

**B-TECH CIVIL ENGINEERING
V SEMESTER**

Code	Subjects
	Theory
CE401	Computational Methods
CE402	Structural Analysis-I
CE403	Geotechnical Engineering-I
CE404	Environmental Engineering -I
CE405	Transportation Engineering-I
CE406	Hydrology and Water Resources Engineering
	Practical
CE407	Geotechnical Engg. Lab
CE408	Fluid Flow and Hydraulic Machinery
CE409	Transportation Engineering Lab
CE410	General Proficiency

CE401 COMPUTATIONAL METHODS

Unit – I

Solution Of Algebraic And Transcendental Equations And Eigen Value Problem :The method of bisection, the method of false position, Newton-Raphson method (single and system of two equations) and Graeffe's Root squaring method. Eigen value and Eigen vector by power method.

Unit-II

Solution of linear simultaneous equations and matrix inversion: Gauss and Gauss-Jordan elimination methods- Method of triangularization and Crout's reduction. Iterative methods: Gauss-Jacobi, Gauss-Seidel and Relaxation methods. Matrix inversion by Gauss-Jordan elimination and Crout's methods.

Unit-III

Interpolation: Finite Differences, Relation between operators - Interpolation by Newton's forward and backward difference formulae for equal intervals. Newton's divided difference method and Lagrange's method for unequal intervals. Differentiation based on finite differences. Integration by Trapezoidal and Simpson's rules. Difference equations.

Unit-IV

Solution of Ordinary Differential Equations: Single step methods: Taylor series method, Picard's method, Euler and Improved Euler methods, Runge- Kutta method of fourth order only. Multistep methods: Milne and Adams-Bashforth methods. Boundary value problems using finite differences.

Unit – V

Solution of Partial Differential Equations: Solution of Laplace and Poisson equations: Leibmann's iterative method. Diffusion equation: Bender- Schmitt method and Crank-Nicholson implicit difference method. Wave equation: Explicit difference method

Text Book

1. Venkataraman M.K., Numerical methods in Science and Engineering, National Publishing Company, Madras, 2007.

Reference Book

1 Kandasamy . P., Gunavathy K. and Thilagavathy K, Numerical Methods, S. Chand & Company Ltd, New Delhi 2007.

CE 402 STRUCTURAL ANALYSIS-I

Unit – I

Static indeterminacy – Analysis of statically indeterminate beams and frames by consistent deformation/force method.

Unit II

Analysis of plane trusses with one or more redundant members by force method - trusses with lack of fit - Thermal stresses - Settlement of supports – analysis of trussed beams.

Unit – III

Slope Deflection Method - Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support displacements.

Unit IV

Moment Distribution Method - Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway

Unit – V

Kani's method of analysis of beams and frames. Column-analogy method of analysis of simple and symmetric beams and frames.

Text Books

1. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Eleventh Edition, Laxmi Publications, New Delhi, 2002.
2. Bhavikatti. S. S., Structural Analysis, Vol. I, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

Reference Books

1. Wang. C. K., Intermediate Structural Analysis, McGraw Hill Publishing Co., Tokyo, Fourth Edition, 1989.
2. Jindal, R. L., Indeterminate Structural Analysis, S.Chand & Co. New Delhi, Third Edition, 1997.
3. Kinney. S.J., Indeterminate Structural Analysis, Oxford IBH Publishing Co., 1999.

CE 403 GEOTECHNICAL ENGINEERING-I

Unit-I

Soil formation – soil minerals – soil structure - three phase system – definitions- inter-relationships – Index properties - IS soil classification – soil deposits in India.

Unit-II

Soil hydraulics : soil water – capillary phenomenon – permeability – field and laboratory test - seepage and flow nets – geostatic stress - neutral and effective stress.

Unit-III

Stress Analysis- Stress due to concentrated load, due to uniformly loaded area, line load strip load pressure distribution diagrams - contact stress - Westergarrd's analysis.

Unit-IV

Compressibility : One dimension consolidation - consolidation process - consolidation theory – laboratory test – pre consolidation pressure. Compaction – laboratory tests – field compaction.

Unit-V

Shear strength- Mohr – coulomb theory – shear strength parameter – laboratory and field tests – pore pressure parameters - stress path - insitu shear strength - factors affecting shear strength – shearing characteristics of sand and clay.

Text Books

1. Purushothama Raj. P, Soil Mechanics and Foundation Engineering, Pearson Education, 2008
2. Punmia, B.C., Soil Mechanics and foundation Engineering, Standard Book House, 1997.

Reference Books

1. Bowles, J.E., Physical and Geotechnical Properties of Soils, McGraw Hill, 1998
2. Venkataramiah. C., Geo Technical Engineering, NAIP, 2002.

CE 404 ENVIRONMENTAL ENGINEERING –I

Unit – I

Introduction: Water supply Scheme - objectives and requirements - Domestic, commercial and public requirements - Various methods of estimating population Variations in rate of demand and its effects on design.

Unit-II

Sources of Water and intakes: Surface and groundwater sources - Computation of storage capacity of reservoirs by analytical and graphical methods - Forms of underground sources like wells, Infiltration wells and galleries, Intake structures, tube wells - Sanitary protection of wells,

Unit-III

Quality of Water: Indian and W.H.O. Standards for drinking water - Impurities in water - Physical, chemical and bacteriological tests for water - quality of water for trade purpose and swimming pools

Unit-IV

Water Treatment system: Unit process of water treatment - Principles, functions and design of flocculators, sedimentation tanks, sand filters, principles of disinfection, water softening, aeration, Iron and manganese removal.

Unit-V

Conveyance and distribution –Service reservoir location, determination of capacity – Leak detection - lining of pipes, various materials used for pipes, selection and class of pipes -. - Method of Layout of distribution systems, analysis of pipe networks by different methods, pipe appurtenance for distribution system – Plumbing works and layout of water supply system for buildings, Effects of corrosion and its prevention.

Text Books

1. Duggal, K.N., Elements of Environmental Engineering ,S. Chand & Company , New Delhi 2008
2. Birdie G. S and Birdie J.S, Water Supply and Sanitary Engineering, Dhanpat Rai and Sons (1998), New Delhi

Reference Books

1. Peavy, H.S., Rowe, D.R. and Tehobanoglous, G., Environmental Engineering, McGraw Hill Book Company, 1998

2. Hussain ,S.K., Water supply and sanitary engineering , Oxford & IBH, New Delhi, 1997
3. Steel, E.W., Water supply and Sewerage , McGraw Hill, 1996
4. Fair, G.M., Gayer, I. and Okun , Water and Waste Water Engineering , John Wiley & Sons,1981

CE 405 TRANSPORTATION ENGINEERING.-I

Unit – I

Importance Road transportation, Highway alignment - Requirement, Engineering surveys for highway location. Maps & drawings to be prepared. Geometric design - Cross section element, width, camber, design - Speed, sight distances, requirements and design of horizontal and vertical alignments.

Unit – II

Highway materials - Properties of sub-grade pavement component materials - Tests on aggregates, subgrade soil & bituminous materials. Pavement Design Factors in the design of flexible and rigid pavements, Group index and CBR methods. IRC recommendations of rigid & flexible pavement design.

Unit – III

Traffic Engineering – Fundamentals of traffic flow, Level of service, analysis of Speed studies. Accident studies and analysis. Principles and design of signalized and un-signalized intersections as per IRC standards

Unit – VI

Pavement construction techniques-Types of pavements- WBM Road construction. Construction of bituminous and rigid pavements. Pavement failures and their remedies. Surface and subsurface highway drainage. Pavement evaluation – structural, functional, design of overlays based on Benkelman beam studies, pavement Maintenance.

Unit – V

Airport planning - Aircraft characteristics - Zoning laws and site selection. Runway & taxiway design - runway orientation and configuration, Basic runway length and corrections. Taxiway design, airport marking and lighting, Drainage

Text Books

1. Khanna S.K& Arora, M.G.Airport Planning and Design, Nemchand and Bros., 2007

2. Khanna, S.K. and Justo, C.E.G., Highway Engineering, Khanna Technical Publications, Delhi, 2007(reprint).

Reference Books

1. Gupta B. L and Amith Gupta, Highway and Bridge Engg., Standard publishers, and Distributor New Delhi 2003
2. Partha Chakroborthy and Animesh Das, Principles of Transportation Engineering, Prentice Hall of India Pvt. Ltd., New Delhi,2003.
3. Kadiyali, L. R, Lal, N. B, “Principles and practice of highway engineering”, Khanna Publishers New Delhi ,006
4. Kadiyali, L. R, “Traffic Engineering and Transport Planning”, Khanna Publishers New Delhi , 2006
5. Sharma, S. K. “Principles Practice and Design of Highway Engineering”, S. Chand & Co Ltd. New Delhi, , 2006
6. Robert Horonjeff, Planning & Design of Airports, McGraw Hill Book Co., NewYork, 2007

CE 406 HYDROLOGY AND WATER RESOURCES ENGINEERING

Unit – I

Precipitation: Hydrologic cycle, precipitation, stream flow, evaporation, transpiration and infiltration, types and measurement of precipitation, gauge networks, hyetographs, average depth of precipitation over the basin, mass rainfall curves, intensity duration curves - estimates of missing data and adjustment of records.

Unit – II

Evapo-transpiration and Infiltration: Evaporation, factors affecting, measurement and estimation of evaporation, transpiration, factors affecting and determination of transpiration, methods of estimating evapo-transpiration, factors affecting and measurement of infiltration, infiltration indices.

Unit – III

Groundwater: Occurrence and movement of ground water, Darcy’s law, aquifers - types and specific yield of aquifers and basin, steady & unsteady flow in wells in confined and unconfined aquifers, well loss and specific capacity of a well.

Unit – IV

Runoff: Factors affecting runoff, Hydrograph analysis - Unit hydrograph theory and analysis, Space distribution and variability of runoff, stream flow measurement - selection of site, velocity and discharge measurements - base flow separation methods. Probability Concepts : Rainfall frequency, Flood frequency, Stream flow synthesis - Elements of stochastic methods.

Unit – V

Floods: Design flood, estimation by empirical and statistical methods, Flood control Measures – Levees and flood walls, Flood control reservoirs, Water shed management, Flood forecasting methods, Flood routing (elementary treatment only) Planning for Water Resources Development: Level, phases, objectives, Project formulation, systems analysis, multipurpose projects.

Text Books

1. Sharma, R.K. and Sharma, T.K., Hydrology and Water Resources Engineering, Dhanpat Rai & Sons, 2002.
2. Linsley, R.K., and Franzini, J.B., Water Resources Engineering, ISE - McGraw Hill, 2002.

Reference Books

1. Chow, V.T. Hand book of Applied Hydrology, Mc-Graw Hill, 1964.
2. Mutreja, K.N., Applied Hydrology, Tata Mc-Graw Hill, 1986.
3. Varshney, R.S., Engineering Hydrology, Nem Chand & Bros., 3rd edn. 1986.
4. Das, M.M, Saikia, M.D, Hydrology, Prentice Hall of Indian , 2008

CE 407 GEOTECHNICAL ENGG. LAB

(A) List of Experiments

1. Visual classification of soil and Specific gravity test.
2. Liquid limit and Plastic limit Test
3. Shrinkage limit and Free swell Test
4. Grain size analysis. – Mechanical Method
5. Grain size analysis. – Sedimentation Analysis
6. In situ Unit weight determination.
7. Laboratory Permeability test
8. Proctor compaction test.
9. Unconfined compression test.

10. Direct shear test.
11. Triaxial compression test

(B) Demonstration Tests

1. Consolidation test.
2. Swell Pressure Test
3. Insitu Field Tests (SPT, SCPT, VST, Pressuremeter)

Reference Books

1. Alam Singh., Soil Engineering (In Theory and Practice), Geotechnical Testing and Instrumentation (Vol .2), 1998.
2. Bowles,J.E., Engineering Properties of Soils and Measurements, McGraw Hill, 1978

CE 408 FLUID FLOW AND HYDRAULIC MACHINERY LAB

A. Fluid Flow Laboratory

1. Calibration of rectangular, triangular, trapezoidal notches
2. Determination of coefficient of discharge for orifices and mouthpieces
3. Calibration of venturimeters, orifice meters and Rota Meters
4. Verification of Bernoullis theorem
5. Determination of pipe friction
6. Determination of minor losses in pipe due to bends, elbows, sudden contraction, expansion etc.,
7. Determination of Metacentric height of various ship models
8. Determination of force due to Impact of jet on vanes

B. Fluid Machinery Laboratory

1. Study of performance characteristics of centrifugal pump (constant speed)
2. Study of performance characteristics of Reciprocating pump
3. Study of performance characteristics of Submersible pump
4. Tests on Turbine

CE 409 TRANSPORTATION ENGINEERING LAB

I. Test on Highway Materials

Testing of sub-grade soil

1. C.B.R. Test - (on sub grade soil)
2. Sand-Gravel mix design -(on sub grade soil)

II. Tests on Aggregate:

1. Crushing value
2. Los Angles Abrasion test
3. Impact test
4. Shape Tests (elongation index, flakiness index, angularity number)
5. Specific gravity & Water absorption

III. Tests on Bitumen:

1. Penetration Value
2. Ductility
3. Softening point
4. Flash & fire point
5. Specific gravity
6. Viscosity of cutback Bitumen
7. Tests on rubberized/polymer bitumen
8. Marshall's test on bituminous mixes
9. Bitumen content

CE 410 GENERAL PROFICIENCY –I

Unit -I Art Of Communication

Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

Unit - II : Introduction To Soft Skills

Attitude – Self-Confidence – Leadership Qualities – Emotional Quotient – Effective Time Management Skills – Surviving Stress – Overcoming Failure – Professional Ethics – Interpersonal Skills

Unit – III Writing

Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

Unit – IV Speaking Practice

Dialogue – Telephone Etiquette – Public Speaking – Debate – Informal Discussions – Presentations

Unit – V Aptitude

Verbal and Numerical aptitude

References

1. Nicholls, Anne. Mastering Public Speaking. Jaico Publishing House,2003.
2. Aggarwal, R.S. Quantitative Aptitude. S.Chand &Co.,2004.
3. Leigh, Andrew and Michael Maynard. The Perfect Leader. Random House Business Books,1999.
4. Whetton .A.David and Kim S. Cameron. Developing Management Skills. Pearson Education, 2007.
5. Lakshminarayan K.R, Developing Soft Skills. Scitech, 2009.
6. Sherfield M Robert. Developing Soft Skills Pearson Education, 2005.
7. Hair O’ Dan, Friedrich W. Gustav and Lynda Dee Dixon. Strategic Communication in Business and the Professions. Pearson Education,2008.
8. Chaney Lilian and Jeanette Martin. Intercultural Business Communication, Fourth Edition. Pearson Education, 2008.