CURRICULUM

For the Academic year 2018 – 2019

DEPARTMENT OF CIVIL ENGINEERING

III & IV Semester B. E.

RAMAIAH INSTITUTE OF TECHNOLOGY
(Autonomous Institute, Affiliated to VTU)
BANGALORE – 54
**About the Institute**

Ramaiah Institute of Technology (RIT) (formerly known as M. S. Ramaiah Institute of Technology) is a self-financing institution established in the year 1962 by industrialist and philanthropist, Late Dr. M S Ramaiah offering Bachelor of Engineering courses. It is accredited by NBA and NAAC. Ramaiah Institute of Technology is one of the few institutions with faculty & student ratio of 1:15 with excellent performance in both academics and other curricular & co-curricular activities. The institute was a participant in Technical Education Quality Improvement Program (TEQIP), an initiative of the Government of India. Ramaiah Institute of Technology comprises of competent and quality faculty with postgraduates and doctorates. Some of the distinguished features of RIT are: State of the art laboratories, individual computing facility to all faculty members. Many departments are recognized research centers by Visvesvaraya Technological University, Belgaum with many research scholars pursuing research for their Ph D and faculties are involved actively in many sponsored research projects by AICTE, DST etc. More than 130 scholars are pursuing their research for PhD. The Centre for Advanced Training and Continuing Education (CATCE), and Entrepreneurship Development Cell (EDC) have been set up in campus as incubation centers training students for enhancing their innovative ideas, skill, and competence. RIT has a strong Placement and Training department with a committed team, a fully equipped Sports department, large air-conditioned library with over 80,000 & more books with subscription to more than 300 International and National Journals. The Digital Library subscribes to several online e-journals like IEEE, JET etc.

RIT is a member of DELNET, and AICTE INDEST Consortium. RIT has a modern air-conditioned auditorium, several hi-tech conference halls with video conferencing facilities. It also provides excellent hostel facilities for boys and girls. RIT has a very vibrant and interactive Alumni Association maintaining contacts with all graduated from institute and also distinguished Alumni, who have occupied very high positions in India and globally also. In the year 2007, VTU, Belgaum accorded Academic Autonomy status for UG and PG programs of the institute. As per the National Institutional Ranking Framework, MHRD, Government of India, Ramaiah Institute of Technology has achieved 60th rank in 2018 among the top 100 engineering colleges across India.

**About the Department**

The Civil Engineering Department was started in the year 1971. Master program [M Tech] in Structural Engineering was started in the year 1984. In the year 1994, department was recognized as Research Center by affiliated university. Over four decades the department has carved its self niche in the areas of academics, research, consultancy, collaborative projects, sponsored research projects and publications. The department was awarded distinction of three years of accreditation by NBA, when it was evaluated for fourth time. Many research scholars have been awarded with PhD degree and many more are pursuing their research to obtain PhD. There is also master degree program M.Sc [by research] degree in Civil Engineering. Around 250 and more technical papers are published in reputed journals and conferences by faculties and research scholars. The Department holds a patent on utilizing pond ash as replacement to sand, “Total Replacement of Sand in Concrete by Pond Ash” (Patent No 244063). The department has been involved actively in conducting conferences, workshops, FDP’s, Site Visits, Project Tours and several students related programs to provide platform for sharing and spreading the latest developments in the field of Civil Engineering.
VISION OF THE INSTITUTE
To evolve into an autonomous institution of international standing for imparting quality technical education

MISSION OF THE INSTITUTE
MSRIT shall deliver global quality technical education by nurturing a conducive learning environment for a better tomorrow through continuous improvement and customization

QUALITY POLICY
We at M. S. Ramaiah Institute of Technology strive to deliver comprehensive, continually enhanced, global quality technical and management education through an established Quality Management System complemented by the synergistic interaction of the stake holders concerned

VISION OF THE DEPARTMENT
To become a premier Department to impart state-of-the-art technical knowledge and professional skills through effective learning process with research ambience to produce global quality Civil Engineers to develop sustainable society.

MISSION OF THE DEPARTMENT
To transform the young minds into employable professionals by providing contemporary technical knowledge and appropriate professional skills through suitable teaching learning process.

To provide rigorous training and acquaint the students with necessary skills and leadership qualities along-with ethical values to address the complex and multi-faceted Civil Engineering Problems.

To provide opportunity to develop their potential by fostering intellectual curiosity to promote them for pursuing higher studies and research through exposure to the modern engineering tools and techno innovative projects.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):
Bachelor of engineering graduates of Civil Engineering program of M S Ramaiah Institute of Technology shall attain the following PEO’s within three to four years of graduation.

<table>
<thead>
<tr>
<th>PEO</th>
<th>Description</th>
<th>Theme</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEO 1</td>
<td>To perform well in engineering profession as competent professionals using contemporary technical knowledge and professional skills. (THEME: Perform well in engineering profession as competent professionals)</td>
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<tr>
<td>PEO 2</td>
<td>To pursue higher education and show intellectual curiosity for lifelong learning. (THEME: Higher education and lifelong learning)</td>
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<tr>
<td>PEO 3</td>
<td>To communicate effectively to work in multi-disciplinary environments embedded with ethical values and social responsibilities. (THEME: Effective communication, leadership and ethical values)</td>
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</table>
PROGRAM OUTCOMES (POs):

PO1: **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs):

PSO1: Apply the knowledge of basic sciences, geology and environmental science along with the conceptual knowledge of engineering sciences to illustrate the process involved in planning, analysis and design of sustainable civil engineering systems.

PSO2: Conduct laboratory experiments/field investigations, and analyze/interpret the experimental results for appropriate conclusions and recommendations to a real-world civil engineering problem with a significant perspective of economy, society and environment.

PSO3: Demonstrate professional ethics and implement the principles of project management, business and public policy to lead the project execution as per the design requirement, with the state-of-the-art technology and contemporary skills.
## Curriculum Course Credits Distribution

<table>
<thead>
<tr>
<th>Semester</th>
<th>Humanities &amp; Social Sciences (HSS)</th>
<th>Basic Sciences / Lab (BS)</th>
<th>Engineering Sciences / Lab (ES)</th>
<th>Professional Subjects - Core (Hard core, soft core, Lab) (PS-C)</th>
<th>Professional Subjects - Electives (PS-E)</th>
<th>Other Electives (OE)</th>
<th>Project Work (PW)</th>
<th>Internship/other activities (IS/EAC)</th>
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## SCHEME OF TEACHING

### III SEMESTER

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Category</th>
<th>Credits</th>
<th>Contact Hours</th>
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<tbody>
<tr>
<td>1.</td>
<td>CV MAT 31</td>
<td>Engineering Mathematics - III</td>
<td>BS</td>
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<tr>
<td>2.</td>
<td>CV 32</td>
<td>Strength of Materials</td>
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<td>3.</td>
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<td>Surveying</td>
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<td>4.</td>
<td>CV 34</td>
<td>Fluid Mechanics</td>
<td>PS-C</td>
<td>3 1 0 0</td>
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<td>5.</td>
<td>CV 35</td>
<td>Materials and Constructions</td>
<td>PS-C</td>
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<td>6.</td>
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<td>Engineering Geology</td>
<td>PS-C</td>
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<td>7.</td>
<td>CVL 37</td>
<td>Strength of Materials Lab</td>
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<td>Building Graphics Laboratory</td>
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### IV SEMESTER

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<th>Sl. No.</th>
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<tr>
<td>1.</td>
<td>CV 41</td>
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<td>2.</td>
<td>CV 42</td>
<td>Hydraulics and Hydraulic Machinery</td>
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<td>3.</td>
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<td>Transportation Engineering – I</td>
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<td>4.</td>
<td>CV 44</td>
<td>Concrete Technology</td>
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<td>5.</td>
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<td>Environmental Engineering – I</td>
<td>PS-C</td>
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<td>CV 46</td>
<td>Engineering Management &amp; Entrepreneurship</td>
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<td>7.</td>
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<td>Surveying Practice</td>
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<td>Engineering Geology Laboratory</td>
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(L= Lecture  T= Tutorial  P= Practical  S= Self Study)
ENGINEERING MATHEMATICS-III

Course Code: CV31
Prerequisite: Engineering Mathematics I & II

Course Credits: 3:1:0:0
Contract Hours: 56

Course Outcomes

Students will be able to:
1. Solve the problems of algebraic, transcendental and ordinary differential equations using numerical methods fit a suitable curve by the method of least squares and determine the lines of regression for a set of statistical data.
2. Use a given data for equal and unequal intervals to find a polynomial function for estimation. Compute maxima, minima, curvature, radius of curvature using numerical differentiation and compute arc length, area, surface area and volume using numerical integration.
3. Find the rank of a matrix and testing the consistency and the solution by Gauss elimination and Gauss-Seidel iteration methods.
4. Form functional as integral and find external curve using Euler-Lagrange equation.
5. Apply the concepts of probability distributions to solve the engineering problems

Course contents

Unit I

Numerical solution of Algebraic and Transcendental equations: Method of false position, Newton - Raphson method.
Statistics: Curve fitting by the method of least squares, fitting a linear curve, fitting a parabola, fitting a Geometric curve, Correlation and Regression.

Unit II

Finite differences and interpolation: Forward and backward differences, Interpolation, Newton – Gregory forward and backward interpolation formulae, Lagrange’s interpolation formula, Newton’s divided difference interpolation formula (no proof).
Numerical differentiation and Numerical Integration: Derivatives using Newton-Gregory forward and backward interpolation formulae, Newton - Cote’s quadrature formula, Trapezoidal rule, Simpson’s (1/3)rd rule, Simpson’s (3/8)th rule.

Unit - III

Linear Algebra: Elementary transformations on a matrix, Echelon form of a matrix, rank of a matrix, Consistency of system of linear equations, Gauss elimination and Gauss – Seidal method to solve system of linear equations, eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix, diagonalization of a matrix, system of ODEs as matrix differential equations.
Unit IV

**Calculus of variation:** Variation of a function and a functional, Extremal of a functional, Euler’s equation, Standard variational problems, Geodesics, Minimal surface of revolution, Hanging cable and Brachistochrone problems.

Unit V

**Random Variables:** Random Variables (Discrete and Continuous), Probability density function, Cumulative density function, Mean, Variance, Moment generating function.

**Probability Distributions:** Binomial and Poisson distributions, Normal distribution, Exponential distribution, Uniform distribution.

**Text Books:**


**References:**

STRENGTH OF MATERIALS

Course Code: CV32
Prerequisite: Basic Civil Engg. and Mechanics
Course Credits: 3:1:0:0
Contract Hours: 56

Course Outcomes:
Students will be able to:

1. Evaluate the engineering properties of the materials and compile to analyze their structural behavior under axial loading.
2. Analyze the behavior of structural elements subjected to compound stresses.
3. Evaluate the shear and flexure forces in determinant beams for various combinations of loads and supporting conditions.
4. Analyze the bending, shear and torsional stresses across various beam sections.
5. Determine deflection in beams and stability of the compression members.

Course Contents:

UNIT-I


UNIT-II

Compound Stresses: Introduction – Derivation of expressions to Stress components such as normal and shear stress on an inclined plane in one dimensional stress system - General two dimensional stress system derived from beam subjected flexure and shear. Derivation of expressions to normal and shear stress on an inclined plane. Principal planes and stresses, derivation of corresponding expressions, obtaining the maximum and minimum shear and normal stress including their planes – Graphical representation of two dimensional stress system. Obtaining the shear, normal and principal stresses on an inclined plane including principal stresses using Mohr’s Circle of stresses. Application of compound stress principle to evaluate the stresses in thin cylinders subjected to pressure and change in dimension.
UNIT-III
Bending Moment and Shear Force in Beams: Introduction - Types of beams, loadings and supports – Shear force & bending moment (SF & BM) and Sign conventions. From the fundamentals derivation of the Relationship between loads, shear force and bending. Drawing the SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams subjected to point loads, UDL, UVL and Couple. Evolution of loading diagram from the SFD and BMD. Significance of contra flexure point (Point of inflexion) to draw the elastic curve in overhanging beams.

UNIT-IV
Bending and Shear Stress in Beams: Introduction – Bending stress in beam - Assumptions in simple bending theory - Derivation of Bernoulli’s equation using principles of simple bending – Highlights of strength and stiffness equations of simple bending theory in the analysis and design of cross sections of beams. Bending stress distribution over the cross section. Significance of Section modulus and Flexural rigidity in bending - Expression for horizontal shear stress in beam from the first principles – Derivation of Shear stress distribution for rectangular, ‘I’ and ‘T’ sections. – Application principles of superposition in the analysis of Combined Direct and Bending stresses – Only application of torsional equation in understanding the behaviour of circular Shaft under Torsion.

UNIT-V

Text Books

Reference Books
SURVEYING

Course Code: CV33
Prerequisite: Nil

Course Credits: 3:0:0:1
Contract Hours: 56

Course outcomes
Students will be able to:

1. Describe types of surveying through time and measure distance using different instruments
2. Establish reduced levels, plot profile and contours and use theodolite.
3. Demonstrate the use of total station. Summarize application of GIS and GPS.
4. Compute data and set curves for the construction.
5. Estimate the area/volume and mark center line for different construction projects.

Course Contents:

UNIT- I
Introduction: Definition of surveying / Geomatics. Importance of surveying to Civil Engineering. Types of surveying - control survey, topographic survey, cadastral survey, hydrographic survey, alignment survey, mine surveying and construction survey. Surveying through the ages - chain surveying, compass surveying and plane table surveying - concepts and limitations only.
Distance Measurement: Using tapes, Hand held distance meter and distance measuring wheel. Electronic Distance Measurements (EDM) - Total station and GPS.

UNIT- II

UNIT-III
Trigonometric leveling: Finding elevation using single and double plane method and Total Station. Total station- Features and advantages. Measurement of coordinates using total station. Data collection, storage, data transferring and plotting in CAD. Geographic Information system: Introduction to GIS.
Definition of GIS, Key Components of GIS, Functions of GIS, Data structures in GIS, layer concepts, analysis of data and output. Applications of GIS in Civil Engineering. Global Positioning system- GPS satellite systems, components of GPS, positioning and relative positioning with GPS. Surveying using GPS. Applications of GPS in civil engineering.

UNIT-IV

**Setting Curves** : Types of Curves- Application of curves in civil engineering. Setting out curve by theodolite (Rankine’s method and using Total Station). Components of compound, Reverse curve (Between 2 parallel straights). Transition Curve and its related problems.

UNIT-V

**Areas And Volumes**: Methods of determining areas by trapezoidal and Simpsons’ rule. Measurement of volume by prismatic and trapezoidal formula- volume calculation from spot levels and from contour plans-Problems on Railway and Highway embankments - Construction Surveying-Setting out works using Total Station. Setting out building by Centre line method.

**Text Books:**

**Reference Books:**
FLUID MECHANICS

Course Code: CV34  Course Credits: 3:1:0:0
Prerequisite: Nil  Contract Hours: 56

Course outcomes:
Students will be able to:
1. Describe fluid properties and their significance in fluid mechanics. Demonstrate the skills in evaluation of fluid pressure
2. Evaluate the hydrostatic forces acting on submerged bodies and stability analysis of floating bodies
3. Apply principles of conservation of mass and momentum on fluid flow
4. Analyze the energy principle and its applications in fluid dynamics and flow measuring devices
5. Apply the concepts of fluid mechanics for analyzing viscous flow and boundary layer phenomenon.

Course Contents

UNIT-I


UNIT-II

HYDROSTATICS: Introduction - Total Pressure and Centre of Pressure – Definitions, Total pressure and Centre of pressure on plane Vertical, Inclined and Curved surfaces, Pressure diagrams, Practical applications of Total pressure and centre of pressure. Buoyancy and Flotation- Archimedes principle, Buoyant force and Centre of buoyancy, Meta centre, Stability of submerged and floating bodies. Problems on total pressure, centre of pressure and buoyancy & flotation. Liquids in relative equilibrium – Introduction, Pressure exerted by the fluid when subject to constant linear acceleration.

UNIT-III


UNIT-IV


UNIT-V


Text Books:

Reference Books:
ENGINEERING MATERIALS AND CONSTRUCTIONS

Course Code: CV35
Prerequisite: Nil

Course Credits: 2:0:0:1
Contract Hours: 56

Course Outcomes:
The students will be able to
1. Determine suitable materials for construction purpose.
2. Demonstrate the use of binders and construction materials.
3. Demonstrate the construction of Masonry, Reinforced cement concrete and Trusses.
4. Illustrate the functions of doors, windows and staircases.
5. Outline the methods of building finishes and contemporary construction practices.

COURSE CONTENTS:

UNIT-I

UNIT-II

UNIT-III
Structural Components: Foundations, Masonry and Roof Coverings, Excavation, Bearing capacity of soil. Classification of foundations, different types of foundations, rubble and ashlars stone masonry. Terminologies used in brick masonry, Construction of brick masonry using English and Flemish bond. Solid and hollow block masonry, cavity wall construction. Tools, tackles and necessary staging used construction to be discussed. RCC slab and beam type flat roof, wooden and steel truss supported pitched roof systems with tiles and sheets.

UNIT-IV
requirements of stairs. Types of stairs Doglegged and open well type. Lintel, Chajja, Balcony.

UNIT-V


Text Books:


Reference Books:

ENGINEERING GEOLOGY

Course Code: CV36
Prerequisite: Nil
Course Credits: 3:0:0
Contract Hours: 42

Course outcomes
Students will be able to:

1. Describe index properties of earth dynamic and justify geological hazards.
2. Identify natural resources for construction and mineral based industries
3. Determine rock mass properties and its suitability in engineering projects
4. Estimate and evaluate the ground behavior and conditions of rocks.
5. Delineate the interactions between groundwater systems and change detection of thematic layers through geo-informatics techniques

Course Contents

UNIT I
Geomorphology and Geodynamics: Geology and its importance in Civil Engineering projects; Internal structure of the Earth and its composition; Geological agents and their processes in restructuring the earth's surface, Weathering of rocks, Kinds of weathering, Formation of soil and its classification, Soil profile, Soil erosion and its conservation; Geological work of rivers; Concept of Plate tectonics, Geological hazards such as landslides and earthquakes, Causes, Effects, Slope stabilization, Construction of seismic resistant structures.

UNIT II
Applied Mineralogy and Igneous Petrology: Definition of Mineral, Physical and chemical properties in minerals, Classification of minerals based on chemistry such as Rock forming minerals, Economic ore forming minerals and industrial minerals; Description of quartz and its varieties, Feldspars group, Mica Group, Amphibole Group, Pyroxene Group, Carbonate Group such as Calcite, Dolomite, Magnesite; Ores such as Magnetite, Haematite, Limonite, Chalcopyrite, Pyrolusite and Bauxite.
Introduction, definition and classification based on their genesis of Igneous rocks - Mode of occurrence, Textures, Structure and their importance in Civil Engineering practice, Description of some common rock types such as Granite, Granite Porphyry, Diorite, Syenite, Dolerite, Basalt.

UNIT III
Sedimentary Petrology and Metamorphic Petrology: Mode of occurrence, Textures, Structure and their importance in Civil Engineering practice; Metamorphic rocks - Metamorphism, Agents of Metamorphism & types of Metamorphism, Textures, Structure and their importance in Civil Engineering practice; Description of some common rock types such as Conglomerate, Breccia, Sandstone, Limestone and Shale; Gneiss, Mica-schist, Slate, Quartzite, Marble and its varieties.
UNIT IV

**Rock Mechanics and Engineering Geology:** Definition - Outcrops, Dip and Strike, Compass clinometers; Description of folds and its types; Faults and its types; Joints and its types; Recognition of folds, faults in the field and its consideration in Civil Engg projects; Geological site investigation, Surface and subsurface explorations by Geological and Geo-Physical investigations; Selection of site for Dams, Reservoirs, Tunnels, Bridge sites and Highways; Rock as a Engg material in construction of foundations, Concrete Aggregate, Road metal, Railway ballast with reference to Engg properties.

UNIT V

**Hydrogeology and Geoinformatics:** Hydrological cycle, Water bearing properties of Rocks and Soils, Aquifers and its types, Geological factors for selecting a site for sinking wells and Electrical Resistivity survey for Ground water explorations, Artificial Recharge of Groundwater by different methods, Effect of ground water on various Civil Engg structures. Introduction to remote sensing and GIS, Remote sensing platforms - Airborne, Space borne satellites, Satellite imageries; Applications of RS and GIS techniques for Civil Engineering - Lithological discrimination, Structural mapping, Land use and land cover, Deforestation, Water resources studies.

**Text Books:**

**Reference Books:**
STRENGTH OF MATERIALS LABORATORY

Course Code: CVL37
Prerequisite: Strength of Materials (CV32)

Course outcome:
Students will be able to:
1. Classify the type of engineering material based on the energy absorption capacity
2. Demonstrate the experiments and evaluate the mechanical strength of various ductile materials
3. Demonstrate the experiments and evaluate the mechanical strength of various brittle materials
4. Demonstrate the experiments and evaluate the strength of various materials
5. Summarize various properties of the materials and compile their suitability as per the provisions given in I.S code

List of Experiments:

1. Hardness tests of mild steel and aluminum samples
2. Impact energy absorbed tests by mild steel and aluminum
3. Determination of mechanical properties of the ferrous metals
5. Determination of shear strength of steel sample.
6. Determination of flexural strength test of wood and demonstrate strain ageing of steel bar.
7. Determination of tensile strength of steel sample.
8. Determination of stiffness and modulus of rigidity of steel springs under tension and compression
9. Determination of young’s modulus of steel and wood by deflection equation.
11. Verification of Laws of friction using friction test for different material on different surface conditions.

Note: Hierarchy of the experiments is based on the machines and instruments used for testing.

Reference Books:
2. Laboratory Manual prepared by the Department

Reference IS code:
BUILDING GRAPHICS LABORATORY

Course Code: CVL38
Prerequisite: Nil

Course Credits: 0:0:2:0
Contract Hours: 28

Course outcomes:
The students will be able to:

1. Develop the ability to draft civil engineering drawing using CAD software.
2. Demonstrate the knowledge of local bylaws and will be able to design the building in accordance with local regulations.
3. Design the different types of building in accordance with climatic conditions, with environmentally responsibility and as per the requirements of the owner.
4. Create working drawings for construction.
5. Create detailed drawing of utilities including water supply, sanitary and electrical layout as layers.

LIST OF EXERCISES
1. Principles of civil engineering drawing and introduction to AutoCAD.
2. Sectional elevation of masonry wall including footing.
3. Concept of plan, elevation, cross section, schedule of opening and site plan of a single bed residential building.
4. Development of plan, elevation and section of building from single line diagram.
5. Development of plan, elevation and section of two storied building from single line diagram.
6. Concept of setbacks, carpet area, plinth area, floor area ratio, and floor space index, super built up area and coverage. Introduction to urban and municipal bylaws as per national building codes
7. Space design of a apartment building using circulation diagram (bubble diagram) satisfying the given requirement.
8. Space design of a primary health centre.
9. Space design of a educational building
10. Development of water supply, sanitary and electrical drawing for a given residential building as a layer.
11. Development of center line drawing for a storied building- footing, column, beam locations.
Text Books:

Reference Books:
STRUCTURAL ANALYSIS-I

Course Code: CV41  Course Credits: 3:1:0:0
Prerequisite: Strength of Materials  Contract Hours: 56

Course outcomes
The students will be able to:
1. Describe different forms of structures and evaluate their indeterminacy, and analyze determinate truss
2. Analyze the deflection of simple beams by different methods
3. Analyze arches and cables with supports at same and different levels
4. Develop influence lines for long spans structures and describe the behavior of structural components subjected to rolling loads
5. Analyze indeterminate structures using method of consistent deformation

Course Contents:

UNIT I

UNIT II
Deflection of Beams: Deflection of determinate beams by moment area and Conjugate beam methods - Strain energy due to axial force, BM and SF- Principle of virtual work and Castiglione's theorems- Unit load and its application to deflection of determinate beam and truss.

UNIT III
Arches and Cable Structures: Three hinged parabolic arches with supports at same and different levels, Determination of normal thrust, radial shear and bending moment- Analysis of cables under point loads and UDL, Length of cables for supports at same and at different levels- Stiffening trusses for suspension cables.

UNIT IV
Influence Lines and Moving Loads: Concept of influence lines- ILD for reactions, SF and BM for determinate beams- ILD for axial forces in determinate trusses- BM, SF and axial forces in determinate systems using ILD- Maximum BM, Absolute BM and Maximum SF in determinate beams using rolling loads concepts.

UNIT V
Analysis of Indeterminate Beams: Propped cantilever and fixed beams using method of consistent. Deformations- Forces due to rotation and settlement of supports.
Text books:

2. KU Muthu e.t al “Structural Analysis”, IK International publications, New Delhi.

Reference books:

HYDRAULICS AND HYDRAULIC MACHINERY

Course Code: CV42
Prerequisite: Fluid Mechanics
Course Credits: 3:1:0:0
Contract Hours: 56

Course outcomes:
The students will be able to
1. Analyze pipe-flow system and design pipe line system as per the requirements
2. Design open channels for various types of flow systems in open channels
3. Evaluate the performance of centrifugal pumps and selection of suitable pump for various design conditions.
4. Apply the concepts of hydraulics for estimating the performance of turbines and their suitability
5. Apply similarity laws and study of models to evaluate the behavior of prototype.

Course Contents:

UNIT – I

UNIT – II

UNIT – III
Impact of Jet On Vanes And Centrifugal Pumps: Introduction. Force exerted by fluid jet on stationary and moving flat plates (normal & inclined). Force exerted by fluid jet on moving curved vane striking at its centre and one of the tips, Velocity triangles, Equation for work done and efficiency. Pumps- centrifugal pumps, Classification of centrifugal pumps, Work done by the impeller, Priming of pumps, Head of a pump, Losses and efficiencies, Minimum starting speed, NPSH, Cavitation in centrifugal pumps, Multistage pump, Performance of centrifugal pumps. Introduction to submersible pump.

UNIT – IV
Turbines: Introduction. Head and Efficiency of turbines, Classifications of turbines, Pelton wheel, Equation for work done and efficiency, Working proportions of Pelton wheel and Kaplan turbine, Draft

UNIT – V


**Text Books:**

**Reference Books:**
TRANSPORTATION ENGINEERING I

Course Code: CV43  
Course Credits: 4:0:0:0  
Prerequisite: Surveying  
Contract Hours: 56

Course outcomes
The students will be able to:
1. Describe transportation modes and necessitate the planning of road development
2. Define highway geometrics and traffic engineering.
3. Characterize materials for pavement construction.
4. Design the flexible and rigid pavements.
5. Design the drainage systems and carry out economic feasibility analysis for road projects

Course Contents:

UNIT I

Transportation Systems: Importance of transportation, different modes of transportation and their characteristics, Jayakar committee recommendations, implementation, highway planning, phasing, road development plans in India, recent developments, highway alignment, new and re-alignment projects, numerical examples. Introduction of multi model transport for urban areas.

UNIT II

Geometric Design: Importance of highway geometric design, highway cross sectional elements. Sight distances, elements of horizontal and vertical alignments, scope of traffic engineering, traffic characteristics, volume studies, speed studies, O & D studies, PCU and Traffic Capacity.

UNIT - III


UNIT - IV

Pavement Design: Requirements of highway pavements - Types and design factors, ESWL, design of flexible pavements by IRC method, stresses in rigid pavements - wheel load stresses, temperature and frictional stresses, combination of stresses, design of rigid pavements by IRC method. Numerical examples. Failures and causes in flexible and rigid pavements and remedial measures.

UNIT – V

Highway Drainage: Significance and requirements of highway drainage - design of surface and subsurface system. Highway user benefits - tangible and intangible - motor vehicle operation cost - annual highway costs, methods of economic analysis - highway financing, BOT, BOOT, numerical examples.
Text Books:

Reference Books:
CONCRETE TECHNOLOGY

Course Code: CV44                          Course Credits: 3:0:0:1
Prerequisite: Engineering Materials and Construction  Contract Hours: 56

Course outcomes
The students will be able to:
1. Describe the basic Engineering Properties of the concrete
2. Demonstrate fresh properties of concrete
3. Evaluate hardened properties of concrete
4. Design required grade of concrete using concrete mix design principles
5. Describe properties of durability of concrete

Course Contents:

UNIT-I

UNIT-II

UNIT-III

UNIT-IV
Concrete Mix Design: Concept of mix design, variables in proportioning, exposure conditions, procedure of mix design as per IS 10262-2009 and numerical examples of mix design.

UNIT-V
Hardened Concrete: Durability – definition and significance. Permeability, sulphate attack, chloride attack and carbonation. Factors contributing to cracks in concrete – plastic shrinkage, settlement cracks and construction joints. Thermal expansion, transition zone and structural design
deficiencies. Tests on hardened concrete – compressive strength, split tensile strength, flexural strength and non-destructive testing of concrete. (Detailed test procedures to be covered in laboratory)

**Text Books:**

**Reference Books:**
1. Neville, A M, “Properties of Concrete”, ELBS Publications
2. IS: 10262 – “Recommended guidelines for Concrete Mix design”, – BIS Publications
   Mehta PK, Properties of Concrete, ICI, Chennai
ENVIRONMENTAL ENGINEERING I

Course Code: CV45
Prerequisite: Nil

Course outcomes:
The students will be able to
1. Forecast population and identify sources of water
2. Analyze the water for its suitability
5. Design water supply distribution system.

Course Contents:

UNIT-I
Need for public water supply and role of engineers: Quantity of water-Different water demands-
domestic, institutional and commercial demand, public uses, fire demand-estimation by kuichling’s
formula, freeman formula and National board of fire underwriters formula. Per-capita
consumption- factors affecting per capita demand. Design period. Population forecast-
Arithmetic mean, Geometric mean and incremental increase method. Sources of water -
Classification, quantity aspects.

UNIT-II
Quality of water: Concept of safe water, wholesome water and palatable water. Physical, chemical
and bacteriological analysis of water. Standards of Water quality desired for domestic water supplies
– BIS and WHO Standards – Health significance of Fluorides, Nitrates and Heavy metals like
Mercury, Cadmium, Arsenic etc.. Water borne diseases. Bacterial examination of water-multiple
fermentation tube and membrane filter test –MPN.

UNIT-III
Treatment of water: Objectives. Conventional treatment plant layout. Different treatment units
(location and its function) - Screening, Aeration-Types of aerators, Sedimentation-Coagulant aided
sedimentation; jar test, chemical feeding, flash mixing and clari-flocculator. Design of sedimentation
units.

UNIT-IV
Filtration: theory of filtration, types of filters-rapid sand filters and pressure filters including
construction, operation and cleaning. Disinfection- Types of disinfection, chlorination, chlorine
demand, residual chlorine, use of bleaching powder. Design of filtration units.

UNIT V
Distribution Systems: Different distribution systems and layouts. Storage and Distribution
Reservoirs. Layout of Distribution system. Pumps. Pipe sizes and recommended velocities and
pressures. Pipe fittings and pipe joints. Testing of pipe lines, pressure test for pipe distribution,
causes of leakages in pipe joints. Water supply to buildings -Street connection, internal storage
(sump and overhead tank) - Capacity calculations. Distribution of water – Supply systems
within the building (overhead tanks and Hydro pneumatic systems).
Text Books:

Reference Books:
ENGINEERING MANAGEMENT AND ENTREPRENEURSHIP

Course Code: CV46  Course Credits: 2:0:0:1
Prerequisite: Nil  Contract Hours: 42

Course outcomes:
The students will be able to
1. Enumerate various parameters involved in estimation of the projects feasibility
2. Formulate the given physical problem as linear program to yield the solution
3. Select the type of machine and equipment shall be used for various construction purposes
4. Provide optimal construction planning, scheduling and controlling of project execution
5. Demonstrate the management of construction projects.

Course Contents:

UNIT I

UNIT II

UNIT III
Construction Mechanization: Introduction to mechanization, Mechanization through construction equipment: earth excavation, moving and hauling, aggregate manufacturing; concrete production and placement- types of equipment, trench-less technology. Factors for selecting equipment and performance and economic life

UNIT IV

UNIT V
Construction Industry and Management: Management- Meaning – nature and characteristics of Management, Scope and functional areas of management , Management as a science, art or profession, Planning- importance and purpose of planning process, steps in planning, Organization-purpose,
principles of organization ,Types of organization. Directing and controlling-Meaning, Leadership styles. Coordination-meaning, importance and techniques.

Text Book:
3. NVR Naidu, “Management and Entrepreneurship” I K International New Delhi

Reference Books:
SURVEYING PRACTICE

Course Code: CVL 47  
Course Credits: 0:0:2:0  
Prerequisite: Surveying  
Contract Hours: 28

Course outcomes
The students will be able to:
1. Determine distances and angles using different instruments
2. Determine the levels of accessible and inaccessible points. Plot profiles
3. Demonstrate the use of total station, find areas and plot contours using Total station
4. Set curves using theodolite and total station
5. Mark centerline of building for construction

LIST OF EXERCISES
1. Distance measurement- Using tapes, hand held distance meter, distance measuring wheel and Electronic Distance Measurements (EDM)
2. Angle measurement using Theodolite- Horizontal and vertical angle measurement.
3. Angle measurement using Total station - Horizontal and vertical angle measurement.
4. Leveling - finding elevation by differential leveling (Plane of collimation method)
5. Measurements of heights and distances by single and double plane method using Theodolite
6. Finding areas using total station.
7. Setting out a simple curve by deflection angle method.
8. Contouring using total station. Plotting using CAD
9. Profile survey L/S, C/S using total station. Plotting using CAD
10. Setting out simple curve using Total station
11. Setting out building by centre line method.
12. Setting out sewer line using total station.

Text Books:

Reference Books:
ENGINEERING GEOLOGY LABORATORY

Course Code: CVL 48
Course Credits: 0:0:2:0
Prerequisite: Engineering Geology
Contract Hours: 28

Course outcomes
Student will be able to:
1. Determine rock forming minerals and ore/industry forming minerals
2. Scrutinize the different types of rocks and their properties
3. Demonstrate Construction of surface and subsurface geological maps
4. Estimate the thickness of ground strata from drill-hole logs
5. Delineate thematic layers trough geo-informatics techniques

List of Experiments:
1. Identification of Rock forming minerals (Silicate minerals)
2. Identification of Rock forming minerals (Non-silicate minerals)
3. Identification of Ore forming/Industrial based minerals (Non-silicate minerals)
4. Recognition and descriptive study of Igneous rocks
5. Recognition and descriptive study of sedimentary rocks
6. Recognition and descriptive study of Metamorphic rocks
7. Study of Geological maps and their interpretation of Sections
8. To find out the Dip and strike of the geological formation (Surface method problems)
9. To find out the thickness of Beds of the geological formation (True thickness & vertical thickness problems)
10. To find out the Borehole problems of three and four level (Sub surface dip and strike)
11. Visual interpretation of satellite imagery, Digitization of thematic layer, lay-outing and map preparation

Text Book:

Reference Lab Manual:
2. Satyanarayana Swamy, Engineering Geology lab manual”