M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

ADVANCED STRUCTURAL MECHANICS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

A. DETAILED SYLLABUS

- Review of concepts of structural analysis
- Member stiffness approach for analysis of skeletal structures: beams, plane truss, plane frame, grid, space truss, space frame with computer programming
- Special Problems: effect of shear deformation in stiffness matrix, torsional effects for thin-walled member inclusive of torsional bending, finite joints (both rigid and flexible); consideration of local load (inclusive of temperature) effects; formulation of geometric stiffness due to axial force; linear buckling analysis.
- Introduction to Material non-linearity and Geometric non-linearity, assumption of non-linear analysis; Secant and Tangent Stiffness Matrices, Various methods to solve non-linear equations, Non-linear analysis of truss, Plastic Analysis: Step by step procedure of analysis, Non-linear analysis of frames

PREREQUISITES/ SELF-STUDY:

- Flexibility and Stiffness Method - System Approach.
- Basic Programming using C / MATLAB

B. RECOMMENDED TEXT / REFERENCE BOOKS

Reference 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
5. Matrix Structural Analysis - W. McGuire, R. H. Gallagher,
6. Matrix Methods of Structural Analysis, - Dr A. S. Meghre, S. K. Deshmukh
7. Structural Analysis: A unified classical and matrix approach - A. Ghali, A. M. Neville

M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

ADVANCED FOUNDATION ENGINEERING

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

A. DETAILED SYLLABUS

- Planning of subsoil exploration of major civil engineering projects, deriving characteristic strength deformation parameters from soil exploration report, calculation of safe bearing capacity for various soil types from shear as well as settlement criteria, pull out resistance of foundations, extrapolation of plate load test and pile load tests.
- Proportioning of isolated footings, combined footings, raft, floating foundations for different load combinations,
- Design of pile foundation for axial load – compression and pull out, lateral loads, negative skin friction, group action in piles, design of piles cap
- Foundations for water tanks, chimney, transmission line towers, antenna etc.
- Free and fixed cantilever sheet pile walls, anchored bulkheads

PREREQUISITES/ SELF-STUDY:

- Methods of drilling/boring and sampling.
- Field Test Procedures as per IS Code: SPT, SCPT, Plate Load Test, Pile Load Test
- Laboratory Test Procedures as per IS Code: Classification Tests, Shear Tests, Consolidation Test, Swell Tests,
- Bearing Capacity as per IS 6403 for Shallow Foundations, Settlement Calculations for Sand and Clay soils as per IS 8009.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Analysis and design of foundation - J. E. Bowles
2. Soil mechanics & foundation engg. vol-II - V.N.S. Murthy
3. Principles of foundation Engg. - Braj M. Das
4. Foundation Engineering - M.J. Tomlinson
5. Analysis and Design of Substructures - Swami Saran
6. Foundation Design – Coduto
7. Design Aids in Soil Mecahnics and Foundation Engg. - Kaniraj
8. SP 36, pt 1 and 2, IS 6403, IS 8009 pt.1, IS 2911 (all),

M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

SOLID MECHANICS WITH FINITE ELEMENT APPLICATIONS

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

A. DETAILED SYLLABUS

- Linear elasticity; stress, strain, constitutive relations; Boundary conditions; Description of an elasticity problem as a boundary value problem, Plane stress, strain, axial symmetrical problems.

- Introduction to plasticity, Yield condition; ideal elasto-plastic material.

- Analysis of Continuum and discrete structures, finite element principle and solution for continuum problems, steps in finite element analysis, principles of discretization, formulation of element stiffness matrix based on direct, variation principles, shape functions, numerical integration, convergence, 2-D formulations for plane stress, plane strain, axisymmetric including isoperimetric elements, introduction to 3D brick elements for Continuum problems.

B. RECOMMENDED TEXT / 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
6. Advance Mechanics of Solids - Srinath

M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

DESIGN & DETAILING OF STRUCTURAL ELEMENTS: RCC

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	2	4	3	40	0	25	25	90

A. DETAILED SYLLABUS

- Introduction to various design methods i.e. Working Stress Method, Ultimate Load Method and Limit State Method.
- Design of Singly Reinforced and Double Reinforced Rectangular Beams for Limit State of Collapse for Flexure. Development of non-linear moment-curvature relationship.
- Design of Flanged Beams for Limit State of Collapse for Flexure
- Design of Rectangular Beams for Limit State of Collapse for Shear and Torsion.
- Design of One-way and Two-way simply supported and continuous Slabs.
- Design of Short and Slender Columns subjected to Axial Load and Uniaxial or Biaxial Bending. Development of non-linear P-M-M relationship.
- Design of Isolated and Combined Footings
- Preparation and use of excel sheets for RCC element design

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Design of RCC Structures Vol-I - H. J. Shah
2. Reinforced Concrete Design - N. Krishna Raju
3. Design of RCC Structures - P. C. Varghese
4. Reinforced Concrete Design - S. N. Sinha
5. Reinforced Concrete Design - S Unnikrishna Pillai & Devdas Menon

M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

DESIGN & DETAILING OF STRUCTURAL ELEMENTS: STEEL

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	2	4	3	40	0	25	25	90

A. DETAILED SYLLABUS

- Introduction to various design methods i.e. Working Stress Method, Ultimate Load Method and Limit State Method - Brief History and Comparison.
- Design of Tension Members made up of single and built-up sections, Choice of sections, Connections (riveted, bolted & welded), Splices.
- Design of Compression Members: Single and Built-up sections, Choice of sections, lacing and battering.
- Design of Laterally Restrained and Unrestrained Beams including deflection check.
- Design of Slab base, Gusseted base.
- Design of members subjected to combined actions, bending with compression/tension.
- Preparation and use of excel sheets for RCC element design

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Design of Steel Structures - N. Subramanian
2. Design of Steel Structures - Arya & Ajmani
3. Design of Steel Structures - S. Ramamrutham
4. Design of Steel Structures – Vol 1 and Vol. 2 - Ramchandran
5. Design of steel Structures - P. Dayaratnam

M. TECH. SEMESTER – I (CIVIL-STRUCTURAL ENGINEERING)

ELECTIVE PAPER – I

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	1	0	3	3	40	0	25	0	65

1. THEORY OF THIN PLATES AND SHELLS

A. DETAILED SYLLABUS

Thin plate: small deflection theory, plate equation. Applications of Navier's solution, Levy's solution, tables & charts for solution of rectangular and circular plates, use for rectangular water tanks with different boundary conditions.

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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Theory of Plates and shells - S.P.Timoshenko and Woinowsky-Krieger
2. Design of cylindrical shell roofs - W.T. Marshall
3. Design & construction of concrete shell roofs - Ramaswamy, G. S.
4 A Text Book of Plate Analysis - Bairagi N. K.
5. Shell Analysis - Bairagi N.K.
6. Theory and Analysis of Plates : Classical and Numerical Methods - Szilard R.

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2. THEORY OF STRUCTURAL STABILITY

A. DETAILED SYLLABUS

- Criteria for Design of Structures: Stability, Strength, and Stiffness, Classical Concept of Stability of Discrete and Continuous Systems, Linear and nonlinear behaviour.
- Stability of Columns: Axial and Flexural Buckling, Lateral Bracing of Columns, Combined Axial, Flexural and Torsion Buckling.
- Stability of Frames: Member Buckling versus Global Buckling, Slenderness Ratio of frame members.
- Stability of Beams: Lateral torsional buckling.
- Stability of Plates: Axial flexural buckling, Shear flexural buckling, buckling under combined loads.
- Introduction to Inelastic Buckling and Dynamic Stability.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Theory of elastic stability - Timoshenko and Gere,
2. Principles of Structural Stability Theory - Alexander Chajes
3. Structural Stability of columns and plates - Iyengar, N. G. R.
4 Strength of Metal Structures - Bleich F. Bucking

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3. ADVANCED CONCRETE TECHNOLOGY

A. DETAILED SYLLABUS

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 behavior, Dimensional stability, Fracture mechanics and concrete failure mechanism.
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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Concrete technology - A. N. Nevile, J.J. Brooks
2. Micro Concrete - P. Kumar Mehta

M. TECH. SEMESTER – I (CIVIL- STRUCTURAL ENGINEERING)

SUBJECT: AUDIT COURSE – I: DISASTER MANAGEMENT

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	0	2	0	0	0	0	0	0

A. DETAILED SYLLABUS

1. Introduction
   Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

2. Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

3. Disaster Prone Areas In India
   Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

4. Disaster Preparedness And Management
   Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.

5. Risk Assessment
   Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

6. Disaster Mitigation
   Meaning, Concept and Strategies of Disaster Mitigation, Emerging Trends in Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs Of Disaster Mitigation in India.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Disaster Management in India: Perspectives, issues and strategies - R. Nishith, Singh AK
2. Disaster Mitigation Experiences and Reflections - Sahni, PardeepEt.Al.
3. Disaster Administration and Management Text and Case Studies - Goel S. L.

M. TECH. SEMESTER – II (CIVIL-STRUCTURAL ENGINEERING)

DYNAMICS AND EARTHQUAKE ENGINEERING

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

A. DETAILED SYLLABUS

- 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.
- Characterization 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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

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

M. TECH. SEMESTER – II (CIVIL-STRUCTURAL ENGINEERING)

SOIL STRUCTURE INTERATION

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

A. DETAILED SYLLABUS

- Critical study of conventional methods of foundation design; Nature of complexities of soil structure interaction; Application of advanced techniques of analysis such as the finite element method, finite differences, relaxation and interaction for the evaluation 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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1 Analysis and design of foundation - J. Bowles
2 Numerical Methods in Geotechnical Engg. - Desai & Christian
3 Elastic Analysis of Soil Foundation Interaction - A P S Selvadurai
4 Advanced Geotechnical Engineering - C S Desai, M. Zaman

M. TECH. SEMESTER – II (CIVIL-STRUCTURAL ENGINEERING)

ELECTIVE PAPER – II

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
3	1	0	4	4	60	40	25	0	125

1. PRESTRESSED CONCRETE

A. DETAILED SYLLABUS

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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

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

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2. BRIDGE ENGINEERING

A. DETAILED SYLLABUS

- 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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Concrete Bridges practice Analysis. Design &Economics - V.K. Raina
2. Design of Concrete Bridges - Vazirani, Ratwani and Aswani

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3. NUM. METHODS & APPLICATIONS TO STRUCTURAL ENGG.

A. DETAILED SYLLABUS

- 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 dependent on first and higher order derivatives
- Laplace transform methods, Laplace equation -Properties of harmonic functions -Fourier transform methods for Laplace equation.
- Application to Structural Engineering: Software Usage: Modeling, analysis and design using professional software like STAAD, STRAP, STRUDS, RISA 3D as Group exercise

B. RECOMMENDED TEXT / REFERENCE BOOKS

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

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4. STRUCTURAL OPTIMIZATION AND RELIABILITY

A. DETAILED SYLLABUS

- 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

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Optimization theory & application - S. S. Rao
2. Structural optimization - Majid
3. Advanced mathematics - Kresysig
4. Foundation of structural optimization - Marris

M. TECH. SEMESTER – II (CIVIL-STRUCTURAL ENGINEERING)

DESIGN AND DETAILING OF RCC STRUCTURES

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	3	5	3.5	40	0	25	25	90

A. DETAILED SYLLABUS

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.

B. RECOMMENDED TEXT / REFERENCE BOOKS

- Manual of Limit State Design - Variyani and Radhaji
- Reinforced Concrete Design. - Pillai & Menon
- Illustrated Design of G + 3 Building - Shah & Karve
- Advanced R.C.C Design - Krishna Raju
- Plain & Reinforced Concrete Vol. II - Jain & Jaikrishna

M. TECH. SEMESTER – II (CIVIL-STRUCTURAL ENGINEERING)

DESIGN AND DETAILING OF STEEL STRUCTURES

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	3	5	3.5	40	0	25	25	90

A. DETAILED SYLLABUS

- Connection design, Design of Plate Girders, Gantry Girders
- Complete design and structural detailing of structures, viz. Chimney, Steel bridges, Multi-storeyed buildings, Industrial building, Godowns, cantilever sheds, platform roofs, 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

B. RECOMMENDED TEXT / REFERENCE BOOKS

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

M. TECH. SEMESTER – II (CIVIL- STRUCTURAL ENGINEERING)

SUBJECT: RESEARCH METHODOLOGY

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	0	2	2	40	0	0	0	40

A. DETAILED SYLLABUS

1. Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

2. Effective literature studies approaches, analysis Plagiarism , Research ethics

3. Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

4. Nature of Intellectual Property - Patents, Designs, Trademark and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

5. Patent Rights - Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

6. New Developments in IPR - Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Stuart Melville and Wayne Goddard, Research methodology: an introduction for science & engineering students
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”
3. Ranjit Kumar, 2nd Edition , “Research Methodology: A Step by Step Guide for beginners”
4. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
5. Mayall, “Industrial Design”, McGraw Hill, 1992.
6. Niebel , “Product Design”, McGraw Hill, 1974.
7. Asimov , “Introduction to Design”, Prentice Hall, 1962.
8. Robert P. Merges, Peter S. Menell, Mark A. Lemley, “ Intellectual Property in New Technological Age”, 2016.
9. T. Ramappa, “Intellectual Property Rights Under WTO”, S. Chand, 2008

M. TECH. SEMESTER –II (CIVIL- STRUCTURAL ENGINEERING)

SUBJECT: AUDIT COURSE – II: PEDAGOGIC STUDIES

Teaching Scheme (Hours/Week)				Credits	Examination Scheme				
Lect	Tut	Prac	Total		Ext	Sess.	TW	Prac	Total
2	0	0	0	0	0	0	0	0	0

A. DETAILED SYLLABUS

1. Introduction and Methodology:
   Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions**.** Overview of methodology and Searching.
2. Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.
3. Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.
4. Professional development: alignment with classroom practices and followup support Peer support, Support from the head teacher and the community, Curriculum and assessment, Barriers to learning: limited resources and large class sizes
5. Research gaps and future directions, Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

B. RECOMMENDED TEXT / REFERENCE BOOKS

1. Culture and pedagogy: International comparisons in primary education. - Alexander RJ
2. Read India: A mass scale, rapid, 'learning to read' campaign - Chavan M