Syllabi of

Third Semester B.Tech Degree Programme in

CIVIL ENGINEERING

CE2001 MECHANICS OF SOLIDS

L	T	P	C
3	0	0	3

Prerequisite: ZZ1001 Engineering Mechanics

Total hours: 42

Module 1 (10 hours)

1. Tension, compression & shear

Types of external loads - self weight - internal stresses - normal and shear stresses - strain - Hooke's law - Poisson's ratio - relationship between elastic constants - stress strain diagrams working stress - elongation of bars of constant and varying sections - statically indeterminate problems in tension and compression - assembly and thermal stresses - strain energy in tension, compression and shear.

Module 2 (11 hours)

2. Analysis of stress and strain (5 hours)

Stress on inclined planes for axial and biaxial stress fields - principal stresses - Mohr's circle of stress - principal strains - strain rosette – principal stress/strain problem as an eigenvalue problem.

3. Bending moment and shear force (6 hours)

Different types of beams - shear force and bending moment diagrams for simply supported overhanging and cantilever beams - relationship connecting intensity of loading, shearing force and bending moment - shear force and bending moment diagrams for statically determinate plane frames.

Module 3 (10 hours)

4. Stresses in laterally loaded symmetrical beams (7 hours)

Theory of simple bending - limitations - bending stresses in beams of different cross sections - moment of resistance - beams of uniform strength - beams of two materials - shearing stresses in bending - principal stresses in bending - strain energy due to bending.

5. Unsymmetrical bending (3 hours)

Shear flow - shear centre - determination of shear centre for simple sections.

Module 4 (11 hours)

6. Theory of columns (4 hours)

Axial loading of short strut - long columns - differential equation of the elastic curve - Euler's formula - eccentric loading - direct and bending stresses – buckling load as an eigenvalue problem.

7. Torsion (4 hours)

Torsion of circular solid and hollow shafts - power transmission - strain energy in shear and torsion - close coiled and open coiled helical springs.

8. Thin and thick cylinders (3 hours)

Lame's equation - stresses in thick cylinders due to internal and external pressures – compound cylinders - shrink fit - wire wound pipes and cylinders.

References

1. Gere, J.M., Mechanics of Materials, Thomson, Singapore, 2001.
2. Popov, E.P., Mechanics of Materials, Prentice Hall India, New Delhi, 2002.

3. Timoshenko, S.P., and Young, D.H., Elements of Strength of Materials, East West Press, New Delhi, 2003.
4. Beer, F. P. and Johnston, E. R., Mechanics of Materials, Tata McGraw Hill, New Delhi, 2005
5. Hearn, E. J., Mechanics of Materials Pergamon Press, Oxford, 1982.
6. Nash, W. A., Strength of Materials, Schaum's Outline Series, McGraw Hill, New York, 1988.

CE2002 MECHANICS OF FLUIDS

L	T	P	C
3	0	0	3

Prerequisite: Nil

Total hours: 42

Module 1 (12 hours)

Fluids - Definition - Types and properties. Fluid as a continuum - Control volume concept. Fluid Statics- Fluid pressure- Measurement of pressure- Hydrostatic forces on immersed surfaces-Application of fluid pressure analysis in engineering problems. Buoyancy and stability of immersed and floating bodies, Pressure in case of accelerated rigid body motion.
Fluid kinematics- Methods of describing fluid motion - Types of motion, Inviscid flows, Velocity and acceleration- Continuity equation- Potential flows-Velocity potential and Stream function. Cauchy Reimann equations – Flownet - Circulation and vorticity.

Module 2 (10 hours)

Fluid dynamics, Types of forces, Forces influencing fluid motion- Energy and Head-Energy correction factor, Euler and Bernoulli's equations. Application of Bernoulli's equation. Flow measurement, Linear momentum equations, Momentum correction factor, Application of momentum equation.

Module 3 (9 hours)

Pipe flow- Introduction – Laminar and turbulent flows - Reynolds' number, Head loss. Major loss in pipe flow- Friction loss, Minor losses, Total energy and hydraulic gradient line, Compound pipes, Pipes in series and parallel, Branching pipes, Pipe networks.

Module 4 (11 hours)

Introduction to boundary layer theory - Boundary layer growth in flow over a plate, Flow past immersed bodies.
Dimensional analysis and similitude - Methods of dimensional analysis, Dimensionless numbers. Principles of similarity- Modelling using Reynolds and Froude laws, Distorted models and scale effects.

References

1. Shames, I.H., Mechanics of Fluids, McGraw Hill ,New York, 1992
2. Streeter, V. L., and Wylie, E. B., Fluid Mechanics, McGraw Hill , New York, 1985.
3. Subramanya, K., Theory and Applications of Fluid Mechanics, , McGraw Hill , New York,. 1992.
4. Massey, B. S., John Ward-Smith, Nelson Thornes Ltd, UK, 2001
5. Modi, P. N., and Seth, S. M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 2005

CE2003 BUILDING TECHNOLOGY

L	T	P	C
3	0	0	3

Prerequisite: Nil

Total hours: 42

Module 1 (11 hours)

Bricks- IS classifications - Properties and testing - Types of bricks - Tiles - Manufacture, properties and uses - aerocon blocks- Types of tiles ; Ceramic products - Lime - Classification - Manufacture, properties and uses ; Plastics – properties - reinforced plastics- uses- light roofing materials - glass- manufacture – testing – geosynthetics - classification – aluminum composite panels – uPVC panels – industrial timber products – manufacture and properties

Module 2 (10 hours)

Cement - Ingredients - Manufacture - Types of cement - Properties and testing - Uses ; Mortar - Sand - Properties - Types of mortar and uses ; Concrete - Properties of fresh concrete and tests - Proportioning of concrete mixes - Properties of hardened concrete and tests - Recent developments in concrete ; Iron and steel - Structural sections - Properties and uses of structural steel - Recent developments in steel and concrete;

Module 3 (11 hours)

Foundation - Timbering of foundation trenches - Bearing capacity of soils - Improvement of bearing capacity - Settlement of foundation - Description of spread, grillage, raft and pile foundations; Brick and stone masonry - Bonds in brick work - Cavity walls - Lintels and arches; Concrete construction - Batching, mixing, placing, compacting and curing of concrete - form work - Precast concrete - Prestressed concrete - Recent developments in concreting; Partition walls - Types and features.

Module 4 (10 hours)

Floors and flooring – Different types and applications; Doors, windows and ventilators - Different types ; Finishing works; Building Failures - Concrete failure - Steel failure - Foundation failure - Other types of failures – Causes and Remedial measures – Building repairs - Shoring - Underpinning; Steel and concrete frames Slip form and lift slab constructions- trenchless technology, micro tunnelling; Fire proof construction - Fire load - Fire resisting properties of building materials – Fire extinguishing methods – Fire proof construction methods.

References

1. Rangwala, S. C., Engineering Materials, Charotar Publishing House, 1992.
2. Punmia, B. C., Building Construction, Laxmi Publlications, New Delhi, 1999.
3. Rangwala, S. C., Building Construction, Charotar Publishing House, 1992.
4. Huntington, W. C., Building Construction, John Wiley, New York, 1959.
5. Shetty, M. S., Concrete Technology, S.Chand & Co., New Delhi, 1992,
6. Varghese, P C., Building Materials Prentice Hall of India, 2006

CE2004 SURVEYING

L	T	P	C
3	0	0	3

Prerequisite: Nil

Total hours: 42

Module 1 (10 hours)

Introduction - classification of surveys - plane surveying - geodetic surveying - topographic surveying - reconnaissance - principle of working from whole to part - provision of control - conventional signs - chain survey - instruments - principles of chain survey - field book - plotting - tie line and check line - chaining and ranging - obstacles - chaining on sloping ground - errors in chain survey - uses of cross staff and optical square

Module 2 (10 hours)

Compass survey - prismatic compass - surveyor's compass - whole circle and reduced bearing - true and magnetic bearing - dip and declination - local attraction - traversing - plotting - error of closure - graphical and analytical adjustments - plane table survey - instruments and accessories - different methods - orientation - advantages and disadvantages of plane tabling - two point problem - three point problem - errors in plane tabling - minor instruments - hand levels - clinometer - Ceylon ghat tracer - hypsometer - pantagraph -ediograph - box sextant - telescopic alidade

Module 3 (10 hours)

Levelling - definition of level surfaces - mean sea level - reduced level - bench marks - levelling instruments - temporary and permanent adjustments - fly leveling - booking - reduction of levels - corrections for refraction and curvature - reciprocal leveling - longitudinal levelling and cross sectioning - contour survey - definition - characteristics of contour - uses of contour - methods of contouring - direct and indirect interpolation - plotting - areas and volumes - trapezoidal rule - Simpson's rule - area from latitude and departure - uses of planimeter - volumes - trapezoidal and prismoidal formula

Module 4 (12 hours)

Theodolite surveying - study of theodolite - temporary and permanent adjustments - measurement of horizontal angles - method of repetition and reiteration - measurement of vertical angles - theodolite traverse - calculation of co ordinates - corrections - traverse table - omitted measurements - tacheometric surveying - stadia system - fixed and movable hair methods - staff held vertical and normal - instrument constants - analytic lens - tangential system - direct reading tacheometer - subtense bar – trigonometric leveling – various methods – E.D.M – total station.

References

1. Kanetkar, T. P., and Kulkarni, S. V., Surveying Vol I and II, Vidyarthigriha Prakashan, 2004
2. Punmia, B. C., Surveying Vol I and II, Laxmi Pub, 1994.
3. Arora, K. R., Surveying Vol I and II, Standard Book House, 1993
4. Duggal, S. K., Surveying Vol 1, Tata - McGraw Hill, 2004.

CE2091 SURVEYING PRACTICAL - I

L	T	P	C
0	0	3	2

Prerequisite: CE2004 Surveying or its concurrent registration

Total hours: 42

List of Exercises

1. Chain survey- Traversing and plotting of details
2. Compass survey - Traversing with compass and plotting
3. Plane table survey - Method of Radiation and Intersection
4. Plane table survey - Solving three point problem
5. Plane table survey - Solving two point problem
6. Plane table survey - Traverse
7. Levelling -Fly leveling - Plane of collimation method
8. Levelling -Fly leveling - Rise and Fall method
9. Levelling -Longitudinal and cross sectioning
10. Levelling -Automatic levels
11. Levelling- Contour surveying
12. Theodolite surveying - Measurement of horizontal angle by method of repetition and reiteration.

CE2092 MATERIAL TESTING LABORATORY - I

L	T	P	C
0	0	3	2

Prerequisite: Nil

Total hours: 42

List of Exercises

1. Tests on aggregate for concrete
   (a) Grain size distribution (b) Specific gravity (c) Density (d) Voids (e) Bulking (f) Aggregate crushing value (g) Aggregate impact value
2. Tests on cement
   (a) Fineness (b) Normal consistency (c) Setting time (d) Compressive strength
3. Test on Timber beam – Bending test
4. Tests on tiles – Dimension, Transverse Strength, Water Absorption and Crazing
5. Tests on bricks – Crushing strength, water absorption and efflorescence
6. Tests on metals – Hardness test and impact test

Brief Syllabi

CE2001 MECHANICS OF SOLIDS

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Tension, compression & shear-internal stresses - strain - Hooke's law - Poisson's ratio - constant and varying sections - statically indeterminate problems - assembly and thermal stresses - strain energy in tension, compression and shear-analysis of stress and strain-Stress on inclined planes-principal stresses - principal strains.
Bending moment and shear force diagram-different types of beams - statically determinate plane frames-Stresses in laterally loaded symmetrical beams-shearing stresses in bending - strain energy due to bending-Unsymmetrical bending- shear centre.
Theory of columns-short strut - long columns - differential equation of the elastic curve - Euler's formula – Torsion-circular solid and hollow shafts - close coiled and open coiled helical springs-Thin and thick cylinders-Lame's equation - stresses in thick cylinders due to internal and external pressures.

Total hours : 42

CE2002 MECHANICS OF FLUIDS

L	T	P	C
3	0	0	3

Prerequisite: Nil

Fluids-Engineering Properties-Fluid statics-Forces on immersed surfaces - Equilibrium of immersed and floating bodies - Fluid kinematics - Potential flow theory - Conservation of mass - Transport theorem, Continuity equation. Fluid dynamics - Energy and Momentum principles - Application of, Bernoulli's equation and Impulse momentum equation. Flow through pipes-laminar and turbulent flows. Boundary layer theory. Dimensional analysis

Total hours : 42

CE2003 BUILDING TECHNOLOGY

L	T	P	C
3	0	0	3

Prerequisite: Nil

Bricks- Properties and testing – Types; Tiles - Manufacture, properties and uses; Ceramic products - Lime - Plastics – reinforced plastics- light roofing materials - glass- geosynthetics - aluminum composite panels – uPVC panels – industrial timber products - Cement – Manufacture – properties. Concrete – properties- Foundation – Brick and stone masonry - Precast concrete - Prestressed concrete - Floors and flooring – doors, windows and ventilators - Finishing works; Building Failures - Building repairs - Fire proof construction - methods.

Total hours : 42

CE2004 SURVEYING

L	T	P	C
3	0	0	3

Prerequisite: Nil

Introduction - classification of surveys - chain survey - instruments - principles of chain survey - errors in chain survey. Compass survey - whole circle and reduced bearing - local attraction - traversing - plotting – adjustments. Plane table survey - instruments and accessories - different methods errors in plane tabling - minor instruments. Levelling - definition of level surfaces, leveling instruments - temporary and permanent adjustments - fly levelling, reciprocal leveling, longitudinal levelling and cross sectioning - contour survey - definition - plotting - areas and volumes. Theodolite surveying measurement of horizontal and vertical angles - theodolite traverse - tacheometric surveying – trigonometric levelling –E.D.M – total station.

Total hours : 42

CE2091 SURVEYING PRACTICAL - I

L	T	P	C
0	0	3	2

Prerequisite: CE2004 Surveying or its concurrent registration

Chain survey- Traversing and plotting of details -Compass survey - Traversing with compass and plotting -Plane table survey - Method of Radiation and Intersection , Solving three point problem, Solving two point problem, Traverse -,Levelling -Fly leveling - Plane of collimation method, Fly leveling, Rise and Fall method, Longitudinal and cross sectioning, Automatic levels, Contour surveying - Theodolite surveying - Measurement of horizontal angle by method of repetition and reiteration.

Total hours : 42

CE2092 MATERIAL TESTING LABORATORY - I

L	T	P	C
0	0	3	2

Prerequisite: Nil

Tests on aggregate for concrete-Grain size distribution, Specific gravity, Density, Voids, Bulking , Aggregate crushing value, Aggregate impact value - Tests on cement – Fineness, Normal consistency, Setting time, Compressive strength - Bending test on Timber beam – Tests on tiles – Dimension, Transverse Strength, Water Absorption, Crazing - Tests on bricks – Crushing strength, water absorption, efflorescence - Tests on metals – Hardness test and impact test

Total hours : 42