| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501501 | PJ | **Mechanics of Materials - 2** | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objective:**
- Study of the subject provides the understanding of principal stress, strains and theories of failure.
- Can able to differentiate between thin and thick cylinders,
- Stability Euler buckling load. Issues in column design.
- Can determine the stresses in chimneys, retaining walls and dams
- To estimate the stresses due to unsymmetrical bending

**Course Outcomes:** Upon completion of this course, students will be able to,
- Understand the concept of stress, principal stresses, strains and stress distribution on various cross   sections of members due to eccentric and lateral loads,
- Determine the hoop and longitudinal stresses in thin and thick walled cylinders,
- Identify the behavior of columns and apply the Euler equation to calculate buckling load for long straight columns of varying end conditions Compute column critical load and stress
- Understand the concept of direct stress and bending stresses
- Identify the Centroidal principal axes of different sections

## Unit - 1 Principal Stresses and Strains

Introduction – Stresses on an inclined section of a bar under axial loading – Compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions

**Theories of Failures:** Various Theories of failures like Maximum Principal stress theory – Maximum Principal Strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

## Unit - 2 Thin Cylinders

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – Hoop, longitudinal and volumetric strains – Changes in diameter, and volume of thin cylinders – Thin spherical shells.

**Thick Cylinders:** Introduction Lame's theory for thick cylinders – Derivation of lame's formulae – Distribution of hoop and radial stresses across thickness – Design of thick cylinders – Compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

## Unit - 3 Columns and Struts

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – 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 – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

## Unit - 4 Direct and Bending Stresses

Stresses under the combined action of direct loading and B.M - Core of a section - Circular, rectangular and triangular (solid and hollow) - Determination of stresses in the case of chimneys, retaining walls and dams - Conditions for stability - Stresses due to direct loading and B.M about both axis.

**Unit - 5 Unsymetrical Bending**

Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis

**TEXT BOOKS**
1. R K Rajput "Strength of Materials", S Chand & Company Ltd, New Delhi.
2. R K Bansal "A Text Book of Strength of Materials", Laxmi Publications (P) Ltd., New Delhi.
3. S S Bhavikatti "Strength of Materials", Vikas Publishers, New Delhi.

**REFERENCE BOOKS**
1. Schaum's Out Line Series "Strength of Materials", Tata McGraw-Hill Companies, Inc. New York.
2. S Ramkrishna and R Narayan "Strength of Materials", Dhanpat Rai Publications. New Delhi.
3. R Subramanian "Strength of Materials", Oxford University Press.
4. L S Srinath et al., "Strength of Materials", Macmillan India Ltd., Dew Delhi.
4. B C Punmia "Strength of Materials", Laxmi Publications (P) Ltd., New Delhi.
5. M L Gambhir "Fundamentals of Solid Mechanics", PHI Learning Pvt. Ltd, New Delhi.
6. S B Junnarkar "Mechanics of Structures", Charotar Publishing House, Anand, Gujrat

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501502 | PJ | Geo-Technical Engineering – 2 | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
- To emphasize the importance of soil investigations including destructive and nondestructive methods,
- To explain how earth pressure theory is important in retaining structure design,
- To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation system including settlement consideration,
- To explain in what circumstances pile is needed and how do analysis the pile and pile group under various soil conditions,
- To explain method of installation of well foundation, part and shape of well, to study the types of slopes for different conditions.

**Course Outcomes:** Upon completion of this course, students will be able to,
- Carry out soil investigation for any civil engineering construction,
- Analyze earth retaining structures for any kind of soil medium,
- Estimate bearing capacity using IS code methods, design proper foundations for any kind of shallow foundation system,
- Estimate pile and pile group capacity for any kind of soil including group efficiency and negative friction,
- Design of well foundation, design of slopes for any type of soil conditions.

**Unit – 1 Site Investigation & Sub-Soil Exploration**

Site reconnaissance – Depth of exploration – Lateral extent of exploration – Test pits – Auger borings – Wash borings – Soil samplers – Penetration test – Standard penetration test (SPT) – Geophysical methods – Seismic refraction and electrical resistivity methods – Sub soil investigation reports - Plate load test – Pressure meter.

## Unit – 2 Earth Pressure Theories and Retaining Walls

Active and passive earth pressures in cohesionless and cohesive soils (with and without surcharge, horizontal and inclined surfaces) - Rankine's theory of earth pressure – Earth pressures in layered soils – Coulomb's earth pressure theory – Culmann's and Rebhann's graphical method. Types of retaining walls – Stability of gravity and cantilever retaining walls – Drainage in retaining

## Unit – 3 Bearing capacity of shallow foundations

Types of foundations – Depth of foundation – Terzaghi's bearing capacity equation – Bearing capacity of strip, square, circular, rectangular footings – Meyerhof's theory – Skempton's method – Brinch Hansen's method – Effect of ground water table on bearing capacity – Bearing capacity from building codes – Tolerable settlements – Settlement analysis.

## Unit – 4 Pile Foundations

Types of piles – Load carrying capacity of piles based on Static pile formulae – Dynamic pile formulae – Pile Load tests - Load carrying capacity of pile groups in sands and clays – Settlement of pile groups - Negative skin friction.

## Unit – 5 Earth Slope Stability

Infinite and finite earth slopes – Types and causes of failures – Factor of safety of infinite slopes – Stability analysis by Swedish arc method, Standard method of slices, Bishop's simplified method – Taylor's stability number- Stability of slopes of earth dams under different conditions.

## TEXT BOOKS

1. Dr. K R Arora "Soil Mechanics & Foundation Engineering", Standard Publishers Distributers, New Delhi.
2. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Soil Mechanics & Foundation Engineering", Lakshmi Publications, New Delhi.
3. C Venkatramaiah "Geotechnical Engineering", New Age International (P) Limited, Publishers, New Delhi.

## REFERENCE BOOKS

1. Michael Tomlinson and John Woodward "Pile Design and Construction Practice", CRC Press, Taylor and Francis Group.
2. Joseph E. Bowles "Foundation analysis & Design", Tata McGraw-Hill Companies, Inc. New York.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501503 | PJ | Hydrology | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**

- The course is designed to, Introduce hydrologic cycle and its relevance to Civil Engineering to appreciate the concepts of groundwater movement and well hydraulics.
- Make the students understand physical processes in hydrology and, components of the hydrologic cycle and its estimation
- Provide an overview and understanding of Unit Hydrograph theory and its analysis,
- Understand flood frequency analysis, design flood, flood routing,

**Course Outcomes:** Upon completion of this course, students will be able to,

- Have a thorough understanding of the theories and principles governing the hydrologic processes and its components

- Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures,
- Design storms and carry out frequency analysis, Be able to determine storage capacity and life of reservoirs,
- Develop unit hydrograph and synthetic hydrograph, Be able to estimate flood magnitude and carry out flood routing,
- Determine aquifer parameters and yield of wells, Be able to model hydrologic processes

## Unit - 1 Introduction

Engineering hydrology and its applications - Hydrologic cycle - Hydrological data - Sources of data Precipitation - Types and forms – Measurement - Rain gauge network - Presentation of rainfall data - Average rainfall - Continuity and Consistency of rainfall data - Frequency of rainfall – Intensity–Duration-Frequency (IDF) curves - Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP) - Design storm.

## Unit - 2 Abstractions from Precipitation

Initial abstractions, Evaporation: Factors affecting – Measurement – Reduction - Evapo-transpiration - Factors affecting – Measurement - Control
**Infiltration:** factors affecting, Infiltration capacity curve, measurement, infiltration indices.

## Unit - 3 Runoff

Catchment characteristics - Factors affecting runoff – Components - Computation - Empirical formulae - Tables and Curves - Stream gauging - Rating curve - Flow mass curve and Flow duration curve
**Hydrograph Analysis:** Components of hydrograph - Separation of base flow - Effective rainfall hyetograph and Direct runoff hydrograph - Unit hydrograph assumptions - Derivation of unit hydrograph - Unit hydrographs of different durations - Principle of superposition and S-hydrograph methods - Limitation and Applications of unit hydrograph - Synthetic unit hydrograph.

## Unit - 4 Flood Frequency Analysis

Design method: Methods of estimating design flood - Empirical formulae - Rational method - Flood frequency analysis - Methods of flood control - Flood routing through reservoir – Channel flow routing

## Unit - 5 Ground Water Hydrology

Occurrence - Types of aquifers - Aquifer parameters – Porosity - Specific yield – Permeability - Transmissivity and Storage coefficient - Types of wells - Darcy's law - Dupuit's equation - Steady radial flow to wells in confined and unconfined aquifers - Yield of a open well - Recuperation test.

## TEXT BOOKS

1. K Subramanya "Engineering Hydrology", Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
2. P Jayarami Reddy "Engineering Hydrology", Laxmi Publications Pvt. Ltd., New Delhi.
3. V T Chow, D R Maidment and L W Mays "Applied Hydrology", Tata McGraw-Hill Education Pvt. Ltd., New Delhi.
4. C S P Ojha, R Berndtsson and P Bhunya "Engineering Hydrology", Oxford University Press, Noida.

## REFERENCES BOOKS

1. L W Mays "Water Resources Engineering", Wiley India Pvt. Ltd, New Delhi.

2. V M Ponce "Engineering Hydrology – Principles and Practice" Prentice Hall International, New Jersey.
3. K C Patra "Hydrology and Water Resources Engineering", Narosa Publications, New Delhi.
4. H M Raghunath "Hydrology" New Age International (P) Limited, Publishers, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501504 | PJ | **Concrete Technology** | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objective:**
- Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.
- The present day industry needs the knowledge of concrete technology thoroughly.
- The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

**Course Outcomes:** After completion of the course, students will be able to
- Know the basics of cement, its composition, different properties.
- Get familiarize with aggregates used in concrete and the properties of fresh concrete.
- Know about elasticity, shrinkage creep and durability of concrete.
- Carry out the testing on hardened concrete.
- Design the mix of concrete proportions by ACI and IS methods

**Unit – 1 Cements & Admixtures**
Portland cement – Chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Types of cements - Tests on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures

**Unit - 2 Aggregates & Fresh Concrete**
**Concrete aggregates:** Classifications – Heavy aggregates – Normal weight aggregates – Strength and other mechanical properties – Moisture content and its effects – Deleterious substances – Alkali-Aggregate reaction – Thermal properties – Grading curves and Grading requirements – Gap-graded aggregate – Maximum aggregate size – Use of 'Plums' – Handling of aggregates.
**Fresh concrete:** Workability – Factors affecting workability – Measurements of workability – Comparison of tests – Effect of time and temperature – Segregation – Bleeding – Mixing of concrete – Concrete mixers – vibration of concrete – Types of vibrators – Ready mixed concrete – Pumped concrete.

**Unit - 3 Durable Properties of Concrete**
**Elasticity, Shrinkage and Creep:** Modulus of elasticity – Dynamic modulus – Poisson's ratio – Shrinkage and its effects – Creep of concrete – Factors affecting creep.
**Durability:** Permeability – Chemical attack of Concrete – Efflorescence – Air entrained concrete – Measurements – Effects – Thermal properties – Resistance of concrete to fire.

**Unit - 4 Hardened Concrete**
**Curing of concrete:** Methods of curing – Maturity - Influence of temperature – Steam curing at atmospheric pressure – High pressure steam curing
**Hardened concrete:** Compression tests – Effect of capping – Flexure test – Splitting test – Rebound Hammer test – Ultrasonic pulse test – Abrasion of Concrete.

**Unit - 5 Mix Design of Concrete**
**Concrete Mix Design and Quality Control:** Basic consideration – Factors in the choice of properties – Method of calculation by absolute volume method – Simple example of mix design – Design of high strength mixes – Design of air entrained concrete – ACI & IS methods of mix design.

**TEXT BOOKS**
1. M S Shetty "Concrete Technology", S. Chand Publishers, New Delhi.
2. A M Neville "Properties of Concrete", Pearson Publications, England.

**REFERENCES BOOKS**
1. M L Gambhir "Concrete Technology", Tata McGraw-Hill Companies, Inc. New York.
2. P K Mehta and J M Monteiro "Concrete: Micro structure, Properties and Materials", Tata McGraw-Hill Companies, Inc. New York.
3. Krishna Raju "Design of Concrete Mix", CBS Publishers, New Delhi.
4. J Prasad and C G K Nair "Non-Destructive Test and Evaluation of Materials", Tata McGraw-Hill Companies, Inc. New York.
5. A R Santha Kumar "Concrete Technology", Oxford University Press, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501505 | PJ | **Water Supply Engineering** | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objective:** This subject provides the knowledge of water sources, standards, treatment of water for distribution to the domestic purpose. Basics of plumbing are also included.
**Course Outcomes:** Upon completion of this course, students will be able to,
- Get an idea of water supply and its development, need, objectives to the public.
- Know the sources, Quality and Standards of water.
- An acquaintance with different treatments for protected water supply.
- Advanced water treatments in removal of harmful constituents and water management.
- Different water distribution system, its working and the basics of plumbing.

**Unit - 1 Introduction to Water Supply**
Environmental Engineering - Role of Environmental Engineer - Water supply - Development of public water supply - Need for protected water supplies - Objectives of water supply systems - Water supply scheme - Quantity of water - Estimating requirements - Design period – Per Capita Consumption - Fluctuations in demand pattern -population forecast – Arithmetic, Incremental, Geometric methods.

**Unit - 2 Sources, Quality and Standards of Water**
Sources of water - Surface and ground water sources – Quality of water - Physical, chemical and biological aspects - Analysis of water - Water quality standards - Impurities in water - Water borne diseases - Drinking water quality standards.

**Unit - 3 Treatment of Water**
Flowchart of water treatment plant - Treatment methods (Theory and Design) – Sedimentation - Coagulation - Sedimentation with Coagulation – Filtration - Chlorination and other Disinfection methods - Softening of Water – Defluoridation - Removal of Odors.

**Unit - 4 Advanced Water Treatments**
Principles and functions of Aeration - Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination - Membrane Systems - Recent advances.

**Water Management**: Sustainable Development - Rain Water harvesting methods - Water Pollution - Causes and effects

**Unit - 5 Water Distributions**

Distribution systems – Requirements, Layout of Water distribution systems - Design procedures-Hardy Cross and equivalent pipe methods service reservoirs – Joints, valves such as sluice valves, air valves, scour valves and check valves water meters – Laying and testing of pipe lines – Pump house, waste detection and prevention, Principles of design of water supply in buildings - House service connection.

**Plumbing:** Water supply – pipes and fittings; House drainage - Sanitary fittings, Traps, Plumbing system of drainage

**TEXT BOOKS**
1. S K Garg, "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi.
2. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Water Supply Engineering", Lakshmi Publications, New Delhi.

**REFERENCE BOOKS**
1. H S Peavy, D R Rowe and G Tehobanoglous "Environmental Engineering" Tata McGraw-Hill Companies, Inc. New York.
2. S K Hussain "Water Supply and Sanitary Engineering", Oxford & IBH, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501506 | PN | Introduction to Java Programming | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
- To make the students to understand the basis of java syntax and language features, compilation, interpretation, execution, class and object.
- To make the students Packages and Interfaces, Multithreading and Exception handling.

**Unit – 1**

**Object Oriented Programming Basics**: Need for OOP paradigm, Summary of OOP Concepts.

**Java Basics:** Overview of Java, History of Java, Java buzzwords, Simple java program.

**Unit – 2**

Data types, Variables, and Arrays, Operators, Control statements. I/O: I/O Basics, Reading console input, writing console output, Reading and Writing Files. Classes and objects – concepts of classes, objects, methods, and Introducing access control, this keyword, constructors, overloading methods and constructors.

**Unit – 3**

**Inheritance:** Basic concepts, uses super, method overriding, dynamic method dispatch, Abstract class, using final, the object class.

**Unit – 4**

**Packages and Interfaces:** Packages, Access protection, Importing packages, Interfaces.

**Exception Handling:** Fundamentals, Types of Exceptions, Usage of try, catch, throw, throws, finally keyword, Built-in Exceptions.

**Unit – 5**

**Multithreading:** Concepts of multithreading, Main thread, creating a thread and multiple threads, Using is Alive() and join(), Thread priorities, Synchronization.

## TEXT BOOKS
1.  Herbert Schildt "Java – The Complete Reference", Tata McGraw-Hill Companies, Inc. New York.
2.  T Budd "understanding OOP with Java", Pearson Education India, New Delhi.

## REFERENCE BOOKS
1.  J Nino and F A Hosch "An Introduction to Programming and OO Design using Java", John Wiley & sons.
2.  R A Johnson "An Introduction to Java Programming and Object Oriented Application Development", Thomson.
3.  Cay S Horstmann and Gary Cornell "Core Java 2", Vol 1& Vol 2, Pearson Education India, New Delhi.
4.  P Radha Krishna "Object Oriented Programming through Java", Universities Press, New Delhi.
5.  John Hunt "Java and Object Orientation - An Introduction", Spinger.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501507 | PN | Operation Research | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
The course is intended to identify and develop operations research models, understand the mathematical tools to solve optimization problems and develop a report that describes the model, the solving techniques and analyze the results.

**Course Outcomes:** By the end of the course, the student will be able to:
*   Apply linear programming model and assignment model to domain specific situations,
*   Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results.

## Unit – 1 Introduction to Operations Research
Introduction - Scope of Operations research – Linear programming – Assumptions of linear programming – Properties of linear programming solution – Development of LP models – Graphical method – Simplex method.

## Unit – 2 Duality Theory and Sensitivity Analysis
Dual Linear Program – Formulation of Dual program – Dual simplex method
**Sensitivity analysis:** Changes in the right hand side constants of constraints – Changes in the objective function coefficients – Adding a new constraint – Adding a new variable.

## Unit – 3 Transportation and Assignment Problems
Transportation Problem - Mathematical model for transportation problem – Types of transportation problem – Starting solutions: North- West corner rule – Least cost method – Vogel's approximation method.
Assignment problem – Hungarian method.

## Unit – 4 Sequencing
Introduction – n jobs through two machines – n jobs through three machines – n jobs through m machines – two jobs through m machines – Travelling salesman problem.

## Unit – 5 Dynamic Programming
Introduction – Application of Dynamic Programming – Capital Budget Problem – Cargo Loading Problem – Design of Continuous beams – Design of Minimum – Cost Drainage system.

**TEXT BOOKS**

1. R Pannerselvam "Operations Research", PHI Publications, New Delhi.
2. H.S Kasana and K.D. Kumar "Introductory Operations Research Theory and Applications", Springer International Edition.

**REFERENCES BOOKS**

1. Singiresu S Rao "Engineering Optimization", New Age International Publishers, New Delhi.
2. Kanthi Swarup, P K Gupta and Manmohan "Operations Research", S. Chand & Sons, New Delhi.
3. S D Sharma "Operations Research", Kedar Nath Ram Nath Publications & Co, Meerut.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501508 | PN | Entrepreneurship | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**

- Understand the role of entrepreneurs in the economy,
- Identify the traits of successful entrepreneurs, think about whether they might want to be an entrepreneur,
- Learn the ways entrepreneurs fund their businesses,
- Evaluate the trade-off between risk and reward for entrepreneurs

**Course Outcomes:** Upon completion of this course, students will be able to,

- Demonstrate a fundamental comprehension of business opportunity evaluation, from the perspective of a prospective investor,
- Identify the most recognized sources of potential funding and financing for business start-ups and/or expansion,
- Demonstrate basic computer proficiency, including the use of word processing, presentation, and spreadsheet software packages, as well as a basic facility with the internet and other research tools,
- Demonstrate extemporaneous speaking skills developed through in-class discussion of text materials, case study analyses, and current entrepreneurship-related issues,
- Assess their own personal work product(s) - and critique those of their colleagues - with regard to thoroughness, creativity and how those could apply to their own real life, future business ventures.

**Unit – 1 Entrepreneurship and Management**

Introduction – Concept – Expectations of an entrepreneur – Entrepreneurial style vs Managerial style – Style in an industry – Management in industries – Location of industries – Rural vs Urban industrialization – Technocrats.

**Motivation Risks and Rewards:** What makes an entrepreneur – Entrepreneurial motivation – India's experience in motivating entrepreneurs – State government schemes – Risk and rewards – Entrepreneurial failure.

**Unit – 2 Entrepreneurial Development**

Development, profile and requirements – Need for a planned and co-ordinated effort – Follow up and institutional support needed – Programmes existing in India for developing entrepreneurs

**Small Business Scene:** History of small business in India – Promotional measures for the development of small business sector – Trend in small firm growth – The individual firm and total business scene – Role and scope of small scale industries – Requirements for licensed surveyor and to become contractor

**Unit – 3 Setup Small Business**
Concept and definition of small scale industry – Significance or importance of small scale units – Assistance programme for small business enterprise – Institutional setup for development of small business enterprises in India – Role of banks – Incentives to the entrepreneurs – Small scale industries in self employment scheme

**Finance and Financing:** Introduction and objectives of accounting – Important accounting terms – Financial management – Cost – Direct cost – Over heads – Financing – Fixed or blocked capital – Working capital – Factors affecting working capital – Scales and turn over – Break even analysis – Mechanics of break even analysis – Profit and loss account – Funds – sources and application of fund – Cash and cash flow

**Unit – 4 Feasibility Study**
Introduction – Starting new enterprise – Market and demand survey – Product and product analysis – Inputs – Material and man power – Location and site for industries – Economic and technical evaluation – Feasibility and project report – Simplified format for a feasibility report or scheme for small scale industry

**Marketing and Sales:** Market – Classification – Pricing of factor market and production market – Demand for factor service – Marketing – Pricing policies – Objectives of pricing policy – Information needed for pricing decisions – Pricing methods – Sales & salesmanship – Qualities of salesman

**Unit – 5 Financial Management and Control**
Cost control – Fixed and variable expense analysis – Selling on credit – Inventory valuation – Management accountancy and engineering economy – Essential accounting records – Simplified accounting system – Final accounts – Cash flow analysis

**Total Quality Management:** Introduction – Elements of total quality management – Requirements and aims of TQM – Ways for TQM – Concepts of quality – Quality system – Principles of quality assurance – Elements of quality systems – Necessity of international standards ISO 9000 series of quality standards – Evaluation of ISO standards – Various standards under ISO – Outstanding features of ISO 9000 – Indian standard on quality systems

**TEXT BOOKS**
1. N Sreenivasulu "Entrepreneurship", Radiant Publishing House, Hyderabad.
2. H Nandan "Fundamentals of Entrepreneurship" PHI Learning Private Limited, New Delhi.

**REFERENCE BOOKS**
1. Desh Deshpande "On Entrepreneurship and Impact"
2. Sangeeta Sharma "Entrepreneurship Development", PHI Learning Private Limited, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501509 | PJ | **Strength of Materials Laboratory** | 00 | 00 | 03 | 50 | 50 | 02 |

**Course Objective:** The objective of the course is to make the student to understand the behavior of materials under different types of loading for different types structures.

**Course Outcomes:** Upon completion of this course, students will be able to,
- Interpret the hardness curve measured after heat treatment,
- Correlation between material structure and its creep property,
- Index XRD plot and determine the phases,
- Perform non destructive failure analysis

# LIST OF EXPERIMENTS
1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam
3. Bending test on simple support beam
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood and concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams
11. Continuous beam – deflection test

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501510 | PJ | **Geo-Technical Engineering Laboratory** | 00 | 00 | 03 | 50 | 50 | 02 |

**Course Objectives:**
- To estimate index properties of soils (coarse and fine),
- To estimate consistency limit of fine grained soils,
- To estimate shear strength of soils by direct shear test and unconfined compressive test
- To estimate the engineering properties of the soils by density test, CBR, permeability test

**Course Outcomes:** Upon completion of this course, students will be able to,
- Classify soil by physical observation of the soils,
- Classify soil based on estimated index and engineering characteristics of soils
- Carry out interpolation among the estimated soil design parameters

# LIST OF EXPERIMENTS
1. Determination of Water Content
   Oven Drying method
   Pycnometer Method
2. Determination of Specific Gravity
   Pycnometer Method
   Density Bottle Method
3. Particle Size Analysis
   Dry Sieve Analysis
   Hydrometer Analysis (Demo)
4. Consistency Limits
5. Free Swell Index
6. Determination of In-Situ Densities
   Core Cutter Method
   Sand Replacement Method
7. Proctor Compaction Test
   Standard Proctor Compaction
8. Determination of Shear Strength Parameters
   Direct Shear Test
   Unconfined Compressive Strength Test
   Triaxial Shear Test (Demo)
9. Determination of Permeability
   Constant Head Method
   Variable Head Method

10. California Bearing Ratio Test
11. North Dakota Penetration test (Demo)
12. Determination of Consolidation Properties (Demo)

**TEXT BOOKS**
1. S Mittal and J P Shukla "Soil Testing for Engineers", Khanna Publishers, New Delhi.
2. T G Sitharam and T N Ramamurthy "Geo-Technical Engineering", S Chand Publishing, New Delhi.

**REFERENCE BOOKS**
1. Compendium of Indian Standards on Soil Engineering: Part – 1 & 2, Laboratory and Field Testing of Soils for Civil Engineering Purposes.
2. Dr. K R Arora "Soil Mechanics & Foundation Engineering", Standard Publishers Distributers, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1525601 | HS | Managerial Economics And Financial Analysis | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
- To equip the budding engineering student with an understanding of concepts and tools of economic analysis. Provide knowledge of managerial economics through differential economics concepts, accounting concepts are necessary to analyze and solve complex problems relating financial related matters in bog industries.
- An understanding of professional and ethical responsibility and ability to communicate effectively. The broad education necessary to understand the impact of engineering solutions in a global and societal context. Recognition of the need for, and an ability to engage in life-long learning and to meet contemporary issues.

**Course Outcomes:**
- Expected to achieve the overall course objective to understand and enhancing the knowledge regarding managerial concepts and obtaining optimal solutions. And to get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

**Unit – 1 Introduction to Managerial Economics**
Definition, nature and scope of Managerial Economics – Relation with other disciplines. Demand analysis – Determinants, Law of Demand and its exceptions – Elasticity of Demand – Types and Measurement of Elasticity of Demand – Methods of Demand Forecasting.

**Unit – 2 Theory of Production and Cost Analysis**
**Production Functions**: Law of variable proportion, Isoquants and Isocost, least cost combination of inputs, Returns to Scale and Cobb- Douglas production function. Internal and external economies of scale.
**Cost Analysis:** Cost concepts – Break-Even Analysis (BEA) – Break Even Point – significance and limitations of BEA.

**Unit – 3 Introduction to Markets and Pricing**
**Markets structures**: Perfect and Imperfect competition – Features of Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly. Price - Output determination under perfect competition, monopoly and monopolistic competition – Price rigidity in Oligopoly.
**Methods of pricing:** Cost plus pricing, marginal cost pricing, skimming pricing, penetration pricing, differential pricing and administrative pricing.

**Unit – 4 Business Organizations and Capital Budgeting**
**Business Organizations:** Types of business organizations - Sole Proprietorship, Partnership, Joint Stock Company, Public Ltd and Private Ltd companies, Public Private Partnership (PPP).
**Capital Budgeting:** Types of capital, methods and sources of raising Capital. Capital Budgeting Techniques: Payback Period Method, Accounting Rate of return (ARR) and Net Present Value Method (NPV) (simple problems).

**Unit – 5 Financial Accounting and Analysis**
Double Entry Book keeping, Journal, Ledger, Trail Balance – Final Accounts (Preparation of Trading Account, Profit and Loss Account and Balance Sheet without adjustments). Analysis and interpretation of financial statements through ratios (Liquidity, Profitability and Activity Ratios) (Simple problems).

**TEXT BOOKS**
1. Varshney & Maheswari "Managerial Economics", Sultan Chand Publishers, New Delhi.
2. Prasad and K V Rao "Financial Accounting", Jaibharth Publishers, Vijayawada.

**REFERENCES**
1. K K Dewett "Managerial Economics", Sulthan Chand Publishers, New Delhi.
2. P L Mehtha "Managerial Economics", Sulthan Chand Publishers, New Delhi
3. S P Jain & K L Narang "Financial Accounting", Kalyani Publishers, New Delhi.
4. M Sugunatha Reddy "Managerial Economics and Financial Analysis", Research India Publication, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501602 | PJ | Structural Analysis – 1 | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objective:**
To make the students to understand the principles of analysis of structures of static and moving loads by various methods
**Course Outcomes:** Upon completion of this course, students will be able to,
- Understand the fixed beams and three moment theorem and its applications,
- Understand the importance of the slope deflection method,
- Understand the importance of the moment deflection method,
- Understand the importance of Kani's method,
- Use strain energy concepts in the analysis

**Unit - 1 Three Moment Equation Method**
Introduction to statically indeterminate beams with uniformly distributed load - Central point load - Eccentric point load - Number of point loads - Uniformly varying load - Couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support - Effect of rotation of a support.

**Unit - 2 Slope Deflection Method**
Slope-deflection equations - Principals of the method - Applications of the method to the analysis of Continuous beams and portal frames (single bay, single storey with vertical legs only) without and with side sways

**Unit - 3 Moment Distribution Method**
Principals of the method - Stiffness and carry over factors – Distribution and carryover of moments - Applications of the method to the analysis of Continuous beams and portal frames (single bay, single storey with vertical legs only) without and with sideways.

## Unit - 4 Kani's Method

Principal's of the method - Application to continuous beams including settlement of supports and portal frames (single bay, single storey with vertical legs only ) with and with side sway by Kani's method.

## Unit - 5 Energy Theorems

Introduction-Strain energy in linear elastic system - Expression of strain energy due to axial load - Bending moment and shear forces – Castigliano's first theorem - Deflections of simple beams and pin jointed trusses.

## TEXTBOOKS
1. C S Reddy "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
2. S S Bhavaikatti "Structural Analysis" – Vol. 1 & Vol. 2, Vikas Publishing Pvt. Ltd., New Delhi.

## REFERENCE BOOKS
1. S Ramamrutham and R Narayana "Theory of Structures" Dhanpathrai Publications, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501603 | PJ | Design & Detailing of Reinforced Concrete Structures – 1 | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:** A student can able to know The different structural elements and its behavior by imposing of loads, Analysis and design of different structural elements like beams. The usage of IS Codes in the process of analysis.

**Course Outcomes:** After completion of this course, students will expertise on
- Identify the different loading combinations and its variations
- Analysis and design of beams
- Design of shear reinforcement and know the importance of development length
- Structural detailing of different slabs
- Importance of serviceability

## Unit - 1 General Concepts of RC Design

Introduction to working stress - Ultimate stress and limit state methods - Stress stain curves of concrete and steel - Characteristic strength - Partial safety factors and Stress block diagrams

## Unit - 2 Design for Flexure

Limit state of collapse in flexure – Ultimate flexural strength – Balanced, Under and Over - reinforced sections – Design of singly and doubly reinforced rectangular beams – Design of flanged beams.

## Unit - 3 Design for Shear, Torsion and Bond

Shear – Design of beams for shear and torsion – Anchorage and development length.

## Unit - 4 Design of Slabs and Stair Cases

Design of one way and two way slabs - Design of stair cases

## Unit - 5 Design of Compression Members

Columns – Reduction factors – Axially loaded, eccentrically loaded columns – Uniaxial moment – Biaxial moment (Biaxial moment for practice only and not for University Examination).

**Limit states of serviceability**: Deflection (short and long term) – Cracking.

**TEXT BOOKS**
1. Ashok. K Jain "Reinforced Concrete: Limit State Design"
2. S R Karve and V L Shah "Limit State Theory and Design of Reinforced Concrete", Structures Publication, Pune.

**REFERENCE BOOKS**
1. B C Punmia, Ashok Kumar Jain & Arun Kumar Jain "Comprehensive RCC Design", Lakshmi Publications, New Delhi.
2. N Krishna Raju and R N Pranesh "Reinforced Concrete Design: IS: 456-2000 Principles and Practice", New Age International (P) Limited, Publishers, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501604 | PJ | **Water Resources Engineering – 1** | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
- Introduce the types of irrigation systems, Introduce the concept of planning and design of irrigation systems, Understand design method of erodible and non-erodible, Know the principles of design of hydraulic structures on permeable foundations, Learn design principles of canal structures.

**Course Outcomes:** Upon completion of this course, students will be able to,
- Estimate irrigation water requirements,
- Design irrigation canals and canal network,
- Plan an irrigation system, Plan and design diversion head work,
- Analyze stability of gravity dam and earth dam
- To know how to dissipate the energy, different structures and to know scour problems in downstream.

**Unit – 1 Irrigation**
Necessity and importance principal crops and crop seasons – Types - Methods of application - Soil-water-plant relationship - Soil moisture constants - Consumptive use - Estimation of consumptives use - Crop water requirement - Duty and delta - Factor affecting duty - Depth and frequency of irrigation - Irrigation efficiencies - Water logging and drainage - Standard of quality for irrigation - Crop rotation - Soil-water-plant relationship - Vertical distribution of soil moisture - Soil moisture constants - Soil moisture tension

**Unit – 2 Classification of Canals**
Classification of canals - Design of Irrigation canals by Kennedy's and Lacey's theories - Balancing depth of cutting - Canal lining.

**Unit – 3 Diversion Head works**
Types of Diversion head works - Diversion and storage head works - Weirs and barrages - Layout of diversion head works – Components - Causes and failure of hydraulic structures on permeable foundations - Bligh's creep theory - Khosla's theory - Determination of uplift pressure - Impervious floors using Bligh's and Khosla's theory - Exit gradient - Functions of U/s and d/s sheet piles.

**Unit – 4 Dams and Reservoirs**
Types of dams - Merits and demerits - Factors affecting selection of type of dam - Factors governing selecting site for dam - Types of reservoirs - Selection of site for reservoir - Zones of storage of a reservoir - Reservoir yield - Estimation of capacity of reservoir using mass curve.

## Unit – 5 Gravity and Earth Dams

**Gravity dams:** Forces acting on gravity dam - Causes of failure of a gravity dam - Elementary profile and practical profile of a gravity dam - Limiting height of a low gravity dam - Stability analysis - Drainage galleries.

**Types of Earth dams:** Causes of failure of earth dam - Criteria for safe design of earth dam - Seepage through earth dam - Graphical method - Measures for control of seepage.

### TEXT BOOKS
1. S K Garg "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi.
2. Dr. K R Arora "Irrigation Water Power and Water Resources Engineering", Standard Book House, New Delhi.
3. R K Sharma and T K Sharma "Irrigation Engineering", S Chand Publishing, New Delhi.

### REFERENCE BOOKS
1. GL Asawa "Irrigation and Water Resources Engineering", New Age International Publishers, New Delhi.
2. R S Varshney "Concrete Dams", Oxford & IBH Publishing Co., New Delhi,
3. Murthy Chall and N Satya "Water Resources Engineering', New Age International Publishers, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501605 | PJ | Transportation Engineering – 1 | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:**
This course is taught to impart the knowledge in highway planning, alignment, geometric design of different elements of highway, different traffic surveys, traffic regulation and management and pavement design.

**Course Outcomes:** Upon completion of this course, the students will be able to
- Conduct different engineering surveys and take up different highway alignment projects
- Design highway pavement geometrics.
- Collect traffic data, analyze the data and design suitable traffic management systems
- Design suitable traffic islands and rotary intersections
- Do structural design of flexible and rigid pavements.

### Unit – 1 Highway Development and Planning
Highway development in India – Necessity for Highway Planning – Different Road Development Plans – Classification of Roads – Road Network Patterns – Highway Alignment – Factors affecting alignment – Engineering surveys – Drawing and Reports

### Unit – 2 Highway Geometric Design
Importance of Geometric Design - Design controls and Criteria - Highway Cross Section Elements Sight Distance Elements - Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance - Design of Horizontal Alignment - Design of Super elevation and extra widening - Design of Transition Curves -Design of Vertical alignment – Gradients - Vertical curves.

### Unit – 3 Traffic Engineering
Basic Parameters of Traffic -Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – Factors affecting capacity and level of service - Traffic Volume Studies - Data Collection and Presentation - Speed studies - Data Collection and

Presentation - Road Accidents - Causes and Preventive measures - Accident Data Recording – Condition Diagram and Collision Diagrams.

**Traffic Regulation and Management:** Road Traffic Signs – Types and Specifications – Road markings - Need for Road Markings - Types of Road Markings- Specifications - Design of Traffic Signals – Webster Method –Saturation flow – Phasing and timing diagrams – Numerical problems.

## Unit – 4 Intersection Design

Conflicts at Intersections - Channelization: Objectives – Traffic Islands and Design criteria - Types of At-Grade Intersections – Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary and Design Criteria - Advantages and Disadvantages of Rotary Intersection.

## Unit – 5 Pavement Design

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – IRC methods only (as per IRC 37-2002) – Design of Rigid pavements – Critical load positions – Westergaard's stress equations – Computing Radius of Relative stiffness and equivalent radius of resisting section – Stresses in rigid pavements

## TEXT BOOKS

1. S K Khanna, C E G Justo and A Veeraragavan "Highway Engineering", Nemchand Publications, New Delhi.

## REFERENCE BOOKS

1. G V Rao "Principles of Transportation and Highway Engineering", Tata McGraw-Hill Companies, Inc. New York.
2. L R Kadiyali "Principles and Practice of Highway Engineering", Khanna Publishers, New Delhi.
3. Partha Chakroborthy, Animesh Das, "Principles of Transportation Engineering", Prentice Hall of India, New Delhi.
4. S P Bindra "Highway Engineering", Dhanpath Rai & Sons, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501606 | PJ | **Remote Sensing and GIS** | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objective:** The purpose of this course is to provide an understanding of physical concepts and underlying various engineering and technological applications in remote sensing. In addition, the course is expected to understand the basic principles of remote sensing and its applications.

**Course Outcomes:** After completion of the course, the student can be able to
- Perceive the basics of remote sensing.
- Pick out the characteristics of the instruments used for remote sensing.
- Analyze the need and standard techniques used for image processing
- Perceive the basics of GIS.
- Study the areas of application using Remote Sensing and GIS.

## Unit - 1 Remote Sensing – 1

Introduction to Basic Concepts: Definition – Physics of Remote Sensing – Electro Magnetic Radiation (EMR) – Interaction of EMR with atmosphere, Earth surface features – Vegetation, soils, water – Spectral reflectance curves – Atmospheric windows

## Unit - 2 Remote Sensing – 2

Remote Sensing Systems: Platforms: Introduction – Types – Satellites and orbits, - Spectral, radiometric and spatial resolutions, temporal resolution of satellites - Some remote sensing satellites and their features.

## Unit - 3 Image Processing Techniques

Digital Image Processing: Image enhancement – Contrast stretch, Spatial filtering and edge enhancement; Classification – Supervised unsupervised classification – Visual image interpretation techniques.

## Unit - 4 G I S

Geographical Information Systems: Basic Principles – Definition – Components – Data Structures – Raster and Vector formats – Functioning of GIS – Data Input – Data Manipulation – Data Retrieval – Spatial Data Analysis – Computational Analysis Methods (CAM) – Visual Analysis Methods (VAM) - Data Display – Data Base Management Systems.

## Unit - 5 Remote Sensing Applications

Remote Sensing Applications: Water shed management - Irrigation Management - Drought Assessment - Environmental Monitoring - other applications.

## TEXT BOOKS
1. Thomas Lillesand, Ralph W Kiefer and Jonathan Chipman "Remote Sensing and Image Interpretation", John Wiley & Sons, India.
2. M Anji Reddy "Remote Sensing & GIS", B.S Publications, Hyderabad.
3. C P Lo and Albert K W Yeung "Concepts and Techniques in Geographical Information Systems", Prentice Hall of India, New Delhi.

## REFERENCE BOOKS
1. Floyd F Sabins Jr. "Remote Sensing Principles and Interpretation", Freeman and Co., San Franscisco.
2. J R Jensen "Remote Sensing of the Environment: An Earth Resource Perspective", Prentice Hall of India, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501607 | PJ | Watershed And River Basin Management | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Outcomes:**
- Student understands the processes leading to degradation of soil and water resources and implementation of conservation measures.
- Water shed development programme is proper use of all available resources of a watershed for optimum production with minimum hazards to natural resources
- To know deferent water and soil conservation structures to improve the ground water table
- To understand basin characteristics and to know the ridge to valley concept to save downstream people.
- To impart the principles of managing water form watershed to river basin scale.

## Unit – 1 Introduction to Watershed

Watershed delineation - Watershed development - Definition and concepts - objectives and need - Integrated and multidisciplinary approach for watershed management - Characteristics of

watershed - Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils - Hydrology and hydrogeology - Socio-economic characteristics.

### Unit – 2 Watershed Management
Definition of watershed management – Factors affecting watershed management - Preparation of land drainage schemes - Types and design of surface drainage - Controlling of soil erosion and soil salinity - Estimation of soil loss due to erosion - Universal soil loss equation.

### Unit – 3 Water Conservation and Harvesting
Types and design of water conservation and water harvesting structures for different types of catchments - Rainwater harvesting - Catchment and roof top harvesting - Harvesting structures - Soil moisture conservation - Check dams - Artificial recharge - Farm ponds - Percolation tanks

### Unit – 4 Introduction to River Basins
River systems - Water and river basin management in India - Upstream-downstream demands - Quality problems downstream - Environmental flows - Shared rivers - Water conflict resolution - Requirements for integrated river basin management.

### Unit – 5 River Basin Management
River basin management - Principles of planning processes - Water availability assessment – Surface water and groundwater - Water demand assessment - Municipal, industrial, agricultural and environmental - Water allocation - Principles and policies - Case studies - Impacts of anthropogenic activities and climate change on water resources.

### TEXT BOOKS
1. J V S Murthy, "Watershed Management", New Age International Publishers, New Delhi.

### REFERENCE BOOKS
1. Ghanshyam Das "Hydrology and Soil Conservation Engineering", Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Suresh R "Soil and Water Conservation Engineering", Standard Publishing Distributors, New Delhi.
3. E M Tideman "Watershed Management", Omega Scientific Publishers, New Delhi.
4. M Newson, "Land, Water and Development: River Basin Systems and Their Sustainable Management", Routledge, London.
5. G J Young, J C I Dooge and J C Rodda, "Global Water Resources Issues", Cambridge University Press, Cambridge, UK.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501608 | PJ | Civil Engineering Professional Practice | 03 | 01 | 00 | 30 | 70 | 03 |

**Course Objectives:** A student can able to understand, Organization of departments, How to record the field measurement, To know the importance of fire resistance, To understand the architectural service rules.

**Course Outcomes:** After completion of the course, students will expertise on
- Recording of items in government works
- Rule to follow during the measurements
- Importance and difficulties of land acquisition
- Architectural policies
- Procedure for arbitration

### Unit - 1 P.W.D. Accounts and Procedure for Works

Organization of Engineering Department – Works, Classification of works – Methods of carrying out works – Contracts – Measurement Book – Stores – Tools and plants – Mode of payment – Public Works Account.

### Unit - 2 Rules and methods of measurements

General Rues, Earth work – Concrete – Brick work – Stone masonry – Wood work – Carpenter's works – Joinery – Steel and iron work – Roof covering – Sloping roof – Flat terraced roof – Ceiling – Floor – Plastering and pointing – White washing – Colour washing – Painting – Sanitary and water supply works – Electrical works – Road works – Bituminous road – Dismantling – Demolition – Materials.

### Unit - 3 Land Acquisition

Acquisition of easements - Loss of easements - Land Acquisition Act - Purpose of acquisition - Claim report for acquisition - Ceiling act – Introduction of main provisions.

### Unit - 4 Fire Insurance

Insurance Policy duties of architect - Fire loss assessment - Insurable value of property.

**Architects Registration Act:** Code of professional conduct - Code for architectural competition - Architectural services – Normal additional, special and partial. Scale of fees and mode of payment, claiming of fees. Architects Act of Registration of 1972, copy right of drawings.

### Unit - 5 Arbitration

Introduction to Arbitration, umpire, nature of arbitration, conduct, powers and duties of arbitration and umpire procedure – Procedure for arbitration, preparation and publication of awards, impeachment. Claims

### TEXT BOOKS

1. B S Patil "Civil Engineering Contracts and Estimates", Universities Press, New Delhi.
2. Dr Roshan H Namavati "Professional Practice", Lakhani Book Depot, New Delhi.
3. 'National Buildings Code' by ISI.

### REFERENCE BOOKS

1. K G Krishnamurthy and S V Ravindra "Professional Practice", PHI Learning Private Limited, New Delhi.

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501609 | PJ | **Environmental Engineering Lab** | 00 | 00 | 03 | 50 | 50 | 02 |

**Course Objective:**

- To get exposure about water and sewage analysis.
- The laboratory provides knowledge of estimating various parameters like $P^H$, Chlorides, and different solids in water.
- For effective water treatment, the determinations of optimum dosage of coagulant and chloride demand are also included.
- The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

**Course Outcomes:** Upon completion of this course, students will be able to,

- Identify the BIS and WHO standards of water for domestic consumption and also for various industrial and agricultural purposes.

## LIST OF EXPERIMENTS
1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of Dissolved Oxygen.
7. Determination of B.O.D
8. Determination of C.O.D
9. Determination of Optimum coagulant dose.
10. Determination of Chlorine demand.

## TEXT BOOKS
1. Clair N Sawyer, Perry L Mccarty and Gene F Parkin "Chemistry for Environmental Engineering and Science", Tata McGraw-Hill Edition, New Delhi.
2. Dr. G Kotaiah and Dr. N Kumara Swamy "Environmental Engineering Lab Manual", Charotar Publishing House, Anand, Gujrat

| Subject Code | Subject Category | Subject Title | L | T | P | IM | EM | Credits |
|---|---|---|---|---|---|---|---|---|
| 1501610 | PJ | Computer Aided Building Drawing Lab | 00 | 00 | 03 | 50 | 50 | 02 |

### Course Objectives & Outcomes:
- A student will able to know how to apply engineering drawing using computers
- A student can understand about the scope of Auto CAD software,
- A student will know what is plan and how it should draw in auto CAD software.

## LIST OF EXPERIMENTS

### Part A (Manual Drawing)
1. Basics of Building Drawing
2. Developing Plan, Section and Elevation of a Residential Building
3. Developing Plan, Section and Elevation of a Two Paneled Door

### Part B (Drawing using Auto CAD or Equivalent)
1. Basic commands
2. Operation with drawing entities
3. Hatching, Blocks and printing
4. Two Paneled Door
5. Developing Plan, Section and Elevation of a Residential building
6. Developing a roof truss.

## TEXT BOOKS
1. Dr. N Kumara Swamy and A Kameswara Rao "Building Planning and Drawing", Charotar Publishing House, Anand, Gujrat.