Faculty of Engineering & Technology
KAKATIYA UNIVERSITY, WARANGAL-506 009
Department of Civil Engineering

B. Tech. (Civil)

IV – SEMESTER

SCHEME OF INSTRUCTION FOR B.E. (CIVIL)

Sl. No.	Course Code	Course Title	Scheme of Instruction				Credits
			L	T	Dr	P	
1	HS 301MC	Managerial Economics and Accountancy	3+1*	-	-	-	3
2	PC 401CE	Mechanics of Materials	2	1	-	-	3
3	PC 402CE	Structural Engineering	2	1	-	-	3
4	PC 403CE	Hydraulic Engineering	2	1	-	-	3
5	PC 404CE	Hydrology and Water Management	2	1	-	-	3
6	PC 405CE	Construction Engineering and Management	2	1	-	-	3
7	PC 401BS	Engineering Geology	2	0	-	-	2
8	PC 451CE	Material Testing Laboratory	-	-	-	2	1
9	PC 452CE	Fluid Mechanics-II Laboratory	-	-	-	2	1
10	PC 453BS	Engineering Geology Laboratory	-	-	-	2	1
11	ES 461CE	Survey Camp	-	-	-	-	1
		Total	**15**	**05**		**06**	**24**

Faculty of Engineering & Technology
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Department of Civil Engineering

B. Tech. (Civil) IV – SEMESTER,
HS 301MC (CM 355UE)
MANAGERIAL ECONOMICS AND ACCOUNTANCY

Unit – I

Meaning and Nature of Managerial Economics: Managerial Economics and its usefulness to Engineers, Fundamental Concepts of Managerial Economics-Scarcity, Marginalism, Equimarginalism, Opportunity costs, Discounting, Time Perspective, Risk and Uncertainty, Profits, Case study method.

Unit – II

Consumer Behavior: Law of Demand, Determinants, Types of Demand; Elasticity of Demand (Price, Income and Cross-Elasticity); Demand Forecasting, Law of Supply and Concept of Equilibrium. (Theory questions and small numerical problem can be asked)

Unit – III

Theory of Production and Markets: Production Function, Law of Variable Proportion, ISO quants, Economics of Scale, Cost of Production (Types and their measurement), Concept of Opportunity Cost, Concept of Revenue, Cost-Output relationship, Break-Even Analysis, Price - Output determination under Perfect Competition and Monopoly (theory and problems can be asked)

Unit – IV

Capital Management: Significance, determination and estimation of fixed and working capital requirements, sources of capital, Introduction to capital budgeting, methods of payback and discounted cash flow methods with problems. (Theory questions and numerical problems on estimating working capital requirements and evaluation of capital budgeting opportunities can be asked)

Unit – V

Book-keeping: Principles and significance of double entry book keeping, Journal, Subsidiary books, Ledger accounts, Trial Balance, concept and preparation of Final Accounts with simple adjustments, Analysis and interpretation of Financial Statements through Ratios.
(Theory questions and numerical problems on preparation of final accounts, cash book, petty cash book, bank reconciliation statement, calculation of some ratios)

Text and Reference books

1. Mehta P.L., *Managerial Economics* —Analysis, Problems and Cases , Sulthan Chand & Sons Educational Publishers, 2011
2. Maheswari S.N., *Introduction to Accountancy* , Vikas Publishing House, 2005
3. Pandey I.M., *Financial Management* , Vikas Publishing House, 2009

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B. Tech. (CIVIL) IV SEMESTER
PC-401CE
MECHANICS OF MATERIALS

Unit – I

Deflection: Slope and deflection by double integration method for cantilever, simply supported beams and overhanging beams carrying one, two point loads, u.d.l. and uniformly varying load over entire span. Moment area and conjugate beam method

Propped cantilevers: Cantilever beams on elastic and rigid props for point loads and UDL only. Calculation of reactions, B.M. and S.F. diagrams, and deflections.

Fixed Beams: Determination of shear force, ·)ending moment slope and deflection in fixed beams with and without sinking of supports for (i) point loads (ii) u.d.l. (iii)uniformly varying load over entire span.

Continuous Beams: Determination of moments in continuous beams with and without sinking of supports by theorem of three moments, S.F. and B.M. diagrams.

Unit – II

Column analogy method: Application to fixed beams- analogous column- stiffness and carryover factors

Strain energy: Strain energy and resilience in statically determinate bars subjected to gradually applied, suddenly applied, impact and shock loads. Resilience of beams. Deflections from resilience. Castigliano Theorem - I and its application to beams- Reciprocal theorem. Static indeterminacy and kinematic indeterminacy of structures.

Unit – III

Strain energy method: Deflections of statically determinate trusses and frames using unit load method.

Redundant trusses and frames: Analysis of plane trusses with one degree of redundancy (internal / external) and plane frames with one degree of redundancy, Lack of fit and temperature effect.

Unit – IV

Torsion and Springs- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of close-coiled-helical springs.

Columns and Struts: Euler's theory for long columns- different end conditions- equivalent length- Rankine's theory. Eccentrically loaded columns- Secant and Perry's formulae.

Unit – V

Unsymmetrical bending of beams: Location of neural axis, maximum stresses for rectangular section .Symmetric channel section.

Shear Centre: Shear stress, shear flow, locating shear center for angle section channel section and T- section, with one axis of symmetry.

Text and Reference Books

1. D.S. Prakash Rao, *Strength of Materials* - A practical Approach, Universities Press, 1999.
2. S.B. Junarkar, *Mechanics of Structures* (Vol. 1 &2), Charotar Publishing House Anand, 1992.
3. R.K. Rajput, *Strength of Materials*, S. Chand & Co., 2003.
4. B.C. Punmia, *Strength of Materials and Theory of Structures*, Laxmi Publishers, Delhi, 2000.
5. G.H. Ryder, *Strength of Materials*, Third Edition in SI units, Macmillan Indian Limited, Delhi, 2002.
6. A. Pytel and F. L. Singer, *Strength of Materials*, Harper & Row, Fourth Edition, New York, 1987.
7. R.K. Bansal, A Text book of Strength of materials, Lakshmi Publications, New Delhi, 2010.
8. Dr. Sadhu singh, *Strength of Materials*, Khanna Publishers, Delhi, 2006.
9. S.M.A Kazimi, *Solid mechanics*, Tata Mc- raw-Hill Publications Ltd. New Delhi, 2009.
10. B.C. Punmia, Ashok kumar Jain, Arunkumar Jain, *Theory of structures*, Lakshmi publications (P) Ltd, New Delhi, 2007.

Faculty of Engineering & Technology
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B. Tech. (CIVIL) IV SEMESTER
PC-402CE
STRUCTURAL ENGINEERING

Unit – I

Materials and Structural Design Criteria Development of design philosophies-Working stress method, Ultimate load method, and Limit state method - Concepts, Characteristics loads and strengths, Partial safety factors, Stress-strain relationship for concrete and steel, stress block parameters.

Working stress method: Design of RCC beams - Balanced, under-reinforced and over reinforced sections - Rectangular, T and L sections, Design of singly and. doubly reinforced rectangular, T and L sections.

Unit – II

Introduction to the analysis and design

Limit state of collapse in flexure: Assumptions, Design for flexure - Singly and doubly reinforced rectangular, T and L sections.

Limit state of collapse in shear and torsion: Design for shear and torsion. Limit states of serviceability: Check for deflection and cracking.

Unit – III

Design of Structural Elements

Design of slabs (Limit state method): Design of one way and two way slabs - Simply supported and continuous slabs subjected to uniformly distributed loads, Detailing of reinforcement, Check for serviceability of slabs.

Design of stair cases (Limit state method): Types of stairs, Effective span, Distribution of loading on stairs, Design and detailing of dog-legged stair cases.

Unit – IV

Design of columns (Limit state method): Assumptions, Design of axially loaded circular, square and rectangular columns, Design of columns with uni-axial and bi-axial bending interaction diagrams

Design of footings (Limit state method): Design of isolated footings of uniform depth and sloped footings, Deign of square, rectangular and circular footings as per IS code, Design of combined rectangular slab footing, Combined rectangular beam and slab footing for two columns

Unit – V

System Design Concepts; Special Topics that may be Covered as Part of the
Design Project Discussions; *Introduction* - Types of bridges, materials of construction, codes of practice (Railway and Highway bridges), aesthetics, loading standards (IRC, RDSO, AASHTO), *Concrete Bridges* - Materials and infrastructure requirements, precast systems and materials used for precast and cast in-situ bridges. Bridge deck and approach slabs, design of bridge deck systems, slab-beam systems design philosophies.

Text and Reference books:

1. Nilson, A. H. *Design of Concrete Structures.* 13th edition. McGraw Hill, 2004
2. Punmia B.C., Jain A.K. and Jain A.K., RCC Designs, Laxmi Publications, 2006.
3. Krishna Raju N. and Pranesh R.N., Reinforced Concrete Design, New Age International Pvt. Ltd., 003.
4. Varghese P.C; Limit State Design of Reinforced Concrete, Prentice Hall of India Pvt. Ltd." 2002.
5. Varghese P.C; Design of Reinforced Concrete Foundations, PHI Learning Pvt. Ltd., 2009.
6. D.S. Prakash Rao, Design Principles and Detailing of Concrete Structures, .Tata Mcfiraw Hill Publishing Co. Ltd., 1995.
7. Nawy, E. G. *Prestressed Concrete: A Fundamental Approach*, Prentice Hall, NJ, (2003).

Note: All relevant latest IS codes necessary for this course may be referred (i.e. IS 456-2000)

Faculty of Engineering & Technology
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B. Tech. (CIVIL) IV SEMESTER
PC-403CE
HYDRAULIC ENGINEERING

Unit – I

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, velocity and pressure distributions in a channel cross-section, energy and momentum correction coefficients, friction to flow in open channels, uniform flow, Manning and Chezy formulae, most efficient channel sections, specific energy, concept and applications of critical depth. Gradually varied flow: Significance of Froude number, dynamic equation of gradually varied flow, classification of gradually varied flow profiles

Unit – II

Boundary layer: Definition, laminar and turbulent boundary layers, boundary layer thickness, displacement thickness, momentum thickness, and energy thickness, hydro-dynamically smooth and rough boundaries, and boundary layer separation.
Drag and Lift: fundamental concepts of drag and lift forces, drag on a sphere, cylinder, flat plate, and aerofoil.

Unit – III

Dimension analysis and model studies: Dimensional analysis and a tool in experimental hydraulics, Buckingham‘s Pie theorem, applications, geometric, kinematic and dynamic similarity, similarity laws, significance of Reynolds, Froude and Mach similarity laws, different types of models and their scale ratios.

Unit – IV

Hydraulic turbines: Classification, specific speed, velocity triangles, power developed, efficiencies, principles of design of impulse and reaction turbines, turbine laws and constants, characteristic curves, selection of turbines.

Unit – V

Centrifugal pumps: Components, work done and efficiency, minimum starting speed, Euler head equation, specific speed and characteristic curves of centrifugal pump, pumps in series and parallel.

Text and Reference Books

1. K. Som, and Biswas, G, _Fluid Mechanics and Fluid Machines‘, Tata McGraw-Hill Publishing Co., New Delhi, 1998
2. Yuan, S. W., _Foundation of Fluid Mechanics‘, Prentice-Hall India Pvt. Ltd., New Delhi, 1976
3. C.S.P. Ojha, R.Berndtsson, P.N. Chandramouli, _Fluid Mechanics and Machinery‘, Oxford University Press, New Delhi, 2010
4. A.K.Mohanty, _Fluid Mechanics‘, Prentice-Hall India Pvt. Ltd., New Delhi,1994.
5. Subrahmanya , K, Fluid Mechanics and Hydraulic Machines Tata McGraw-Hill Publishing Co., New Delhi, 2001

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B. Tech. (CIVIL) IV SEMESTER
PC-403CE
HYDROLOGY AND WATER MANAGEMENT

Unit – I

General: Definition, relation to engineering design, hydrological cycle, importance of hydrology and its application in engineering.

Rainfall: Definition, types of rainfall, measurement of rain fall, types of raingauges, network design, presentation of precipitation data, mean aerial rainfall; thiessen polygon, isohyetal methods., depth- area- duration curve, dependable rainfall.

Infiltration: Evaporation, transpiration-definitions and processes.

Unit – II

Runoff: Definition, runoff process, factors affecting runoff, determination of runoff, importance of stream gauging, runoff formulae and runoff tables, dependable yield of a basin.

Floods: Definition, causes, importance of flood studies, flood peak and flood hydrograph, methods of computing flood peak, empirical methods, rational formula, unit hydrograph method, flood frequency studies, Weibul‘s and Gumble‘s extreme value methods.

Unit – III

Ground water: Types of aquifers, aquifer parameters, specific yield, storage coefficient, coefficients of permeability and transmissivity, Darcy‘s law, types of well, steady radial flow to wells in confined and unconfined aquifers, yield of open wells, safe yield, constant level pumping test and recuperation test.

Unit – IV

Statistics in Hydrology: Introduction, Statistical parameters; central tendency parameters, dispersion characteristics, skewness., probability distribution; discrete and continuous distribution., frequency analysis; log pearson type III distribution., regression and correlation; standard forms of bivariate equations., multivariate linear regression and correlation., analysis of time series., selection of a design return period, determination of permissible risk.

Unit – V

Irrigation: Definition, necessity of irrigation, types of irrigation, advantages and ill-effects of irrigation.

Soil-water-plant relationship: Vertical distribution of soil moisture, soil moisture tension, soil moisture stress, soil moisture constants, plant water relationship, moisture stress and plant response, consumptive use, crop factor, duty, factors affecting duty, types of crops and their water requirements, crop rotation.

Text and Reference Books:

1. K. Subramanya, *Engineering Hydrology*, Tata McGraw Hill Publishing Co.Ltd. 1996.
2. H.M. Raghunath, *Hydrology – Principles, Analysis and Design*, New Age International Publishers, 1996.

3. Michael, A.M, *Irrigation Theory & Practice*, Vikas Publishing House, New Delhi, 1978
4. Ray K.Linsley, Jr, Max A. Kohler, Joseph L.H.Paulhus, *Hydrology for Engineers*, McGraw-Hill Book Company, 1980
5. Ven Te Chow, Hand book of Applied Hydrology, McGraw-Hill Book Company, New York, 1964

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B. Tech. (CIVIL) IV SEMESTER
PC-405CE
CONSTRUCTION ENGINEERING AND MANAGEMENT

Unit – I

Basics of Construction- Unique features of construction, Construction project planning- Stages of project planning, Sequence of events in general Civil Engineering construction projects, Construction Schedule, work break-down structure. Development of management techniques, Bar charts, Gantt charts, CPM and Network analysis examples.

Unit – II

PERT techniques, Introduction to cost analysis, Cost reduction in construction management. Cost time analysis, Crashing the Network, Resource Leveling and smoothing.

Unit – III

Development of Operations Research (OR), Quantitative Analysis and Decision Making, need for linear programming, standard form of Linear programming, Graphical Method. An algebraic overview of Simplex Method, solving minimization and maximization problems, Dual method, case studies.

Unit – IV

Safety Engineering, Safety program, Direct and Indirect loss due to accident, Classification of Construction accidents and causes, Location hazards and their elimination, Safety in demolition of buildings, Safety in storage and handling of materials and equipments

Unit – V

Contracts Management – Basics, Importance of contracts; Types of Contracts, parties to a contract; Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials.

Text and Reference Books

1. Robert L. Peurifoy and William B. Ledbetter, Construction Planning, equipment, and methods, McGraw-Hili International Editions, New Delhi, 1985
2. FrankHarris and Ronald Mc.Caffer,modern construction Management.Blookwell science L1d,2001.
3. Mahesh Varma, Construction Equipment and its Planning and Application, Metropolitan Book Company Pvt Ltd., New Delhi, 1994.
4. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.
5. H.N.Ahuja, Construction performance control by networks, John willey & sons, New York, 1976.

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B. Tech. (CIVIL) IV SEMESTER
PC-401 BS
ENGINEERING GEOLOGY

Unit – I

Rocks: Distinguishing features of igneous, sedimentary and metamorphic rocks Geological description and Indian occurrence of Granite, Basalt, Dolerite, Gabbro, Laterite, Sandstone Shale, Limestone Slate, Gneiss, Quartzite, Marble, Khondalite and chamockite.

Geological Structures: Folds, Fractures joints and faults - Fundamental types, mechanism origin and classifications of structures; Field identification and Engineering analysis of structures

Unit – II

Rock Weathering: Processes and end - products of weathering; susceptibility of rocks tc weathering, Assessment of the degree of weathering and its classification.

Geology of Soils: Formation, geological classification, description and Engineering use of soils Types of Indian soils.

Hydrogeology: Hydrologic cycle, water table, aquifers, occurrence of ground water in various lithological formations, ground water movement, springs, ground water exploration and ground water provinces of India.

Unit – III

Geomorphology: Evolution, characteristics features and Engineering, considerations of fluviatile, Aeolian, glacial and marine land forms.

Rock Mechanics: Engineering properties- of rocks Stress - Strain behaviour of rocks under uniaxial compression.

Site Investigation: Aerial Photographs, Electrical: Resistivity and Seismic refraction methods.

Unit – IV

Rock as a Construction Material: Geological considerations III the selection of Concrete aggregate, Highway and Runway aggregates, building stones, Decorative stones, Roofing and facing stones. Building stones of India.

Geology of Dams and Reservoirs: Types of Dams, Problems associated with Dam foundations and reservoirs, Engineering Geological investigations for a masonry dam site, Analysis of dam failure; Engineering Geology of major Dam sites of India.

Unit – V

Tunnels: Stand - up time of different rocks, Engineering Geological investigations of tunnels in rock, problems in tunneling, pay line and over break, logging of tunnels and geology of some well known Indian tunnels.

Geological Hazards: Geological aspects of Earthquakes, Tsunamis and Landslides; Disaster prevention, mitigation and management.

Text and Reference Books

1. F.G. Bell, Engineering Geology, Elsivier - 2007.
2. Dimitri P. Krynine and William R. Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distributors, First Edition, 1998.
3. B.P.Attewel and I.W. Fanner, Principles of Engineering Geology, Chapman and Hall 1976.
4. Officers of the Geological Survey of India, "Engineering Geology Case Histories" Miscellaneous Pub. No. 29, 1975.

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B. Tech. (CIVIL) IV SEMESTER
PC-451 CE
MATERIAL TESTING LABORATORY

Cycle - I

1. Tension –I Uni-Axial tension test on a specimen of ductile material
2. Tension II Stress-Strain characteristics of a ductile material
3. Brinell‘s hardness test
4. Compressive strength test on bricks
5. Bending test on simply supported beam of timber

Cycle - II

6. Torsion test on a specimen of ductile material
7. Compression test on close coiled helical spring
8. Bending test on simply supported beam of steel
9. Bending test on fixed beam of steel
10. Izod impact test

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B. Tech. (CIVIL) IV SEMESTER
PC-452CE
FLUID MACHANICS-II LABORATORY

List of Experiments

1. Determination of roughness coefficient in an open channel
2. Determination of a vane coefficient
3. Study of universal characteristic curves of a Pelton wheel
4. Study of universal characteristic curves of a Francis turbine
5. Determination of super elevation in an open channel
6. Determination of basic characteristics of a hydraulic jump
7. Verification of Froude‘s Model law in an open channel
8. Determination of critical slope of an open channel
9. Study of main characteristic curves of a Centrifugal pump
10. Study of universal characteristic curves of a Kaplan turbine

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B. Tech. (CIVIL) IV SEMESTER
PC-453CE
ENGINEERING GEOLOGY LABORATORY

1. Identification and description of physical properties of Minerals
2. Identification and description of geological and geotechnical characteristics of rocks; IS Code: 1123 (1975) .
3. Determination of apparent specific gravity, porosity and water absorption of different rocks; IS Code: 1124 (1974) ,
4. a) Study of structural models (folds, faults and unconformities) and
   b) Measurement of strike and dip of planar features by clinometers compass.
5. Vertical electrical sounding (VES) - a field experiment to determine depth to water table and bedrock.
6. Seismic refraction survey to determine depth to bedrock (demonstration only).
7. a) Determination of unconfined compressive strength of intact rocks.
   b) Study of topographic maps.
8. Stereoscopic examination of aerial photographs pertaining to landforms, vegetation and water bodies.
9. Study of geological maps of Andhra Pradesh, Teleangana and India with reference to occurrence of building stones.
10. Study of (a) Geotechnical Map of India and (b) Geomorphological Map of India.
11. Study of Hydro geological Maps of Andhra Pradesh and India.
12. Study of Foundation Geological Maps and sections pertaining to the major dam sites of India.

Note: At least 10 experiments are to be conducted

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B. Tech. (CIVIL) IV SEMESTER
ES-461CE

SURVEY CAMP

The students will be given basic training of handling various survey instruments including the Total stations. The students are given certain tasks on all the instruments and equipments to solve the real practical problems in the vicinity of campus which enables them to learn and apply to the real life survey problem