysis and design of foundation - J. Bowles
2 Numerical Methods in Geotechnical Engg. - Desai & Christian

MS 237 - STRUCTURAL DESIGN PRACTICE – II

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
1	4	-	-	50	100	150	1	2	3

Connection design, Beam Columns,
Complete design and structural detailing of structures, viz. Water tanks, Chimney, Steel bridges, Multi-storeyed buildings, Industrial building, Godowns, cantilever sheds, platform roofs, Towers, Transmission Line Towers etc.
Plastic design of continuous beam and portal frames,
Introduction and applications of Cable Structures
Use of cold form sections, Castellated beams, light metal structures, stability of portal frames

Books:

1. K. Mukhanov, Design of Metal structures.
2. B.Bresler, T.Y lin and JB Scalzi, Design of steel structure.
3. Design of Steel Structures – Arya Ajmani
4. Design of Steel Structures Vol-1 & 2 – Ramchandran
5. Design of Steel Structures – N. Subramanian

MS 242 - PRESTRESSED CONCRETE

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Prestressing concepts, materials, systems of prestressing and losses. Introduction to working stress method, limit state analysis and design of members for bending. Shear torsion and forces. End block design. Deflections, use of relevant codes of practice.

Books:

1. Design of Prestressed Concrete Structures.
2. Design of Prestressed Concrete Structures – Krishna Raju
3. Limit State Design of Prestressed Concrete Structures – Mallick & Gupta

MS 239 - ADVANCED CONCRETE TECHNOLOGY

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Cement : Hydration, chemistry and microstructure of cement paste, special cement
Microstructures of concrete : Interfacial transition zone, Structure-property relationships.
Chemical and mineral admixtures in concrete :
Types, Mechanism, Application.
Properties of hardened concrete :
Strength, stress-strain behaviour, Dimensional stability, Fracture mechanics and concrete failure mechanisum.
Mix Design :
Concrete mix design (IS,ACI, BS)
Concrete Durability :
Physical deterioration(abrasion, erosion, cracking) Chemical attack (sulfates/seawater/acid), Corrosion, Durability improvement measures.
Testing and quality assurance of concrete :
Testing of fresh concrete, Destructive and non-destructive evaluation of hardened concrete, statistical quality control.
Special concrete :
Cement and polymer concrete compositions, Self-compacting concrete, Ready mixed concrete, High performance concrete.

Books:

1.Concrete technology, ELBS Punlication A,N. Nevile, J.J. Brooks
2. Micro Concrete – P. Kumar Mehta

MS 240 - BRIDGE ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Loading Standards.
Design of Balanced Cantilever Bridge.
Design of Bow String Girder Bridge.
Design of prestressed concrete girder and box girder bridges considering only primary torsion.
Design of end block.
Bridge Bearing: Types of Bearings, Elastomeric bearing.
Piers, Abutments, Wing walls factors effecting and stability. Well foundations. Design of well, Construction, open sinking of walls, Plugging, sand filling and casting of well cap.

Books:

1.V.K. Raina, Concrete Bridges practice Analysis. Design and Economics, Shroff Publishers, New Delhi, 2nd Ed. 2005.
2.Vazirani, rarwani and Aswani, Design of Concrete Bridges, Khanna Publishers, 2nd Es. 2008.

MS 241 - STRUCTURAL OPTIMIZATION AND RELIABILITY

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Introduction to optimization, optimization techniques for unconstrained and constrained optimization problems, Classical Optimization, Lagrange Multiplier technique and Kuhn – Tucker conditions, Solution of NLP by direct methods and by series of unconstrained optimization problems, formulation of different types of structural optimization problems.
Computation of derivatives of response quantities with respect to design variables.
Minimum weight design of trusses, frame, etc.

Concept of Structural safety, design methods, basic statistics, probability Theory, statistics for concrete and steel properties, probabilistic analysis of loads
Basic structural reliability Monte Carlo method, level 2 reliability, reliability based design and reliability of simple structural systems

Books:

1. Arora J.S , Introduction to optimization, MGH(Int,Ed.),1989
2. Rao S.S, Optimization: Theory and applications , Wiley Eastern,1992
3. Optimization theory & application S. S. Rao
4. Structural optimization Majid
5. Advanced mathematics Kresysig
6. Foundation of structural optimization Marris

MG 105 - SOIL ENGINEERING-I

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Idealized concept soil based on practice size, orientation, crystal structure, electrical imbalance etc. Soil water, consistency, viscosity, Stock's law, Concept of effective diameter, Basic concept of flow through porous media; Darcy's law its limitation for use in real soils; Threshold gradient, governing differential equation for anisotropic media; Effective stress and neutral stress concepts; Suction potential and capillary flow; Description of state of stress and strain at a point; Development of rheological models and equation of state for soils. Stress distributions, Problems in elastic half-space; Familiarity with Westergard's Burmister's and Midline's problems; Distribution of contact pressure; Fundamental concepts of consolidation; Primary and secondary compression, One two and three dimensiopnal problems; Consolidation of partially saturated soils; Settlement computations.

Books:

1. Soil Mechanics – D. W. Taylor
2. Soil Engieering – M. G. Spangler
3. Soil Mechanics – Means & Parcher
4. Advanced Soil Mechanics – B. M. Das

MG 107 – NUMERICAL METHODS & APPLICATIONS TO GEOTECHNICAL ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
1	4	-	-	50	100	150	1	2	3

Advanced Matlab Applications for :

Solution of non – linear algebraic equations, , numerical solutions of ordinary differential equations and partial differential equations, its applications to structural engineering problems. Solution of Eigen value problems, iterative methods & transformation methods. Use of software for transformation methods. Computer oriented algorithms

Correlation and regression, Principles of least squares
Euler's equation -Functional dependant on first and higher order derivatives

Laplace transform methods, Laplace equation -Properties of harmonic functions -Fourier transform methods for Laplace equation.

Application : Excel spread sheets for the design of shallow foundations, laboratory testing applications, settlement calculations, pile foundations etc.
Use of software for Report preparation in subsurface explorations.
Software Usage: Applications of Geo4, Z-soil, Plaxis, STAAD, STRAP etc. for Soil Structure Interaction and foundation design problems.

Reference Books:

1) Numerical methods in Engineering — Salvadori & Baron
2) Numerical Methods in Finite Element Analysis — Bathe & Wilson
3) Numerical Analysis — Scarborough
4) Numerical Methods in Geotechnical Engg. — Desai C.s. and Christian
5) Foundation Design — Bowles J. E.

MG 108 - SUBSURFACE EXPLORATION AND GEOTECHNICAL TESTING PRACTICE

Sr. No.	WORK LOAD		MARKS					CREDIT STRUCTURE		
	Th	T/L	Th	Sess	TW	Pract	Total	L	P	TOTAL
1	1	4	-	-	50	100	150	1	3	4

For Soil as well as Rock : Problems and phases of foundation investigations, Soundings and drilling, sample requirements, sampling, methods and equipments, Handling, preservation and Transportation of samples, sample preparation, laboratory tests, Insitu testing, analysis of the data and interpretations, Reporting.

Books:

1.Head, H.K Manual of laboratory testing: Vol: 1 to 3,1981
2.Compedium of Indian standards on soil Engineering part I and II, 1987,1988.

MG 213 - SOIL ENGINEERING-II

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Shear strength of cohesionless and cohesive soils, physic-chemical aspects, experimental determination of shear strength, failure theories yield criteria. Influence on failure conditions of intermediate principal stress, history, drainage; rate of stress applications ets; Platic equilibrium in soils, Mohr diagram, active and passive states, theories of earth pressure on retaining walls, effect of wall friction on the shape of sliding surface, theories of arching, bearing capacity, concepts of general and local shear failure, critical height of vertical banks, various methods of computation of slope stability, earth pressure on temnering of cuts and on free and anchored bulkheads.

Books:

1 Theoretical Soil Mechanic – Karl Terzaghi
2 Advanced Soil Mechanics – B. M. Das
3. Soil Mechanics - Whitlow

MG 217 - SOIL DYNAMICS AND GEOTECHNICAL EARTHQUAKE ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Elements of Soil Dynamics, Free and forced vibrations with and without damping for single degree of freedom. Natural frequency of foundation soil system – Barken, Pressure bulb concept, Pauw's analogy and Vibration isolation.
Wave Propagation: Waves in elastic half space, Elements of seismic methods, Steady state vibrations, Influence of soil condition on shaking intensity and associated structural damage and land slides.
Elastic Properties of Soil: Field and laboratory methods, Stress strain characteristics of soil under dynamic loads, damping properties, bearing capacity of soil under dynamic loads by pseudo static analysis.
Liquefaction and Ground Improvement: Mechanism, Laboratory methods, Evaluation of liquefaction in the field, Factors affecting liquefaction, Anti liquefaction measures, Ground improvement in cohesionless soils – Dynamic compaction, Vibrofloatation, Blasting, Compaction piles and Grouting.
Seismic bearing capacity of foundations and seismic earth pressure.

Books:

1. Richart, F.E., Wood, R. D. and Hall, J. R., Vibrations of Soils and Foundations, Pentice Hall, 1970
2. Steven, Kramer, Geotechnical Earthquake Engineering, Pearson Education, 2003
3. Day, Robert, W, Geotechnical Earthquake Engineering Hand Book, Mc Graw Hill – 2002.

MG 221 - REINFORCED EARTH AND GEOTEXTILES

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	0	60	40	-	-	100	3	0	3

Basic introduction to the elements of ground engineering characteristics of reinforcing materials, definition of reinforced and advantage of RE, Soil reinforcement interaction, behaviour of reinforced earth walls, basis of wall design, the coulomb force method, the rankine force method, internal and external stability condition, field application of RE, randomly reinforced earth and analysis of reinforced soils, testing of soil reinforcements.

Definitions, functions, properties and application of geotextiles, design of geotextile applications, definations, functions, properties and application of geo membranes, design of geo membranes applications, geo textiles associated with geo membranes, testing on geo textiles, environmental efforts, ageing and weathering.

Books:

1. Reinforced Earth & Geotextiles : Koerner
2. Reinforced Earth & Geotextiles : G. V. Rao

MG 218 - ENVIROMENTAL GEOTECHNOLOGY

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Introduction to environmental geotechniques, source, production and classification of wastes; soil-pollution interaction, effects of pollutant on soilproperties, foundation problems on contaminated clays, hazardous waste management, criteria for selection of sites for waste disposal facilities, subsurface disposal techniques, passive containment systems, monitoring and performance of waste facilities.

Books:

Proceeding of the Workshop on Geotechnical Hazardous Waste Management at DDU Nadiad

MG 219 - ROCK MECHANICS

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Classification of inferential testing, transitional materials, engineering property evaluation; laboratory methods and insitu tests, friction in rocks, elasticity and strength of rocks, insitu stress determination, application of rock mechanics in engineering and underground openings, slope stability and foundation problems.

Books:

1. Goodman, F. E., Rock Mechanics, John Wiley & sons, 2nd Ed, 1982
2.Ohn, A. Franklin and Maurice B. Dusseault, Rock Engineering, Mc Graw Hill – N.Y., 1989.

MG 220 - GEOPHYSICAL EXPLORATIONS

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Unit 1: Introduction,
An overview of geophysical methods of exploration; classification – major /minor; artificial / natural; applications and limitations, need for integrated surveys.
Physical properties, rocks-density, susceptibility, resistivity and elastic wave velocities, factors controlling the properties, numerical values for important rock types, concept of physical property contrast.
Role of geophysics in understanding the internal structure of the earth and plate tectonics.

Unit 2: Gravity Methods
Earth's gravity field, origin, variation with elevation and depth, temporal and transient variations, international gravity formula, geoid, spheroid.
Principle of gravity exploration, concept of gravity anomaly; gravimeters, gravity surveys, reduction of data, free air, Bougrer and topographic correlations; concepts of regional and residuals; contamination and derivative maps.
Quantitative interpretation of anomaly maps, identification of faults, folds and contacts, principles of quantitative interpretation with reference to spheres, cylinders and thin horizontal sheets; concepts of modeling and inversion.

Unit 3: Magnetic Methods
Earth's magnetic field, origin; magnetic elements, interrelationships, transient and temporal variations; IGRF; principle of magnetic method, origin of anomalies, induced and remanant magnetizations; magnetometers, proton precession and fluxgate; plan of magnetic surveys, reduction of data; anomaly maps, identification of structures; familiarization of magnetic anomalies over spheres, sheets and dykes; interpretation of magnetic anomalies of sheets and dykes.
Airborne magnetometry, plan of surveying and presentation of results.

Unit 4: Electrical and Electromagnetic Methods
Self potential method, origin of SP; resistivity method, concept of apparent resistivity, Werner, Schlumberger and Dipole-dipole configurations; electrical sounding, interpretation through curve matching, electrical profiling; elements of electromagnetic methods, in phase, out of phase components, identification of conductors from EM anomalies.

Telluric and magneto methods, application in oil exploration.

Unit 5: Seismic Methods

Elastic propagation in rocks, Hooke's Law, acoustic impedance; Snell's Law, principles of seismic refraction method, travel time curves over horizontal interfaces and faults, interpretation of results; principles of seismic reflection method, travel time curves, over horizontal and dipping layers, interpretation; concept of RMS interval and average velocities; seismic data acquisition on land and sea, sub-bottom profilers, seismic sources, air gun, etc., processing of seismic reflection data, single channel and multi channel seismic data interpretation methods, pitfalls, seismic stratigraphy, velocity pull ups, bright spots etc.,

Technological advances in seismic data processing, modern survey techniques; GPS; reservoir characterization.

Books:

1. M.B.R.Rao, (1993). Outlines of geophysical prospecting, English Book Depo, Dehradun.
2. Radhakrishna Murthy, I.V., (1998). Gravity and magnetic interpretation in exploration geophysics. Geol. Soc. India, Bangalore.
3. Jhon, Milsom (2003). Field Geophysics, 3rd Edn. John Wiley, London.
4. Dobrin, M.B. and Savit, C.H. (1988). Introduction to geophysical prospecting, 4th Edn., McGraw Hill, New York.
5. Saha, J. G. Seismic data processing manual, ONGC Pub. Dehradun.
6. Coffeen, J.A. 1986. Seismic exploration fundamentals and seismic techniques for finding oil, 2nd Edn. Pennwell Pub. Co., Tulsa, Oklahoma.
7. Domenico, S.N. 1983. Modern Seismic Exploration concepts. Tulsa, Oklahoma.
8. Macquillin, R. Bacon, M.(eds). 1984. An introduction to seismic interpretation, reflection seismics in petroleum exploration, Grahmam, Trot.

MG 214 - EARTHDAM ENGINEERING

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
3	1	60	40	25	25	150	3	0.5	3.5

Factors influencing design of earthdams, types of earthdams, Control of pore pressure within the dam and foundation, critical study of earthdam failures, embankment settlement during and after construction, differential settlement and cracks, construction pore pressures and control, seepage analysis, various methods of construction of flownets, methods of foundation treatment, critical evaluation of methods of stability analysis, dams with impervious membranes of manufactured materials like reinforced concrete, steel plates and asphaltic conctrete, embankment construction procedures, equipment, methods of quality control, measuring instruments, performance observations, aseismic design, slope protection, rockfill construction.

1. Earth Dam Engg. – Sherrared

MS 136 - SEMINAR-I

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	2	0	0	50	0	50	0	1	1

MS 236 - SEMINAR-II

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	2	0	0	50	0	50	0	1	1

Dissertation based on Research work or based on field Data Part-I MS 311

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	15	0	0	125	225	350	--	--	8

MS 312 - SEMINAR-III

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	4	0	0	50	0	50	0	2	2

Dissertation based on Research work or based on field Data Part-II MS 411

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	15	0	0	150	300	450	--	--	10

MS 412 - SEMINAR-IV

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	4	0	0	50	0	50	0	2	2

MG 109 - SEMINAR-I

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	2	0	0	50	0	50	0	1	1

MG 216 - SEMINAR-II

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	2	0	0	50	0	50	0	1	1

Dissertation based on Research work or based on field Data Part-I MG 311

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	15	0	0	125	225	350	--	--	8

MG 312 - SEMINAR-III

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	4	0	0	50	0	50	--	2	2

Dissertation based on Research work or based on field Data Part-II
MG 411

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	15	0	0	150	300	450	--	--	10

MG 412 - SEMINAR-IV

WORK LOAD		MARKS					CREDIT STRUCTURE		
Th	**T/L**	**Th**	**Sess**	**TW**	**Pract**	**Total**	**L**	**P**	**TOTAL**
0	4	0	0	50	0	50	--	2	2