VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING & TECHNOLOGY HYDERABAD
B.TECH. II YEAR
(CIVIL ENGINEERING)

III SEMESTER **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
19BS1MT12	Probability, Statistics and Time Series	3	0	0	3	3
19PC1CE01	Strength of Materials - I	3	0	0	3	3
19PC1CE02	Fluid Mechanics	3	1	0	4	4
19PC1CE03	Building Materials, Construction and Planning	3	0	0	3	3
19PC1CE04	Surveying and Geomatics	3	0	0	3	3
19PC2CE01	Strength of Materials Laboratory	0	0	3	3	1.5
19PC2CE02	Surveying Laboratory	0	0	3	3	1.5
19PC3CE01	Computer Aided Civil Engineering Drawing	0	0	2	2	1
Total		**15**	**1**	**8**	**24**	**20**

IV SEMESTER **R19**

Course Code	Title of the Course	L	T	P/D	Contact Hours/ Week	Credits
19PC1CE05	Strength of Materials - II	3	0	0	3	3
19PC1CE06	Structural Analysis	3	1	0	4	4
19PC1CE07	Concrete Technology	3	0	0	3	3
19PC1CE08	Hydraulic Engineering and Hydraulic Machines	3	0	0	3	3
19ES1EE07	Elements of Electrical and Electronics Engineering	3	0	0	3	3
19PC2CE03	Fluid Mechanics and Hydraulic Machines Laboratory	0	0	3	3	1.5
19PC2CE04	Concrete Laboratory	0	0	3	3	1.5
19ES2EE06	Elements of Electrical and Electronics Engineering Laboratory	0	0	2	2	1
Total		**15**	**1**	**8**	**24**	**20**
19MN6HS03	Gender Sensitization	0	0	2	2	0

L – Lecture T – Tutorial P – Practical D – Drawing

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19BS1MT12) PROBABILITY, STATISTICS AND TIME SERIES

COURSE PRE-REQUISITES: Permutations and combinations, basic statistics

COURSE OBJECTIVES:
- To elementary ideas in basic probability
- To different types of probability distribution functions
- To methods of calculating correlation and regression
- To various methods to test the hypothesis
- To introduce the notion of time series and its utility in engineering applications

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Solve problems involving basic probability
CO-2: Evaluate statistical parameters of different probability distributions
CO-3: Calculate correlation, regression, rank correlation coefficients
CO-4: Apply the knowledge of different probability distributions to Test of Hypothesis
CO-5: Use Least squares method to compute time series

UNIT – I:
Basic Probability: Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem. Random variables - discrete and continuous distributions - Expectation of Discrete Random Variables, Moments, Variance of a sum.

UNIT – II:
Probability Distributions: Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions –related properties.

UNIT – III:
Correlation and Regression: Coefficient of correlation, regression coefficient, the lines of regression, rank correlation

UNIT – IV:
Testing of Hypothesis - Large Sample: Sampling distributions, Tests of hypothesis - null hypothesis, alternate hypothesis, type I, type II errors, critical region. Inferences concerning means and proportions- Large samples- test of hypothesis for single mean and difference between the means. Test of hypothesis for the proportions- single and difference between the proportions, confidence interval for the mean and proportions.

UNIT – V:
Tests of Significance - Small Samples: Tests of significance-t distributions, confidence interval for the t- distribution, F-distributions and Chi square distributions.

UNIT – VI:
Time Series: Time series- utility of time series analysis, components of time series. Preliminary adjustments before analyzing time series. Measurement of trend by the method of least squares, method of moments.

TEXT BOOKS:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006
2. Probability and Statistics for Engineers – Richard.A, Johanson, 1995, 5th Edition, Prentice-Hall
3. Introduction to Probability Theory, P. G. Hoel, S. C. Port and C. J. Stone, Universal Book Stall, 2003 (Reprint)

REFERENCES:

1. Statistical Methods, S.P. Gupta, 2011, Sultan Chand and sons
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000
4. Applied Statistics for Engineers-Jay. L. Devore, Nicholas. R. Famum, Jimmy.A. Doi, 3rd Edition, Cengage learning
5. Chris Chatfield, The Analysis of Time Series -An Introduction, 6th Edition, CRC Press

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE01) STRENGTH OF MATERIALS – I

COURSE OBJECTIVES:

- **To define** various types of stresses and strains
- **To understand** the concept of shear force and bending moment
- **To draw** the bending stress and shear stress distribution across various cross-sections
- **To distinguish** between various methods of determining the slopes and deflections

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Determine the stresses and strains in determinate and indeterminate systems
CO-2: Draw the shear force and bending moment diagrams in determinate beams
CO-3: Apply the bending stress and shear stress formulae for the design of beams
CO-4: Determine the slopes and deflections due to various types of loads in determinate beams

UNIT – I:
Simple Stresses and Strains : Mechanical properties of solids – Elasticity, Plasticity, Ductility, Brittleness, Malleability, Toughness, Hardness - Stress, Strain - Hooke"s law – Types of Stresses and Strains – Stress-Strain curves for ductile and brittle materials – Principle of superposition - Bars of varying sections – Bar of tapering section - Working stress – Factor of safety – Lateral Strain – Poisson"s Ratio - Volumetric Strain – Elastic moduli - Relationship between different Elastic moduli.

UNIT – II:
Statically Indeterminate Systems: Members subjected to self-weight acting axially and their articulation for uniform stress – Equations of Equilibrium and Compatibility – Composite bars – Temperature stresses
Strain Energy: Strain energy due to axial loads - gradually applied, suddenly applied and impact loads.

UNIT – III:
Shear Force and Bending Moment: Types of supports, loads, beams – Concept of shear force and bending moment – Relation between SF, BM and Rate of loading - SF and BM diagrams for statically determinate beams – Cantilevers, Simply supported beams, Overhanging beams - Point of contra flexure and its significance.

UNIT – IV:
Bending Stresses: Theory of Simple bending – Assumptions - Neutral axis – Derivation of flexure formula – Section modulus for various sections - Bending stress distribution – Strength of a section - Design of simple beam sections.

UNIT-V:
Shear Stresses: Derivation of Shear stress formula – Shear stress distribution across depth of various beam sections like Rectangular, Circular, Triangular, I and T sections.

UNIT-VI:
Deflection of Beams: Slope, Deflection and Radius of curvature – Differential equation for the deflection curve of a beam – Slope and Deflection of beams using Successive

Integration method – Macaulay"s method – Mohr"s Moment Area method – Conjugate beam method – Application to Cantilever and Simply supported beams.

TEXT BOOKS:

1. Mechanics of Materials by R. C. Hibbeler – Pearson Education
2. Mechanics of Materials by James Gere – Cengage Learning

REFERENCES:

1. Strength of Materials by B. C. Punmia, Ashok Jain, Arun Jain - Laxmi Publications
2. Strength of Materials by R. K. Bansal - Laxmi Publications
3. Strength of Materials by S. S. Rattan – McGraw-Hill Education (India) Pvt. Ltd
4. Strength of Materials by R. K. Rajput – S. Chand & Company Ltd

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE02) FLUID MECHANICS

COURSE OBJECTIVES:

- **To identify** and obtain values of fluid properties and relationship between them
- **To explain** the principles of continuity, momentum, and energy as applied to fluid motions
- **To apply** these principles in the form of mathematical equations
- **To solve** these equations as applied to practical fluid mechanics problems

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Define fundamental concepts of fluid mechanics as applied to civil engineering and environmental problems

CO-2: Discuss and derive the fundamental mathematical equations of fluid mechanics

CO-3: Solve the fluid mechanics problems as related to practical civil engineering problems of water conveyance in pipes, orifices, mouth pieces, notches and weirs

CO-4: Evaluate the various assumptions made in the application of equations to avoid the common pitfalls

UNIT – I:

Properties of Fluid: Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics: Fluid Pressure: Pressure at a point, Pascal"s law, pressure variation with temperature, density and altitude, Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers, Pressure gauges; Hydrostatic pressure and force: horizontal, vertical and inclined surfaces; Buoyancy and stability of floating bodies.

UNIT – II:

Fluid Kinematics: Classification of fluid flow; steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; One, two and three-dimensional flows; Irrotational and rotational flows; Ideal and real flows; Stream line, streak line, path line and stream tube; stream function, velocity potential function; Equation of acceleration; Convective and local acceleration; One-, two- and three - dimensional continuity equations in Cartesian coordinates; Flow net.

UNIT – III:

Fluid Dynamics: Surface and body forces; Equations of motion - Euler"s equation; Bernoulli"s equation – derivation; Energy Principle; Practical applications of Bernoulli"s equation: venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced

UNIT – IV:

Flow Measurement: Measurement of velocity by Pilot tube; Discharge through venture meter; Discharge through office meter; Discharge through flow nozzle; Flow through

orifices; Determination of coefficients for an orifice; Flow through mouth piece; Flow through rectangular; triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.

UNIT – V:

Analysis of Pipe Flow: Reynolds experiment Classification of Laminar & Turbulent flows. Steady laminar flow through circular pipes. Energy losses in pipelines: Minor losses, Darcy Weisbach equation; Pipes in series and parallel; Branching of pipes, three reservoir problem Total energy line and hydraulic gradient line. Resistance to flow of fluid on smooth and rough pipes; Moody"s diagram.

UNIT – VI:

Theory of Boundary Layer: Boundary layer and its growth, Boundary layer thickness, displacement, momentum & energy thickness; Characteristics of Boundary layer along a thin flat plate, Laminar and Turbulent Boundary layers (no derivations), Boundary layer Separation and Control. Flow around submerged objects – Drag and Lift – Magnus effect.

TEXT BOOKS:

1. Fluid Mechanics and Hydraulic Machines by Modi and Seth, Standard Book House
2. Fluid Mechanics & Hydraulic Machines - Problems and Solutions by K. Subramanya McGraw-Hill Education (I) Pvt. Ltd
3. Fluid Mechanics and Machineries by C. P. S. Ohja, P. N. Chandramouli, and R. Berndtsson

REFERENCES:

1. Fluid Mechanics by V. L. Streeter, E. Benjamin Wiley and W. Bedford, McGraw-Hill Company
2. Fluid Mechanics by Frank M. White, Tata McGraw-Hill Pvt. Ltd
3. Fluid Mechanics and Hydraulics Machines by R. K. Bansal, Laxmi Publications

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE03) BUILDING MATERIALS, CONSTRUCTION AND PLANNING

COURSE OBJECTIVES:

- **To list** different construction materials, their properties and applications
- **To identify** and explain major building components
- **To understand** the building bye-laws
- **To explain** the services required for different types of buildings

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Define and **examine** the properties of construction materials and their behavior
CO-2: Appraise various traditional and emerging building materials
CO-3: Describe various building components and finishes
CO-4: Plan a building with appropriate building services

UNIT – I:
Stones, Bricks and Tiles: Stones – classification and quarrying – properties – structural requirements – dressing of stones; Bricks – composition of Brick earth – manufacturing and properties of bricks; Ceramics – Tiles – manufacturing - specifications of tiles.

UNIT – II:
Lime, Cement, Wood, Aluminum, Steel and Glass: Lime – ingredients of lime, classification, manufacturing; Cement- ingredients of cement; Wood – structure – types and properties – seasoning; Aluminum and Steel – composition, material properties and behavior; Glass, Fiber reinforced plastic- material properties.

UNIT – III:
Building components: Basic Structural and Non- structural components; Foundations – types; Damp Proof Course - methods adopted; Lintels – Types; Walls – load bearing and non-load bearing walls; Floors - types – mud and muram, wood/timber, marbles, tiles, concrete, flag stones, bricks, mosaic, terrazzo floors; Roofs - types – pitched, flat, curved, lean-to-roof, coupled roofs, trussed roof – king and queen post trusses; Doors – Windows – types.

UNIT – IV:
Masonry: Brick Masonry – types – bonds; Stone masonry – types; Composite Masonry – reinforced brick, cement concrete.
Formwork and Finishing: Scaffolding – types; Shoring; Underpinning; Finishes – plastering, pointing, painting, claddings – types.

UNIT – V:
Building services: Plumbing Services, Water Distribution, Sanitary – Lines & Fittings; Ventilators: Functional requirements, systems of ventilators. Air conditioning – Essentials; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire hazards

UNIT – VI:
Building planning: Principles of Building Planning, classification of buildings and Building bye laws – Building Information System – Green building concepts.

TEXT BOOKS:

1. Building Materials by Duggal, New Age International
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain-Laxmi Publications (P) ltd, New Delhi

REFERENCES:

1. Materials Science and Engineering – An Introduction by William D. Callister, Jr., John Wiley and Sons, New York
2. Engineering Materials by S. C. Rangwala, Charotar Publishing House, Anand
3. Building Construction by Arora and Bindra, Dhanpat Roy Publications

Codes:

1. Building Construction by S. C. Rangwala, Charotar Publishing House, Anand
2. Building Construction by PC Varghese, PHI
3. National Building Code - 2016
4. Building bye laws by State and Central governments and Municipal corporations

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE04) SURVEYING AND GEOMATICS

COURSE OBJECTIVES:

- **To understand** methods of measuring horizontal distances using chain and compass instruments
- **To evaluate** reduced levels and apply in the preparation of contour maps, earthwork and reservoir capacity estimation
- **To implement** the principles of trigonometry and optics for the determination of horizontal and vertical distances
- **To correlate** the importance of modern surveying techniques adopted in real world situation

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Measure horizontal distance through plane surveying
CO-2: Prepare contour map and estimate the quantity of earthwork required for road and railway constructions
CO-3: Judge on type of instrument to be used for setting out curves and vertical elevations and horizontal distances
CO-4: Articulates the importance of modern instruments used in geomatics

UNIT – I:
Introduction to Surveying: Definition; Classification; Principles of surveying; Errors in surveying: Types of errors; Ranging, Principles of chain surveying; Basic definitions.
Compass Surveying: Prismatic compass; Local attraction; angular measurements Bearings.

UNIT – II:
Simple Leveling: Basic definitions; Curvature and Refraction; classification of methods of leveling; Sources of errors in leveling. Contour; contour interval; Characteristics of contours; Methods of plotting of contours; Uses of contour maps.
Areas and Volumes: Introduction; Simpson"s rule; Boundaries with offsets at irregular intervals; coordinate method; planimeter; level section; two level section; trapezoidal and prismoidal rule; volume from contour plan; capacity of a reservoir.

UNIT – III:
Theodolite Survey & Traversing: Theodolite components parts; basic definitions, fundamental lines; measurement of a horizontal angle; repetition and reiteration method and measurement of vertical angle.
Trigonometric Leveling: Base of the object accessible, base of an inclined object accessible, reduced level of the elevated points with inaccessible bases.

UNIT – IV:
Tacheometric Surveying: Basic systems of tacheometric measurements; Inclined sight with staff held vertical; inclined sight with staff held normal to the inclined line of sight.
Curves: Basic definitions; designation of a curve; relationship between radius and degree of curve; types of curve; elements of a simple circular; methods of setting out for simple.

UNIT – V:

Modern Field Survey Systems: Principle of Electronic Distance measurement; types of EDM instruments, total station, parts, accessories – advantages and applications, field procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments.

UNIT – VI:

Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping; photographic mapping.

TEXT BOOKS:

1. Surveying, Vol. I, II and III, Arora, K. R., Standard Book House, 2015
2. Elementary Surveying, Charles D. Ghilani, Paul R. Wolf., Prentice Hall, 2012
3. Surveying, Vol. I & II, Duggal S. K., Tata McGraw-Hill Education, 2013

REFERENCES:

1. Surveying I & II, B. C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Laxmi Publications, 2005
2. Advanced Surveying: Total Station, GIS and Remote Sensing, Madhu N., Sathikumar R. and Satheesh Gobi, Pearson India, 2006
3. Surveying & Levelling by R. Subramanian, Oxford University Press, New Delhi, 2011

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC2CE01) STRENGTH OF MATERIALS LABORATORY

COURSE OBJECTIVES:

- **To conduct** the Tension test, Compression test on various materials
- **To conduct** the Shear test, Bending test on determinate beams
- **To conduct** he Compression test on spring and Hardness test using various machines
- **To conduct** the Torsion test, Impact test on various materials

COURSE OUTCOMES: After the completion of the course, students should be able to
CO-1: Determine the yield stress, ultimate tensile stress, percentage elongation of steel, compressive strength of brick and concrete
CO-2: Determine the ultimate shear stress, modulus of elasticity of steel
CO-3: Determine the stiffness of the close coiled helical spring and hardness number of mild steel, brass, copper and aluminium
CO-4: Determine the modulus of rigidity and impact strength of steel

LIST OF EXPERIMENTS

1. Uni-axial tension test on mild steel specimen.
2. Compression test on brick and concrete.
3. Rockwell hardness test.
4. Brinell's hardness test.
5. Izod impact test.
6. Bending test on simply supported beam.
7. Direct shear test.
8. Compression test on close coiled helical spring.
9. Charpy impact Test.
10. Torsion test.
11. Bending test on cantilever beam.
12. Bending test on continuous beam.

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC2CE02) SURVERYING LABORATORY

COURSE OBJECTIVES:

- **To apply** the concepts of leveling for determining longitudinal and cross sectional profile
- **To develop** contour maps through in-direct method of leveling
- **To understand** the principles of trigonometric and tacheometric surveying for measurement of horizontal and vertical distances
- **To relate** the applications of modern instruments in measurement of area, contouring and curves

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Construct profile of a given ground to develop contour maps
CO-2: Determine horizontal and vertical distances of accessible and inaccessible points
CO-3: Appraise the importance of modern instruments in determination of area and plotting the same accurately and precisely
CO-4: Set out simple horizontal curves using modern instruments

CYCLE - I
Leveling:

1. Measurement of elevation of various given points.
2. Fly Leveling.
3. Longitudinal Leveling
4. Cross – sectional Leveling and Plotting of Contours

Theodolite surveying:

5. Measurement of horizontal angles and vertical angles.
6. Distance between two inaccessible points using the principles of tachometer surveying.
7. Distance between two inaccessible points using the principles of trigonometric surveying.

CYCLE - II
Total Station:

8. Area Measurement.
9. Remote Elevation Measurement & Missing Line Measurement.
10. Longitudinal and Cross Section Profile.
11. Stake Out.
12. Contouring
13. Setting out of a Simple curve.

REFERENCES:

1. Surveying I & II, B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Laxmi Publications, 2005
2. Higher Surveying, Chandra A. M., New Age International Publishers, 2007
3. Plane Surveying, Chandra A. M., New Age International Publ., 2007
4. Elementary Surveying, Charles D Ghilani, Paul R Wolf., Prentice Hall, 2012

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B.Tech. III Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC3CE01) COMPUTER AIDED CIVIL ENGINEERING DRAWING

COURSE OBJECTIVES:

- **To understand** various types of conventional signs and brick bonds
- **To draw** the plan section and elevation for doors, trusses and staircases
- **To use** AutoCAD tools to draw building plans, sections and elevations from a given line diagram and specifications
- **To develop** working drawings of residential buildings

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Use different AutoCAD Commands to draw Conventional signs and brick bonds, Plan, Section and elevation of buildings
CO-2: Draw section and elevation of panelled doors and trusses
CO-3: Draw and detail the different components of Stair cases
CO-4: Draw Electrical layout, Plumbing layout for residential buildings

LIST OF EXPERIMENTS:

1. Introduction to Computer Aided Drafting and Conventional Signs
2. Brick bonds: English bond & Flemish bond – Odd and Even courses
3. Drawing elevation of a King Post Truss
4. Drawing elevation and section of a fully panelled door
5. Developing plan and section of dog-legged staircase
6. Developing plan of single storied residential building
7. Developing section and elevation of single storied residential building
8. Developing plan of two storied residential building
9. Developing section and elevation of two storied residential building
10. Development of working drawing of building – Electrical Layout
11. Development of working drawing of building – Plumbing Layout

TEXT BOOKS:

1. Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao – Radiant Publishing House
2. Civil Engineering Drawing-II by N. Sreenivasulu – Radiant Publishing House

REFERENCES:

1. Engineering Graphics by P. J. Sha - S. Chand & Co
2. Civil Engineering Drawing-I by S. Mahaboob Basha – Falcon Publishers
3. Building drawing by M. G. Shah - Tata McGraw-Hill Education
4. Structural Engineering Drawing by S. Mahaboob Basha – Falcon Publishers

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE05) STRENGTH OF MATERIALS – II

COURSE OBJECTIVES:

- **To determine** the stresses on an inclined plane
- **To understand** the concept of torsion and different types of springs
- **To distinguish** between thin and thick cylinders
- **To find out** the crippling load on columns by various formulae

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Determine the principal stresses and strains and design the elements according to theories of failure
CO-2: Analyze the shafts subjected to torsion and determine the deflections in close and open coiled helical springs
CO-3: Determine the various stresses in Thin and Thick cylinders
CO-4: Determine the crippling loads on columns and evaluate the combined stresses

UNIT – I:
Principal Stresses and Strains: Stresses on an inclined plane at a section of a bar under axial loading – Compound stresses – Normal and Tangential stresses on an inclined plane for biaxial stresses – Two perpendicular stresses accompanied by a state of simple shear –Mohr"s Circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

UNIT – II:
Torsion of Circular Shafts: Theory of pure torsion – Assumptions - Derivation of Torsion equation – Torsional moment of resistance – Polar moment of Inertia - Torsional rigidity – Shafts in series and parallel - Power transmitted by shafts.
Springs: Types of springs – Close coiled helical springs under axial pull and axial couple – Open coiled helical springs under axial pull and axial couple - Springs in series and parallel.

UNIT – III:
Thin Cylinders: Thin cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains – changes in diameter, length and volume of thin cylinders – Wire wound thin cylinders - Thin spherical shells.
Thick Cylinders: Lame"s Theory for thick cylinders – Derivation of Lame"s equations - Distribution of hoop and radial stresses across the thickness – Compound cylinders

UNIT – IV:
Columns and Struts: Short and Long columns – Euler"s theorem for long columns – Assumptions – Derivation of Euler"s critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler"s critical stress - Limitations of Euler"s theory – Rankine"s formula – Long columns subjected to eccentric loading – Secant formula.

UNIT – V:

Direct and Bending Stresses: Stresses under the combined action of axial loading and bending moment – Core/Kernel of a section – Middle-Third rule - Determination of stresses in Chimneys, Retaining walls and Dams.

UNIT – VI:

Theories of Failure: Maximum principal stress theory - Maximum principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

TEXT BOOKS:

1. Mechanics of Materials by R. C. Hibbeler – Pearson Education
2. Mechanics of Materials by James Gere – Cengage Learning

REFERENCES:

1. Strength of Materials by B. C. Punmia, Ashok Jain, Arun Jain - Laxmi Publications
2. Strength of Materials by R. K. Bansal - Laxmi Publications
3. Strength of Materials by S. S. Rattan – McGraw-Hill Education (India) Pvt. Ltd
4. Strength of Materials by R. K. Rajput – S. Chand & Company Ltd

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE06) STRUCTURAL ANALYSIS

COURSE OBJECTIVES:

- **To differentiate** between statically determinate and indeterminate structures
- **To solve** the statically indeterminate structures by applying the principles of equilibrium and compatibility of deformations
- **To analyze** the statically determinate beams, arches and frames
- **To draw** the Influence line diagrams for various types of moving loads on beams

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze statically indeterminate beams and can sketch SFD and BMD
CO-2: Analyze statically determinate and indeterminate trusses
CO-3: Calculate the slopes and deflections in beams and trusses
CO-4: Evaluate the maximum SF and BM due to various types of moving loads

UNIT – I:
Pin Jointed Plane Frames: Types of frames – Assumptions - Analysis of pin jointed frames by Method of joints, Method of sections.

UNIT – II:
Three Hinged Arches: Elastic theory of arches – Eddy"s theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – Supports at different levels – Effect of temperature.

UNIT – III:
Energy Theorems: Strain energy due to bending moment – Castigliano"s first theorem – Deflection of simple beams and pin jointed trusses.
Castigliano"s second theorem – Analysis of indeterminate beams and trusses with single degree of indeterminacy.

UNIT – IV:
Propped Cantilevers: Introduction to statically indeterminate beams – Analysis of propped cantilevers – shear force and bending moment diagrams
Fixed Beams: Analysis of Fixed beams – Effect of sinking of support, rotation of support - Shear force and bending moment diagrams.

UNIT – V:
Continuous Beams: Clapeyron"s theorem of three moments - Analysis of continuous beams with constant and varying moment of inertia – Effect of sinking of supports – Shear force and bending moment diagrams.

UNIT – VI:
Influence Lines: Definition of influence line for reaction, SF and BM - load position for maximum SF and BM at a section - single point load, udl longer than the span, udl shorter than the span, two points loads with fixed distance between them and several point loads.

Moving Loads: Absolute maximum SF and BM due to single concentrated load, udl longer than the span, udl shorter than the span, two point loads with fixed distance between them and several point loads - Equivalent uniformly distributed load.

TEXT BOOKS:

1. Structural Analysis by Devdas Menon, Narosa Publishers
2. Structural Analysis by R. C. Hibbeler, Pearson Education

REFERENCES:

1. Theory of Structures by S. P. Timoshenko, D. H. Young, McGraw-Hill International Edition
2. Analysis of Structures by V. N. Vazirani, M. M. Ratwani and S. K. Duggal, Khanna Publishers
3. Theory of Structures by B. C. Punmia, Ashok Kumar Jain, A. K. Jain, Laxmi Publications
4. Basic Structural Analysis by K. U. Muthu, Azmi Ibrahim, M. Vijayanand and M. Janardhana, I K International Publishing House

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE07) CONCRETE TECHNOLOGY

COURSE OBJECTIVES:

- **To use** different types of cements as per their properties for different field applications
- **To design** economic concrete mix proportion for different exposure conditions and intended purposes
- **To supervise** various concreting operations
- **To conduct** field and laboratory tests on concrete in fresh and hardened state

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Determine the properties of concrete ingredients by conducting different tests
CO-2: Use various chemical and mineral admixtures to design cement based materials with tailor-made properties
CO-3: Use advanced laboratory techniques to characterize cement based materials
CO-4: Perform mix designs to develop special concretes and evaluate their properties

UNIT – I:
Cement: Manufacture of Portland Cement, Basic cement chemistry, Hydration of cement, Heat of hydration - Tests on cement – Fineness, consistency, setting times, soundness and strength - Types of cements – Ordinary Portland Cement, Rapid-hardening cement, Low-heat portland cement, Sulfate resisting cement, Portland pozzolan cement, White and coloured portland cement, High-alumina cement.

UNIT – II:
Aggregates: Classification of aggregates – size, shape and texture, Mechanical properties of aggregates – bond, strength, toughness and hardness - Physical properties specific gravity, bulk density, porosity and absorption, moisture content, bulking of sand, Sieve analysis, Grading curves, Fineness modulus, Grading requirements, Maximum aggregate size, Gap graded aggregate, Quality of water for mixing and curing of concrete.

UNIT – III:
Admixtures and Fresh Concrete: Admixtures – plasticizers, superplasticizers, retarders, accelerators, air-entraining admixtures, pozzolanic admixtures, Fresh concrete – workability, factors affecting workability, cohesion and segregation, bleeding, Workability tests – slump, compaction factor, vee bee test, Setting time of concrete, Effect of time and temperature on workability.

UNIT – IV:
Strength, Elasticity, Creep and Shrinkage of Concrete: Water/cement ratio, Gel/space ratio, Maturity concept of concrete, Factors affecting strength of concrete, Relation between tensile and compressive strength, bond to reinforcement. Elasticity, Factors influencing modulus of elasticity, Poisson"s ratio, Creep, Factors influencing creep, Effects of creep, Shrinkage, Factors influencing shrinkage, Types and effects of cracking.

UNIT – V:

Testing and Conformity: Strength tests – compressive strength, tensile strength, Test cores, Accelerated curing, Schmidt hammer, Penetration resistance, Pull-out test, Ultrasonic pulse velocity test, Variability of strength, acceptance and conformity.

UNIT – VI:

Concrete Mix Design and Special Concretes: Factors in the choice of mix proportions, Concrete mix design as per IS 10262, Special concretes – Introduction to light weight concrete, Aerated concrete, No-fines concrete, Recycled aggregate concrete, Fibre reinforced concrete, Ferrocement, Roller compacted concrete, High performance concrete, Self-consolidating concrete.

TEXT BOOKS:

1. Concrete Technology by A. M. Neville and J. J. Brooks, Prentice Hall Publication
2. Concrete Technology by M. S. Shetty, S. Chand & Co. Publication

REFERENCES:

1. Concrete Technology by A. R. Santha Kumar, Oxford University Press
2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill Press
3. Properties of Concrete by A. M. Neville, Pearson Publication
4. Concrete: Micro Structure, Properties and Materials by P. K. Mehta and J. M. Monteiro, McGraw-Hill Publishers

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC1CE08) HYDRAULIC ENGINEERING AND HYDRAULIC MACHINES

COURSE OBJECTIVES:

- **To define** the fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in open channels
- **To discuss** Dimensional analysis and design of channels in uniform and non-uniform flow conditions, hydraulic machinery (pumps and turbines) and the factors affecting their operation and specifications as well as the operation in a system
- **To solve** problems on open channel flow and efficiency of pumps and turbines
- **To Study** and **Analyze** different types, elements of hydro-electric power plants and operational characteristics of turbines and pumps. Study about CFD

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Study of basics of Open Channel Flows and Design open channels under different flow conditions

CO-2: Interpret and **apply** dimensional analysis and similarity to develop models and testing

CO-3: Study of basics of Hydraulic Machines. Compare and categorize the design of appropriate hydraulic pumps and hydraulic turbines and their application in Hydro Electric power plants

CO-4: Study of elements of Hydropower Engineering, Introduction to CFD and Hydroinformatics

UNIT – I:

Open Channel Flow-I: Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow; geometrical parameters of a channel; classification of open channels, classification of open channel flow, Velocity Distribution of channel section.

Continuity Equation; Energy Equation and Momentum Equation; Characteristics of uniform flow; Chezy"s formula; Manning"s formula; Factors affecting Manning"s Roughness Coefficient; Most economical section of channel; Computation of Uniform flow, Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and super critical flows

UNIT – II

Open Channel Flow – II: Non uniform flow: Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile; Computation of water surface profile by Direct Step method.

Rapidly Varied Flow: Theory of hydraulic jump; Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, types, and applications of hydraulic jump; Energy dissipation. Introduction to Positive and negative surges.

UNIT – III:

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity; Rayleigh method; Buckingham"s Pi method; Dimensionless groups; Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.

UNIT – IV:

Basics of Hydraulic Machines: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular momentum principle, applications to radial flow turbines.

Hydropower Engineering: Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

UNIT – V:

Hydraulic Turbines: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – Pelton wheel – Francis turbine – Kaplan turbine - Working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function, efficiency. Governing of turbines – Surge tanks – Unit and specific turbines – Unit speed – Unit quantity – Unit power – Specific speed – Performance characteristics – Geometric similarity – Cavitation.

UNIT – VI:

Centrifugal Pumps: Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation.

TEXT BOOKS:

1. Fluid Mechanics and Hydraulic machines by Modi and Seth, Standard Book House
2. Open Channel Flow by K. Subramanya, Tata McGraw-Hill Pvt. Ltd., 2008

REFERENCES:

1. Open Channel Hydraulics by V. T. Chow, McGraw-Hill, 1959
2. Fluid Mechanics & Hydraulic Machines - Problems and Solutions by K. Subramanya McGraw-Hill Education. (I) Pvt. Ltd., 2011
3. Computational Fluid Dynamics - The Basics with Applications by Jr., John D. Anderson, McGraw-Hill Pvt. Ltd., 2017
4. Fluid Mechanics and Hydraulics Machines by R. K. Bansal, Lakshmi Publications

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19ES1EE07) ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OBJECTIVES:
- **To Study** and **understand** the performance of basic electric circuits
- **To understand** the performance of electrical machines
- **To know** the utilization of electrical energy in day to day to affairs
- **To understand** the operation of diode and transistor

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyse the performance of electrical circuits
CO-2: Test, analyse and find the applications of different electric machines
CO-3: Know the use of electric power for domestic and industrial purposes
CO-4: Understand the principles of semiconductor devices and their applications

UNIT – I:
Fundamentals of Electrical Circuits: Basic R-L-C parameters, Ohm's Law, kirchhoff's Laws, Series-parallel connections, Star/Delta Transformation, Generation of A.C, Average, RMS values and Form Factor of Sinusoidal Voltages, AC through RL,RC and RLC, concept of impedance, power, power factor, simple problems

UNIT – II:
D.C Machines: D.C Generator, Basic Construction, Operation, emf Equation, types, Open Circuit Characteristics, simple problems. D.C Motor-principle-back emf-Torque equation, Speed control, Swinburne's test.

UNIT – III:
Introduction to 3-phase circuits, relation between line and phase quantities in balanced star and delta networks.
A.C Machines: Single phase transformer: principle-emf equation-types-OC and SC tests- Voltage Regulation -Efficiency-Simple problems.

UNIT – IV:
Three phase induction motor: Working principle – slip- torque equation- Torque slip characteristics, Principle of Alternator.
Electrical Power Systems and Utilization: Hydro Power Plant: Lay out -Efficiency **Calculation, Illumination:** Definitions-Laws of Illumination- working of Incandescent Fluorescent lamps.

UNIT – V:
Electronics Devices: Semiconductor materials, Review of P-N junction, Diode Characteristics, Basic Operation of Half-wave and Full wave Rectifiers, Zener Diode as Voltage Regulator, BJT, biasing, Characteristics, applications.

UNIT – VI:
Digital Circuits and Transducers: Logic gates, Combinational Logic circuits, Basic operation of SR-JK-T and D Flip-Flops, Transducers -Overview - Passive Sensors - Working

of Strain Gauge, Pressure Gauge, Dial Gauge - Piezoelectric Accelerometer Model-Galvanometer.

TEXT BOOKS:

1. Principles of Electrical and Electronics Engineering by V. K. Mehta, S. Chand & Co
2. Fundamentals of Electrical Engineering by Ashafaq Hussain, 2nd Edition, Dhanpat Rai & Co
3. Electronic Devices and Circuits by S. Salivahanan, N. Suresh Kumar, 3rd Edition, McGraw- Hill Education

REFERENCES:

1. Electrical Technology by Edward Hughes, ELBS Longman Publisher
2. Basic Electrical Engineering by D. P. Kothari & I. J. Nagrath, TMH Publications, 2nd Edition
3. Utilization of Electric Power and Electric Traction by G. C. Garg, Khanna Publishers

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC2CE03) FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY

COURSE OBJECTIVES:

- **To identify** the behavior of analytical models introduced in lecture to the actual behavior of real fluid flows
- **To explain** the standard measurement techniques of fluid mechanics and their applications
- **To illustrate** the students with the components and working principles of the hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines
- **To analyse** the laboratory measurements and to document the results in an appropriate format

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Describe the basic measurement techniques of fluid mechanics and its appropriate application

CO-2: Interpret the results obtained in the laboratory for various experiments

CO-3: Discover the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines

CO-4: Compare the results of analytical models introduced in lecture to the actual behaviour of real fluid flows and draw correct and sustainable conclusions

LIST OF EXPERIMENTS:

1. Verification of Bernoulli"s equation
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Calibration of Venturimeter / Orifice Meter
4. Calibration of Triangular / Trapezoidal Notch
5. Study of Minor losses in pipe flow
6. Determination of Friction factor of a pipe line
7. Impact of jet on vanes
8. Study of Hydraulic jump
9. Main characteristics of Pelton wheel turbine
10. Performance test on Francis turbine
11. Main characteristics of a single stage / multi stage Centrifugal Pump
12. Operating characteristics of Reciprocating Pump

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19PC2CE04) CONCRETE LABORATORY

COURSE OBJECTIVES:

- **To know** the various procedures to determine the characteristics of cement
- **To understand** the test procedures to evaluate the characteristics of aggregates
- **To know** the test procedures to find the properties of fresh concrete
- **To understand** the test procedures to find mechanical properties of hardened concrete

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Perform various tests required to assess the characteristics of cement
CO-2: Test and **evaluate** the properties of fine and coarse aggregates and determine its suitability for construction
CO-3: Evaluate the fresh and hardened properties of concrete
CO-4: Design the concrete mix for required strength and test its performance characteristics

LIST OF EXERCISES:

Cycle -I

1. **Tests on Cement:**
   a) Standard consistency.
   b) Initial and final Setting Time.
   c) Specific gravity.
   d) Fineness.
   e) Soundness.
   f) Compressive strength.

2. **Tests on Aggregates:**
   a) Specific gravity of fine aggregate.
   b) Specific gravity of coarse aggregate.
   c) Bulking of fine aggregate.
   d) Grading of fine aggregate

CYCLE -II

3. **IS method of mix design of normal concrete as per IS : 10262**
4. **Tests on Fresh Concrete:**
   a) Slump cone test.
   b) Compacting factor test.
   c) Vee-Bee consistometer test.
5. **Tests on Hardened Concrete:**
   a) Compressive & Tensile strength tests.
   b) Modulus of elasticity of concrete.
   c) Non-destructive testing of concrete.

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	3	**0**	**3**

(19ES2EE06) ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

COURSE PRE-REQUISITES: Physics

COURSE OBJECTIVES:

- To understand the performance of basic electric circuits
- To understand the measuring procedures for power
- To understand the performance of electrical machines
- To understand the operation of diode and transistor

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Analyse the performance of electrical circuits.
CO-2: Analyse the power using voltmeter and ammeter method
CO-3: Assess the performance of transformer and electrical machines.
CO-4: Understand the principles of semiconductor devices and their applications

LIST OF EXPERIMENTS:

1. Verification of KVL & KCL.
2. Analysis of series RL and RC circuits
3. Single phase power measurement by three voltmeters and three ammeters method
4. Load test on 1- φ Transformer
5. OC & SC test on 1- φ Transformer.
6. Speed control DC shunts Motor.
7. Swinburne test on DC shunt machine
8. V-I characteristics of P-N junction Diode.
9. Performance of Full wave rectifier.
10. Input and output characteristics of transistor.

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B.Tech. IV Semester	**L**	**T/P/D**	**C**
	0	**2**	**0**

(19MN6HS03) GENDER SENSITIZATION

COURSE DESCRIPTION:
This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features a number of exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender-based violence on education, health and development.

ACTIVITIES:
Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments.

COURSE OBJECTIVES:
- To sensitize students on issues of gender in contemporary India
- To provide a critical perspective on the socialization of men and women
- To expose the students to debates on the politics and economics of work
- To enable students to reflect critically on gender violence
- To expose students to more egalitarian interactions between men and women

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand important issues related to gender in contemporary India
CO-2: Attain a finer grasp of how gender discrimination works in our society and how to counter it
CO-3: Acquire insight into the gendered division of labour and its relation to politics and economics
CO-4: Respond to put an end to gender violence
CO-5: Equipped to work with the other gender treating them as equals

MODULE 1: Introduction to Gender
- Definition of Gender
- Basic Gender Concepts and Terminology
- Exploring Attitudes towards Gender
- Social Construction of Gender

MODULE 2: Gender Roles and Relations

- Types of Gender Roles
- Gender Roles and Relationships Matrix
- Gender-based Division and Valuation of Labour

MODULE 3: Gender Development Issues

- Identifying Gender Issues
- Gender Sensitive Language
- Gender, Governance and Sustainable Development
- Gender and Human Rights
- Gender and Mainstreaming

MODULE 4: Gender-based Violence

- The concept of violence
- Types of Gender-based violence
- The relationship between gender, development and violence
- Gender-based violence from a human rights perspective

MODULE 5: Gender and Culture

- Gender and Film
- Gender and Electronic Media
- Gender and Advertisement
- Gender and Popular Literature

MODULE 6: Gender and Studies

- Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge
- Whose History: Questions for Historians and Others, Reclaiming a Past, Writing Other Histories

TEXT BOOK:

1. "Towards a World of Equals: A Bilingual Textbook on Gender", A. Suneetha, Uma Bhrugubanda, Duggirala Vasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu, Telugu Akademi, Telangana Government, 2015

REFERENCES:

1. "More than One Million Women are Missing" by Sen, Amartya, New York Review of Books 37.20 (20 December 1990), Print 'We Were Making History' Life Stories of Women in the Telangana People's Struggle, New Delhi: Kali for Women, 1989
2. "By the Numbers: Where Indian Women Work" Women's Studies Journal (14 November 2012), by Tripti Lahiri, Available online at: http: // blogs.wsj.com/ India real time/2012/11/14/by-the-numbers-where-India-women-work/&gt
3. "I Fought For My Life ...and Won " by Abdulali Sohaila, Available online at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal
4. The Violence of Development: The Politics of Identity, Gender and Social Inequalities in India, by K. Kapadia, London: Zed Books, 2002
5. Just Development: Beyond Adjustment with a Human Face, by T. Banuri and M. Mahmood, Karachi: Oxford University Press, 1997