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

B. Tech. (Civil)

III – SEMESTER

SCHEME OF INSTRUCTION FOR B.E. (CIVIL)

Sl. No.	Course Code	Course Title	Scheme of Instruction			
			L	T	P	C
1	BS 301MT	Mathematics-III	3	0	0	3
2	ES 301CE	Surveying and Geomatics	2	1	0	3
3	PC 301CE	Introduction to Solid Mechanics	3	0	0	3
4	PC 302CE	Introduction to Fluid Mechanics	3	0	0	3
5	PC 303CE	Material Testing and Evaluation	3	0	0	3
6	ES401ME	Elements of Mechanical Engineering	3	1	0	4
7	MC 302CE	Environmental Sciences	2	0	0	0
8	ES 351CE	Surveying laboratory	0	0	2	1
9	PC 351CE	Fluid Mechanics-I laboratory	0	0	2	1
		Total credits				21

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B. Tech. (CIVIL) III SEMESTER
BSC-105
MATHEMATICS - III
STATISTICS, PROBABILITY, AND NUMERICAL TECHNIQUES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Module1: Statistical Methods
Introduction, Collection of Data, Graphical Representation, Measures of Dispersion, Moments, Skewness, Kurtosis, Correlation, Coefficient of Correlation, Lines of Regression.
(Sections 25.1, 25.2, 25.3, 25.6, 25.9, 25.10, 25.11, 25.12, 25.13, 25.14 of Text Book)

Module2: Probability & Distributions
Probability, Addition Law of Probability, Independent Events, Baye's Theorem , Random Variable, Continuous Probability Distribution, Expectation, Moment Generating Function, Binomial Distribution , Poisson Distribution, Normal Distribution, Exponential Distribution.
(Sections26.1,26.4,26.5,26.6,26.7,26.9,26.10,26.11,26.14,26.15,26.16,26.19(6) of Text Book)

Module3: Numerical Techniques-I
Solution of Algebraic and Transcendental Equations, Principle of Least Squares, Method of Least Squares, Fitting of Other Curves, Finite Differences, Forward Differences, Backward Differences. (Sections 28.2, 24.4, 24.5, 24.6, 30.2, 30.2(1), 30.2(2) Of Text Book)

Module4: Numerical Techniques-II
Central Differences, Other Difference Operators, Newton's Interpolation Formulae, Gauss's Forward Interpolation Formula, Interpolation with Unequal Intervals, Numerical Differentiation. Sections 29.7, 29.4, 29.6, 29.7(1), 29.9, 30.1.of Text Book)

Module5: Numerical Techniques-III
Numerical Integration, Trapezoidal Rule, Simpson's one –third Rule, Simpson's three-eight Rule, Weddle's Rule, Solution of Simultaneous Linear Equations (Iterative Methods)
(Sections 30.4, 30.6, 30.7, 30.8, 30.10, 28.5 of Text Book)

Text Book:
 B.S Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publications.

References
1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th Edition, John Wiley & Sons
2. S.C. Gupta, V.K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand &Sons
3. S.S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Pvt. Ltd.

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B. Tech. (CIVIL) III SEMESTER
ES-301CE
SURVEYING AND GEOMATICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	1	0	3	External Marks: 70

Unit – I:
Introduction to Surveying: Principles, Linear, methods, Leveling: Plane table surveying, Principles of levelling- reducing levels; differential, reciprocal leveling, Digital and Auto Level, contouring: Characteristics, uses; areas and volumes.
*Triangulation and Tri-lateration***:** Theodolite survey: Instruments, Measurement of Horizontal and vertical angle; - methods -triangulation - network- Signals. Baseline - choices - instruments and accessories - corrections - Satellite station - reduction to centre - Indivisibility of height and distances - Trigonometric leveling.

Unit – II:
Curves Elements of simple and compound curves – Method of setting out- Transition curve — Elements of transition curve and Vertical curves.

Unit – III:
Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, , Surveying with GPS.

Unit – IV:
Photogrammetric Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, flight planning; Stereoscopy, ground control extension for photographic mapping- photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Unit –V:
Remote Sensing: Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation;

Text and Reference books

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.

5. Anji Reddy, M., Remote Sensing and Geographical Information System, B.S. Publications, 2001
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

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B. Tech. (CIVIL) III SEMESTER
PC-301CE
INTRODUCTION TO SOLID MECHANICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Unit – I:
Simple Stresses and Strains- Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience– Gradual, sudden, impact and shock loadings – simple applications.

Unit – II:
Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain

Unit – III:
Bending moment and Shear Force Diagrams- Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without over hangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

Unit – IV:
Flexural Stresses-Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.
Shear Stresses- Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

Unit – V:
Direct and Bending: Basic concept , Eccentric loading, limit of eccentricity-Core of sections-rectangular and circular, solid and hollow sections-wind pressure on chimneys and water pressure on dams.
Thin Cylinders - Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder.
Thick Cylinders: Lame's equations, stresses under internal and external fluid pressures-Compound cylinders- Shrink fit pressure.

Text and Reference books:

1. Timoshenko, S. and Young, D. H., ‒Elements of Strength of Materials‖, DVNC, New York, USA.
2. Kazmi, S. M. A., ‒Solid Mechanics‖ TMH, Delhi, India.
3. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson,Prentice Hall, 2004
4. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd edn. New York, NY: McGraw Hill, 1979
5. Laboratory Manual of Testing Materials - William Kendrick Hall
6. Mechanics of Materials - Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DE wolf – TMH 2002.
7. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi

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B. Tech. (CIVIL) III SEMESTER
PC-302CE
INTRODUCTION TO FLUID MECHANICS

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Unit – I:
Fluid Properties: Basic concepts: Specific weight, specific volume, specific mass, gravity, viscosity, bulk modulus, vapour pressure, capillarity and surface tension, viscosity-Newton's law of viscosity, Newtonian and Non-Newtonian fluids, classification of fluids-ideal and real.

Unit – II:
Fluid Kinematics: Fundamentals of fluid flow-description of flow pattern, stream lines, path lines, streak lines, stream tubes, classification of fluids, steady and unsteady flows, laminar and turbulent flows, uniform and non-unsteady flows, rotational and irrotational flows, laminar and turbulent flows, uniform and non- uniform flow, one, two and three dimensional flows, stream function, and velocity potential function, flow net-significance and use.

Unit – III:
Fluid Statics: Fluid pressure at a point, variation of pressure in a fluid, measurement of pressure - simple and differential manometers.
Fluid Dynamics: Convective and local acceleration, concept of continuity, three-dimensional continuity equation, body forces and surface forces, body force potential, Euler's equation of motion for 3-D flow, Bernoulli's equation by integration of Euler's equation, significance of Bernoulli's equation and its limitations, applications of Bernoulli's equation- venturimeter, pitot tube. Impulse-momentum equation and its applications- forces on a pipe bend.

Unit – IV:
Flow Through Pipes: Introduction, types of flows-laminar and turbulent, Reynolds experiment, Darcy-Weisbach equation, and steady laminar flow through circular pipes-Hagen-Poiseuille's equation, hydro-dynamically smooth and rough boundaries- criteria and resistance to flow of fluid in smooth and rough boundaries, variation of friction factor.

Unit – V:
Compressible Flow: Compressibility of liquids and gases, differential form of continuity equation, Bernoulli's energy equation for isothermal and adiabatic conditions, velocity of pressure wave, wave velocity for adiabatic and isothermal conditions, Mach Number and Mach cone, stagnation pressure and temperature.

Text and Reference books

1. K. Subramanya, _Theory and Applications of Fluid Mechanics', Tata McGraw-Hill

Publishing Company Ltd., New Delhi, 1993

2. Vijay Gupta and Santosh K. Gupta, ‗*Fluid Mechanics and its applications*', Wiley Eastern Ltd., New Delhi,1984

3. K.L. Kumar, ‗*Engineering Fluid Mechanics*', Eurasia Publishing House Pvt Ltd., New Delhi, 2009

4. Valentine, H.R., ‗*Applied Hydrodynamics*', Butterworths & Co Ltd., London, 1959

5. P.N. Modi and S.M.Seth, ‗*Hydraulics and Fluid Mechanics*', Standard Book House, New Delhi, 2013

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B. Tech. (CIVIL) III SEMESTER
PC-303CE
MATERIAL TESTING AND EVALUATION

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	0	0	3	External Marks: 70

Unit – I:
Introduction: Uses of stones as building materials, classification, characteristics, dressing and polishing of stones, methods of quarrying and construction.
Bricks: Methods of manufacturing bricks. Classification and methods of construction.
Timber: Timber as a building material and its uses. Methods of seasoning and preservation laminates and their uses, defects in Timber.
Cement: Introduction to cement, different grades, IS specifications and OPC and PPC Cements (blended cements).
Mortar and Sand: Characteristics of good mortar making sand, availability of sand ant its classification, bulking of sand, manufacturing methods of mortar. Different types of mortars-preparation, setting and curing.

Unit – II:
Coarse and fine Aggregate: Characteristics of good coarse and fine aggregates for manufacture of concrete. Significance and application of coarse and fine aggregate for the production of good quality concrete.
Concrete: Introduction to Nominal mix and Design mix

Unit – III:
Type of joints in Concrete - Construction, expansion, contraction, and isolation joints.
Cracks in Buildings- Type of cracks in buildings, principal causes-moisture movement, thermal variations, elastic deformation, creep, chemical reaction.
Smart building Materials: Energy conservation in buildings- use of recycled materials, regional materials and industrial waste products as means of sustainable development. Green Building Materials

Unit – IV:
Plastering and Pointing: Different types of plasters and plastering process, defects in plastering.
Paints, Varnish and Distemper: Constituents, characteristics of good paints, bases, vehicles, thinners and coloring pigments. Painting of different types of surfaces varnish and its types, application. Distemper, dry and oil bound, and application of distemper.

Unit – V:
Form work- Types of Form work, types of materials used in form work
Scaffoldings- Types of Scaffoldings, Scaffolding Erection & dismantling, Scaffolding Inspection

Fire protection in structures- Classification of fire, general causes of fire, detection of fire, methods for fire control, Analysis for structural components for fire resistance (wood, steel, concrete and masonry).

Damp Proof Course-Causes of dampness, effects of dampness, methods of damp proofing

Text and Reference books

1. VN. Vazirani, and S.P. Chandola, *Engineering Materials*, Khanna Publishers 1993.
2. Sushil Kumar, Building Construction, Standard Publilshers 1992.
3. S.P. Arora and S.P. Bindra, *Text book on Building Construction*, Dhanpath Raj Publications, 1999.
4. M.S.Shetty, *Concrete Technology*, S.Chand Publishers,2012.
5. Gurucharan singh, *Building materials and construction*, Standard book house

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Elements of Mechanical Engineering

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
3	1	0	4	External Marks: 70

UNIT- I
Statements of zeroth law, 1st, 2nd and 3rd Laws of thermodynamics with their applications. Representation of thermodynamic processes on p-V and T-s plots. Ideal gas equation. Relations for internal energy and entropy changes, heat and work transfers for closed systems. Steady flow energy equation for an open systems-derivation and applications in turbines, compressors, nozzles and diffusers. Relations for enthalpy changes, heat and work transfers for open systems.

UNIT-II
Power Cycles: Concept of air standard cycles- Carnot cycle, Otto, Diesel, Joule cycles with applications. Representation of Cycles on P-V and T-s plots. Calculation of Cycle efficiencies.
IC Engines: Classification of IC Engines. Mechanical components of IC Engines. Working Principles of four stroke and two stroke cycle engines. Differences between petrol and diesel engines. Calculation of engine parameters -IP, BP, Specific fuel consumption, mechanical and thermal efficiencies.

UNIT-III
Working principles of reciprocating air compressors-single and double acting, single stage and two stage. Effect of clearance. Conditions for maximum efficiency. Isentropic and isothermal efficiencies. Problems on work input, power required and efficiencies of single and two stage compressors. Methods for improving efficiency –use of intercooler and after cooler.
Refrigeration: Working of vapour compression refrigeration system and window Air conditioners. COP calculation. Common refrigerants in use, environmental impacts of refrigerants.

UNIT-IV
Belt drives: Velocity ratio, effect of slip. Length of open and cross belts. Ratio of tensions, centrifugal tension and its effect on power transmission. **Gear drives**: Nomenclature and types of gears. Problems on simple and compound gear trains. **Governors**: Working of Watt, Porter and Hartnell governors. Effect and power of governor. Stability of governor and isochronism. Balancing of several masses in one plane and in several planes.

UNIT- V
Production Techniques: Principles of Arc, Gas and Resistance welding, soldering and Brazing, working mechanism of Lathe, milling and drilling machines by simple sketches. Working principle of NC machines. Basic principles of USM, EDM, LBM and ECM. Principles of sand casting and die casting. Plastics and their moulding methods.

Text and Reference Books

1. R.K. Rajput, "*Thermal Engineering*", Laxmi Publications, New Delhi, Eighth Edition, 2010.
2. P.K. Nag, "*Basic and Applied Thermodynamics*", Tata Mc-Graw Hill, Eigth Reprint, 2006.
3. Thomas Bevan, "*Theory of Machines*", College Book Store (CBS) Publishers, 3rd Edn., 1986.
4. Hajra Choudary, "*Elements of Workshop Technology-Vel. I and 2*, Asian Publishers, 6th Edn., 1993.
5. P. N. Rao, "*Manufacturing Technology*", Vol. I &2, Tata McGraw- Hill, 2nd Edn., 2009.

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B. Tech. (CIVIL) III SEMESTER
MC 210
ENVIRONMENTAL SCIENCES

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 30
2	0	0	0	External Marks: 70

UNIT–I (8)

Introduction to Environmental Science: Environment and society, major environmental issues: Ozone layer depletion, Acid rains, global climate change etc, sustainable development, Environmental impact assessment, environmental management

Natural Resources Utilization and its Impacts: Energy, minerals, water and land resources, Resource consumption, population dynamics, urbanization..

UNIT–II (8)

Ecology and Biodiversity: Energy flow in ecosystem, food chain, nutrient cycles, eutrofication value of biodiversity, biodiversity at global, national and local levels, threats for biodiversity, conservation of biodiversity.

UNIT–III (8)

Water Pollution: Sources, types of pollutants and their effects, water quality issues, contaminanttransport, self-purification capacity of streams and water bodies, water quality standards, principles of water and wastewater treatment.

UNIT–IV (8)

Air Pollution: Sources, classification and their effects, Air quality standards, dispersion of pollutants, control of air pollution, automobile pollution and its control.

UNIT–V (8)

Solid Waste Management: Sources and characteristics of solid waste, effects, Collection and transfer system, disposal methods.

Text Books:
1. M. Chandrasekhar, Environmental science, Hi Tech Publishers, 2009.
2. P.N. Modi (2006), Water supply Engineering – Environmental Engineering (Vol. I) – Standard Book House.
3. Gerard Kiely, Environmental Engineering, McGraw Hill Education Pvt Ltd, Special Indian Edition, 2007.

References:
1. W P Cunningham, M A Cunningham, Principles of Environmental Science, Inquiry and Applications, Tata McGraw Hill, Eighth Edition, 2016.

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B. Tech. (CIVIL) III SEMESTER
ES351CE
SURVEYING LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	2	1	External Marks: 50

List of Experiments:

1. Applications of traversing to locate a building and field objects by taking perpendicular and oblique offsets; and recording in the field book.
2. To determine the area of the given site by cross staff survey
3. Closed traverse by chain and compass, plotting and adjustment by graphical method
4. Plane tabling: Radiation and intersection methods
5. Introduction to leveling: Fly leveling using dumpy level
6. Measurement of horizontal angles by repetition and reiteration methods using Vernier Theodolite.
7. Measurement of vertical angle: Application to simple problems of height and distance by measuring angle of elevation and depression
8. Single plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are placed in a same vertical plane- when base of the Object inaccessible.
9. Two plane method: Determination of R.L. of an elevated Object using two Instrument Stations which are not placed in the same vertical plane- when base of the Object inaccessible.
10. Setting out of a simple circular curve by linear method
11. Setting out of a simple circular curve by angular method
12. Setting out of a transition curve by linear method
13. Introduction to Total station and applications: To determine difference in elevation of any two given points. The introduction includes, setting up of the Total station over a station, input values, field measurements, downloading of the data in to a computer.
14. Total station and applications: Application to simple problems of height and distance by measuring angle of elevation and depression and determination of **R.L** of the target object.
15. Total station and applications: Determination of area enclosed in a closed traverse having minimum 5 stations. Plot the measured values by using a software package.
16. Geographic Position System (GPS),Geographical Information system(GIS) and their applications: Determination of Latitude and Longitude of any four stations and computation of the area. Check trust worthiness of the measured results.

Suggested Reading:

1. B.C. Punmia, *Surveying, Vol. I and Vol. II*, Laxmi Publications, 1994.
2. Arora, K.R., *Surveying, Vol. I, II and III*, Standard Book House., 1995.
3. T.M. Lillesand and R.W. Kiefer, *Remote Sensing and Image Interpretation*, John Wiley & Sons, 1994.
4. R. Srinivasa Kumar, *A Text Book of Highway Engineering*, Universities Press, Hyderabad, 2011.
5. M. Chandra, *Advanced Surveying*, New Age International Publishers New Delhi, 2000.

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B. Tech. (CIVIL) III SEMESTER
PC351CE
FLUID MECHANICS – I LABORATORY

Teaching Scheme				Examination Scheme
L	T	P	C	Internal Marks: 25
0	0	2	1	External Marks: 50

List of Experiments:

1. Determination of C_d and C_v of an orifice

2. Calibration of a mouth piece

3. Determination of C_d of a mouth piece for unsteady flow in a hemi-spherical tank

4. Calibration of a rectangular notch

5. Calibration of a triangular notch

6. Calibration of a broad crested weir

7. Verification of Bernoulli's principle

8. Determination of types of flows

9. Determination of major and minor losses in the pipes

10. Calibration of a Venturi meter