

Syllabi of

Fourth Semester B.Tech Degree Programme in

CIVIL ENGINEERING

CE2005 STRUCTURAL ANALYSIS - I

L	T	P	C
3	0	0	3

Prerequisite: CE2001 Mechanics of Solids

Total hours : 42

Module 1 (14 hours)

Deflection of beams

Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.

Module 2 and 3 (17 hours)

Elastic theorems and energy principles

Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-jointed trusses and rigid frames - temperature effects.

Module 4 (11 hours)

Moving Loads and Influence Lines

Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams - influence lines for forces in trusses – analysis for different types of moving loads - single concentrated load - several concentrated loads - uniformly distributed load shorter and longer than the span.

References

1. Menon, D., Structural Analysis, Narosa publishers, 2008.
2. Wilbur, J. B., Norris, C. H., and Utku, S., Elementary Structural Analysis, McGraw Hill, New York, 2006.
3. Wang, C. K., Intermediate Structural Analysis, McGraw Hill, New York, 1989.
4. Timoshenko, S. P., and Young, D. H., Theory of Structures, McGraw Hill, New York, 1988.
5. Reddy, C. S., Basic Structural Analysis, Tata McGraw Hill, New Delhi, 2007.
6. Negi, L. S., and Jangid, R. S., Structural Analysis, Tata McGraw Hill, 2006.
7. Hibbler, R. C., Structural Analysis, Pearson Education, 2006.

CE2006 OPEN CHANNEL HYDRAULICS AND HYDROLOGY

L	T	P	C
3	0	0	3

Prerequisite: CE2002 Mechanics of Fluids

Total hours : 42

Module 1 (11 hours)

Uniform Open Channel Flow

Free surface flows - Comparison with pipe flow, Classification of flow in open channels. Uniform flow – Equations for uniform flow - Chezy's and Manning's equations. Most efficient channel sections of different geometry. Velocity distribution in open channels. Conveyance, Normal depth and Hydraulic exponent for uniform flow, Determination of normal depth and velocity. Energy concepts in free surface flows. Specific energy and Specific force diagrams, Critical flow, Hydraulic exponent for critical flow, Channel transitions, Flow measurement-weirs and flumes. Design of rigid boundary channels.

Module 2 (10 hours)

Non-uniform Open Channel Flow

Non-uniform flow, Gradually Varied Flow, Occurrence and importance. Basic assumptions, Dynamic equation for gradually varied flow, Different forms of the dynamic equation, Flow profiles in prismatic channels, Computation of the length of the backwater curve - Graphical Integration and Direct Step Methods. Rapidly Varied Flow- Hydraulic Jump, Equation for a classic hydraulic jump, Practical applications, Energy loss and efficiency of a jump, Stilling Basins, Selection of Stilling Basins, Standard stilling basins, Rapidly varied unsteady flow–Surges.

Module 3 (10 hours)

Surface Water Hydrology

Hydrologic cycle- Precipitation, rainfall variations, measurement, presentation of RF data, Mean precipitation, Depth-Area-Duration relationships, Intensity-Duration-Frequency relationship, Abstractions from precipitation - Evaporation, Evapotranspiration, Initial Loss, Infiltration, Stream flow measurement- Area Velocity method, Stage-Discharge relationship, Runoff - Long term runoff, empirical formulae, short term runoff- hydrograph analysis. Surface water quality – Pollutant transport - release and transport of pollutants in surface water

Module 4 (11 hours)

Groundwater Hydrology

Soil water zones, Soil moisture relations Specific retention, Specific yield. Occurrence of ground water - Types of aquifers – unconfined aquifer, confined aquifer, perched water table, Leaky aquifer, Storage coefficients, Governing differential equation for confined groundwater flow, Darcy's law, Transmissivity, Flow between two water bodies through a confined aquifer, One-dimensional confined aquifer, Dupuit's assumptions, Hydraulics of wells - Steady confined and unconfined flows into a well. Well losses, Evaluation of well losses, Specific capacity. Ground water quality criteria, pollution of groundwater - causes and monitoring. Distribution of pollution underground. Saline water intrusion in aquifers and control.

References

1. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, Inc., New York, 1951.
2. Ven Te Chow et al., Applied Hydrology, McGraw-Hill Book Company, NY, 1988.
3. French, R. H., Open-Channel Hydraulics, McGraw-Hill, New York, 1985
4. Subramanya, K., Flow in Open Channels, Tata McGraw Hill, 1990.
5. Hanif Chaudhry, M., Open Channel Flow, Prentice Hall of India. 1994.
6. Rangaraju, K. G., Flow through Open Channels, Tata McGraw-Hill, 1984.

7. Rajesh Srivastava., Flow Through Open Channels, Oxford University Press, 2008.
8. Subramanya, K., Engineering Hydrology, Tata McGraw-Hill publishers, 2008.
9. Linsley, W., Water Resources Handbook, McGraw–Hill International Edition, 1996.
10. Mays, L. W., Water Resources Engineering, John Wiley and Sons, New York, 2001.
11. Todd, D. K., Groundwater Hydrology, John Wiley and Sons, New York, 1958.
12. Raghunath, Ground Water, New Age International (P) Ltd. Publishers, 1987.
13. Kashef, A. I., Groundwater Engineering. McGraw-Hill Book Company, 1987.

CE2007 FUNCTIONAL DESIGN OF BUILDINGS

L	T	P	C
2	0	2	3

Prerequisite: CE2003 Building Technology

Total hours : 56

PART: A (28 hours)

Module 1 (6 hours)

Functional planning – Introduction to anthropometrics and ergonomics – Occupancy classification of Buildings – Essentials of National Building Code – Essentials of Building and development rules – Introduction to green building.

Module 2 (7 hours)

Building Physics

Thermo-physical properties of building materials: Thermal quantities and their units - Periodic heat flow and its characteristics - Heat flow calculations.

Sun's movement and building: Sun control devices – External shading devices, Internal blinds and curtains and Special glasses

Heat flow and thermal insulation

Heat flow through buildings - Thermal gradient; Insulating materials - Properties - Thermal insulation of roofs, Exposed walls and Openings

Module 3 (8 hours)

Building services

Vertical transportation: Stairs - Types and design considerations; Elevators - Types and design considerations; Escalators - features, operation & arrangement; Ramps.

Ventilation and air conditioning: Ventilation requirements - Natural and mechanical ventilation ; Air conditioning - Heat exchange of building - Calculation of air conditioning load - Summer and winter air conditioning - Parts and operation of a/c plant - Systems of air conditioning.

Plumbing services: Typical details of water supply and sewage disposal arrangements for buildings - Standard requirements.

Module 4 (7 hours)

Lighting

Photometric quantities - Day lighting - Day light factor and components - Artificial lighting - Lamps and luminaries - Polar distribution curves - Design of artificial lighting - Lumen method - Point by point method - Glare - Measurement of illumination.

Acoustics

Room acoustics - Reverberation - Sabine's formula - Acoustical defects - Sound absorbing materials and constructions ; Requirements for good acoustics - General principles of acoustic design ; Sound insulation - Transmission loss

PART: B-DRAWING (28 hours)

1. Panelled doors, glazed windows and ventilators in wood
2. Steel and aluminium windows
3. Steel roof trusses
4. Reinforced concrete staircase
5. Residential buildings with flat and pitched roof – RC and tiled
6. Public buildings like office, dispensary, post office, bank etc.
7. Industrial buildings

References

1. Punmia, B. C., Building Construction, Laxmi Publications, 1999.
2. Koenigsberger, Manual of Tropical Housing and Building Part I - Climatic Design, Orient Longman, 1994.
3. Mckaig, T. H., Building Failures, McGraw Hill, 1962.
4. Knudsen, V. O., & Harris, C. M., Acoustical Design in Architecture, John Wiley, 1962.
5. Adler, R., Vertical Transportation for Buildings, American Elsevier Publishing Company, 1970.
6. Huntington, W. C., Building Construction, John Wiley, 1959.
7. Indian Standard Institution, National Building Code of India.

CE2008 GEOMATICS

L	T	P	C
3	0	0	3

Prerequisite: CE2004 Surveying

Total hours : 42

Module 1(10 hrs)

Triangulation - principle - reconnaissance - selection of site for base line - selection of stations - orders of triangulation - triangulation figures - scaffolds and signals - marking of stations - intervisibility and heights of stations - satellite stations - base line measurement - equipment and corrections - adjustment of observations.

Module 2 (12 hours)

Survey adjustments and theory of errors – introduction – laws of accidental errors – probability curve – principle of least squares – laws of weights – probable error – normal equation – most probable value – method of correlates – angle adjustment – station adjustment – figure adjustment – adjustment of triangles – adjustment of a geodetic quadrilateral.

Module 3 (10 hours)

Curves - types of curves - elements of a curve - simple curves - different methods of setting out – introduction to compound curves - reverse curves, transition curves, vertical curves - hydrographic survey - scope - shoreline survey - river survey - soundings – sounding equipment - methods - ranges - locating sounding - plotting - three point problem.

Module 4 (10 hours)

Photogrammetry – terrestrial and aerial photogrammetry – heights and distances from Photographs – flight planning – elements of stereoscopy – photo mosaic – photo interpretation – applications of photogrammetry.– GPS – differential GPS.

References

1. Kanetkar, T. P., and Kulkarni, S. V., Surveying Vol. I and II, Vidarthigriha Prakasan, 2004.
2. Punmia, B. C., Surveying Vol. I and II, Laxmi Pub, 2004.
3. Arora, K. R., Surveying Vol. I and II, Standard Book House, 1993
4. Duggal, S. K., Surveying Vol. II, Tata McGraw Hill, 2004.

CE2009 GEOSCIENCES

L	T	P	C
3	1	0	3

Prerequisite: Nil

Total hours : 56

Module 1 (12 hours)

Earth System: Lithosphere, Hydrosphere, Cryosphere and atmosphere and their interactions; **Solid Earth:** Shape, size, interior of the solid earth.

Geological materials: rocks, soils, minerals, Engineering and Genetic classification of soils, rocks, rock cycles, rock-water interaction. Earth Processes and their consequences, Geomorphologic features.

Earthquakes: Causes, classification, magnitude, intensity, Historical earthquakes, Seismic hazards zoning, Strong ground motion, Earthquake prediction.

Landslides and Subsidence: Causes, Classification and Monitoring.

Module 2 (16 hours)

Groundwater: Groundwater resources and quality of ground water.

Geology of India: Introduction, rock types and mineral wealth.

Geological maps, geophysical studies and Remote sensing: Interpretation of Geologic maps, Stereogram, aerial photos, Satellite imageries. Seismic, Resistivity studies. Introduction to *Remote sensing, GIS and GPS*. Their applications in Engineering Geology.

Engineering applications of geologic structures: Rock deformation in nature. Recognition and classification of Folds, Faults, Joints and Unconformities. **Criteria** for site selections for Dam, tunnels, waste/radioactive disposal sites.

Module 3 (13 hours)

Nature of soil: Soil formation and soil types-soil structure and their effects on the basic soil properties. **Soil phase relationship:** phase diagram – definitions and relationships between soil parameters - laboratory determination of soil parameters – in-situ unit weight determination by core cutter, sand replacement and wax coating methods.

Index properties: grain size distribution by sieve analysis, hydrometer analysis and pipette analysis - Atterberg limits and indices of consistency- soil aggregate properties.

Classification of soils: Necessity and Principles of soil classification-I.S. classification – Plasticity charts - field identification of soils- Group index.

Module 4 (15 hours)

Effective stress Theory: Principle and Physical meaning of effective stress – effective stress in a soil mass under hydrostatic and steady seepage conditions - total, neutral and effective stress diagrams-quick sand condition.

Permeability: Darcy's law – discharge and seepage velocities, Laboratory determination of coefficient of permeability of soil, Factors affecting permeability, effect of stratification on permeability.

Compaction: Definition and objectives of compaction - Proctor test and modified proctor test - factors influencing compaction- Effect of compaction on soil properties - Field compaction methods and field control.

Consolidation: Definition-differences between consolidation and compaction- concepts of coefficient of compressibility - Coefficient of volume change and compression index - e-log p curves - Terzaghi's theory of one dimensional consolidation-determination of coefficient of consolidation- pre-consolidation pressure.

Stress distribution: Boussinesq's equations for vertical pressure due to point loads- Assumptions and limitations - pressure bulb – Influence diagram - Vertical pressure due to uniformly distributed loads, line loads and strip loads - Newmark charts and their use - Westergaard's solution.

References

1. Bangar, K. M., Principles of Engineering Geology, Standard Publishers, New Delhi, 1995.

2. Bell, F. G., Engineering Geology, Elsevier, India, 2007.
3. Blyth, F. G. H., and De Freitas, M. H., A Geology for Engineers, Elsevier, India, 2007.
4. Kesavulu, P., Engineering Geology, Oxford University Press, IInd Edition, 1999.
5. Singh, P., Engineering and General Geology, S. K. Kataria and Sons, 2008, India.
6. Parriaux, A., Geology Basics for Engineers, CRC Press, The Netherlands, 2009.
7. Terzaghi, K. and Peck, R. B., Soil Mechanics in Engineering Practice, John Wiley Sons, 1967.
8. Gopal Ranjan and A. S. R. Rao, Basic and Applied Soil Mechanics, New Age International, 2005.
9. Arora, K. R., Soil Mechanics and Foundation Engineering, Standard publications, 2009.
10. Alam Singh, Soil Engineering-Theory and Practice, Asia Publications, 2006.
11. Punmia, B. C., Soil Mechanics and Foundations, Saurabh publications, 2005.
12. Murthy, V. N. S., Soil Mechanics and Foundation Engineering, Dhanpat Rai publications, 2009.
13. Khan, I. H., Text Book of Geotechnical Engineering, Prentice Hall of India, 1999.

CE2093 SURVEYING PRACTICAL - II

L	T	P	C
0	0	3	2

Prerequisite: CE2008 Geomatics or its concurrent registration

Total hours : 42

List of Exercises

1. Determination of tacheometric constants
2. Heights and distances by stadia tacheometry
3. Heights and distances by tangential tacheometry
4. Heights and distances by solution of triangles
5. Setting out of simple curves – linear methods
6. Setting out of simple curves – angular method
7. Setting out of transition curve
8. Heights and distances by using subtense bar
9. Total station.
10. Permanent adjustments of theodolite

CE2094 MATERIAL TESTING LABORATORY - II

L	T	P	C
0	0	3	2

Prerequisite: CE2001 Mechanics of Solids

Total hours : 42

List of Exercises

1. Tension test on MS rod
2. Shear Test on MS rod
3. Torsion test on MS Specimen
4. Bending test on steel beams
5. Spring test – open and close coil springs
6. Workability tests – slump, compaction, V-bee, flow and preparation of cubes
7. Compression test on cubes and cylinders – determination of modulus of elasticity
8. Split test on concrete cylinders and flexure test on concrete
9. Study of extensometers and strain gauges
10. Bending test on reinforced concrete beams – under reinforced and over reinforced.
11. Demonstration of Non- Destructive Testing Equipment.

Brief Syllabi

CE2005 STRUCTURAL ANALYSIS - I

L	T	P	C
3	0	0	3

Prerequisite: CE2001 Mechanics of Solids

Deflection of beams - differential equation of the elastic curve - successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear - Elastic theorems and energy principles - Strain energy and complementary energy - principle of superposition - principle of virtual work - Castigliano's theorem - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - determination of deflections of statically determinate beams - pin-jointed trusses and rigid frames - temperature effects.

Total hours : 42

CE2006 OPEN CHANNEL HYDRAULICS AND HYDROLOGY

L	T	P	C
3	0	0	3

Prerequisite: CE2002 Mechanics of Fluids

Uniform flow in open channels-Energy concepts in open channel flow analysis- Non uniform flow in open channels- Gradually varied and rapidly varied flows. Design of rigid boundary channels. Hydrology-surface water hydrology – Rainfall, Runoff. Surface water quality. Groundwater Hydrology - Soil moisture relations-distribution and flow of ground water , Well hydraulics, Ground water quality, Salinity intrusion.

Total hours : 42

CE2007 FUNCTIONAL DESIGN OF BUILDINGS

L	T	P	C
2	0	2	3

Prerequisite: CE2003 Building Technology

Building physics- Thermal comfort-Thermo-physical properties of building materials- Sun's movement and building -Heat flow and thermal insulation -Building services-Vertical transportation- Ventilation and air conditioning- Plumbing services- Lighting -Acoustics -Introduction to environment – site and built up space relationships - Functional planning – Introduction to anthropometrics and ergonomics –Essentials of National Building Code.

Total hours : 28+28 = 56

CE2008 GEOMATICS

L	T	P	C
3	0	0	3

Prerequisite CE2004 Surveying

Triangulation - principle - triangulation figures - marking of stations - satellite stations - base line measurement - adjustment of observations. Survey adjustments and theory of errors – introduction – laws of accidental errors – probability curve – principle of least squares - angle adjustment – station adjustment – figure adjustment –

adjustment of triangles – adjustment of a geodetic quadrilateral. Curves - types of curves - elements of a curve - simple curves - introduction to compound curves - hydrographic survey - scope - soundings - sounding equipment - plotting - three point problem. Photogrammetry – terrestrial and aerial photogrammetry – flight planning – elements of stereoscopy – applications of photogrammetry. GNSS – GPS – differential GPS.

Total hours : 42

CE2009 GEOSCIENCES

L	T	P	C
3	1	0	3

Prerequisite: Nil

Earth System - Geological materials – Earthquakes - Landslides and Subsidence.

Groundwater - Geology of India - Geological maps - Remote sensing, GIS and GPS - Geologic structures - site selections for Dam, tunnels, waste/radioactive disposal sites.

Soil formation and soil types-phase diagram – soil parameters – Index properties - classification of soils – Effective stress Theory – Permeability – Compaction – Consolidation - Stress distribution

Total hours : 56

CE2093 SURVEYING PRACTICAL - II

L	T	P	C
0	0	3	2

Prerequisite: CE2008 Geomatics or its concurrent registration

Determination of tacheometric constants - Heights and distances by stadia tacheometry, tangential tacheometry, solution of triangles - Setting out of simple curves – linear methods, angular method, transition curve - subtense bar - Total station - Permanent adjustments of theodolite

Total hours : 42

CE2094 MATERIAL TESTING LABORATORY - II

L	T	P	C
0	0	3	2

Prerequisite: CE2001 Mechanics of Solids

Tension test on MS rod - Shear Test on MS rod - Torsion test on MS Specimen - Bending test on steel beams - Spring test – open and close coil springs - Workability tests – slump, compaction, V-bee, flow and preparation of cubes - Compression test on cubes and cylinders – determination of modulus of elasticity - Split test on concrete cylinders and flexure test on concrete - Study of extensometers and strain gauges - Bending test on reinforced concrete beams – under reinforced and over reinforced - Demonstration of Non- Destructive Testing Equipment.

Total hours : 42

