COURSE STRUCTURE AND DETAILED SYLLABUS

II,III & IV- B.TECH-I & II - SEMESTERS

ANURAG GROUP OF INSTITUTIONS

(AUTONOMOUS)

(Formerly CVSR College of Engineering)

Venkatapur, Ghatkesar, Hyderabad – 500 088.

www.anurag.edu.in

CIVIL ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2018-19)

Anurag (CVSR) Campus
Venkatapur (V), Ghatkesar (M), Ranga Reddy (Dist.)

B.Tech. Programs:

Chemical Engineering

Civil Engineering

Computer Science and Engineering

Electrical and Electronics Engineering

Electronics and Communication Engineering

Information Technology

Mechanical Engineering

Artificial Intelligence

Pharmacy Programs:

B.Pharmacy

Pharma-D

Pharma-D (Post Baccalaureate)

M.Pharm (Pharmaceutics)

M.Pharm (Pharmacology)

M.Pharm (Pharmaceutical Analysis
 & Quality Assurance)

M.Pharm (Industrial Pharmacy)

M.Tech. Programs:

M.Tech (Computer Science and Engineering)

M.Tech (Power Electronics & Electrical Drives)

M.Tech (Electrical Power Systems)

M.Tech (Machine Design)

M.Tech (VLSI System Design)

M.Tech (Embedded Systems)

M.Tech (Structural Engineering)

Master of Business Administration

ANURAG GROUP OF INSTITUTIONS

(AUTONOMOUS)

(Formerly CVSR College of Engineering)

Venkatapur, Ghatkesar, Hyderabad – 500 088.

www.anurag.edu.in

COURSE STRUCTURE AND DETAILED SYLLABUS

II,III & IV- B.TECH-I & II - SEMESTERS

CIVIL ENGINEERING

FOR
B.TECH FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2018-19)

ANURAG GROUP OF INSTITUTIONS
(Autonomous)

II-B.Tech. I-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A53001	BSC	Mathematics-III	3	0	0	3
A53002	ESC	Basic Electrical Engineering	3	0	0	3
A53003	PCC	Surveying and Geometics	3	0	0	3
A53004	PCC	Solid Mechanics-I	3	0	0	3
A53005	PCC	Building Materials and Construction Practice	3	0	0	3
A53006	HSMC	Managerial Economics and Financial Analysis	3	0	0	3
A53201	PCC	Surveying and Geometics Lab	0	0	2	1
A53202	PCC	Solid Mechanics Lab	0	0	2	1
A53007	MC	Gender Sensitization	2	0	0	0
		TOTAL	**20**	**0**	**4**	**20**

II-B.Tech. II-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A54001	PCC	Fluid Mechanics	3	0	0	3
A54002	PCC	Engineering Geology	2	0	0	2
A54003	PCC	Solid Mechanics-II	3	0	0	3
A54004	PCC	Structural Analysis	3	1	0	4
A54005	PCC	Transportation Engineering	3	0	0	3
A54006	PCC	Concrete Technology	3	0	0	3
A54201	PCC	Engineering Geology Lab	0	0	2	1
A54202	PCC	Fluid Mechanics and Hydraulic Machinery Lab	0	0	2	1
A54007	MC	Environmental Studies	2	0	0	0
TOTAL			**19**	**1**	**4**	**20**

III-B.Tech. I-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A55001	PCC	Hydraulic Engineering	3	0	0	3
A55002	PCC	Environmental Engineering	3	0	0	3
A55003	PCC	Geotechnical Engineering	3	0	0	3
A55004	PCC	Design Of Concrete Structures	3	0	0	3
A55006 A55007 A55008	OEL	**Open Elective-I** Logical Reasoning,Verbal and Quantitative Ability English for Professionals Fundamentals of Budget	3	0	0	3
A55009 A55010 A55011	PEC	**Professional Elective-I** Pavement Design Ground Improvement Technics Prestressed Concrete	3	0	0	3
A55201	PCC	Material Testing Lab	0	0	2	1
A55202	PCC	Transportation Engineering Lab	0	0	2	1
A55203	MC	AUTO CAD	0	0	3	0
TOTAL			18	0	7	20

III-B.Tech. II-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A56001	HSMC	Entrepreneurship Development	2	0	1	3
A56002 A56003 A56004	PEC	**Professional Elective-II** Irrigation Engineering Railway, Airport and harbor Engineering Finite Element Method	3	0	0	3
A56005 A56006 A56007	PEC	**Professional Elective-III** Traffic Engineering and Management Remote Sensing and GIS Earthquake Engineering	3	0	0	3
A56008	PCC	Hydrology Water Resources Engineering	3	0	0	3
A56009	PCC	Foundation Engineering	3	0	0	3
A56010	PCC	Design of Steel Structures	3	0	0	3
A56201	PCC	Geotechnical Engineering Lab	0	0	2	1
A56202	PCC	Environmental Engineering Lab	0	0	2	1
A56203	MC	Structural Analysis Lab	0	0	3	0
Total			17	0	8	20

IV-B.Tech. I-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A57001	PCC	Estimation and Costing	3	0	0	3
A57002	PCC	Construction Engineering and Management	3	0	0	3
A57003	PCC	Advanced Structural Analysis	3	0	0	3
A57004 A57005 A57006	PEC	**Professional Elective-IV** Solid And Hazardous Waste Management Urban Transportation Planning Advanced Structural Design	3	0	0	3
A57007 A57008 A57009	PEC	**Professional Elective-V** Rural Water Supply And Onsite Sanitation System Ground Water Engineering Repair and Rehabilitation of Structures	3	0	0	3
A57010 A57011 A57012	PEC	**Professional Elective-VI** Environmental Impact Assessment and Life Cycle Analysis Bridge Engineering Disaster Preparedness and Planning	3	0	0	3
A57201	PCC	Remote Sensing and GIS Lab	0	0	2	1
A57202	HSMC	Advanced English Communication Skills Lab	0	0	2	1
A57203	PROJ	Mini Project	0	0	4	2
TOTAL			18	0	8	22

IV-B.Tech. II-Semester   **Course Structure**

Subject Code	Category	Course Title	L	T	P/D	Credits
A58001 A58002 A58003	OEL	**Open Elective-II** Computational Fluid Dynamics Negotiation Skills Computer Graphics	3	0	0	3
A58004 A58005 A58006	OEL	**Open Elective-III** Project Management Database Management System Nano Science and Nano Technology	3	0	0	3
A58201	PROJ	Technical Seminar	0	0	6	2
A58202	PROJ	Comprehensive Viva Voce	0	0	0	2
A58203	PROJ	Project Work	0	0	15	10
TOTAL			6	0	21	20

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

	L	T	P/D	C
	3	0	0	3

(A53001) MATHEMATICS-III
NUMERICAL METHODS ANDPARTIAL DIFFERENTIAL EQUATIONS

Course Objectives:

- Determine the approximate solution of algebraic and transcendental equations using iterative methods and interpolate the values for the given data.
- Concepts of Numerical Differentiation to find the higher order derivatives for the tabulated values and finding integration of given data points with various step sizes by using Numerical methods.
- Determine the solution of linear first order initial value problems using single and multi-step methods.
- Formation of PDE's and solution of linear and non-linear PDE's using various methods.
- Classification of PDE's and Solving One Dimensional Heat and Wave equations.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Solve the algebraic and transcendental equations using numerical methods and also finding the polynomial using given set of tabulated values and estimation of the functional value within the data by Interpolation.
- Apply the method of Numerical Differentiation and Numerical Integration for engineering problems.
- Solve the first order initial value problems using Taylors, Euler and Runge-Kutta methods.
- Using concepts of partial differential equations to solve linear and non-linear problems.
- Solve Heat conduction and wave equations by using method of separation of variables and identify the consistent solution.

UNIT-I

Solution of Non- linear Equations:

Solution of Algebraic and Transcendental Equations – The Bisection Method – The Method of False Position – Newton-Raphson Method.

Interpolations:

Introduction- Finite differences (Forward Differences, Backward differences and divided difference) Lagrange's Interpolation formula, Newton divided, Newton's forward and backward difference interpolation formulae - Problems.

UNIT-II

Numerical Differentiation using interpolation formulae.

Numerical integration: Newton's cotes quadrature formulae,Trapezoidal rule, Simpson's 1/3rd and 3/8 rules

UNIT-III

Numerical solution of Ordinary Differential Equations: Solution by Taylor's series-Picard's Method of successive Approximations- Euler and modified Euler's methods -Runge-Kutta Method

UNIT-IV

Partial differential equations of First Order

Introduction and Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) equations, Charpits Method.

UNIT-V

Partial differential equations of Second Order

Method of separation of Variables for second order equations.Classification of general second order partial differential equations. Applications of Partial Differential Equations-One dimensional wave equation, Heat equation

TEXT BOOKS

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley and Sons, 2006.

2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.

3. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

REFERENCE BOOKS

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand and Company, 2nd Edition, Reprint 2012.

2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

3. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

L	T	P	C
3	0	0	3

BASIC ELECTRICAL ENGINEERING
(Common to All Branches)

Course Objectives:
- To impart knowledge of basic electrical equipment
- To introduce the concept of electrical circuits and its components.
- To impart the knowledge of AC circuits, Phasor algebra related to alternating quantities
- To acquaint the students with principles of operation of transformers, Electrical machines and electrical installations

Course Outcomes:
At the end of the course, students will be the able to
- Understand the importance of various theorems.
- Analyze basic electric circuits with DC excitation.
- Determine the losses and efficiency of single transformers.
- Compare the difference between the performance and applications of three phase and single phase induction motor.
- Demonstrate the principle of operation of alternator, the importance of fuse, circuit breaker.

UNIT-I DC Circuits:
Basic definitions, types of elements, types of sources, Kirchhoff's Laws**,** resistive networks, series, parallel circuits, Star- Delta and Delta- Star transformation, Network theorems-Superposition & Thevenin's - simple problems.

UNIT-II AC Circuits:
Representation of sinusoidal waveforms, peak, rms and average values. Elementary treatment of single-phase AC circuits consisting of R, R-L, R-C, R-L-C combinations (series only). Phasor representation, power factor, real power, reactive power, apparent power, resonance concept. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT –III: Magnetic Circuits &Transformers:
Magnetic circuits: Magnetic materials, B-H characteristics, Faraday's laws of Electromagnetic Induction, Lenz Law, Fleming's Right hand Rule, Fleming's Left hand Rule Magnetic Circuits - concept of Self & Mutual Inductance.

Transformers:
Ideal and practical single phase transformer, OC-SC tests, losses in transformer, regulation and efficiency - simple problems.

UNTI-IV: DC Machines and Induction Motors:
DC Machines:
Construction, Principle of Operation of DC Generator & DC Motor.
Three Phase Induction Motor:
Construction, Principle of operation of three phase Induction Motor, torque slip characteristics, -simple problems.
Single Phase Induction Motor
Single phase Induction Motor construction and working principle, capacitor start-applications

UNIT –V: AC Generator & Electrical Installation:
AC Generator
Construction, Principle of operation of Synchronous Generator.

Electrical Installation:
Fuse, Relay and Circuit breakers, difference between fuse, Relay and circuit breaker, Types of Batteries, battery backup.

TEXT BOOKS:

1. Basic Electrical Engineering-By M.S. Naidu and S. Kamakshiah-TMH.
2. Principles of Electrical Engineering-by V.K.Mehta & Rohit Mehta-S.Chand Publications.
3. Basic Electrical Engineering - by T.K. Nagasarkar and M.S. Sukhija, Oxford University press.
4. Electrical and Electronics technology- By Hughes-Pearson Education.

REFERENCE BOOKS:

1. Network Analysis by Sudhakar & Shyam Mohan.
2. Theory and problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath, PHI.
3. L.S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. V.D. Toro, "Electrical Engineering Fundamental", Prentice Hall India, 1989.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

L	T	P/D	C
3	0	0	3

(A53003) SURVEYING AND GEOMATICS

Prerequisite- Mathematics and Physics.

Course Objectives:

- Describe the function of surveying in civil engineering construction, Work with survey observations, and perform calculations, customary units of measure.
- Operate an automatic level to perform differential and profile levelling; properly record notes
- Measure horizontal, vertical, and zenith angles with a transit, theodolite, total station or survey grade GNSS instruments, calculate azimuths, latitudes and departures, error of closure
- Determine latitudes, departures, and coordinates of control points and balancing errors in a traverse.
- Use appropriate software for calculations and mapping,operate a total station to measure distance, angles, and to calculate differences inelevation. Reduce data for application in a geographic information system

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the meaning of basic terminology involved in estimation of surveying
- Apply the knowledge, techniques, skills, and applicable tools of the discipline to engineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructure facilities
- Relate the knowledge on Surveying to the new frontiers of science likeHydro graphic surveying, Electronic Distance Measurement
- Understand Global PositioningSystem (GPS), Photogrammetry, Remote Sensing andGeographic Information System (GIS*).*

UNIT-I

Introduction to Surveying: Principles of surveying, objectives of surveying and classifications of surveying,Linear, angular and graphical methods, Survey stations, Survey lines- ranging, Bearing of survey lines, Levelling: Plane table surveying, Principles of levelling- booking and reducing levels; differential, reciprocal levelling, profile levelling and cross sectioning. Digital and Auto Level, Errors in levelling; contouring: Characteristics, methods, uses; areas and volumes.

UNIT-II

Triangulation and Trilateration: Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation -network- Signals. Baseline - choices - instruments and accessories - extension of base lines -corrections - Satellite station - reduction to centre – Intervisibility of height and distances -Trigonometric levelling - Axis single corrections.

UNIT-III

Curves: Elements of simple and compound curves – Method of setting out– Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves.

UNIT-IV

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Diatomite, Total Station – Parts of a Total Station –Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.

UNIT-V

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

Geographic Information System (GIS): Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

TEXT BOOKS

1. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
2. Anji Reddy, M., Remote sensing and Geographical information system, B.S.Publications, 2001.

REFERENCE BOOKS

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2. Surveying, Vol-I, II Venkatraman, Published by Macmillan and Co. Ltd, Third Edition in SI Units

NPTEL

1. https://nptel.ac.in/courses/112107142/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

	L	T	P/D	C
	3	0	0	3

(A53004) SOLID MECHANICS - I

Prerequisite- Engineering Mechanics

Mathematics

Course Objectives:

• To relate mechanical properties of a material with its behavior under various load types
• To provide the concepts of finding shear force and bending moment for different types of beams under various loads
• To assess the bending stresses and shear stresses variations across various cross sections of a beams
• To determine the deflections of beams under various types of loads
• Todetermine the stresses and deformations in circular shafts due to torsion and in different types of springs

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Understand the meaning of basic terminology involved in estimation of strength of various materials
• Analyze the various beams under different types of loads to draw shear force and bending moment diagrams
• Determine the bending and shear stress distribution in various beam cross section
• Know the different methods of finding deflections in beams under different types of loads
• Know the theories involved to find stresses and deformations in the torsion of circular shafts and different types of springs

UNIT-I

Simple Stresses And Strains: Elasticity and plasticity-Types of stresses and strains-Hooke'slaw-stress-strain diagram for mild steel-working stress-factor of safety-Lateral strain, Poisson's ratio and volumetric strain-Elastic moduli and the relationship between them-Bars of varying section-composite bars-Temperature stresses.

UNIT-II

Shear Force and Bending Moment: Definition of beam-Types of beams-concept of shearforce and bending moment-S.F and B.M diagrams for cantilever, simply supported with and without overhanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads-point of contra flexure-Relation between S.F, B.M and rate of loading at a section of a beam

UNIT-III

Flexural Stresses: Theory of simple bending-Assumptions-Derivation of bending equation:M/I=f/y=E/R-Neutral axis-Determination of bending stresses-section modulus of rectangular and circular sections (solid and hollow), I, T, and Channel sections and-Design of simple beams.

Shear Stresses: Derivation of formula - Shear stress distribution across various beamsections like rectangular, circular, triangular, I, T

UNIT-IV

Deflection of Beams: Bending into a circular arc - slope, deflection and radius of curvature-Differential equation for the elastic line of a beam-Double integration and Macaulay's methods-Determination of slope and deflection for cantilever and simply supported beams, subjected to point loads, U.D.L, Uniformly varying loads-Mohr's theorems - Moment Area Method, Conjugate Beam Method, application to simple cases.

UNIT-V

Torsion of Circular Section: Theory of pure torsion–derivation of torsion equations- $T/J = q/r = N\theta/L$ – assumptions made in the theory of pure torsion – torsional moment of resistance– polar section modulus – power transmitted by shafts – combined bending and torsion and end thrust – design of shafts according to theories of failure

Springs: Introduction–type of springs–carriage/leaf springs, helical springs-deflection ofclose and open coiled helical springs under axial pull and axial couple - springs in series and parallel.

TEXT BOOKS

1. Strength of Materials by S Ramamrutham, DhanpatRai Publishing Company (P) Limited,-2011.
2. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, Eleventh Edition-2015.

REFERENCE BOOKS

1. Strength of Materials-A Practical Approach by D S Prakash Rao,University Press
2. Strength of Materials by Pytel A H and Singer F L, Harper Collins, New Delhi
3. Strength of Materials by G.H.Ryder, Published by Macmillan and Co. Ltd, Third Edition in SI Units

NPTEL

1. https://nptel.ac.in/courses/112107146/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem

	L	T	P/D	C
	3	0	0	3

(A53005) BUILDING MATERIALS AND CONSTRUCTION PRACTICE

Course Objectives:

- To make an extent of behavior of various materials used in Civil Engineering.
- To provide an idea about different masonry work used in buildings
- To provide an understanding about different elements, classification and materials of the building.
- Know the functional design of various elements such as arches, lintels, floors, stairs, doors and windows
- To Emphasize about planning and Building by laws

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understanding about different materials used in civil engineering applications
- In supervision of different Masonry construction,
- Understanding about different materials and construction of different elements of building
- Know about various systems of plumbing, Staircase, fire protection etc.
- Understanding about Building planning and building by laws

UNIT-I

Introduction to Engineering Materials: Cement, M- Sand, Different types of concrete such as light wt. concrete, plain and reinforced concrete, steel and glass fiber concrete, High performance concrete, polymer concrete. Bricks, Glass, Plastic, Timber, Structural steel, paints, Acoustical material and Geo- textiles, carbon composites etc.

UNIT-II

Masonry: Cutting and dressing, selection of stones, types of stone masonry, and principles of construction joints in masonry, lifting heavy stones, common building stones in India.

Reinforced brickwork, brick noggin, parapets, copings, sills and corbels, brief introduction to cavity walls, load bearing and partition walls, Masonry construction using cement concrete blocks and clay blocks, precast construction, Introduction to methods and materials, precast elements like poles, cover, Jallies, steps etc.

UNIT-III

Arches and lintels: Terminology in construction, types, Chajjas and canopies, precast lintel and arches. Damp proofing: Causes and effects of dampness, various methods of damp proofing, damp proofing in plinth protection, new techniques of damp proofing, Floors: General principles, types and method of construction, upper floors, finishing and testing of floor tiles, Synthetic and ceramic tiles. Roofs: Flat and pitched roofs, roof coverings, types and their construction, features, Thermal insulation.

UNIT-IV

Stairs: Types of stairs, functional design of stairs. Doors and windows: Purpose and materials of construction and types. Building Services: Plumbing services: Water distribution, Sanitary lines and fittings; Ventilations: Functional requirements, system of ventilations; Air conditioning: Essentials and types; Acoustics: Characteristics, absorption, design;

Doors and Windows: Purpose and materials of construction and types.

Fire protection: Fire hazards, classification of fire-resistant materials and construction, fire safety norms.

UNIT-V

Plastering and pointing: Necessity, types and methods. Formwork: Centering and formwork, shoring, underpinning and scaffolding. Painting: White washing, colour washing and distempering, new materials and techniques. Building Planning: Principles of building planning, Classification of buildings and building by laws.

TEXT BOOKS

1. S. P. Arora and S. P. Bindra, 'A Text book on Building Construction', Edition 2010Dhanpat Roy Publications, New Delhi.
2. Rangwala, 'Engineering Materials', Charotar Publications.43rd Edition, 2017

REFERENCE BOOKS

1. Basics of Civil Engineering by SubhashChander, Jain brothers Publications.
2. Building by laws by State and Central Governments and Muncipal Corporations.
3. National Building Code of India 2003, Indian Standards Institution.
4. Building Construction by B. C. Punmia, Ashok Kr. Jain and Arun Kr. Jain, Laxmi Publications Pvt. Ltd, New Delhi.

NPTEL

1. https://ntptel.ac.in/courses/105/102012
2. https://ntptel.ac.in/noc/individual_course.php?id=noc18-ce20

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

	L	T	P/D	C
	3	0	0	3

(A53006) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- To explain the fundamentals of the key elements of a business organization.
- To learn practical approach to various functional areas of decision making.
- To Compare different pricing Strategies.
- To enhance a knowledge of Capital Budgeting Techniques.
- To solve the problems using Rations analysis.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Describe the concept of demand and its determinants in Managerial decisions.
- Analyze the cost concepts and breakeven analysis in production.
- Evaluate the market structures and different Pricing Strategies.
- Apply the capital budgeting techniques in financial decisions.
- Application of Ratios in solving of business problems and taking correct decisions.

UNIT-I

Introduction to Managerial Economics: Definition, Nature and scope of Managerial Economics, Demand Analysis- Demand Determinants, Law of Demand and its exceptions.

Elasticity of Demand: Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Methods of Demand Forecasting (Survey Methods, Statistical Methods, Expert Opinion Method, Test Marketing, Controlled Experiments, Judgmental Approach to Demand Forecasting)

UNIT-II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs.

Cost Analysis: Cost concepts, Opportunity Cost, Out of Pocket Costs vs. Imputed Costs. Breakeven Analysis (BEA) – Determination of Breakeven Point (simple problems), Managerial Significance and limitations of BEA.

UNIT-III

Market Structures and Pricing Policies:

Market structures: Types of Competition, Features of Perfect Competition, Monopoly and Monopolistic Competition, Price - Output determination in Perfect Competition and monopoly.

Objectives and Policies of Pricing: Objectives of pricing**,** Methods of Pricing - Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Two - Part Pricing, Block Pricing, Peak Load Pricing, Cross Subsidization.

UNIT-IV

Introduction to Financial Accounting: Accounting, Double-Entry Book Keeping, Journal, Ledger, and Trial Balance, Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT-V

Financial Analysis through ratios: Computation, Analysis and Interpretation of Liquidity Ratios (Current Ratio and Quick Ratio), Activity Ratios (Inventory Turnover Ratio and Debtor Turnover Ratio), Capital Structure Ratios (Debt – Equity, Interest Coverage Ratio), and Profitability Ratios (Gross Profit Ratio, Net Profit Ratio, Operating Profit Ratio, P/E Ratio and EPS).

TEXT BOOKS

1. VarshneyandMaheshwari, Managerial Economics, Sultan Chandand Sons, 2014.
2. S.A. Siddiqui and A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, Hyderabad, 2013

REFERENCE BOOKS

1. R. K. Sharma andShashi K Gupta, Financial and Management Accounting, 4th Ed., Sultan Chand.
2. V. Rajasekaranand R. Lalitha, Financial Accounting, Pearson Education, New Delhi, 2010.
3. Domnick Salvatore, Managerial Economics in a Global Economy, 4th Edition, Cengage, 2009.
4. Subhash Sharma and M. P. Vittal, Financial Accounting for Management, Text and Cases, Machmillan, 2012.
5. S. N. Maheshwariand S. K. Maheshwari, Financial Accounting, Vikas 2012.
6. Truet and Truet, Managerial Economics; Analysis, Problems and Cases, Wiley, 2012.
7. Dwivedi, Managerial Economics, Vikas 2012.
8. M. Kasi Reddy and S.Saraswathi, Managerial Economics and Financial Accounting, PHI, 2012.
9. Erich A. Helfert, Techniques of Financial Analysis, Jalco, 2007.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

L	T	P/D	C
0	0	2	1

(A53201) SURVEYING AND GEOMETICS LAB

Prerequisite- SURVEYING AND GEOMETICS

Course Objectives:

• To understand the practical applications of surveying instruments.
• To know the field measurements and observations
• To observe the behaviour of surveying instruments
• To understand the different methods involved in surveying field work.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Understand the land surveying to find its Areas and volumes
• Determine the elevations of different ground levels.
• Understand the concept of Principal of Total station.
• Apply the Arc GIS software.

LIST OF EXPERIMENTS:

1. Determination of distance between two inaccessible points with compass

2. Leveling - longitudinal and cross sectioning and plotting

3. Measurement of horizontal and vertical angles using Theodolite

4. Trigonometric leveling using Theodolite

5. Heights and distance using principles of Tachometric surveying

6. Determination of area using total station

7. Determination of remote height using total station and Contouring using total station

8. Distance, gradient, diff, height between two inaccessible points using total.

9. Georeferencing of topo sheet using ArcMap tool

10. Georeferencing of satellite image using ArcMap

11. Digitization of point, line and polygon features using ArcMap

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

L	T	P/D	C
0	0	2	1

(A53202) SOLID MECHANICS LAB

Prerequisite- SOLID MECHANICS I

Course Objectives:

- To study behaviour of material under various types of stresses
- To observe and understand basics of equilibrium conditions / Free Body Diagrams
- To observe the behaviour of deformable bodies
- To apply the Maxwell's Reciprocal Theorem and Principal of Superposition

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the behavior of Mild steel material in elastic, plastic and elasto-plastic states before breaking or failure.
- Determine the load-deflection characteristics of beams, springs and shafts.
- Understand the concept of Principal of superposition of loads
- Apply the Maxwell's Reciprocal Theorem.

LIST OF EXPERIMENTS

1. Tension Test on Mild Steel
2. Determining Young's Modulus of Elasticity (E) of Material of Cantilever Beam by Deflection test
3. Determining Young's Modulus of Elasticity (E) of Material of Simply Supported Beam by Deflection test
4. Hardness tests
   A) Brinell Hardness Test
   B) Rockwell Hardness Test
5. Torsion Test
6. Modulus of Rigidity of Material of the Helical Spring
7. Compression Test on BrickandConcrete
8. CharpyandIzod Impact Test
9. Direct Shear Test
10. Verification of Maxwell's Reciprocal Theorem.
11. Demonstration on use of electrical resistance gauges

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-I Sem.

	L	T	P/D	C
	2	0	0	0

(A53007) GENDER SENSITIZATION
(MANDATORY COURSE)

Prerequisite: Surveying

Course Objectives:

1. To develop students' sensibility with regard to issues of gender in contemporaryIndia
2. To provide a critical perspective on the socialization of men and women.

3. To introduce students to information about some key biological aspects of genders.
4. To expose the students to debates on the politics and economics of work
5. To help students reflect critically on gender violence
6. To expose students to more egalilarian interactions between men and women.

Course Outcomes:

7. Students will have a better understanding of important issues related to gender in contemporary India.

8. Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

9. Students will acquire insight into the gendered division of labour and its relation to politics and economics.

10. Men and women students and professionals will be better equipped to work and live together as equals.

11. Students will develop a sense of appreciation of women in all walks of life.

12. Through providing accounts of studies and movement as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence

UNIT-I

UNDERSTANDING GENDER: Gender: Why Should We Study it? (Towards a World of Equals: Socialization: Making Women, Making Men (Towards a World of Equals: Unit2) introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste, Different Masculinities. Just Relationships: Being Together as Equals (Towards a World of Equals: Mary Komand Onier. Love and Acid just do not Mix, Love Letters, Mothers and Fathers. Further Reading. Rosa Parks-The Brave Heart.

UNIT-II

GENDER AND BIOLOGY: Missing Women: Sex Selection and its Consequences (Towardsa world of Equals: Unit-4) Declining Sex Ration, Demographic Consequences.Gender Spectrum:Beyond the Binary (Towards a World of Equals:Unit-1Two or Many? Struggles

With Discrimination. Additional Reading: Our Bodies, Our Health (Towards a World of

Equals: Unit-13)

UNIT-III

GENDER AND LABOUR: Housework: the Invisible Labour (Towards a World of Equals:Unit-3*My Mother Doesn't Work* "Share the Load"Women's Work: Its Politics and Economics Fact and Fiction. Unrecognized and Unaccount work Further Reading Wages and Conditions of Work

UNIT-IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No!(Towards a World of Equals:Unit-6)Sexual Harassment, not Eve-teasing-Coping with Everyday Harassment- Further Reading "Chupulu"Domestic Violence :Speaking Out (Towards a World of Equals: Unit-8)Is Home a Safe Place? When Women Unite (Film), Rebuilding Lives. Further Reading New Forums for justice. Thinking about Sexual Violence (Towards a World of Equals :) Blaming the Victim- "I Fought for my Life." Further Reading. The Caste Face of Violence.

UNIT-V

GENDER STUDIES: Knowledge: Through the Lens of Gender Point of view . Gender andthe Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.Who's History? Questions for historians and Others Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Telangana History.Essential Reading: All the units in the Textbook, "Towards a World of Equals: A Billingual Textbook on Gender" written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, VasudhaNagaraj, AsmaRasheed, GoguShyamala, DeepaSreenivas and SursieTharu.

Note:Since it is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or any other qualified faculty who has expertise in this field.

Reference Books:

1. Sen, Amartya, "More than One Million Women are Missing." New York Review of Books 37.20 (20 December 1990). Print. 'We Were Making Hisoty…' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.
2. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's StudiesJournal (14 November 2012) Available online at:http://blogs.wsj.com/ India real time/2012/11/14/by-the-numbers-where-Indian-women-work/>
3. K.Satyanarayana and Susie Tharu (Ed.) Steel Nibs Are Sprouting: New Dalit WritingFrom South India, Dossier 2, Telugu and Kannada http://harpercollings.co.in/BookDetail.asp?BookCode=3732

4. Vimala. "Vantilliu (The Kitchen)". Women Writing in India: 600 Bc To the
   Present,Volume It: The 20th Century, Ed. Susie Tharu and K.Lalitha. Delhi: Oxford
   University Press, 1995. 599-601.
5. Shatrunghna, Veena et al. Women's Work and its impact on Child Health and Nutrition,
   Hyderabad, National Institute of Nutrition, Indian Council of Medical Research, 1993.
6. Stree Shakti Sanghatana. "We Were Making History…' Life Stories of Women in the
   Telangana People's Struggle, New Delhi: Kali for Women, 1989.
7. Menon, Nivedita, Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012
8. Jayaprabha, A. "Chupulu (Stares)". Women Writing in India: 600BC to the
   Present.Volume II: The 20th Century Ed. Susie Tharu and K.Lalita, Delhi: OxforUniverity
   Press. 1995, 596-597.
9. Javeed. Shayan and AnupamManuhaar. "Women and Wage Discrimination in India: A
Critical Analysis." International Journal of Humanities and Social ScienceInvention 2,.4
(2013).
10. Gautam, Liela and Gita Ramaswamy. "A 'conversation' between a Daughter and a
Mother." Broadsheet on Contemporary Politics. Special Issue on Sexuality andHarassment:
Gender Politics on Campus Today. Ed. MadhumeetaSinha and AsmaRasheed. Hyderabad:
Anveshi Research Center for Women's Studies, 2014.
11. AbdulaliSohaila. "I Fought For My Life… and Won." Available online at:
http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/
12. Jeganathanpradeep, ParthaChatterjee (Ed). "Community, Gender and Violence Subaltern
Studies XI". Permanent Black Ravi Dayal Publishers, New Delhi, 2000.
13. K.Kapadia. The Violence of Development: The Politics of Identity, Gener and
SocialInequalities in India. London: Zed Books, 2002.
14. S.Benhabib. Situating the Self: Gender, Community, and Postmodernism in
Contemporary Ethics, London: Routledge, 1992.

15. Virginia Woolf. A Room of One's Own, Oxford: Black Swan, 1992.

16. T.Banuri and M. Mahmood, Just Development Beyond Adjustment with a Human Face,
Karachi: Oxford University Press, 1997.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. CIVIL -II SEM

	L	T	P/D	C
	3	0	0	3

(A54001) FLUID MECHANICS

Prerequisite- Mathematics ,Engineering Mechanics

Course Objectives:

• To know the various fluid properties and fluid pressure measurement.
• To formulate and analyze problems related to calculation of forces in fluid structure interaction
• To study the different equations of fluid motion and understand the dynamics of fluids.
• To impart the knowledge of boundary layer theory and flow in pipes.
• To analyze different losses and types of flows in closed channels

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Identify the fluid properties and relationship between them.
• Apply the mathematical equations in fluid mechanics
• Analyze fluid flow in momentum and energy equations.
• Solve viscous and boundary layer flow problems
• Analyze pipe flows and fluid machinery

UNIT-I

Units of measurement - Physical properties of fluids - specific gravity–viscosity – Vapour pressure surface tension and capillarity - pressure at a point - variation of pressure in a fluid - atmospheric, absolute, gauge and vacuum pressure - measurement of pressure: pressure gauges, Manometers: differential and Micro Manometers.

UNIT-II

Fluid Statics: Hydrostatic forces on submerged plane:horizontal, vertical, inclined and curved surfaces -center of pressure. Derivations and problems, buoyancy: buoyancy, meta center, stability of submerged and floating bodies.

UNIT-III

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows - equation of continuity for one, two , three dimensional flows stream and velocity potential functions, flow net analysis.

Fluid Dynamics: forces acting on fluid in motion –Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, impulse momentum equations and its applications - forces on pipe bend.

UNIT-IV

Boundary Layer Theory: Boundary layer concepts, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no derivations) BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect

Laminar and Turbulent Flows: Reynolds experiment - Characteristics of Laminar and Turbulent flows. Flow between parallel plates, Flow through long tubes.

UNIT-V

Closed Conduit Flow: Laws of Fluid friction -Darcy's equation, Minor losses _ pipes in series -pipes in parallel - total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynolds number –Moody's Chart.

Measurement of Flow: Pitot tube, venture meter and orifice meter -classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches - broad crested weirs. Surge analysis, mouth piece.

TEXT BOOKS

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N. Modi and S.M. Seth, Standard Book House, March 16,2018
2. A Text Book of Fluid Mechanics and Hydraulic Machines by R. K. Bansal, Laxm Publications, 2018

REFERENCE BOOKS

1. Fluid Mechanics, Hydraulics and Hydraulic Machines by K.R. Aurora, Standard Publishers, 2017

2. Theory and Applications of Fluid Mechanics by K. Subramanya, Tata McGraw Hill,2016

NPTEL

1. https://nptel.ac.in/courses/112105171

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-II Sem.	L	T	P/D	C
	2	0	0	2

(A54002) ENGINEERING GEOLOGY

Course Objectives:

- To know the Origin, occurrence, of rocks andphysical, optical properties minerals andweathering.
- To know the Classification, Textures, structures, physical properties of various rocks.
- To know the Structural Geology, Stratigraphic principles, Geological Time Scale andRock Mechanics.
- To know the causes of Geological Hazards and considerations for stable civil Structures.
- To know the Role of Geology andGeophysics and their implications on civil structures andsite selection for dams, reservoirs, tunnels.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Rocks and minerals Genesis and Methods of study, weathering Concept and rock cycle
- Classification, Textures, structures, physical properties of strong andweak rock rocks
- The effect of folds, Faults, Joints and unconformities on civil structures and GTS
- Geological hazards - measures, precautions and geological considerations for civil constructions.
- Application of Geological, Geophysical and Groundwater methods for creating professional civil engineers

UNIT-I

Introduction and Concepts of Geology

Geology and Engineering Geology; important branches of geology; Physical Geology: – Weathering (agents, affects and products) andErosion, Effect of alteration andweathering.; Stages of rivers and various landforms, Solifluction, Coastal deposits; Granite weathering; **Bowens Reaction principle:**Magmticcystallisationand Origin andcomposition of minerals and rocks, Importance of quartz; **Mineralogy:** Mineral Definition, Families; Physical and Optical properties of **Rock forming minerals:** Quartz, Flint, jasper, Agate, Feldspar, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Psilomalane, Chromite, Galena, Graphite, Bauxite andBaryte. Instruments – XRD, XRF, SEM, ICPMS**;** National and State geological organisations.

UNIT-II

Petrology, Talc and Calcite; **Ore forming minerals:** Pyrite, heamatite, Magnetite, Pyrolusite**Petrology**- Definition of rock and petrology; Texture, Structure, Geological classification of rocks; Rock cycle, Classification and Physical properties of rocks; Rock masses, strength and Quality, excavation and stone aggregates, Building and Dimension stones; Igneous, Sedimentary and metamorphic rocks textures and structures; **Igneous petrology**- Magma and lava (Volcanoes) products, Hot Spring and Geysers; Magma types and composition. Plutonic, Hypabyssaland volcanic rocks; Detailed study Granite, Gabbro, Dolerite, Basalt Rhyolite, Pegmatite, Tors, Engineering aspects of granite andBasalt; **Sedimentary petrology:** Mode of formation, Mineralogical Composition. Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone, laterite; **Metamorphic petrology:** Agents andtypes of metamorphism, metamorphic grades, Mineralogical composition, Schistosity, Foliation. Detailed study of Gneiss, Schist, Slate, Phyllite with engineering consideration.

UNIT-III

Structural Geology

Stratigraphy: Stratigraphic principles; Structural geology; Indian Stratigraphy, Geological Time scale, Dip andStrike. Outcrop, Inliers andOutliers; **Structural Classification, and** importance: Folds, Faults, Joints andfractures Unconformities and their recognition in the field; Ductile (plastic) and Brittle Rock Deformation-Compression, Tension andshear and Tectonics; Continental Drift; **Rock Mechanics and Rocks Strength**- Stress andStrain in rocks, engineering characteristics of rocks masses; Rock failure theories, Bearing capacity and shear strength of rocks; Strength of Igneous rocks.

UNIT-IV

Geological Hazards

Landslides: Concept of landslides, Types, Causes andeffect, Rock Instability andSlope movementandRole of lithology, mineralogy, weathering, groundwater in landslides andpreventive measures; Landslides Zonation Maps; Rock Bolting andRock anchoring, Retaining wall, Slope treatment; **Earthquake:** Causes andeffects, Shield areas andseismic belts, Seismic waves (P,S,L and Raleigh), Richter scale, Layered structure of the earth, Seismic Zones of India; Earth Quake resistant civil structures; **Floods and Droughts:** Natural and Urban floodsand droughts, causes, effects andremedies; **Geological considerations** for selecting dam andreservoir site, significance of faults on the dam site and grouting; **Ground Subsidence:** Causes andaffects; Role of mining andgroundwater fluctuation in ground subsidence.

Unit-V

Geophysical -Groundwater studies and Tunnels

Geophysical studies: Principles andconcepts of Geophysical methods- Gravity, Magnetic, Electrical, Seismic, Radio and Geothermal. Special importance and study of Electrical

resistivity andSeismic refraction Studies. **Ground water**: Groundwater Table, Aquifers and springs; Cone of depression, Water bearing capacity of pervious and impervious rocks; Groundwater effects on civil structures and measures; Groundwater movement, controls and exploration; **Geological considerations** of Dams, Reservoirs andTunnels (Lithology, Mineralogy, Structure andGround water); Analysis of Dams, tunnels and reservoirs Failure in the past and Case histories; Water tightness and life of reservoirs; **Tunnels**: Types and affects; Modern methods of tunneling; over break andlining in tunnels; **Strengthening Natural material:** Techniques of Ground (soil) improvement andgrouting to enhance rock competency and life of Civil Structures.

TEXT BOOKS

1. Engineering andGeneral Geology: Parbin Singh, 8th Edition (2010), S K Katariaand

     Sons.

2. Text Book of Engineering Geology: N. ChennaKesavulu, 2nd Edition (2009),

     Macmillan Publishers India.

REFERENCE BOOKS

1. Geology for Geotechnical Engineers: J.C.Harvey, Cambridge University Press (1982).

2. Engineering Geology: D.Venkat Reddy, Second Edition (2016), Vikas Publishing House Pvt Ltd,

3. Engineering Geology: S.K.Duggal, H.D. Panday, N.Raval, McGraw Hill Education (India) Pvt., (2014)

NPTEL

1. https://nptel.ac.in/courses/105105106/

ANURAG GROUP OF INSTITUTIONS (AUTONOMOUS)

II Year B.Tech. Civil-II Sem.

L	T	P/D	C
3	0	0	3

(A54003) SOLID MECHANICS - II

Prerequisite- Solid Mechanics - I

Course Objectives:

- To impart the knowledge of direct and bending stresses in columns, retaining walls. Dams. Chimneys.
- To impart the knowledge of analysis of principal stresses and strains on inclined plane under combinations of stresses.
- To impart the knowledge on analysis of unsymmetrical bending of beams to find stresses and deformations and to assess the stresses and deformations in thin cylinders.
- To analyse and determine the sheer force and bending moment in statically indeterminate beams under different types of loads.
- The theory involved in the various columns with various end conditions.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the behaviour of columns under various loads.
- Analyse various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress; locate the shear center of thin wall beams
- Solve the problems to find stresses and deflections in beams subjected to unsymmetrical bending.
- Know the analysis of indeterminate beams and curved beams.
- Understand the behaviour of columns and struts and the theories involved.

UNIT-I

Direct and Bending Stresses: Stresses under the combined action of direct axial load and bending moment - core of a section – determination of stresses in the case of chimneys, retaining walls and dams - conditions for stability - stresses due to direct loading and bending moment about both axis.

UNIT-II

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.

UNIT-III

Unsymmetrical Bending: Introduction - principal axes - censorial principal axes of section–moments of inertia referred to any set of rectangular axes - resolution of bending moment into two rectangular axes through the centroid - location of neutral axis - stresses in beams subjected to unsymmetrical bending - deflection of beams under unsymmetrical bending – concept of shear center.

Thin Cylinders: Derivation of formula for longitudinal and circumferential stresses–hoop,longitudinal and volumetric strains – change in diameter and volume of thin cylinders – spherical shells.

UNIT-IV

Fixed beams: Fixed beams with uniformly distributed load, central point load, eccentricpoint 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 support.

Continuous beams: Introduction -Clapeyron's theorem of three moments- analysis ofcontinuous beams with constant moment of inertia with one or both ends fixed – continuous beams with overhang, continuous beams with different moment of inertia for different spans - Effects of sinking of supports - shear force and bending moment diagrams.

UNIT-V

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 columns- slenderness ratio – Euler's critical stress - limitations of Euler's theory – Rankine formula - long columns subjected to eccentric loading – Secant formula – empirical formulae - straight line formula - Prof Perry's formula.

Beam columns: Laterally loaded struts subjected to uniformly distributed and concentratedloads - maximum BM and stress due to transverse and lateral loading.

TEXT BOOKS
1. Strength of Materials by S Ramamrutham, DhanpatRai Publishing Company (P) Limited,-2011.
2. Strength of Materials by Dr. Sadhu Singh, Khanna Publishers, Eleventh Edition-2015.

REFERENCE BOOKS
1. Strength of Materials-A Practical Approach by D S Prakash Rao,University Press
2. Strength of Materials by Pytel A H and Singer F L, Harper Collins, New Delhi
3. Strength of Materials by G.H.Ryder, Published by Macmillan and Co. Ltd, Third Edition in SI Units

NPTEL
1. https://nptel.ac.in/courses/112107146/
2. https://nptel.ac.in/courses/105105108/
3. https://nptel.ac.in/courses/112101095/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-II Sem

L	T	P/D	C
3	1	0	4

(A54004)STRUCTURAL ANALYSIS

Prerequisite- Solid Mechanics I

Course Objectives:

- Understand the concept of Castgliano's theorem for statically determinate and indeterminate structures.
- Understand the behavior of arches and their analysis for point loads and UDL.
- Understand the concept of indeterminate beams and frames and to analyze by slope deflection method due to point loads and UDL system.
- Understand the concept of indeterminate beams and frames and to analyze by moment distribution method due to point loads and UDL system.
- Understand the concept of indeterminate beams and frames and to analyze by Kanis method due to point loads and UDL system.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- To compute strain energy in member under various loading situations.
- Analyze three and two hinged arches for various loads.
- Analyze the indeterminate beams and frames by slope deflection method due to point loads and UDL load system.
- Analyze the indeterminate beams and frames by moment distribution method due to point loads and UDL load system.
- Analyze the indeterminate beams and frames by Kanis method due to point loads and UDL load system.

UNIT-I
Strain Energy: Resilience - Gradual, sudden, impact and shock loadings-simple applications.

Energy Theorems: Introduction - strain energy in linear elastic system, expression of strainenergy due to axial load, bending moments and shear force - Castigliano's first theorem – deflection of simple beams and pin jointed trusses. Castgliano's second theorem - Analysis of indeterminate trusses and frames whose degree of redundancy is not exceeding two.

UNIT-II
Arches: Elastic theory of arches - Eddy's theorem, three hinged parabolic arches, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading.

Two Hinged Arches: Parabolic, determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading and temperature effects.

UNIT-III

Slope Deflection Method: Derivation of slope deflection equations - Application tocontinuous beams with and without settlement of supports - Application to portal frames with and without side sway (DOF not exceeding 3). Sketching of shear force and bending moment diagrams.

UNIT-IV

Moment Distribution Method: Stiffness of member with farther end fixed and hinged-moment distribution - Distribution factor - Application tocontinuous beams with and without settlement of supports - Application to portal frames with and without side sway. Sketching of shear force and bending moment diagrams.

UNIT-V

Kani's Method: Applied to continuous beam with and without sinking of supports and single bay storey portal frames with and without side sway.Sketching of shear force and bending moment diagrams.

TEXT BOOKS

1. T. S. ThandavaMoorthy, "Structural Analysis", Oxford University Press, 2nd Edition, 2012.
2. B.C. Punmia, and A. K. Jain, "SMTS - II Theory of Structures", Laxmi Publications, 2017.

REFERENCE BOOKS

1. S. Ramamrutham, "Theory of Structures", Khanna Publishers, 2018.
2. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill, 3rd Edition 2017.

NPTEL

1. https://nptel.ac.in/courses/105105166/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

(A54005) TRANSPORTATION ENGINEERING

Prerequisite- Surveying

Course Objectives:

- Design for Elements of highway geometry.
- Build knowledge on Traffic surveys and regulations.
- Identify and analyze components of traffic management.
- Conduct experiments for ascertaining the quality of highway materials.
- Build knowledge on various components of railway, airport, port and Harbor.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the various road Geometric elements and design based on the geographic conditions.
- Interpret the traffic characteristics knowledge.
- Interpret thedesignof traffic signalsand intersections.
- Analyze various highway construction materials and their suitability for construction.
- Interpret the basics of terminologyRailway, Airport and Port and Harbor Engineering.

UNIT-I

Introduction and Geometric Design of Highways: Introduction to Highway Engineering-Highway Alignment- Factors affecting Alignment- Engineering Surveys.

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-Vertical curves.

UNIT-II

Traffic Engineering: Basic parameters of traffic–volume, speed and density–traffic volume studies – data collection and presentation – parking studies and parking characteristics – road accidents – causes and preventive measures – accident data recording– conditiondiagram and collusion diagrams.Road traffic signs–types and specifications–road markings – need for road markings – types of road markings.

UNIT-III

Traffic Management: Design of traffic signals– Webster method – IRC method-intelligent transportation systems typical architectures.Intersection Design-Types of intersections–conflicts at intersections–types of at– grad intersections – canalization: objectives – traffic islands and design criteria – types of grade separated intersections – rotary intersections – concept of rotary and design criteria – impact of geometrics on intersection with reference safety, operational capacity.

UNIT-IV

Pavement materials: Materials used in Highway Construction- Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements.

UNIT-V

Introduction to Railway,Airport, Port and HarborEngineering: Permanent way – Components and their functions,Functions and requirements of Sleepers and Ballast.Layout of Airports – Components functions – Aircraft characteristics – Airport site selection - Airport obstructions – Functions of Runway, taxiways and aprons.Requirements of Port and Harbor, Classification of Port andHarbor, Features of a Harbor, Planning of Harbor.

TEXT BOOKS

1. S.K.Khanna, C.E.G.Justoand A. Veeraragavan, Highway Engineering, 10th Ed, Nemchandand Bros., 2015.
2. L.R.Kadiyali, Traffic Engineering and Transport Planning,8th Ed., Khanna publishers, Delhi, 2010.
3. S.C Saxena and S.P. Arora, Railway Engineering, DhanpatRai Publications, Delhi, 2011
4. S.C Saxena, Airport Engineering Planning and Design, 7th Ed,CBS Publishers and Distributers Pvt.Ltd.,2017
5. Bindra S P, "A Course In Docks And Harbor Engineering", DhanpatRai And Sons, New Delhi, 2013.

REFERENCE BOOKS

1. S.C Saxena, Highway and Traffic Engineering, 2nd Ed, CBS Publishers and Distributers Pvt.Ltd.,2017
2. S. C. Rangawala, Railway Engineering, 25th Ed., Charotar Publishing House Pvt. Ltd., 2015.
3. K.P Subramanian, Highway, railway, Airport and Harbor Engineering, Scitech Publications (India) Pvt Ltd, 2010.

NPTEL

1. http://www.nptelvideos.in/2012/11/introduction-to-transportation.html
2. https://nptel.ac.in/downloads/105101087.
3. https://nptel.ac.in/courses/105105107.

CODES:

1. IRC 093: Guidelines on Design and Installation of Road Traffic Signals.
2. IRC-35-1997 Code of Practice for Road Markings.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

(A54006) CONCRETE TECHNOLOGY

Prerequisite- Building Materials and Construction Practice
                    Engineering Chemistry

Course Objectives:

• To impart the knowledge of the materials required for making the concrete.
• To know the properties of various materials used in the concrete.

• To provide the knowledge of mix design of concrete and the properties of Fresh and hardened concrete.
• To impart the knowledge about concrete structure and ad how to modify the properties by using different chemical and mineral admixtures.
• To understand about the durability of concrete and how to make the structures durable.

Course Outcomes:

• Understand about the different types and properties of materials require for making concrete.

• Know the properties of Fresh and hardened concrete.
• Know the methods of finding the properties of materials and concrete and relevant IScodal provisions.
• Knowledge of special concretes.
• Understanding about different methods of concrete design mix.
• Understanding about durable concrete and analyze the materials required to make durable structures.

UNIT-I

Cement: Portland cement**–**chemical composition**–**Hydration, Setting of cement**–**Structureof hydrated cement – Test on physical properties – Different grades of cement. **Water:** Quality of mixing water.

Admixtures: Types of Admixtures–Mineral and chemical admixtures- properties–dosageseffects – usage.

Aggregates: Classification of aggregate–Particle shape and texture–Bond, strength andother mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption and moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate– Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine and coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT-II

Fresh Concrete: Water / Cement ratio– Abram's Law –Gel space ratio - Workability–Factors affecting workability – Measurement of workability by different tests – Setting time of concrete – Effect of time and temperature on workability – Segregation and bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete

UNIT-III

Hardened Concrete: Nature of strength of concrete–Maturity concept–Strength in tension and Compression – Factors affecting strength – Relation between compression and tensile strength - Curing.

Tests on Hardened Concrete: Compression tests–Tension tests–Factors affecting strength

– Flexure test – Splitting tensile test – Pull-out test.

NDT: Codal provisions–Ultrasonic Pulse Velocity–Rebound Hammer Tests–Core cuttingtest.

Properties of Hardened Concrete: Modulus of elasticity–Dynamic modulus of elasticity–Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep and time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT-IV

Special Concretes: Light weight aggregates–Lightweight aggregate concrete–Cellular concrete – No-fines concrete – High density concrete – Fiber reinforced concrete Polymer concrete – Types of Polymer concrete – High performance concrete – Self compacting concrete.

UNIT-V

Mix Design: Factors in the choice of mix proportions–Durability of concrete–QualityControl of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – BIS method of mix design-ACI method of mix design - British method.

TEXT BOOKS

1. M.S.Shetty and A K Jain'Concrete Technology -Theory and Practice,S.Chandand Co. 2018
2. A.M. Neville and J.J. Brooks, Concrete Technology,2/e,Prentice Hall, 2010.

REFERENCE BOOKS

1. A.R. Santhakumar, "Concrete Technology", Oxford University Press India
2. P.K. Mehta and J.M. Paulo Monteiro, Concrete Microstructure Properties and Materials,4/e, McGraw-Hill Professional.
3. M.L. Gambhir, Concrete Technology, 5/e, Tata McGraw-Hill Education.

NPTEL

1. https://nptel.ac.in/courses/105104030/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-IISem

L	T	P/D	C
0	0	2	1

(A54201) ENGINEERING GEOLOGY LAB

Prerequisite- Engineering Geology

Course Objectives:

- Study of physical properties and identification of minerals.
- Megascopic and microscopic description and identification of rocks.
- Megascopic and microscopic identification of rocks and minerals.
- of sections for Geological maps and cross sections Interpretation and drawing
- Simile structural geology problems (borehole, Strike and Dip).

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Physical properties of rocks and minerals to decide weak and strong rocks.
- Megascopic and microscopic Identification of rocks and rock and ore forming minerals
- Distinguishing, competent and incompetent rocks for civil engineering structures
- Geological Maps Study for site selection of Dams, reservoirs and Tunnels
- Sub Surface geology and attitude (strike and dip) of rocks) information help to take decision in their profession

List of Experiments:

1. Description of physical properties of minerals.
2. Description of physical properties of rocks
3. **MegascopicIdentification of Rock forming minerals**: Quartz, Amethyst, Jasper, Flint, Orthoclase, Plagioclase, Calcite, Talc, Muscovite, Biotite, Asbestos, Olivine, Hornblende, Kyanite, Garnet,Gypsum
4. **MegascopicIdentificationOre forming minerals**: Graphite, Galena, Magnetite, Hematite, Pyrolusite, Psilomalane, Bauxite, Graphite, Chromite andBaryte
5. **MegascopicIdentification Igneous rocks**: Granite, Dolerite, Pegmatite, Basalt, Gabbro, Syenite,
6. **MegascopicIdentification Sedimentary rocks**: Conglomerate, Breccia, Sandstone, Laterite, Limestone, Shales
7. **Megascopic Identification Metamorphic rocks**: slate, Phyllite, Schist, Gneiss, Quartzite, Marble,
8. **Microscopic Identification of Important minerals**
9. **Microscopic Identification of Important Rocks.**
10. Study of topographical and geological features from Geological maps with symbols
11. **Strike and Dip** Problems
12. Construction of Geological Cross Sections.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B.Tech. Civil-II Sem

L	T	P/D	C
0	0	2	1

(A54202) FLUID MECHANICS AND HYDRAULIC MACHINARY LAB

Prerequisite- Fluid Mechanics

Course Objectives:

• To provide practical knowledge in verification of principles of fluid flow
• To impart knowledge in measuring discharge and velocity of fluid flow
• To understand the measurement of flow through open channels and pipes
• To understand Major and Minor Losses
• To gain knowledge in performance testing of Hydraulic Turbines and Hydraulic Pumps

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Verify the Bernoulli's theorem and its applications
• Determine the co-efficient of discharge of orifice meter, venture meter, orifice and mouth piece
• Analyse the flow through pipes and notches
• Examine the Impact of jet on vanes.
• Examine the efficiency of centrifugal pumps, reciprocating pumps and Francis and Pelton wheel turbine.

List of Experiments:

1. Verification of Bernoulli's equation.
2. Determine the Coefficient discharge of Venturi meter and Orifice meter
3. Determination of coefficient of discharge of orifice and mouthpiece
4. Determination of friction factor of a pipe.
5. Determination of coefficient for minor losses.
6. Determine rate of flow in notches
7. Determine the coefficient of Impact of Jet on given Vanes
8. Determination of hydraulic jump.
9. Performance test on pelton wheel turbine.
10. Performance test on Francis turbine
11. Performance characteristics of a single stage centrifugal pump.
12. Performance characteristics of a multi stage centrifugal pump.
13. Performance characteristics of a reciprocating pump.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

II Year B. Tech. Civil-II Sem

L	T	P/D	C
2	0	0	0

(A54007) ENVIRONMENTAL STUDIES
(MANDATORY COURSE)

Prerequisite: -Nil-

COURSE OBJECTIVES:
1. To impart the knowledge of multidisciplinary nature of environmental studies.
2. To provide the knowledge of natural resources, environmental pollution, waste management technology.
3. To impart the knowledge of rules and regulations of environmental policy.

COURSE OUTCOMES:

On successful completion of this course, it is expected that the students will be able to,
1. Understand the natural resources such as water, mineral, food, energy, land and their associated problems.
2. Understand causes of the environmental pollution and their controlling measures.
3. Know environmental policy rules and regulations.

UNIT-I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

AEcosystems: Concept of an ecosystem–Classification, structure and function ofdifferent ecosystems - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological pyramids.

B Biodiversity and its conservation: Introduction - Definition: genetic, species andecosystem diversity. - Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. ICUN categories of biodiversity and RED DATA book - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-II

　　　　Natural Resources: Renewable and non-renewable resources–Natural resources and associated problems: Forest resources – Use and over – exploitation, deforestation, – Timber extraction, mining, dams and other effects on forest and tribal people: Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. - Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources: Land as a resource, land degradation, man

Induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources: Equitable use of resources for sustainable lifestyles.

UNIT-III
Environmental Pollution: Definition, Cause, effects and control measures of:
a. Air pollution, b. Water pollution, c. Soil pollution, d. Marine pollution e. Noise pollution, f. Thermal pollution, g. nuclear pollution, h. e-Waste.
2**. Social Issues and the Environment**: From Unsustainable to Sustainabledevelopment - Urban problems related to energy -Water conservation, rain water harvesting, and watershed management. -Climate change, global warming, ozone layer depletion, nuclear accidents and holocaust.

UNIT-IV
1.   Waste management technology: Solid waste Management: Causes, effects andcontrol measures of urban and industrial wastes. - Role of an individual in prevention of pollution, Disaster management: floods, earthquake, cyclone and landslides.
Waste water and sewage treatment technology: primary, secondary and tertiary treatments. Bioremediation, Photo-remediation, ZLD (zero liquid discharge), membrane technology. Application of GIS and GPS system in environmental science.
2.   Environmental policy, Rules and regulations. EIA (Environmental ImpactAssessment) & EMP (ENVIRONMENTAL Management Plan) – Environment Protection Act. - Air (Prevention and Control of Pollution) Act. -Water (Prevention and control of Pollution) Act -Wildlife Protection Act –Forest Conservation Act.-Public awareness. Global environmental problems and global efforts.

UNIT-V
Towards sustainable future: concept of sustainable development, threats ofsustainability, population and its explosion, over exploitation of resources, strategies for achieving sustainable development. Environmental education, Conservation of resources. Urban sprawl, sustainable cities and sustainable communities, human health. Role of IT in environment, environmental ethics, concept of green building, Basic principles of Green engineering, clean development mechanism (CDM), Low carbon life cycle, Polluters-pay principle.

Field work: Visit to a local area to document environmental assets River/forest grassland/hill/ mountain Visit to a local polluted site-Urban/Rural/industrial/ Agricultural Study of common plants, insects, birds, Visit to effluent treatment Plant/sewage treatment plant Study of simple eco systems pond, river, hill slopes, etc.
Mini projects by students which is mandatory.

TEXT BOOKS:
1. Agarwal, K.C., Environmental Biology, Nidi Publication Ltd**.**, Bikaner, 2001.
2. BharuchaErach, Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmadabad, 2002.

REFERENCE BOOKS:
1. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
2. Cunningham, W.P., et al., Environmental Encyclopedia, Jaico Publishing House, Mumbai.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

HYDRAULIC ENGINEERING

Prerequisite- Fluid Mechanics

Course Objectives:

• To develop the knowledge of open channel flow relationships.
• To determine the real function obtained through dimensional analysis
• To acquire the knowledge of jet and its velocity triangles, design principles.
• To introduce theory and design principles of turbines and its working efficiencies.
• To introduce theory and design principles of pumps and its working efficiencies.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,
• Design various open channel economical sections
• Use Rayleigh's method and Buckingham's pi theorem for hydraulic models
• Understand the impact of jets and their applications.
• Analyze the types and working principles of various turbines.
• Solve the problems in hydraulic engineering and working principles of pumps.

UNIT-I
Open Channel Flow: types of flows–geometric properties of channels – velocitydistribution – energy and momentum correction factors - Chezy's, Manning's and Bazin formulae for uniform flow –Most economics sections - critical flow- specific energy - critical depth - computation of critical depth: critical, sub-critical and super critical flows – application to channel transitions.

Non uniform flow in channels: dynamic equation for gradually varies flow: mild, critical,steep, horizontal and adverse slopes - surface profiles: classification and characteristics - direct step method, rapidly varied flow - hydraulic jump - energy dissipation – surge in open channels.

UNIT-II
Dimensional Analysis: Introduction–dimensions–dimensional homogeneity–methods: Rayleigh's method and Buckingham's pi theorem - study of hydraulic models - similitude: geometric, kinematic and dynamic similarities - dimensionless numbers - model laws and - types of models - merit and limitations of models – scale effect in models - prototype relations.

UNIT-III
Impact of Jets: hydrodynamic force of jets on stationery flat, moving flat, stationary curved vanes and moving curved vane: jet striking centrally and at tip, velocity triangles at inlet and

outlet - expressions for work done and efficiency - angular momentum, principle, applications to radial flow turbines.

UNIT-IV

Hydraulic Turbines: Elements of hydroelectric power plants - heads and efficiencies of turbines - classification of turbines: pelton wheel, Francis turbine, Kaplan turbine - work done, efficiency, velocity diagram, working proportions and design - draft tube theory – surge tank.

Performance of Turbines: Performance under unit head–under specific conditions– expressions for specific speeds in terms of known coefficients for different turbines – performance characteristic curves.

UNIT-V

Centrifugal Pumps: component parts of centrifugal pumps - working of centrifugal pump– types – work done – head of pump - minimum starting speed – losses and efficiencies - specific speed - multi stage pumps - pumps in parallel - performance of a pumps characteristic curves - Net Positive Suction Head (NPSH) - Cavitation's.

Hydropower Engineering: types of hydro power plants–definition of load factor, utilization factor, capacity factor – components of hydropower plants.

TEXT BOOKS

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N. Modi and S.M. Seth, Standard Book House, 15th edition, Mar 16, 2018.
2. A Text Book of Fluid Mechanics and Hydraulic Machines by R. K. Bansal, Laxmi Publications, 2018..

REFERENCE BOOKS

1. Fluid Mechanics, Hydraulics and Hydraulic Machines by K.R. Arora, Standard Publishers, 9th edition, 2017.
2. Theory and Applications of Fluid Mechanics by K. Subramanya, Tata McGraw Hill,2016.

NPTEL

1. https://nptel.ac.in/courses/105103097/
2. https://nptel.ac.in/courses/105103096

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

ENVIRONMENTAL ENGINEERING

Prerequisite- Environmental Studies
             Fluid Mechanics

Course Objectives:

• To provide the knowledge of source of water and its distribution.
• To provide the knowledge of water quality standards
• To provide the knowledge of water treatment and distribution
• To impart the knowledge of characteristics of sewage,treatment and disposal
• To provide the knowledge of air and noisepollution

Course Outcomes:

At the end of the course, students in a position to

On successful completion of this course, the students will be able to

• Understand the sources of water and Waterborne diseases
• Usethe appropriate technique for the treatment of water and also able plan
   and design water supply distribution schemes
• Assess the Characteristics of sewage, ultimate disposal of sewage, sewage farming
   dilution.
• Identify and design treatment options for wastewater and solid waste
• Understand how to control, reduce and monitor noise and air pollution

UNIT-I

Introduction to water sources and Water Treatment:
Waterborne diseases–protected water supply–population forecast, design period – water demand – types of demand – factors affecting – fluctuations – fire demand – storage capacity – water quality and testing – drinking water standards.

Sources of water: Selection of water source based on quality, quantity and other considerations – intakes – infiltration galleries, confined and unconfined aquifers distribution system – requirements – methods and layouts.

UNIT-II
Layout and general outline of water treatment units – sedimentation ,settling velocity,Principles, design factors, surface loading, jar test, optimum dosage of coagulant – coagulation fluctuations clarifier design – coagulants , feeding arrangements-Filtration theory**,**working of slow and rapid gravity filters, multimedia filters, design of filters , troubles in operation comparison of filters , disinfection, types of disinfection, theory of chlorination other disinfection treatment methods.

Distribution systems – types of layouts of distribution systems – design of distribution system

Hardy cross and equivalent pipe methods and service reservoirs **–** joints, valves such as

sluice valves, air valves, scour valves and check valves water meter **–** laying and testing of pipe lines – pump house.

UNIT-III

Sewer Appurtenances: Conservancy and water carriage systems **–** sewage and storm water estimation – time of concentration – storm water over flows combined flow.

Characteristics of sewage – cycle of decay – decomposition of sewage, examination of sewage -BOD -COD. Equations , design of sewers – shape and materials – sewer appurtenances man holes – inverted siphon – catch basins – fusing tanks – ejectors, pumps and pump houses and house drainage – components requirements – sanitary fittings – traps – one pipe and two pipe systems of plumbing

UNIT-IV

Waste water treatment- Flow diagram of various units in a waste water treatment plant **–** primary treatment- design of screens,grid chambers, skimming tanks,sedimentation tanks –, principles of design – biological treatments – trickling filters – Construction and design, oxidation ponds. Ultimate disposal of sewage, sewage farming, dilution.Sludge digestion tanks – factor affecting, design of digestion tanks,sludge disposal by drying, septic tanks, working principles and design – soak pits.

UNIT-V

Air pollution - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions andinterrelationship. Air quality standards, Control measures for Air pollution, construction and limitations.**Noise pollution**- Basic concept, measurement and various control methods

TEXT BOOKS

1. Engineering Hydrology by K Subramanya, Mc-GrawHill (New edition, Jul 2017)
2. Irrigation Engineering and Hydraulic Structures Vol I and II by S.K. Garg, 2017, Khanna Publishers.

REFERENCE BOOKS

1. A text book ofHydrology by Dr. P. Jaya rami reddy , 2012
2. Irrigation Water Resources and Water Power Engineering by P. N. Modi, KhannaPublishers, 9th ,year 2014

NPTEL:

1.https://nptel.ac.in/courses/105104103

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

GEOTECHNICAL ENGINEERING

Prerequisite- Engineering Geology,
 Engineering Mechanics

Course Objectives:

- To impart knowledge on Characterize and classify soils
- To provide the basic knowledge of soil formation and the properties of various soils.
- To provide knowledge about compaction and consolidation characteristics of soil
- To provide the knowledge on stress distribution in soils
- To provide the knowledge on shear strength in soils

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the classifications and various engineering properties of soil.
- Understand the soil formation, the effect of permeability and seepage on soils.
- Determine compaction and consolidation effect on soils
- Calculate stress distributions in soils.
- Determine strength characteristics of soil and its effect on different soils

UNIT-I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass volume relationship – Relative density. Index Properties of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils.

UNIT-II

Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered soils – Insitu permeability tests (Pumping in and pumping out test). Effective Stress Seepage Through Soils: Total, neutral and effective stresses – principle of effective stress - quicksand condition – Seepage through soils – Flow nets: Characteristics and Uses.

UNIT-III

Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties. – Field compaction Equipment – compaction quality control.

Consolidation: Types of compressibility – immediate settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normal consolidation soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation : square root time and logarithm of time fitting methods.

UNIT-IV

Stress Distribution in Soils: Boussinesq's and Westergard's theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical and horizontal plane, and new mark's influence chart for irregular areas.

UNIT-V

Shear Strength of Soils: Importance of shear strength - Mohr – Coulomb Failure theories-Types of laboratory strength tests – strength tests based on drainage conditions- strength envelops – Shear strength of sands – Dilatancy Critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOK

1.Soil Mechanics and Foundation Engineering by K R Arora, Standard Publishers New
   Delhi-2009.
2.Principles of Geotechnical Engineering by B.M.Das, Cengage Learning-2013.

REFERENCE BOOKS

1. Soil Mechanics by T.W.Lambe and Whitman,McGraw Hill Publishing
    Company,Newyork.
2. Geotechnical Engineering by Manoj Dutta and Gulati S K, Tata
    McGrawhillPublishers,New Delhi,2015.
3. Geotechnical Engineering by C. Venkataramaiah, New Age International, 2006.

NPTEL

1. https://nptel.ac.in/courses/105103097/

Code books:

1. IS 2720 Method of Test for soils.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

DESIGN OF CONCRETE STRUCTURES

Prerequisite- Solid Mechanics,
Concrete Technology.

Course Objectives:

- To provide the basic concepts of reinforced concrete design as per IS codal provision.
- To impart the knowledge of various methods of design.
- To provide the design of simple structural elements such as beams, Columns, footings and slabs.
- To provide the detailing of reinforcement of various structural elements such as beams columns, footings and slabs.
- To provide the knowledge of various civil engineering structural design and drawings

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Know the methods of design of R.C. Structural elements.
- Know the IS codal provisions of various R.C. Structural elements.
- Design the structural elements economically.
- Know the detailing of various R.C elements
- Estimate the quantity of reinforcement of various R.C elements

UNIT-I

Concepts of RC Design: Working stress method - Ultimate load method - Limit State method - Stress-strain curve for concrete, steel - Partial safety factor - Characteristic values - Stress Block parameters – IS:456 2000 provisions.

UNIT-II

Design and Detailing of Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, IS Code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT-III

Design and Detailing of Slabs and Stair Cases: Design of one way, two way and continuous slabs using IS Codes - Limit state of serviceability for deflection and cracking – IS Code provisions - Introduction to yield line theory - Design principles of staircases.

UNIT-IV

Design and Detailing of Short and Long Columns: Subjected to axial loads – uniaxial and

biaxial bending - IS Code provisions.

UNIT-V

Design and Detailing of Footings: Different types of footings – Design of isolated, square, rectangular and circular footings - Introduction to combined footings.

TEXT BOOKS

1. A.K. Jain, Reinforced Concrete – Limit State Design, 7/e Standard book house, 2012.
2. Pillai and Menon Reinforced Concrete Design, 3/e, Tata McGraw Hill, 2009. 3. P.C. Varghese, Limit State Design of Reinforced Concrete, 2/e, Prentice Hall of India,2013.

REFERENCE BOOKS

1. Design of Reinforced Concrete Structures, Dayaratnam P, Oxford and IBH.
2. Reinforced Concrete, H.J. Shah, Charotar Publisher.
3. Design of Reinforced Concrete Structures (conforming to IS 456): Limit State Method and Working Stress Method, S. Ramamrutham, R. Narayan,DhanpatRaiPublishing company .

NPTEL

1. https://nptel.ac.in/courses/105105105/

Code books:

1. **IS 456**-2000 Plain and Reinforced Concrete - Code of Practice is an Indian Standard code of practice for general structural use of plain and reinforced concrete.
2. SP-16 charts and tables

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. CIVIL – I Sem

L	T	P / D	C
3	0	0	3

LOGICAL REASONING, VERBAL AND QUANTITATIVE ABILITY (OE-1)

Pre requisites: Basic Mathematics, Statistics and English

Course Outcomes:

1. Enhance the problem solving ability of the students with focusingon basicconcepts of arithmetic, algebra, geometry data analysis.
2. Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

UNIT-I
Number Systems: Classification of numbers, Squares, Fractions, Simplifications, Divisibility Test, Power Cycle, Reminder Cycle, Factors, LCM, HCF, Application of LCM & HCF

Ratio and Proportion: Tricks to solve ratio, proportions, continuous proportions, Variations, Ages

Percentages: Percentage Increase/ Decrease , Results on population , Results on Depreciation, Simple Interest , Principal , Interest , Amount , Application of Simple Interest, Compound Interest , Compound Annually , Compound Half-yearly , Compound Quarterl, Difference between Compound Interest and Simple Interest

UNIT-II
Geometry: Lines , Properties of lines , Triangles, Properties of Triangles, Angles , Sectors , Chords , Planes , Quadrilateral

Mensuration: Area & Perimeter of Triangle, Quadrilateral, Rectangle, Square, Parallelogram, Trapezium, Surface Area & Volume of 3D Figures

Data Interpretation: Table Charts, Pie Charts, Bar Graphs, Line Graphs

Data Sufficiency: Problems On all quant and Logical topics

UNIT-III
Seating Arrangement: Circular arrangement, row arrangement, column arrangement, Square arrangement, Double row arrangement

Syllogisms: Two Statements & Conclusion, Three Statements & Conclusion, Six Statements

UNIT-IV

Number Series: Letter Series, Number Series, Letter & Number Series

Analogy: Simple Analogy, Double Analogy, Word Analogy, Number Analogy, Choosing Analogy Pairs

Coding & Decoding: Letter Coding, Number Coding, Symbol Coding, Letter - Number Coding, Letter - Symbol Coding, Direct Coding, Indirect Coding

Blood Relations: Based on Dialogue or conversation, Based on puzzles

UNIT-V

Nouns: Types of nouns, rules, usages and error spotting

Pronouns: Types of nouns, rules, usages and error spotting

Articles: Definite and indefinite articles, Omission of articles, rules, usage and error spotting

Adjectives and Adverbs: Types of nouns, rules, usages and error spotting

Preposition: Types of nouns, rules, usages and error spotting

Text Books:

1. Verbal and Non Verbal Reasoning - *R.S.Agarwal*.
2. Quantitative Aptitude - *R.S.Agarwal*.
3. Quantitative Aptitude - *Abhijit Guha*.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

ENGLISH FOR PROFESSIONALS
(OPEN ELECTIVE-I)

Course Objectives:

- To prepare the students to use the language effectively in all professional pursuits

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- analyze the language use in communicative process
- describe the process and product
- interpret the ideas in group activities
- apply different approaches to comprehend the written text
- write any technical and official correspondence within the framework

UNIT-I

Essentials of Communication:

Essentials of Grammar **-** Rudiments of Communications Skills (Listening, Speaking, Reading, and Writing) - Applied Grammar and Usage - Non-Verbal Communication

UNIT-II

Listening Skills:

Art of Listening - Developing Effective Listening Skills - Process of Listening, Intensive and Extensive Listening

Podcasts, Vodcasts (ICT enabled) - Five steps to Active Listening - Effective and Ineffective Listening Skills -Listening and Note-Taking

UNIT-III

Speaking Skills:

Dynamics of Effective Speaking - Group Discussion - Simulated Presentations, Process and Product Descriptions - Proxemics, Paralinguistic Features

UNIT-IV

Reading Skills:

 The Art of Effective Reading - Basic steps to Effective Reading - Extensive and Intensive Reading -

Approaches to Efficient Reading - Reading Comprehension

UNIT-V

Writing Skills:

Art of Condensation - Descriptive Writing Techniques - Writing and Answering Memos, Circulars -

Inter and Intra Official Communication - Writing Minutes of Meeting - Netiquette - E-mail and Blog Writing - Note-Making

TEXT BOOKS

Business Communication (Second Edition) by Meenakshi Raman and Prakash Singh. Oxford University Press. 2012.

REFERENCE BOOKS

1. **Communicating at Work** (Seventh edition) by Adlar, Ronarld.B. McGrawHill. 2004.
2. **Cambridge English for Engineering Professionals** by Mark Ibbotson. Cambridge University. 2008.
3. **Professional Communication** by ArunaKoneru. McGrawHill. 2017.
4. **The Effective Communicator** by Adair John. Jaico Publishing House. 1995.
5. **Oxford English for Careers** by Oxford University Press.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

	L	T	P/D	C
	3	0	0	3

FUNDAMENTALS OF BUDGET
(OPEN ELECTIVE-I)

Course Objectives:

- To Study about the Budget and basic Principles Budgeting and Various types of Budgets
- To study the system of Budgetary Control system.
- To prepare the various types of budgets for proper planning
- To prepare and implement the Budgets for decision making
- To study about the variances for measuring the performance of the firms

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Explain the importance and principles of Budgeting
- Explain about the system of Budgetary Control system
- Prepare the various budgets required by the firms
- Prepare and implement the results of the budgets in decision making.
- Find out the variances for measuring the performance of the firms

UNIT-I

Introduction to Budget: Budget definition, History of Budget, Nature and scope of Budget, Importance of Budget, Components of Budget. Basic Principles of Budget: Economy, Flexibility, Adoptability, Reliability, Balance, Deficit and Surplus Budget.

UNIT-II

Budgetary Control: Meaning of Budgetary control, Objectives, and preliminaries for the adoption of a system of Budgetary control. Annual Vs. Continuous Budgeting system.

UNIT-III

Types of Budget: Material Budget, Purchase Budget, Flexible Budget, Utility Budget, Sales Budget, Cash Budget, Master Budget, Zero base Budget, Performance Budget.

UNIT-IV

Preparation of Budget: Budget preparation and Decision making process, Budget Review, Approval and Implementation.

UNIT-V

Analysis of Variance: Introductionof Analysis of Variance, Material variance,Labour variance,Sales and Profit Variance.

TEXT BOOKS

1. RuddardattandK.P.MSundharam,Indian Economy, S.Chand Publication, 2004
2. Vivek Mittal, Business Environment, Excel Publication, 2007

REFERENCE BOOKS

1. BhahatoshBanerjee,Cost Accounting Theory and Practie,PHI,2006
2. M.N.Arora,Cost and Management Accounting,Vikas Publishing House Pvt Ltd,2012
3. S.P Jain and K.L Narang, Cost Accounting Principles and Practice, 2014
4. Dr.S.N.Maheshwari, Problems and Solutions in Cost Accounting, 2015

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

PAVEMENT DESIGN
(PROFESSIONAL ELECTIVE-I)

Prerequisite: Transportation Engineering

Course Objectives:

- To understand the various factors affecting pavement design.
- To build knowledge on design aspects and methods for flexible pavement design.
- To build knowledge on design aspects and methods for rigid pavement design.
- To build knowledge on design aspects and methods for low volume roads.
- To build knowledge on types of pavement failures and maintenance for pavements

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Illustrate the various factors affecting in pavement design.
- Design flexible pavements considering sub grade condition and axial loads.
- Designrigid pavements considering sub grade condition and axial loads.
- Interpret design of low volume roads.
- Discover various pavement failures and their remedial measures.

UNIT-I
Fundamentals of Design of Pavements: Desirable characteristics of pavement, types and components, Difference between Highway pavement and Air field pavement. Design life – Traffic factors – climatic factors – Road geometry – Subgrade strength and drainage, Stresses and deflections, Boussinesqs theory – principle, Assumptions – Limitations - Burmister's two layer theory- Assumptions.

UNIT-II
Flexible Pavement Design: Design wheel load – contact pressure – ESWL concept – Determination of ESWL by equivalent deflection criteria – Stress criteria – EAL concept.

Flexible pavement Design methods-CBR method- Bur mister method-AASHTO and IRC method (IRC: 37 - 2012)

UNIT-III
Design of Rigid Pavement: Design considerations-wheel load stresses-Temperature stresses-frictional stresses-combination of stresses. Reinforcement in slabs – Requirements of joints – Types of joints – Expansion joint – contraction joint – warping joint – construction joint – longitudinal joint, Design of joints, Design of Dowel bars, Design of Tie bars (IRC:58 -

2011).

UNIT-IV

Design of low volume Roads: IRC Method for Low volume Flexible Pavements (IRC: SP: 72 - 2007).IRC method for low volume rigid pavements (IRC: SP: 62 - 2014) - Continuously Reinforced cement concrete pavements (IRC: 101 - 1988) - Roller Compacted Concrete Pavements.

UNIT-V

Pavement Failures and Maintenance: Flexible-Fatigue(alligator)cracking-Bleeding-Block cracking-Corrugation and shoving-Depression-Joint reflection cracking- Longitudinal cracking Patching-Polished aggregate-Potholes-Raveling-Rutting-Slippage Cracking Stripping-Transverse (thermal) cracking-Water bleeding and pumping.

Rigid-Fatigue cracking- Pumping- Faulting- Spalling- Shrinkage cracking- Aggregates with polished surfaces- Punch out - Linear cracking- Durability cracking- Corner break - Alkali-aggregate reaction- Pop-outs- Blow-ups.

TEXT BOOKS

1. S.K.Khanna, C.E.G.Justoand A. Veeraragavan, Highway Engineering, 10th Ed, Nemchandand Bros., 2015.
2. Yoder and Witczak, Priniciples of Pavement Design, Second edition, John Wiley and Sons, 1975.

REFERENCE BOOKS

1. Yang. H. Huang, Pavement Analysis and Design, Second Edition, Prentice Hall Inc., 2003

NPTEL

1. https://nptel.ac.in/courses/105105107/24
2. https://nptel.ac.in/courses/105101087/27

Code books:

1. IRC: 58 – 2011 Guidelines for the design of Plain jointed Rigid pavements for Highways.
2. IRC: SP: 72 – 2007Guidelines for the design of Flexible pavements for Low volume rural roads.
3. IRC: SP: 62 – 2014 Guidelines for the design and construction of Cement concrete pavements for Low volume roads.
4. IRC: 101 – 1988Guidelines for the design continuously reinforced concrete pavement with Elastic joints.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-I Sem

	L	T	P/D	C
	3	0	0	3

GROUND IMPROVEMENT TECHNIQUES
(PROFESSIONAL ELECTIVE-I)

Prerequisite- Engineering Geology

Course Objectives:

• To identify basic deficiencies of various soil deposits
• To know the problems of expansive soils and foundation techniques in expansive soils.
• To know the different insitu densification techniques in granular soils
• To learn the dewatering technique depending on site conditions
• To know the applications of geosynthetics.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Understand the different foundation techniques in expansive soils.
• Discuss thedifferent ground improvement techniques such as dewatering, insitu densification.
• Understand the soil stabilization methods how to improve the load bearing capacity of soils
• Discuss the reinforced earth and its design.
• Describe the methods involving the improvement of expansive soils and utilization of geosynthetics

UNIT-I
Expansive soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

UNIT-II
In-situ densification methods in granular Soils: Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth. In – situ densification methods in Cohesive soils: – preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

UNIT-III
Stabilization: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum Reinforced Earth: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

UNIT-IV

Dewatering: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis. Grouting: Objectives of grouting-grouts and their properties- grouting methods- ascending, descending and stage grouting-hydraulic fracturing in soils and rocks- post grout test.

UNIT-V

Geosynthetic: Geotextiles- Types, Functions and applications – Geogrids and geo-membranes – functions and applications. Miscellaneous: Pre-stressed Anchors, Rock Anchoring, Contiguous Pile Foundations, and Soil Nailing and Uplift Anchors.

TEXT BOOKS

1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. PPurushotham Raj (2016). Ground Improvement Techniques, Laxmi Publications, New Delhi

REFERENCE BOOKS

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons,New York, USA.
3. Robert M. Koerner (1997), Designing with Geosynthetics, Prentice Hall New Jercy, USA
4. Ground Improvement Techniques by Dr. G.L. SivakumarBabu, Department of Civil Engineering, IISc Bangalore.

NPTEL

1. http://nptel.iitm.ac.in/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-I Sem.

	L	T	P/D	C
	3	0	0	3

PRESTRESSED CONCRETE
(PROFESSIONAL ELECTIVE I)

Prerequisite- Design of RC Structures

Course Objectives:

- To impart the knowledge of systems of pre-stress concrete and their disadvantages
- To know the analysis of pre and post tensioning simple structures
- To design the flexural members for shear, bond and torsion and design the end blocks.
- To analysis and design of composite section and their application in design of prestressed concrete
- To determine the deflections of beams

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the meaning of basic terminology involved in Prestressed concrete design
- Determine the cable profile, kern points and analyse the composite section
- Design the members for flexure as per IS codal provisions
- Design the members for shear as per IS codal provisions
- Know the different methods of finding deflections in beams under different types of loads

UNIT-I

Introduction: Definition, classification and systems of pre stressing, properties of materials in PSC, loss of prestress, losses of prestress in pretension and post tensioned members

UNIT-II

Cable profile, Kern points, load balancing concept, Analysis of simple sections and stress diagrams for prestress, dead and live loads., Analysis of composite section and stress diagrams for prestress, dead and live loads

UNIT-III

Simply supported and continuous beams. Concordant cable profile, design of sections, flexural strength of rectangular I and T sections using IS code provisions

UNIT-IV

Design for shear: shear failure, web shear failure, flexural shear failure, shear compressionfailure, shear tension failure. shear strength of beams of uncracked and cracked in flexure

UNIT-V

Deflections: Deflections of PSC members for simply supported beams with point loads and UDLs.analysis and design of end block by Guyon's method for not more than two cables.

TEXT BOOKS

1. Prestressed Concreteby Krishna Raju, Tata Mc.Graw Hill Publications.
2. Prestressed Concreteby N.Rajasekharan, Narosa publications.

REFERENCE BOOKS

1. Prestressed Concrete by S Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin and NedH.Burns, John Wiley and Sons.
3. Strength of Materials by G.H.Ryder, Published by Macmillan and Co. Ltd, Third Edition in SI Units.

NPTEL

1. https://nptel.ac.in/courses/112107146/

CODES

1. BIS code on Prestressed concrete, IS 1343-2012

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-II Sem

L	T	P/D	C
0	0	2	1

MATERIAL TESTING LAB

Perquisite: Concrete Technology

Course Objectives:

- To provide the knowledge of various tests conducted on cement, aggregates and concrete.
- To provide the knowledge of IS codal provisions.
- To know various materials used in the concrete and their properties
- To know about the procedure about how to determine the physical properties and Mechanical properties of the materials.
- To provide the knowledge about concrete mix design and guide lines.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Able to conduct the tests on various materials used in making the concrete.
- Understand about physical and mechanical properties of different materials
- Able to perform the test on concrete making materials,
- Apply different methods and guide lines to obtain design mix, with respect to codal provisions.
- Students are able to do design mix for various grades of concrete practically

LIST OF EXPERIMENTS

I. Tests on Cement:

- Fineness and normal consistency of cement
- Initial setting time and final setting time of cement
- Specific gravity of cement
- Compressive strength of cement

II. Tests on Aggregate:

- Fineness modulus of fine and coarse aggregate
- Specific gravity and bulk density of fine and course aggregate
- Bulking of sand

III. Tests on Concrete:

- Workability tests on concrete by slump and Vee-bee
- Young's modulus and compressive strength of concrete
- Splitting tensile strength of concrete
- Flexural strength of plain concrete
- Non-destructive testing on concrete (for demonstration)
- Concrete Mix Design as per IS 10262

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-ISem

L	T	P/D	C
0	0	2	1

TRANSPORTATION ENGINEERING LAB

Prerequisite - Transportation Engineering.

Course Objectives:

• To impart the knowledge on road aggregates.
• To impart the knowledge on road bitumen.
• To impart the knowledge on road bitumen mixes.
• To import knowledge on traffic capacity studies.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Build knowledge on quality behavior of road aggregates.
• Develop knowledge on various types of bitumen and their quality behavior.
• Examine the traffic characteristics.
• Inspect traffic capacity and safety

LIST OF EXPERIMENTS

I. TESTS ON ROAD AGGREGATES

• Aggregate crushing value
• Aggregate impact value
• Specific gravity and water absorption
• Los Angeles abrasion test
• Shape tests: (a) Elongation index (b) Flakiness index

II. TESTS ON BITUMEN

• Penetration tests
• Softening point tests
• Ductility tests
• Viscosity grading
• Bitumen extraction tests

III. TESTS ON BITUMEN MIXES

• Marshal stability test

IV. FIELD STUDIES

• Traffic volume studies.
• Spot speed studies.
• Parking studies.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-ISem

L	T	P/D	C
0	0	2	0

COMPUTER AIDED DRAFTING LAB

Course Objectives:
The students will be able to
- Develop parametric design and the conventions of formal engineering drawing
- Plan and interpret 2D drawings
- Develop a design idea or concept either graphically or visually
- Examine a design critically with the knowledge of CAD
- Get a Detailed study of an engineering artifact

Course Outcomes:
The course should enable the students to
- To develop graphical skills for communicating concepts, ideas and designs of engineering products graphically or visually as well as understand stakeholder's designs,
- To get exposure to national standards relating to technical drawings using Computer Aided Design and Drafting practice by using norms of BIM.
- Develop parametric design and the conventions of formal engineering drawing
- Produce and interpret 2D drawings
- The student will be able learn and interpret drawings to produce designs using 2D software.

LIST OF EXPERIMENTS
1. Introduction to computer aided drafting
2. Drawing of plans of buildings for single storied buildings
3. Drawing of plans of buildings for multistoried buildings
4. Developing section and elevations for (a) single storied buildings (b) multistoried buildings
5. Reinforcement drawings for typical slabs.
6. Reinforcement drawings for typical beams and columns.
7. Reinforcement drawings for typical footings.
8. Reinforcement drawings for typical staircase
9. Developing the plan for column positioning.
10. Detailing of building components like doors, windows roof trusses etc. using CAD software
11. Drawings of a typical two storeyed building including all MEP, rebar's, finishing and other details and writing out a description.

TEXT BOOKS:
1. Engineering Drawing, N.D. Bhatt / Charotar publishers
2. Computer Aided Design Laboratory by M. N. SeshaPrakash& Dr. G. S. Servesh, Laxmi Publications, New Delhi.

REFERENCEBOOKS:
1. Code of Practice for Building Information Modeling (BIM).

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

	L	T	P/D	C
	2	0	1	3

ENTRPERNEURSHIP DEVELOPMENT

Course Objectives:

- To provide insights into basic characteristics and process of entrepreneurship
- To develop a business idea and prepare a bankable project report
- To identify the methods to initiate ventures and the sources of finance
- To create awareness about the legal challenges of entrepreneurship and IPR
- To know and apply the various strategic and managerial concerns in the growth stage of the firms

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Interpret concepts and process of entrepreneurship.
- Apply idea development strategies and prepare a bankable project report
- Analyse various opportunities towards initiating ventures.
- Recognize legal challenges of entrepreneurship.
- Assess the strategic perspectives of entrepreneurship.

UNIT-I

Introduction:

Introduction to Entrepreneurship – Characteristics, Qualities, Key Elements and Skills of an Entrepreneur, entrepreneurial stress, Corporate entrepreneurship, Entrepreneurial process.

UNIT-II

Business Plan Preparation:

Search for business idea, project identification, project formulation and development, contents of business plan and Preparation of a Bankable Project Report.

UNIT-III

Launching Entrepreneurial Venture:

Opportunities identification, Methods to initiate Ventures, Creating new ventures, Acquiring existing ventures, Franchising. Sources of finance, Forms of capital requirements, funding agencies and supporting institutions.

UNIT-IV

Legal challenges of Entrepreneurship:

Intellectual Property Protection – Patents, Copyrights, Trademarks and Trade Secrets. The challenges of new Venture Startups- Poor financial understanding, critical factors for new venture development, Evaluation process, Feasibility criteria approach.

UNIT-V

Strategic perspectives in Entrepreneurship:

Strategic planning- Strategic Action, Strategic Positioning, Business Stabilization, Building the adaptive firms, understanding the growth stage, unique managerial concern of growing ventures.

TEXT BOOKS

1. D F Kuratko and T V Rao "Entrepreneurship- A South-Asian Perspective "Cengage Learning, 2012
2. Vasant Desai, Small Scale Industries and Entrepreneurship, HPH, 2012.

REFERENCE BOOKS

1. Rajeev Roy, Entrepreneurship, 2e, Oxford, 2012.
2. B.Janakiram and M.Rizwana, Entrepreneurship Development:Textand Cases, Excel Books,2011.
3. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
4. Robert Hisrich et al, Entrepreneurship, 6e, TMH, 2012.
5. Nandan H, Fundamentals of Entrepreneurship, PHI, 2013
6. Shejwalkar, Entrepreneurship Development, Everest, 2011
7. Khanka, Entrepreneurship Development, S.Chand, 2012

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-II Sem	L	T	P/D	C
	3	0	0	3

IRRIGATION ENGINEERING
(PROFESSIONAL ELECTIVE-II)

Pre Requisites: Fluid Mechanics, Hydraulic Engineering

Course Objectives
• To enable the students study the various types reservoirs and dams
• To understand various forces acting on gravity dam and its failure
• To enable the students understand types of earth dams and causes of failures of earth dams
• To enable the students understanding the types of diversion head works and failures of the diversion head works.
• To understand s the various types of canal falls and cross drainage works

Course Outcomes

At the end of the course, the student will be able to

• Plan the storage head works like reservoirs and dams
• Analyze and design gravity dams
• Analyze earth dams construction
• Plan and design diversion head works like barrages
• Design irrigation canal structures and spillways and energy dissipations works

UNIT-I
  Storage Head Works-Reservoirs - Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve- Reservoir Sedimentation – Life of Reservoir. Types of dams,factors affecting selection of type of dam, factors governing selection of site for a dam.

UNIT-II
  Storage Head Works-Gravity dams: Forces acting on a 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, Factors of Safety - Stability Analysis, Foundation for a Gravity Dam, drainage and inspection galleries.

UNIT-III
  Storage Head Works-Earth dams: 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. Spillways: types of spillways, Design principles of Ogee spillways - Spillway gates. Energy Dissipaters and Stilling Basins Significance of Jump

Height Curve and Tail Water Rating Curve - USBR and Indian types of Stilling Basins.

UNIT-IV

Diversion Head works: Types of Diversion head works- weirs and barrages, layout of diversion head work - components. Causes and failure of Weirs and Barrages on permeable foundations,-Silt Ejectors and Silt Excluders.

Weirs on Permeable Foundations – Creep Theories - Bligh's, Lane's and Khosla's theories, Determination of uplift pressure- Various Correction Factors – Design principles of weirs on permeable foundations using Creep theories - exit gradient, U/s and D/s Sheet Piles - Launching Apron.

UNIT-V

Canal Falls - Types of falls and their location, Design principles of Notch Fall and Sarada type Fall. Canal regulation works, principles of design of distributor and head regulators, Canal Cross Regulators -canal outlets, types of canal modules, proportionality, sensitivity and flexibility. **Cross Drainage works**: types, selection of site.

TEXT BOOKS

1. Irrigation Engineering and Hydraulic Structuresby S.K. Garg, KhannaPublishers,2017.
2. Irrigation and Water Power Engineering B.C. Punmia, B.Pande and BLal, Standard BookHouse,2016.

REFERENCE BOOKS

1. Irrigation and Water Power Engineering by P. N. Modi, KhannaPublishers,2016.
2. Irrigation Water Power and Water Resources Engineering by Standard Publishers,2014.

NPTEL
1. https://nptel.ac.in/courses/105104103

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B. Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

RAILWAY, AIRPORT AND HARBOR ENGINEERING
(PROFESSIONAL ELECTIVE –II)

Pre Requisites: Transportation Engineering

Course Objectives:

- Design for geometric elements of permanent way.
- Build knowledge on construction and maintenance of railway track.
- Build knowledge on components and layout characteristics of airport planning.
- Design for various components of runway and Taxiway.
- Build knowledge on harbor layout, Terminal facilities and coastal structures.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Design various geometric elements of Permanent way.
- Interpret various construction and maintenance techniques of railway track.
- Interpret layout and components of airport planning.
- Design various components of runway and Taxiway.
- Illustrate layout and components of Harbor and Coastal structures.

UNIT-I

Introduction and Geometric Design Of Railway Track

Elements Of Permanent Way – Rails, Sleepers, Ballast, Rail Fixtures And Fastenings, – Track Stress, Coning Of Wheels, Creep In Rails, Defects In Rails – Route Alignment Surveys, Conventional And Modern Methods- – Soil Suitability Analysis – Geometric Design Of Railways, Gradient, Super Elevation, Widening Of Gauge On Curves- Points And Crossings.

UNIT-II

Railway Construction and Maintenance

Earthwork – Stabilization Of Track On Poor Soil –- Tunneling Methods, Drainage And Ventilation –- Calculation Of Materials Required For Track Laying – Construction And Maintenance Of Tracks – Modern Methods Of Construction and Maintenance – Railway Stations And Yards And Passenger Amenities- Urban Rail – Infrastructure For Metro, Mono And Underground Railways.

UNIT-III

Airport Planning

Air Transport Characteristics-Airport Classification-Air Port Planning: Objectives, Components, Layout Characteristics, Socio-Economic Characteristics Of The Catchment Area, Criteria For Airport Site Selection And ICAO Stipulations, Typical Airport Layouts, Case Studies, Parking And Circulation Area.

UNIT-IV

Airport Design
Runway Design: Orientation, Wind Rose Diagram – Runway Length – Problems On Basic And Actual Length, Geometric Design Of Runways, Configuration And Pavement Design Principles – Elements Of Taxiway Design – Airport Zones – Passenger Facilities And Services – Runway And Taxiway Markings And Lighting.

UNIT-V

Harbor Engineering

Definition Of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves And Tides – Planning And Design Of Harbor: Requirements, Classification, Location And Design Principles – Harbor Layout And Terminal Facilities – Coastal Structures: Piers, Break Waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins And Floating Landing Stage – Inland Water Transport – Wave Action On Coastal Structures And Coastal Protection Works – Environmental Concern Of Port Operations – Coastal Regulation Zone, 2011.

TEXT BOOKS

1. S.C Saxena and S.P. Arora, Railway Engineering, DhanpatRai Publications, Delhi, 2011
2. Khanna S K, Arora M G And Jain S S, "Airport Planning And Design", Nemchand And Brothers, Roorkee, 2012.
3. Bindra S P, "A Course In Docks And Harbor Engineering", DhanpatRai And Sons, New Delhi, 2013.

REFERENCE BOOKS

1. Rangwala, "Railway Engineering", Charotar Publishing House, 2013.
2. Rangwala, "Airport Engineering", Charotar Publishing House, 2013.
3. Rangwala, "Harbor Engineering", Charotar Publishing House, 2013

NPTEL

1. https://nptel.ac.in/courses/105107123/7
2. https://nptel.ac.in/syllabus/105107123/
3. https://nptel.ac.in/courses/114106025/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil- II Sem

L	T	P/D	C
3	0	0	3

FINITE ELEMENT METHOD
(PROFESSIONAL ELECTIVE-II)

Prerequisite- Matrix Algebra, Strength of Materials and Advanced Structural Analysis

Course Objectives:

- To study the strain –displacement and linear constitutive relation
- To know the Plane stress, plane strain and shape functions of constraint strain triangle.
- To establishment of the natural coordinates and shape function of 2D and 3D elements.
- To study about the isoperimetric concept and Numerical Integration.
- To introduce the Hermitian polynomials in beam elements

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Develop shape functions and stiffness matrices for spring and bar elements
- Find the nodal displacement of plate and truss elements using constraint strain triangle method
- Derive the shape functions for multiple node of bar, rectangle element, tetrahedron and hexahedral elements.
- Compute the stiffness matrix of 1D and 2D elements using Isoperimetric method and discuss the convergence criteria.
- Determine the displacement and rotation of the joints two nodded beam element.

UNIT-I
Introduction: Concepts of FEM, steps involved, merits and demerits, matrix displacementmethod vs FEM, element definition: interpolation functions, stress-strain relationship, strain displacement relationship, stiffness matrix and load vector from the energy principles, Raleigh-Ritz method of functional approximation.

One dimensional problem: Stiffness matrix for a two-nodded and three-nodded bar elements and their shape functions, equivalent nodal force vector due to surface and body forces, analysis of 1D structures using 2-noded and 3-noded bar elements.

UNIT-II
CST element –Two dimensional problems: Plane stress and plane strain problems, stiffnessmatrix of constraint strain triangle (CST) element, shape functions, equivalent nodal force vector, applications and introduction to linear strain triangle.

UNIT-III

Shape functions: Shape functions for 1D elements in Cartesian coordinators of 2-noded and 3-noded elements, methods of constants, Lagrange polynomial, in natural coordinates.

Shape functions for 2D elements: rectangular elements of Lagrange family, Serendipity family, shape functions of triangular elements in area coordinator.

Introduction to shape functions of 3D element, Conditions which shape functions should satisfy.

UNIT-IV

Isoperimetric elements and numerical integration: Isoperimetric concept, isoperimetricelements for 1D analysis, isoperimetric elements for 2D analysis (Serendipity Family), stiffness matrix for linear isoperimetric element, equivalent nodal force vector, numerical integration, applications, convergence and compatibility requirements, Validity of isoperimetric elements.

UNIT-V

Two-nodded beam element stiffness matrix of a beam element from a cubic polynomial, Hermitian polynomials and their properties, equivalent nodal force vector.

TEXT BOOKS

1. T.R. chandrupatla and A.D. Belegundu, Introduction to finite elements in engineering by, Prentice Hall, 2008.
2. O .C. Zienkiewicz, The finite element method, Tata McGraw-Hill Publishing Company, New Delhi, 2005.

REFERENCE BOOKS

1. C.S. Krishna Murthy, Finite Element Analysis, McGrawHill. 1997.
2. S.S.Bhavakatti, finite Element Analysis, New Age International (P) Limited, Publishers, 2015.
3. Manish Shrikhande, Finite Element Method and Computational Structural Dynamics, Indian Institute of Technology RoorkeeRoorkee (247 667), India, 2008.

NPTEL

1. https://nptel.ac.in/courses/112104116/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

	L	T	P/D	C
	3	0	0	3

TRAFFIC ENGINEERING AND MANAGEMENT
(PROFESSIONAL ELECTIVE –III)

Course Objectives:

• Understand the various traffic characteristics and their measurements.
• Build knowledge on level of service, parking problems and manage traffic regulations.
• Design for traffic signals and Rotary Island.
• Build knowledge on measures for Road safety.
• Build knowledge on various traffic environmental problems.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Identify traffic stream characteristics and studies.
• Interpret level of service, parking problems and manage traffic regulations.
• Design traffic signal cycle and Rotary Island capacity.
• Demonstrate road safety measures.
• Discover traffic-environment problems.

UNIT-I

Traffic Characteristics and Measurement

Basic characteristics of Traffic-Volume, Speed and Density- Relationship among Traffic parameters. Traffic Measurement: Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speeds- Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation- Statistical Methods for Analysis of Speed Data- Origin and Destination studies-Highway Lighting-Speed and Delay Studies.

UNIT-II

Highway Capacity and Parking Studies

Importance of capacity – Factors affecting Capacity- Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor. Parking Studies: Types of parking facilities – On street and Off Street Parking Facilities- Parking Studies- Parking Inventory Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics-Multi Story Car Parking Facility-Design standards- Traffic Flow Characteristics-Land Use Method.

UNIT-III

Traffic Signs, Road Markings and Traffic Control and Regulation

Types of Traffic Signs- cautionary, Regulatory and Informative Signs- Specifications-Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings. Traffic Control and Regulation: Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures-Channelisation-Traffic Signals- Saturation Flow - Signal Design by Webster Method – Signal Phasing and Timing Diagrams- Rotary Design-Warrants of Traffic Control Signal Installation-Signal Design by IRC Method.

UNIT-IV

Highway Safety

Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit-Principles of Road Safety Audit.

UNIT-V

Traffic and Environment

Traffic and Environment: Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution due to Traffic- Noise Pollution – Measures to reduce Noise Pollution-Accident Investigation-Statistical Analysis of Accidents.

TEXT BOOKS

1. L.R. Kadiyali, Traffic Engineering and transportation Planning, 8th Ed., Khanna Publishers, New Delhi, 2005.
2. S.K.Khanna, C.E.G.Justoand A. Veeraragavan, Highway Engineering, 10th Ed, Nemchandand Bros., 2015.

REFERENCE BOOKS

1. S.C Saxena, Highway and Traffic Engineering, 2nd Ed, CBS Publishers and Distributers Pvt.Ltd.,2017
2. ParthaChakroborthy, Animesh Das, Principles of Transportation Engineering, Prentice Hall of India

NPTEL

1. https://nptel.ac.in/courses/105101008/42
2. https://nptel.ac.in/courses/105101008/27
3. https://nptel.ac.in/courses/105101008/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

REMOTE SENSING AND GIS
(PROFESSIONAL ELECTIVE –III)

Course Objectives:

- To provide the basic knowledge of photogrammetry.
- To provide the knowledge of remote sensing.
- To provide the knowledge of Geographic information system.
- To provide the basic knowledge of vector data.
- To provide the basic knowledge of raster data.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Retrieve the information content of remotely sensed data.
- Analyse the energy interactions in the atmosphere and earth surface features.
- Interpret the images for preparation of thematic maps.
- Interpret spatial and attribute data for solving spatial problems.
- Create GIS and cartographic outputs for presentation.

UNIT-I

Introduction to Photogrammetry: Principlesand types of aerial photograph, geometry of vertical aerial photograph, Scale and Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducial points, parallax measurement using fiducial line.

UNIT-II

Remote Sensing: Basic concept of remote sensing, Data and Information, Remote sensing data Collection, Remote sensing advantages and Limitations, Remote Sensing process. Electro-magnetic Spectrum, Energy interactions with atmosphere and with earth surface features (soil, water, vegetation), Indian Satellites and Sensors characteristics, Resolution, Map and Image and False color composite, introduction to digital data, elements of visual interpretation techniques.

UNIT-III

Geographic Information Systems: Introduction to GIS; Components of a GIS; Geospatial Data: Spatial Data-Attribute data – Joining Spatial and Attribute data; GIS Operations: Spatial Data Input- Attribute data Management –Data display- Data Exploration- Data Analysis. COORDINATE SYSTEMS: Geographic Coordinate System: Approximation of the Earth, Datum; Map Projections: Types of Map Projections-Map projection parameters Commonly used Map Projections – Projected coordinate Systems.

UNIT-IV

Vector Data Model: Representation of simple features- Topology and its importance; coverage and its data structure, Shape file; Data models for composite features Object Based Vector Data Model; Classes and their Relationship; The geo-base data model; Geometric representation of Spatial Feature and data structure, Topology rules.

UNIT-V

Raster Data Model: Elements of the Raster data model, Types of Raster Data, Raster Data Structure, Data Conversion, Integration of Raster and Vector data. Data Input: Metadata, Conversion of Existing data, creating new data; Remote Sensing data, Field data, Text data, Digitizing, Scanning, on screen digitizing, importance of source map, Data Editing

TEXT BOOKS

1. B. Bhatta, "Remote Sensing and GIS" 2nd Edition. Oxford Publishers, 2015.
2. Anji Reddy, M. "Textbook of Remote Sensing and Geographical Information System" 2nd Edition, BS Publications, Hyderabad, 2001.

REFERENCE BOOKS

1. Lillesand,T.M., Kiefer, R.W. And J.W.Chipman. "Remote Sensing and Image Interpretation" 5th Edition. John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004.
2. LRA Narayana," Remote Sensing and its applications" University Press, 1999.

NPTEL

1. https://nptel.ac.in/courses/121107009/12.
2. https://nptel.ac.in/courses/105107121/6.
3. https://nptel.ac.in/courses/105108077.
4. http://gi.iitk.ac.in/gi/nptel-lectures.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil- II Sem

L	T	P/D	C
3	0	0	3

EARTHQUAKE ENGINEERING
(PROFESSIONAL ELECTIVE-III)

Prerequisite- Mathematics-I and II and Engineering Mechanics

Course Objectives:

- Learn the basic concepts of engineering seismology.
- To acquire knowledge of the seismic ground motion sensors.
- To introduce basic principles and importance of structural vibrations systems.
- To know the prevent stepping of seismic resistant of buildings.
- To acquire knowledge on building protection techniques and process.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- To know the sources and effects of earthquakes on structures.
- To discuss the working principles of accelerometer and data processing and Interpretation of accelerogram.
- Derive the equation of motion of the Single and Multi Degree of freedom system and evaluate dynamic properties.
- Discuss the methodology to be applied to the architectural design of the building to optimize the earthquake capacity.
- Discuss the base isolation and retrofitting techniques of buildings.

UNIT-I

Elements of Seismology

Causes of Earthquake – Geological faults - Tectonic plate theory - Elastic rebound – Epicentre;
Hypocentre- Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes- Magnitude and IntensityScales-Seismic Zone map of India. Case studies of few destructive earthquakes in country in the past.

Earthquake Ground Motions

Introduction, Strong-motion measurement, Characteristics of Earthquake Ground motions, Estimation of Ground motion parameters, Soils effects and liquefaction.

UNIT-II

Measurement of SGM: Principle and theory of accelerometer, forced balanced accelerometer, seism scope and structural response recorder; Construction and working of analog and digital accelerographs; Seismic alarm/circuit tripping and control devices. Processing and Interpretation of Accelerogram: Digitization of accelerogram, digitization errors and filtering to control these errors; transducer correction.

UNIT-III

Theory of Vibrations

Introduction, Concept of inertia and damping- long and short period structure-Types of Damping - Difference between static forces and dynamic excitation –

SDOF idealization – Degree of Freedom, Equations of motion of SDOF system - Free vibration undampedand damped vibrations of SDOF system- Response to harmonic excitation.

Multiple Degree of Freedom System: Two degree of freedom system –Formulation of Equation of motion- Natural frequencies - Mode shapes.

UNIT-IV

Seismic Resistant Building Architecture: Introduction, Lateral load resisting system, Building configuration-Building Characteristics-Quality of Construction and Materials.

Improving seismic behavior of buildings: Reinforced Concrete building- reinforcement detailing of beam, column and beam-columns joints, Masonry buildings- Detailing of horizontal and vertical reinforcement and Lintel bands and Steel Structures- Join connections.

UNIT-V

Earthquake Protections of Buildings: Introduction, Base isolation and energy dissipation devices-Tuned mass damper.

Seismic retrofitting – Repair, rehabilitation and retrofitting, retrofitting strategies – Methodology for seismic retrofitting of reinforced concrete and brick Masonry Building- Failure modes of Masonry Buildings- Case studies on Reinforced concrete and Brick masonry buildings.

TEXT BOOKS

1. Agarwal.P and Shrikhande.M., Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2007.
2. Victor Gioncu and Federico M.Mazzolani, Earthquake Engineering for Structural Design, Spon Press, An imprint of Landon and New York, 2011.

REFERENCE BOOKS

1. Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2001.
2. Minoru Wakabayashi, Design of Earthquake Resistant Buildings, McGraw – Hill Book Company, 1986.
3. AmrS.Elnashai and Luigi Di Sarno, Fundamentals of Earthquake Engineering for Structural Design, John Wiley and Sons, Ltd. Publications, 2008.
4. C.V.R. Moorthy, Earthquake Tips, NICEE, IIT Kanpur,

NPTEL

1. https://nptel.ac.in/courses/105101004/3,
2. https://nptel.ac.in/courses/105101006/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem	L	T	P/D	C
	3	0	0	3

HYDROLOGY AND WATER RESOURCE ENGINEERING

Prerequisite- Fluid mechanics

Course Objectives:

• To provide the knowledge of hydrology and hydrologic cycle and its applications.
• To impart the knowledge of hydrograph, unit hydrograph, s-curve technic and synthetic hydrograph.
• To provide the knowledge of ground water occurrence and the importance of irrigation.
• To impart the knowledge of agriculture and water requirements of crops.
• To impart the knowledge of design of irrigation canals.

Course Outcomes:

At the end of the course, students in a position to

• Understand various processes in the hydrologic cycle and precipitation measurement
• Design procedures for safe and effective passage of flood flows of hydraulic structures
• Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions
• Calculate water requirements for crops and methods of irrigation
• Design of irrigation canals , Lining of canals and Water logging effects

UNIT-I

Introduction to Hydrology: Hydrologic cycle, water-budget equation, hydrology history, world water balance, applications in engineering. Precipitation-forms of precipitation, characteristics of precipitation in India, precipitation measurement, rain gauge network, mean precipitation over an area, depth-area-duration, maximum intensity/depth-duration-frequency, Probable Maximum Precipitation (PMP), rainfall data in India.

UNIT-II

Precipitation,Evaporation and Infiltration: Abstractions of precipitation- evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction,evapotranspiration,measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modeling infiltration capacity, classification of infiltration capacities, infiltration indices.

UNIT-III
Ground water: Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface

water resources of India, environmental flows.

Ground water and well hydrology- forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

UNIT-IV

Soil-water-plant relationships: Water withdrawals and uses– water for energy production, water for agriculture, water for hydroelectric generation; flood control. Analysis of surface water supply, Water requirement of crops-Crops and crop seasons in India, cropping pattern, duty and delta; Quality of irrigation water; Soil-water-plant relationships, root zone soil water, infiltration, consumptive use, irrigation requirement, frequency of irrigation; Methods of applying water to the fields.

UNIT-V

Canal distribution systems: Canal systems, alignment of canals, canal losses, estimation of design discharge. Design of channels- rigid boundary channels, alluvial channels, Kennedy's and Lacey's theory of regime channels. Canal outlets: non-modular, semi-modular and modular outlets. Water logging: causes, effects and remedial measures. Lining of canals, types of lining. Drainage of irrigated lands: necessity, methods.

TEXT BOOKS

1. Engineering Hydrology by K Subramanya, Mc-GrawHill(New edition,Jul 2017)
2. Irrigation Engineering and Hydraulic Structures Vol I and II by S.K. Garg, 2017, KhannaPublishers.

REFERENCE BOOKS

1. A text book of hydrology by Dr. P. Jaya rami reddy , 2012
2. Irrigation Water Resources and Water Power Engineering by P. N. Modi, KhannaPublishers, 9th , year 2014

NPTEL

1. https://nptel.ac.in/courses/105104103

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

	L	T	P/D	C
	3	0	0	3

FOUNDATION ENGINEERING

Prerequisite- Soil Mechanics,

   Engineering Mechanics

Course Objectives:

• To provide the knowledge of earth pressure distribution in soils, methods of finding the earth pressure on retaining walls and check the stability of retaining walls.
• To provide the knowledge of various methods of slope stability.
• To impart the knowledge of bearing capacity theories and how to calculate bearing capacity of foundations**.**
• To impart knowledge on shallow foundations.
• To impart knowledge on deep foundations and Well foundations.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Know the knowledge of earth pressure theories and retaining walls and its effect on stability of retaining walls.
• Know how to determine slope stability by different methods
• Determine the bearing capacity by various methods.
• Calculate the bearing capacity of soils for shallow foundations using different methods.
• Calculate the bearing capacity of soils for pile foundations using different methods and well foundations.

UNIT-I

Earth Pressure Theories: Lateral Earth pressure, earth pressure at rest, earth pressure theories, Rankine's theory of earth pressure, coulomb's earth pressure theory, Culmann's graphical method.

Retaining Walls: Type of Retaining walls, stability of retaining walls against overturning, Sliding, bearing capacity and drainage from backfill.

UNIT-II

Slope Stability: Infinite and finite earth slopes – types 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 slopes of earth dams under different conditions

UNIT-III

Bearing Capacity of Soils: Karlvon Terzaghi's equation for bearing capacity in soils – it's modification for continuous, square, rectangular and circular footings, general and local shear failure conditions. Plate load test as per IS specification. Allowable bearing capacity. Standard penetration test and use of N values for estimating soil condition and bearing capacity. Proportioning of footings and rafts.

UNIT-IV

Shallow Foundations – Bearing Capacity Criteria: Types of choice of foundation – location of depth – safe bearing capacity – Terzaghi, Meyerhof, Skempton IS methods. Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N value – allowable bearing pressure: safe bearing capacity – plate load test – allowable settlements of structures.

UNIT-V

Pile Foundation: Types of piles – load carrying capacity of piles based on static pile formulae – Dynamic pile formula –pile load tests- load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

Introduction to Well Foundations: Types- different shapes of wells-components of wells-functions, Sinking of Wells-tilts and shifts.

TEXT BOOKS

1. Soil Mechanics And Foundation Engineering by K R Arora, Standard Publishers New Delhi-2009
2. Principles of Geotechnical Engineering by B.M.Das, Cengage Learning-2013

REFERENCE BOOKS

1. Basics and Applied Soil Mechanics by GopalRanjanand ASR Rao, New Age International Pvt.Ltd, Publishers,2002.
2. Geotechnical Engineering by Manoj Dutta and Gulati S K, Tata McGrawhillPublishers,New Delhi
3. Geotechnical Engineering by C. Venkataramaiah, New Age International,2006

NPTEL

1. https://nptel.ac.in/downloads/105101083/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

DESIGN OF STEEL STRUCTURES

Prerequisite- Engineering Mechanics

Design of Reinforced Concrete Structure

Course Objectives:

• To understand the knowledge on various materials used and their properties in the steel   design.
• To examine the knowledge of various methods of designs in steel structures.
• To identify the knowledge of various connections involved in steel structures.
• To extent the knowledge of design principles of various elements of steel structures
• To examine the knowledge of IS Codal provisions and IS hand book for steel structures.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• To understand the knowledge of various steels used in the construction of steel design and their Properties.
• Design various connections involved in the steel structures.
• Discuss various IS codal provisions and the design of various structural Steel elements such as beams, girders, columns, columns bases.
• Apply the knowledge on various structural design and their applications in steel structures.
• Classify various on various methods of design

UNIT-I

Materials - Composition of steel - types of structural steel - mechanical properties of steel - concept of plasticity - yield strength - loads and combinations - local buckling behavior of steel - concept of limit state design - limit states - design strengths - deflection limits – serviceability - stability check.

Bolted Connections: Types of bolts–types of joints - failure of joints - specifications - design strength - efficiency of joint - prying action.

Welded connections: Types of welded joints - specifications - design requirements.

UNIT-II

Design of Tension Members - Design strength - design procedure–splice - lug angle.

Design of Compression Members: Buckling class - slenderness ratio - design strength -

design of angle section.

UNIT-III

Design of beams: types of sections–classification of cross sections - bending and shear strength of beams – web buckling – web crippling – design - built-up beams – bearing plates - laterally supported beams.

Beam Connections: Design of eccentric connections–framed, seated and stiffened seated connections.

UNIT-IV

Design of Columns and Column Bases: Rolled steel columns - built-up columns**:** lacedand battened - slab base - gusseted base.

UNIT-V

Design of plate girder: Elements - economical depth - design of main section -connections between web and flange - design of stiffeners - design of web splice and flange splice.

TEXT BOOKS

1. S.K. Duggal,Limit state design of steel structures, Tata Mcgraw –Hill, 2010.
2. Ramachandra,Design of steel structures VolIand II, Standard Publications 2009.
REFERENCE BOOKS

1. V.L. Shah and Veena Gore, Limit State Design of steel structures IS: 8002007, Structures Publications, 2012.
2. M.L. Gambhir, Fundamentals of Structural Steel Design, McGraw Hill Education, 2013.
3. R. Narayanan, Teaching Resource on Structural Steel Design, INSDAG, Ministry of Steel Publications, 2002.
4. Ramachandra and V. Gehlot, Design of Steel Structures, Scientific Publishers, 2009
5. Design of steel structures – N.Subramaniam, Oxford University press -2009.

NPTEL

1. NPTEL: https://nptel.ac.in/courses/105105105/
Code books:

1.   General Construction In Steel — Code of Practice IS 800- 2007
2.   ISI Handbook for Structural Engineers -Part- 1 Structural Steel Sections

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

L	T	P/D	C
0	0	2	1

GEOTECHNICAL ENGINEERING LAB

Prerequisite- Geotechnical Engineering

Course Objectives:
- To impart the knowledge on how to classify the soils
- To impart the knowledge of field tests involved in knowing the soil properties
- To impart knowledge on permeability characteristics of soils
- To impart knowledge on strength characteristics of soils
- To impart knowledge on how consolidation behaviour of soils

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,
- Classify soils based on grainsize and Atterberg limits.
- Classify the field tests and lab tests conducted on soils.
- Determinethe permeability of soils.
- Understand strength characteristics of soils.
- Determine consolidation of soils.

List of Experiments
1. Determination of specific gravity of soil pyconometer
2. Attenberg Limits (Liquid Limit, Plastic Limit)
3. Field density by core cutter method and sand replacement method
4. Grain size distribution by sieve analysis
5. Differential free swell index
6. Permeability of soil by constant and variable head test methods
7. Standard Proctor's compaction tests
8. Unconfined compression tests
9. Triaxial compression test
10. Direct shear test
11. Vane shear test
12. Determination of coefficient of consolidation (Square root time fitting method)

NPTEL
1. https://nptel.ac.in/courses/105103097/

CODES
1. IS 2720 Method of Test for soils?

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. Civil-II Sem

L	T	P/D	C
0	0	2	1

ENVIRONMENTAL ENGINEERING LAB

Prerequisite- ENVIRONMENTAL ENGINEERING

Course Objectives:

- Estimating various parameters like PH, Chlorides, Sulphate, and Nitrates in water.
- Effective water treatment, the determination of optimum dosage of coagulant and chloride demand.
- Estimation status of BOD and COD of effluent.
- Ambient noise measurement
- Ambient air quality monitoring

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Asses the drinking water quality parameters.
- Estimate various parameters like PH, Chlorides, Sulphate, and Nitrates in water.
- Asses the wastewater quality before and after treatment
- Determinethe ambient noise measurement
- Determinethe ambient air quality monitoring

List of Experiments:

1. Determination of pH and Turbidity of a given water sample
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic) of a given water sample
3. Determination of Alkalinity/Acidity of a given water sample by titration method
4. Determination of total hardness, calcium and magnesium hardness of a given water sample
5. Determination of Chlorides of a given water sample by titration method
6. Determination of iron, Nitrates, total Phosphorous using spectrophotometer
7. Determination of Dissolved Oxygen of a given water sample by titration method
8. Determination of Optimum dose of coagulant of a given water sample by jar test
9. Determination of Chlorine demand of a given water sample by titration method
10. Determination of B.O.D and C.O.D of a given waste water sample
11. Presumptive coliform test of a given waste water sample
12. Determination of ambient noise measurement
13. Determination of ambient air quality monitoring

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

III Year B.Tech. CIVIL - II SEM

L	T	P/D	C
0	0	3	0

(A57201) STRUCTURAL ANALYSIS LAB
(MANDATORY COURSE)

Prerequisite: Structural Analysis & Design of RC Structures

Course Objectives:
- To provide the knowledge of software tools commends.
- To impart the knowledge of using software to define different types of loads, Material properties, Geometry and Boundary conditions.
- To impart the knowledge of using the software to analyze the Structures.
- To impart the knowledge of using the software to design of Structures.

Course Outcomes:
On successful completion of this course, it is expected that the students will be able to,
- Prepare the one, two and three dimensional building model and able to shows loading diagram, Geometry, Material property and Boundary conditions using software.
- Analyze the various structures by using the any software.
- Model, analyze and design the structures by any software.
- Shows and read the output each numerical model by any software.

List of Experiments:

A. Analysis: Analyze the following problems by using scientific calculator and compare theresults obtained by STAAD Pro/ E-Tabs Software.
   1. Analysis of continuous beam
   2. Analysis of plane truss
   3. Analysis of plane frame

B. Analysis and design by STAAD Pro/E-Tabs software
   1. Modeling, analysis and design of multi storied symmetrical building-Gravity loads.
   2. Modeling, analysis and design of multi storied symmetrical building-Gravity loads and Wind Loads.
   3. Modeling, analysis and design of multi storied symmetrical building-Gravity loads and Earthquake Loads.
   4. Modeling, analysis and design of multi storied unsymmetrical building-Gravity and Wind Loads.
   5. Modeling, analysis and design of multi storied unsymmetrical building-Gravity and earthquake Loads.
   6. Modeling, analysis and design of Water Tanks-Gravity, Wind loads and earthquakeLoads.
   7. Modeling, analysis and design of Bridges-Gravity, Wind loads and earthquakeLoads.
   8. Modeling, analysis and design of Truss-Gravity, Wind loads and earthquakeLoads.
   9. Modeling, analysis and design of Stair case- Gravity loads.

TEXT BOOKS:

    1. Any Software manual.
    2. IS code books
      -IS875-Part-1, 2 & 3
      - IS 1893-2016
      - IS 456

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

ESTIMATION AND COSTING

Prerequisite- Managerial Economics and Financial Analysis

Course Objectives:

- To quantify the material of different items of work
- To quantify the materials for roads, culverts and septic tanks
- To study the rate analysis and costing of different items of work
- To know about contract and tender
- To know about bidding process

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand the technical specification of different items of works and how to calculate the quantities of different items of work
- Will have the knowledge on quantifying the earthwork for roads, canals and estimation of different quantities of culvert and septic tank
- Will have the idea of rate analysis and costing of a structure
- Will have the knowledge of tender process and types of contracts used for different types of works.
- Will have the knowledge on Bidding process

UNIT-I

Introduction: Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the estimation, comparison of different alternatives, Bar bending scheduling.

Quantity estimation of buildings: Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, adding equipment costs.

UNIT-II

Quantity estimation of : Bituminous and C.C. Road work including earthwork, Irrigation canal work including earthwork, Single pipe culvert and single cell rectangular box culvert, Septic tank.

UNIT-III

Rate analysis: Purpose, importance and necessity of the rate analysis, factors affecting, Standard Schedule of Rates, task work, daily output from different equipment/ productivity. Labour costs. Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost.

UNIT-IV

Tender: Preparation of tender documents, importance of inviting tenders, Earnest money, security deposit, measurement book, muster roll. Concept of PPP projects, BOT and BOOT projects, contract types, relative merits, prequalification, R.A. Bill and Final Bill, Payment of advance, insurance, claims, price variation, etc

UNIT-V

Preparing Bids: Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct and Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management. Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights

TEXT BOOK

1. B.N. Dutta, Estimating and Costing in Civil Engineering, UBS Publishers, 2002.
2. M. Chakraborti, Estimation, costing, specifications and valuation in Civil Engineering, M. Chakraboti Publishers, 2006.

REFERENCE BOOKS

1. Relevant Indian Standard Specifications-National Building Codes.
2. IS 1200-1992 " Methods of Measurements of builds and Civil Engineering Works"
3. Standard schedule of rates and standard data by public works department.
4. Act related to Minimum wages, Workman's compensation, contract and arbitration.

NPTEL

1. https://nptel.ac.in/courses

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

CONSTRUCTION ENGINEERING AND MANAGEMENT

Prerequisite- Nil

Course Objectives:

- To impart the knowledge of Construction equipment
- To provide an understanding about Planning, Scheduling, Time estimates etc.
- To provide the knowledge about construction Management, Contract Management,
- To make them understand about how to Project Monitoring and Control
- To provide the knowledge about Construction Costs and Construction methods.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understanding about how structures are built and projects are developed, Latest construction practices and different construction equipment's for mechanized construction,
- Able to plan, control and monitor construction projects with respect to time.
- Apply the techniques about how to optimize construction projects based on costs, Different construction equipment's for mechanized construction,
- An overall understanding about how construction projects are administered with respect to contract structures and issues about HSE and QA and QC aspects.
- Able to for cost control, application of different construction methods keeping in view of rating system.

UNIT-I

Construction Equipment: Conventional construction methods Vs Mechanized methods and advantages; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting and placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Planning and organizing construction site and resources- Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control.

UNIT-II

Construction Planning- Construction projects- types and features, phases of a project, agencies involved and their methods of execution, Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, role of client and contractor, work break-down structure, activity lists, estimating durations, sequence of activities, Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical paths.

UNIT-III

Contracts Management: Types of Contracts, Parties to a Contract; Contract Formation, Common contract clauses:Notice to proceed, rights and duties of various parties, notices to be given, Contract duration and price. Performance parameters; Delays, penalties and liquidated damages; Suspension and Termination. Conventional and Alternative Dispute Resolution methods, Legal Aspects in Contract Management.

UNIT-IV

Project Monitoring and Control: Supervision, record keeping, periodic progress reports, and periodical progress meetings. Updating of plans: purpose, frequency and methods of updating, Common causes of time and cost overruns and corrective measures. Basics of Modern Project management systems such as Lean Construction; Use of Building Information Modeling (BIM) in project management; Quality control: concept of quality, use of manuals and checklists for quality control, Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures.

UNIT-V

Construction Costs and Construction methods: Classification of costs, time-cost trade-off in construction projects, compression and decompression. Types of foundations and construction methods, Common building construction methods, Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges; Introduction to current LEED for New Construction rating system.

TEXT BOOKS

1. Construction Project Management – Theory and practice, NirajJha Pearson Education, 2nd Edition, 2015
2. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.

REFERENCE BOOKS

1. Chudley, R., Construction Technology, ELBS Publishers, 2007.
2. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
3. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
4. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi

NPTEL

1. https://nptel.ac.in/courses/105103093/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

ADVANCED STURCTURAL ANALYSIS

Prerequisite- Structural Analysis

Course Objectives:

- Understand the concept of influence line diagrams for determinate beams for various types of loads and to find maximum SF and BM in the beams.
- Know the procedure to construct influence line diagrams for different truss girders for various types of loads and to find maximum forces in the members of trusses.
- Know the procedure for indeterminate beams and frames by approximate methods.
- Understand the procedure for indeterminate beams and trusses by flexibility matrix method due to point load and udl load system.
- Understand the procedure for indeterminate beams and trusses by stiffness matrix method due to point loads and udl load system.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Draw the ILD's and able to find the maximum SF and BM for various positions of the moving loads.
- Draw the ILD's for forces in the members of trusses and to find the maximum forces for various positions of moving loads.
- Analyze the indeterminate beams and frames by approximate method due to point loads and UDL load system.
- Analyze the indeterminate beams and trusses by flexibility matrix method due to point loads and UDL load system.
- Analyze the indeterminate beams and trusses by stiffness matrix method due to point loads and UDL Load system.

UNIT-I

Moving loads: Influence line diagrams for support reactions, bending moment and shear force for a simply supported beam/girder. Determination of maximum values of support reactions, bending moment and shear force at any section for various moving load systems on simply supported beam/ girder. Curves of maximum bending moment and shear force for simply supported girders traversed by (i) single point load, (ii) two point loads (iii) uniformly distributed load longer than the span, and (iv) uniformly distributed load shorter than the span. Focal length, enveloping parabola and EUDL.

UNIT-II

Moving Loads on Truss Girders: Influence lines for forces in the members of statically determinate trusses like Warren truss, Pratt truss, and Curved flange trusses. Determination of maximum forces in truss members due to moving point loads and uniformly distributed loads. Counter bracing.

UNIT-III

Approximate Methods: Application to building frames-Portal method-Cantilever method**.**

Beams curved in plan: Introduction–Circular beams loaded uniformly and supported on symmetrically placed columns – Semi-circular beam simply supported on three equally spaced supports.

UNIT-IV

Flexibility Matrix Method: Analysis of continuous beams, pin jointed plane trusses and rigid jointed plane frames with static indeterminacy not exceeding three with and without sinking of supports.

UNIT-V

Stiffness Matrix Method: Analysis of continuous beams, pin jointed plane trusses and rigid jointed plane frames with kinematic indeterminacy not exceeding three with and without sinking of supports.

TEXT BOOK

1. T. S. ThandavaMoorthy, "Structural Analysis", Oxford University Press, 2nd Edition, 2012.
2. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill, 3rd Edition 2017.

REFERENCE BOOKS

1. B.C. Punmia, and A. K. Jain, "SMTS - II Theory of Structures", Laxmi Publications, 2017.
2. S. Ramamrutham, "Theory of Structures", Khanna Publishers, 2018.

NPTEL

1. https://nptel.ac.in/courses/105105166/.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

SOLID AND HAZARDOUS WASTE MANAGEMENT
(PROFESSIONAL ELECTIVE-IV)

Prerequisite- Environmental Engineering

Course Objectives:

• To understand the source of solid waste, their properties and its handling
• To know the types of solid waste and hazardous waste and their disposal
• To know the types of hazardous waste and their disposal
• To aware the legal aspects of hazardous waste management
• To understand the site remedial technologies for solid waste and hazardous waste

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Identify the various type solid wastes, their properties and their treatment.
• Analyze the types of hazardous waste, their disposal and their legal aspect.
• Understand the methods of biomedical waste disposal.
• Plan and design hazardous waste management practices
• Apply the site remedial technology and aware the legal aspects of waste management

UNIT-I

Solid Wastes: sources, types, composition, physical, chemical, and biological properties of solid wastes / sources and types of hazardous and infectious wastes in municipal solid wastes.

Solid waste generation and collection: Handling, Storage, Processing, Transportation.

UNIT-II

Disposal of Solid waste: Thermal conversion, biological and chemical conversion, recycling of material in municipal solid wastes, Land-filling, Composting, gas generation, closure of land-fills.

Hazardous Wastes: Fundamentals, fate, and Transport of contaminants, Toxicology origin, quantity and quality parameters.

UNIT-III

Biomedical / infectious Waste: Composition, Collection, Handling and Disposal.

Legal aspects of Hazardous Waste Management: Collection, Conveyance, Treatment

and Disposal.

UNIT-IV

Hazardous Waste Management Practices: Environmental Audits, Pollution Prevention.

Treatment and Disposal Methods: Physicochemical processes, Biological Methods, Stabilizationand Solidification, Thermal Methods, Land Disposal.

UNIT-V

Site Remediation: Site and Subsurface Characterization, Remedial Technologies.

Planning, Siting and Permitting of Waste Management Facilities: Planning, developing a facilities plan, securing a site and obtaining permits**.**

TEXT BOOKSS

1. Integrated Solid Waste Management, Techobanglous, Thiesen and Vigil, McGraw Hill.
2. Hazardous Waste Management, Lagrega, Buckingham and Evans, McGraw Hill,N.Y.

REFERENCE BOOKS

1. Solid Waste Management in Developing Countries, A D Bhide, NagpurPublications.

NPTEL:

1. https://nptel.ac.in/syllabus/105102018

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

URBAN TRANSPORTATION PLANNING
(PROFESSIONAL ELECTIVE–IV)

Prerequisite – Transportation Engineering

Course Objectives:

• To know about urban planning, assignment and their attributes.
• Build knowledge on data collection methods.
• Build knowledge on requirement of Trip generation and Trip Distribution methods
• Build knowledge on requirement of mode choice analysis
• Build knowledge on requirement of Traffic Assignment techniques

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Interpret urban transportation issues and learn the solution generation
• Analyze the survey data and data inventory
• Analyze Trip generation and Trip Distribution methods.
• Assess requirement of mode choice analysis.
• Evaluate requirement of traffic assignment techniques.

UNIT-I

Urban Transportation Problems and Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs. Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT-II

Data Collection and Inventories: Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

UNIT-III

Trip Generation and Trip Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates.

Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time

Function Iteration Models.

UNIT-IV

Mode Choice Analysis: Mode Choice Behavior, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation.

UNIT-V

Traffic Assignment: Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

TEXT BOOKS

1. L.R. Kadiyali, Traffic Engineering and transportation Planning, 8th Ed., Khanna Publishers, New Delhi, 2005.
2. Hutchinson, B.G, Introduction to Urban System Planning, 1st Ed., McGraw Hill, 1974.

REFERENCE BOOKS

1. Khisty C.J, Transportation Engineering - An Introduction, 3rd Ed., Prentice Hall, 2003.
2. C.S. Papacostas, Fundamentals of Transportation Planning,3rd Ed., Prentice Hall India, 2000.
3. Mayer.M and Miller.E, Urban Transportation Planning: A decision oriented Approach, 2nd Ed., McGraw Hill, 2000.
4. Bruton M.J, Introduction to Transportation Planning, Hutchinson of London, 1975.

NPTEL

1. http://www.nptelvideos.in/2012/11/urban-transportation-planning.html
2. https://nptel.ac.in/courses/105106058/
3. https://nptel.ac.in/syllabus/105106058/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. CIVIL- I Sem | L | T | P/D | C |
|---|---|---|---|
| 3 | 0 | 0 | 3 |

ADVANCED STRUCTURAL DESIGN
(PROFESSIONAL ELECTIVE –IV)

Prerequisite- Design of RC Structures and Design of Steel Structures

Course Objectives:

• To understand the theory and design of retaining walls
• Identify and assess combined footings behavior under loads
• Outline various methods for types RC water tanks
• To provide the knowledge of design of roof trusses
• To provide the knowledge of plastic analysis

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Classify and design of retaining walls
• Understand the theory and design of combined footing
• Understand the theory and design of circular and rectangle water tanks

• Design a long span roof trusses by applying various loads
• Understand the plastic behavior of steel structures

UNIT-I
Retaining Walls: Introduction, types of retaining walls, stability of retaining walls, design of RCC cantilever and counter fort retainingwalls.

UNIT-II

Combined Footings: Introduction, design of rectangular footing, trapezoidal footing and Raft footing.

UNIT-III

Water Tanks: Introduction-Types**-** Design of Circular water tank**:** Resting on ground, underground and overhead by IS code method (Working Stress Method).
Design of Rectangular water tank: Resting on ground and overhead by IS code method (Working Stress Method).

UNIT-IV
Design of Roof Trusses: Types of roof trusses - loads on trusses - estimation of wind loads as per IS 875 - **Design** – Purlin, strut member, tie member, joints.

UNIT-V

Plastic analysis: Introduction - idealized stress–strain diagrams - shape factor for various sections – moment curvature relationship – ultimate moment - plastic hinge - collapse

mechanism for beams – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS

1. A.K.Jain, Reinforced Concrete Design (Limit state design), 6/e, Nem Chand and Bros, Roorkee, 2007.
2. S K Duggal , Limit State Design of steel structures, Tata McGraw Hill Education Private Limited, New Delhi 2011.

REFERENCE BOOKS

1. Dr. H.J.Shah, Reinforced Concrete, Volume-I, Charotar Publishing house Pvt.Ltd, 2014.
2. N. Subramanian, Design of Reinforced Concrete Structures, 1/e, Oxford University Press, 2013.
3. P.C. Varghese Advanced Reinforced Concrete Design, Prentice Hall of India, 2009.

NPTEL

1. https://nptel.ac.in/syllabus/105103022/

Code books:

1. IS 456:2000, Indian Standard Plain and Reinforced Concrete - Code of Practice, Bureau of Indian Standards, New Delhi.
2. IS 875 (Part 3):1987, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures Part 3 Wind Loads, Bureau of Indian Standards, New Delhi.
3. IS: 3370 (Part I) - 1965, Indian Standard Code of Practice for Concrete Structures for the Storage of Liquids Part I General Requirements. Bureau of Indian Standards, New Delhi.
4. IS: 3370 (Part II)-1965, Indian Standard Code of Practice for Concrete Structures for the Storage of Liquids Part II Reinforced Concrete Structures. Bureau of Indian Standards, New Delhi.
5. IS800-2007, Indian Standard General Construction in Steel - Code of Practice, Bureau of Indian Standards, New Delhi

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem   L   T   P/D   C

                                                                   3   0   0   3

RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEM
(PROFESSIONAL ELECTIVE–V)

Prerequisite- Environmental Engineering

Course Objectives:

- To provide the knowledge of source of water and its distribution
- To provide the knowledge of treatment choices and working of technologies for various water quality parameters are discussed.
- To impart the knowledge of characteristics of sewage, treatment and disposal
- To impart the knowledge of simple wastewater treatment system for rural areas
- To provide the knowledge of Disposal of solids waste, composting, land filling and biogas plants.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Identify the sources of water and its distribution
- Understand technology choice to deal with water quality issues
- Examine the operation and maintenance of water treatment systems
- Choose various treatment methods in treating the waste water in rural areas
- Investigate the solid waste management and rural sanitation

UNIT-I
Sources of Water: Concept of environmental and scope of sanitation in rural areas. Magnitude problem of water supply and sanitation, population to be covered and difficulties National policy. Various approaches for planning of water supply systems in rural areas. Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT-II
Water Treatment: Specific problem in rural water supply and treatment e.g. iron, manganese, fluorides etc. Low cost treatment, appropriate technology for water supply and sanitation. Improvised method and compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc. Water supply through spot sources, hand pumps, opens dug–well.

UNIT-III
Water Distribution, Waste Water Treatment and Disposal: Planning of distribution system in rural areas. Water supply during fairs, festivals and emergencies. Treatment and

disposal of wastewater/sewage. Various methods of collection and disposal of night soil.

UNIT-IV

On site sanitation system and community latrines: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits etc.

UNIT-V

Solid Waste Management: Disposal of solids waste, composting, land filling, incineration, and biogas plants, rural health -other specific issues and problems encountered in rural sanitation.

TEXT BOOKS

1. J.C. Mokeniaan Low cost on site sanitation option, Hoffman and Heijno Occasional Nov.1981 paper no. 23. 21, P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices.
2. Rijswijk (the Haque). Wagner, E.G. and Lanoik, J.N. water supply for rural areas and small   communities, Geneva: W.H.O.1959.

REFERENCE BOOKS

1. Manual supply and treatment of water, 3rd edition, CPHEEO, GOI, New Delhi.

2. Handbook on Technical Options for On-Site Sanitation, Ministry of Drinking Water and Sanitation Government of India, Feb2012.
3. Sanjay Gupta,Rural Water Supply andSanitation, Vayu educational publishers,2015

NPTEL:

1. https://nptel.ac.in/courses/105104102/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

GROUND WATER ENGINEERING
(PROFESSIONAL ELECTIVE–V)

Prerequisite- Water resources engineering, Environmental engineering,

Course Objectives:

- To introduce characteristics of different aquifers.
- To know the objectives of groundwater hydraulics
- To understand the database for groundwater management
- To know Ground water chemistry and its applications
- To understand the techniques of development and management of groundwater.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Understand aquifer properties and its dynamics
- Relate types of wells and well design
- Apply groundwater management and its applications
- Identify ground water chemistry and its applications
- Understand the importance of artificial recharge and groundwater quality concepts.

UNIT-I

Hydrogeological Parameters: Introduction, Groundwater development and Potential in India, Water bearing Properties of Rock, Type of aquifers, Aquifer properties , permeability, specific yield, transmissivity and storage coefficient, Methods of Estimation, Ground water table fluctuation and its interpretations,

UNIT-II

Well Hydraulics: Introduction and Objectives of Groundwater hydraulics, Darcy'sLaw, Groundwater equation, steady state flow. Dupuit, Forchheimer assumptions, Unsteady state flow, Theis method, Jacob method, Slugtests, Image well theory, Partial penetrations of wells.

UNIT-III

Groundwater Management: Introduction to Mathematical model, Need for Management Model, Database for groundwater management, groundwater balance study, Conjunctive use, Collector well and Infiltration gallery.

UNIT-IV

GroundwaterQuality: Ground water chemistry, Origin, movement and quality, Water quality standards, Health and aesthetic aspects of water quality, Saline intrusion, Environmental concern and Regulatory requirements

UNIT-V

Groundwater Conservation: Artificial recharge techniques, Remediation of Saline intrusion, Ground water management studies, Protection zone delineation, Contamination source inventory, remediation schemes, Ground water Pollution and legislation.

TEXT BOOKS

1. Raghunath H.M., Ground Water Hydrology", New Age International (P) Limited, New Delhi, 2010.
2. Todd D.K, Ground Water Hydrology, John Wiley and Sons, New York, 2000.

REFERENCE BOOKS

1. Fitts R Charles, Ground water Science, Elsevier, Academic Press, 2002.
2. Ramakrishnan, Ground Water, S K.J. Grapharts, Chennai, 1998.

NPTEL

1. https://nptel.ac.in/courses/105105042/.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil- I Sem

L	T	P/D	C
3	0	0	3

REPAIR AND REHABILITATION OF STRUCTURES
(PROFESSIONAL ELECTIVE-V)

Prerequisite- Concrete Technology and Design of RC Structures

Course Objectives:

• Learn the fundamentals of maintenance and repair strategies.
• Study the quality assurance, serviceability and durability of concrete.
• Know the various materials and techniques used for repair of structures.
• Know the difference between the repair, rehabilitation and retrofitting of structures.
• Become aware of the seismic retrofitting of structures and to know demolition techniques

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Understand the fundamentals of maintenance and repair strategies.
• Diagnose for serviceability and durability aspects of concrete.
• Acquire the materials and techniques used for repair of structures.
• Decide the appropriate repair, strengthening and rehabilitation technique required for a building.
• Suggest suitable seismic retrofitting measures for existing structures and use an appropriate demolition technique.

UNIT-I
Maintenance: Repair and rehabilitation - Facets of maintenance -Importance of maintenance various aspects of Inspection – Assessment procedure for evaluating damaged structure - Causes of deterioration.

Repair Strategies: Causes of distress in concrete structures – Construction and design failures - Condition assessment and distress-diagnostic techniques - Assessment procedure for inspection and evaluating a damaged structure.

UNIT-II
Serviceability and durability of concrete: Quality assurance for concrete construction - Concrete properties–Strength - Permeability – Thermal properties and cracking. – Effects due to climate - Temperature -Chemicals - Corrosion – Design and construction errors – Effects of cover thickness and cracking.

UNIT-III
Materials and techniques for repair: Special concretes and mortar - Concrete chemicals - Special elements for accelerated strength gain -Expansive cement - Polymer concrete -

Sulphur infiltrated concrete -Ferro cement - Fibre reinforced concrete - Bacterial concrete – Rust eliminators and polymers coating for rebars during repair – Foamed concrete - Mortar and dry pack – Vacuum concrete - Gunite and shotcrete - Epoxy injection - Mortar repair for cracks - Shoring and underpinning -Methods of corrosion protection - Corrosion inhibitors – Corrosion resistant steels - Coating and cathodic protection

UNIT-IV

Repair, rehabilitation and retrofitting techniques: Repairs to overcome low member strength - Deflection - Cracking - Chemical disruption -Weathering corrosion - Wear - Fire - Leakage and marine exposure -Repair of structure – Common types of repairs – Repair in concrete structures-Repairs in under water structures - some simple systems of rehabilitation of structures -Strengthening of structures – Strengthening methods –Retrofitting – Jacketing. Case studies on repairs.

UNIT-V

Seismic retrofitting of structures-Introduction – Methods for seismic retrofitting - Retrofitting of Reinforced Concrete Buildings -Masonry buildings- Steel Buildings-Foundations–Case Studies.

Demolition Techniques –Engineered demolition methods – Case studies.

TEXT BOOKS

1. B.L.Gupta and Amit Gupta, Maintenance and Repair of Civil Engineering structures, Standard publications.Delhi,2009
2. Den Campbell, Allen and Harold Roper, "Concrete Structures Materials, Maintenance and Repair", Longman Scientific and Technical, UK, 1991.

REFERENCE BOOKS

1. W.H. Ransom, "Building Failures: Diagnosis and Avoidance", E and FN Spon Press, London, 1992.
2. Philip H. Perkins"Repair , Protection and Waterproofing of Concrete Structures", Taylor and Francis, 1997.
3. Allen R.T and Edwards S.C, "Repair of Concrete Structures", Blakie and Sons, UK, 1987.

NPTEL

1. https://nptel.ac.in/courses/114106035/38

CODES

1. CPWD "Handbook on Repair and Rehabilitation of RC buildings", Director General of CPWD, New Delhi, 2002.
2. Hand book on"Repair and Rehabilitation of RCC Buildings", published by Director General, CPWD, Govt. of India, 2002.
3. Hand book on Seismic Retrofitting of Buildings, published by CPWD and Indian Building Congress in Association with IIT, Madras, Narosa Publishing House, 2008.
Guide book on Non-destructive Testing of Concrete Structures, Training Course series no. 27", International Atomic Energy Agency, Vienna, 2002.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

ENVIRONMENTAL IMPACT ASSESSMENT AND LIFE CYCLE ANALYSIS
(PROFESSIONAL ELECTIVE–VI)

Prerequisite- Environmental Engineering

Course Objectives:

- To impart the basic concepts of EIA and elements of EIA
- To impart the knowledge of E I A Methodologies
- To impart the knowledge of soil quality, EIA in surface water, air and biological environment and causes and effects of deforestation
- To know the knowledge of Environmental Audit and Environmental legislation
- To know the Post Audit activities, The Environmental pollution Act, The water Act, The Air

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to

- Understanding the elements of EIA and the processes by which they are applied
- Assess the impact of impact of developmental activities and land use on natural resources
- Apply the framework of EIA to relevant situations.
- Utilize EIA documents for policy development, project planning or for legal or political action planning
- Evaluate Audit data and preparation of Audit report.

UNIT-I

Basic Concept of EIA: Initial environmental Examination, Elements of EIA, factors affecting EIA Impact evaluation and analysis, preparation of Environmental Base map, classification of environmental parameters.

EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, cost/benefit Analysis. Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

UNIT-II

Impact on natural resources and assessment: Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water, Air pollution, approach for assessment of Air

pollution Impact, Impact of development activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation

UNIT-III

Life Cycle Assessment: Strategic Environmental Assessment Criteria for determining Alternatives in EIA   Environmental Management Plans ,Review in Environmental Impact Assessment, Resource Balance, Energy Balance and Management review; operational Control

UNIT-IV

Environmental Audit: Objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.
UNIT-V

Environmental legislation: Post Audit activities, The Environmental pollution Act, The water Act, Air pollution Act, Motor Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries like water Resources Project, highway project, sewage treatment plant, municipal solid waste processing plant.

TEXT BOOKS

1. Anji Reddy Mareddy, Environmental Impact Assessment: Theory and Practice ,14 June 2017
2. Anjaneyulu.Y., and Manickam V. Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007

REFERENCE BOOKS

1. Suresh K, Environmental Science and Engineering, Dhaneja – S.K.,Katania and Sons Publication., New Delhi.
2. Dr H.S. Bhatia,Environmental Pollution and Control, Galgotia Publication (P) Ltd

NPTEL

1. https://nptel.ac.in/syllabus/105103024/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. CIVIL- I Sem

L	T	P/D	C
3	0	0	3

BRIDGE ENGINEERING
(PROFESSIONAL ELECTIVE–VI)

Prerequisite- Design of RC Structures

Course Objectives:

- To understand the behavior of loads in bridges
- To understand the theory and design of solid slab bridges
- To understand the theory and design of Girder in bridges
- To understand the theory and design of Pier
- To provide the knowledge on Prestressed members in bridges

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- An ability to calculate the different types of loads in bridges
- An ability to design different components in solid slab bridges
- Outline various methods for types RC water tanks
- Design a long span roof trusses by applying various loads
- Understand the plastic behavior of steel structures

UNIT-I
ConcreteBridges:Introduction-TypesofBridges-Economicspanlength-Typesofloads-Deadload- liveload-ImpactEffect-Centrifugalforce-wind loads-Lateralloads-Longitudinal forces-Seismic loads- SecondaryStresses-TemperatureEffect-ErectionForces andeffects-Widthofroadwayandfootway.

UNIT-II
DesignSolidslabBridges:Introduction- General Design requirements- Design of slab bridge- Moments calculation – reinforcement design.

UNIT-III
Design Girder Bridges:Introduction-General Design requirements – Design of T Beam Bridge- Moment's calculation –Pigeaud's method for design of slab panels.

UNIT-IV
Sub-structureofbridges:Beds block– Piers –PierDimensions-Design loadsfor piers-Abutments-stability analysis of piers-design of abutment.

UNIT-V
Design of Prestressed Concrete Bridges: Introduction-Materials for prestressed

concrete bridges-permissible stresses- Limiting requirements- Design slab and Beams by using Pigeaud's method.

TEXT BOOKS

1. N. Krishna Raju, Design of Bridges, Oxford and IBH publishing Co.Pvt.Ltd.,2018
2. M. G. Aswani, V.N.Vazirani, M.M. Ratwani, "Design of Concrete Bridges", Khanna Publishers.

REFERENCE BOOKS

1. V.K.Raina, ConcreteBridgeDesignandPractice, Tata McGraw-hillpublishing company limted, 1994.
2. D.Johnson Victor, Essential of Bridge Engineering, Oxford and IBH publishing Co.Pvt.Ltd.,2012.
3. M.J. Ryall, G.A.R Parke, J.E. Harding, "The Manual of Bridge Engineering", Thomas Telford Publishers

NPTEL

1. https://nptel.ac.in/courses/105105165/

CODES

2. IRC: 24-2001 code of Practice for Concrete Road Bridges
3. IRC: 6-2014, Standard specification and code of Practice for Bridges Section-II - Loads and Stress.
4. IRC: 22-2015, Standard Specifications and Code of Practice for Road Bridges – Section-VI -Composite Constructions.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
3	0	0	3

DISASTER PREPAREDNESS AND PLANNING
(PROFESSIONAL ELECTIVE–VI)

Course Objectives:

• To know the concept, definition and terminology of the Disaster Management.
• To know the classification and occurrence of disasters in India and elsewhere.
• To know and analyse the socio-economic, environmental and political and gender etc., aspects of disasters impacts.
• To know the Pre, Post and emergency management mitigation strategies and activities of Disaster Management Cycle.
• To know the environment of vulnerable Disaster areas andto implement developmental activities to minimise the impacts.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• To acquire knowledge of concepts and terminology to understand disaster Management.
• To acquaint with different disasters in India and other parts of the world.
• To classify, assess the magnitude and intensity of various impacts of disasters.
• To learn the management methods (Risk and crisis Mgmt) at various stages of Disaster.
• Learn effective sustainable environmental modification techniques to decrease the vulnerability in disaster prone areas.

UNIT-I
Introduction

Concepts and definitions: disaster, hazard, vulnerability, risk, capacity, impact, prevention, mitigation.

UNIT-II
Disasters

Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills etc); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility

UNIT-III
Disaster Impacts

Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate-change and urban disasters.

UNIT-IV

Disaster Risk Reduction (DRR)

Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT-V

Disasters, Environment And Development

Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS

1. H.K. Gupta,Disaster Management - - University Press, India, 2003.
2. Singh B.K, Handbook of Disaster Management: techniques and Guidelines -., Rajat
    Publications, 2008

REFERENCE BOOKS

1. PardeepSahni, Disaster Mitigation: Experiences and Reflections -
2. PradeepSahni,Disaster Risk Reduction in South Asia, Prentice Hall, 2004.

NPTEL

1. https://nptel.ac.in/courses/105104183/

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
0	0	2	1

REMOTESENSING AND GIS LAB

Prerequisite - Remote sensing and GIS.

Course Objectives:

- To impart the knowledge on Topo sheet.
- To impart the knowledge on existing topo data.
- To impart the knowledge on data sets.
- To impart knowledge on spatial data.
- To provide the knowledge of methods of Digitization process.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Identify, locate, and acquire spatial data pertinent to projects in their field of interest.
- Evaluate the appropriateness of the existing data sources for use in a given application.
- Understand the data creation process and create simple data sets.
- Create spatial data from tabular information that includes a spatial reference
- Perform spatial analyses (attribute and spatial queries, buffering, overlays).

LIST OF EXPERIMENTS

1. Introduction to Geographical information systems.
2. Creation of point, Line, Polygon by using Arc map.
3. Geometric corrections of a Top Sheet.
4. Geometric corrections of a satellite Image.
5. Generations of thematic maps by using top sheet.
6. Creations of vector layers and operations. Creations of raster layers and operations.
7. Digitization of point, line and polyline using Arc map.
8. Creation of data base and analysis using Arc map.
9. Application of digital image processing tools on satellite image.

**ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)**

IV Year B.Tech. Civil-I Sem	L	T	P/D	C
	0	0	2	1

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
1. **Vocabulary Building** – synonyms and antonyms, Word Roots, One-Word Substitutes, Prefixes and Suffixes, Study of Word Origin, Analogy, Idioms and Phrases.
2. **Reading Comprehension –** Reading for Facts, Guessing meanings from context, Scanning, Skimming, Inferring Meaning, and Critical Reading.
3. **Writing Skills** –Structure and presentation of different types of writing - Resume Writing /E-Correspondence/Statement of Purpose.
4. **Technical Writing**- Technical Report Writing, Research Abilities/Data Collection/Organizing Data/Tools/Analysis.
5. **Group Discussion** – Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Coherence.
6. **Presentation Skills** – Oral presentations (individual and group) through JAM sessions/Seminars, Written Presentations through Projects/ PPTs/e-mails etc
7. **Interview Skills** – Concept and Process, Pre-Interview Planning, Opening Strategies, Answering Strategies, Interview through Telephone and Video-Conferencing.

Suggested Software:
The software consisting of the prescribed topics elaborated above should be procured and used.
Suggested Software:
- Clarity Pronunciation Power – part II
- Oxford Advanced Learner's Compass, 7th Edition
- DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
- The following software from ‚train2success.com'

i.   Preparing for being Interviewed,

ii.   Positive Thinking,

iii.   Interviewing Skills,

iv.   Telephone Skills,

v.   Time Management

vi.   Team Building,

vii.   Decision making

- English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

Text Books:

1. Technical Communication by Meenakshi Raman &Sangeeta Sharma, Oxford University Press 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D, and Pearson Education 2011.
3. English Language Communication : A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.
4. English Vocabulary in Use series, Cambridge University Press 2008.
5. Management Shapers Series by Universities Press(India)Pvt Ltd., Himayatnagar, Hyderabad 2008.
6. Communication Skills by LeenaSen, PHI Learning Pvt Ltd., New Delhi, 2009.
7. Handbook for Technical Writing by David A McMurrey& Joanne Buckely CENGAGE Learning 2008.
8. Job Hunting by ColmDownes, Cambridge University Press 2008.
9. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
10. English for Technical Communication for Engineering Students, AyshaVishhwamohan, Tata McGraw-Hil 2009.
11. Books on TOEFL/GRE/GMAT/CAT/ IELTS by Barron's/DELTA/Cambridge University Press.
12. International English for Call Centres by Barry Tomalin and Suhashini Thomas, Macmillan Publishers, 2009.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-I Sem

L	T	P/D	C
0	0	0	2

INDUSTRY ORIENTED MINI PROJECT

- Industry oriented mini project is a summer internship/training taken up by the students during their summer vacation after B. Tech. III year.
- Summer internship is planned to expose students to industrial practices.
- Students have to correlate the theory in classroom to the procedures adopted in construction.
- Students have to maintain a diary on the work carried out during their training at the industry and submit a detailed report of their experience within a month after joining for their B. Tech. IV year I semester and present a seminar.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B. Tech. Civil – II Sem

L	T	P/D	C
3	0	0	3

COMPUTATIONAL FLUID DYNAMICS
(OPEN ELECTIVE -II)

PREREQUISITES: Engineering Mechanics, Fluid Mechanics & Hydraulic Machinery and Finite Element Methods

COURSE OBJECTIVES:
The objectives of this course are to:
- Perceive the students with the knowledge base essential for application of computational fluid dynamics to engineering flow problems and Provide the essential numerical background for solving the partial differential equations governing the fluid flow
- Develop students' skills in implementing concepts of FDM and solve problems in explicit and implicit methods.
- Calculate errors and stability by hyperbolic and elliptic equations
- Analyze steam flow and can formulate vorticity, boundary layer theory and buoyancy.
- Develop the concepts of space marching relocation, the alternating direction implicit techniques etc.

COURSE OUTCOMES:
After completion of this course, the student will be able to:
- Solve a physical problemby numerical methods, the graduate will be able to differentiate between FDM, FEM, FVM and understand the concept of CFD.
- Implement concepts of finite difference equations and solve problems by explicit and implicit methods
- Analyze errors and find the stability by hyperbolic and elliptic equations. The student will do a detailed review of equations governing fluid flow and heat transfer.
- Analyze about steam flow and can formulate vorticity, boundary layer theory, buoyancy.
- Solve simple CFD problems by techniques like space marching relocation, the alternating direction implicit techniques, pressure correction technique and computer graphic techniques.

UNIT-I
Introduction: Methods to solve a physical problem – numerical methods – brief comparison between FDM, FEM & FVM – Applied numerical methods – Finite difference applications in heat conduction and convention, heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction – Finitedifference application in convective heat transfer.

UNIT-II
Finite Differences: Discretization, consistency, stability and fundamentals of fluid flow modeling – Introduction to elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT-III
Errors and Stability Analysis: Introduction – First order wave equation, stability of hyperbolic and elliptic equations – Fundamentals of fluid flow modeling – Conservative property – The upwind scheme.
Review of Equations Governing Fluid Flow and Heat Transfer: Introduction – Conservation of mass Newton's second law of motion – Expanded forms of Navier-stokes equations, conservation of energy principle, special forms of the Navier stokes equations.

UNIT-IV
Steady Flow: Dimensional form of momentum and energy equations, Navier stokes equation, and conservative body force fields – Stream function – Vorticity formulation – Boundary layer theory, buoyancy, driven convection and stability.

UNIT-V
Simple CFD Techniques: Viscous flows – Conservation from space marching relocation techniques – Artificial viscosity – The alternating direction implicit techniques, pressure correction technique, computer graphic techniques used in CFD – Quasi one dimensional flow through a nozzle, turbulence models, standard and high Reynolds number models and their applications.

TEXT BOOKS
1. An Introduction to Computational Fluid Dynamics: The Finite Volume Method, Versteeg. H.K., and Malalasekera W, Longman Publications.
2. Computational Fluid Flow and Heat Transfer, Muralidhar.K and Sundararajan T, Narosa Publishing House, New Delhi.
3. Computational Fluid Dynamics, J Chung, Cambridge, University Press India.

REFERENCE BOOKS
1. Numerical Heat Transfer and Fluid Flow, Patankar. S.V., Taylor and Francis.
2. Computational Fluid Mechanics and Heat Transfer, Ronnie Anderson, CRC Press.
3. Computational Aerodynamics And Fluid Dynamics An Introduction, Jean-Jacques Chattot Springer.
4. Essential Computational Fluid Dynamics, Olegzikanov, Wiley Publications India.
5. Pradip, Niyogi S.K. Chakrabartty, M.K. LahaIntroduction To Computational FluidDynamics, ,Pearson Education Limited.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

NEGOTIATION SKILLS
(OPEN ELECTIVE-II)

Course Objectives:

- To familiarize the students with various negotiation approaches and styles.
- Understand & develop effective strategies for each stage of a negotiation
- Identify Cross – cultural challenges that arise in negotiations
- Enhance communication skills, emphasizing effective listening, persuasion & relationship building
- Strengthen creative ability to expand the option for resolving a dispute.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Describe negotiation theories,concepts and tactics to manage negotiations
- Explain the importance of various factors impacting negotiations.
- Apply effective negotiation strategies and tactics for different scenarios
- Identify negotiation practices towards building relationships
- Valuate various conflict resolution strategies.

UNIT-I
Introduction to Negotiation:Introduction, Concept of Negotiation, Characteristics of a Negotiating Situation, Basic Negotiation Skills, Interpersonal Skills in Negotiation, Theories of Negotiation.

UNIT-II
Types of Negotiation: Types of Negotiation, Principles of Negotiation, Steps of Negotiation, Win-Win Negotiation, Negotiation Tactics, Factors Affecting Success in Negotiation.

UNIT-III
Strategies of Negotiation: Fundamentals of Negotiation, Effective Strategies to develop Negotiation Skills, Anchoring / BATNA, Process of Negotiation and Negotiation Phases.

UNIT-IV
Improving Negotiation skills: Enhancing   Communication skills for effective   Listening, Persuasion & Relationship Building, establishing Trust-Building Relationships.

UNIT-V
Managing Negotiation: Managing Different Types of Negotiations**,** Cross –Cultural Challenges in Negotiations, Industrial Negotiation: Collective Bargaining, Arbitration, Origins of Conflict, Dispute Resolution.

TEXT BOOK

1. Fredluthans, Organizational Behavior, 9[th]ed, Prentice Hall.
2. Roger Fischer, Essentials of Negotiations, Harward Business School Press.

REFERENCE BOOKS

1.Beverly DeMarr and Suzanne De Janasz, Negotiation and Dispute Resolution, Prentice Hall, 2013.

2. Roy J Lewicki, Bruce Barry, and David M Saunders, Essentials of Negotiation, 5th Edition, McGraw Hill, 2011

3. Malhotra, Deepak, Negotiating the Impossible: How to Break Deadlocks and Resolve ugly Conflicts (without money or muscle). Oakland, CA: Berrett-Koehler Publishers, 2016.

4. Fatima, Shaheed; Kraus, Sarit; Wooldridge, Michael, Principles of Automated Negotiation. Cambridge, UK; New York: Cambridge University Press, 2015.

5. Subramanian, Guhan, Dealmaking: New Dealmaking Strategies for a Competitive Marketplace. New York: W. W. Norton & Company, 2011.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

COMPUTER GRAPHICS
(OPEN ELECTIVE-II)

Prerequisites: Any programming language, mathematics –I and data structures.

Course Objectives:

• To exemplify the major computer graphics application areas.
• To create computer models of 2D And 3D objects using mathematical knowledge and skills.
• Understanding the 2D and 3D transforms
• Introducing the curves and surface
• Concepts of illumination and shading

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• To discriminate the various structures of Computer Graphics system.
• To analyze basic principles of implementing Computer Graphics primitives.
• To compare and contrast between implementation of 2D and 3D Transformations.
• To differentiate the techniques for representing 3D geometrical objects.
• To analyze requirements and constraints for hidden surface removal and rendering methods.

UNIT-I

Introduction: Computer-Aided design, Presentation graphics, Computer Art, Entertainment, Education and Training, Visualization, Image processing, Graphics user interfaces.

Graphics Systems: Video display devices, Raster scan systems, Random scan systems, Input devices, Hard-copy devices, Graphics software

UNIT-II

Basic Graphic algorithms: Overview, Scan converting lines, Scan converting Circles, Scan converting Ellipse, Filling polygons, Clipping lines (Cohen Sutherland & Liang Barsky), Clipping polygons (Sutherland Hodgeman).

UNIT-III

Geometrical Transformations: 2D Transformation (Translation, Rotation, Scaling, Shearing & reflection), Homogeneous co-ordinates and matrix representation of 2D transformations, Composition of 2D transformations, the window-to-view port transformation. **3D Transformations**: Matrix representation of 3D Transformations

(Translation, Rotation, Scaling, Shearing & reflection).

UNIT-IV

Viewing in 3D: Projections, Specifying an arbitrary 3D view, Examples of 3D viewing
Curves and surfaces: Polygon meshes, Hermite curves, Bezier curves, Bezier surfaces, B-Spline surfaces.

UNIT-V

Visible surface determination: classification of visible surface determination algorithms (Back -Face Detection, Depth-Buffer, Scan line), BSP- Tree Method and Octree Method.
Illumination and Shading: Illumination models (Ambient Light, Diffuse & Specular Reflection and Phong Model), Shading models for Polygons (Gouraud&Phong).

TEXT BOOKS

1. Donald Hearn and M. Pauline Baker, Computer Graphics C version, 2nd Edition, Pearson, 2011.

REFERENCE BOOKS

1. Foley, Van Dam, Feiner, Hughes, Computer Graphics Principles and Practice in C, 2nd Edition, Pearson, 2013.
2. D.F. Rogers, Procedural Elements for Computer Graphics, 2nd Edition.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

PROJECT MANAGEMENT
(OPEN ELECTIVE-III)

Course Objectives:

- To understand the concept of Project Management.
- To know about the different approaches to project screening and planning.
- To explain about the factors of risk involved in project execution.
- To understand about team leading and functional cooperation.
- To know about the project performance and future trends in the project management.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

- Explain about the life cycle and other concepts of Project Management.
- Apply different approaches to project screening and planning
- Analyze different risk factors in project execution
- Estimate how to lead a team, to get functional cooperation
- Build performance evaluation reports and future trends in project management.

UNIT-I
Introduction: Meaning, Need, Principles Project Lifecycle and itsPhases, Project Management Research in brief, Project Management today, Organization strategy and structure and culture, Format of organization structure, Stake holder Management, Organization Culture, creating a culture for Project Management

UNIT-II
Project Identification and Planning: Defining the project, Project Identification Process, Approaches to Project Screening and Selection, Project Planning, Work Breakdown Structure, Financial Module, Getting Approval and Compiling a Project Charter, setting up a Monitoring and Controlling Process.

UNIT-III
Project Execution: Initiating the Project, Controlling and Reporting Project Objectives, Conducting project evaluation, Risk, Risk Management Factors, Project Management, Four Stage Process, Risk Management an Integrated Approach, Cost Management, Creating a Project Budget.

UNIT-IV
Leading Project Teams: Building a Project Team, Characteristics of an effective Project Team, achievingCross- Functional Co-operation, Virtual Project Teams, Conflicts Management, Negotiations.

UNIT-V

Performance Measurement and Evaluation: Monitoring Project Performances, Project Control Cycles,Earned Value Management, Human factors in Project Evaluation and Control, Project Termination, Typesof Project Terminations, Project Follow-up. Current and Future Trends in Project Management.

TEXT BOOKS

1. Gray, Larson, Project Management, Tata McGraw Hill,2015

2. Jeffery K.Pinto, Project Management,Pearson Education,2015

REFERENCE BOOKS

1. EnzoFrigenti, Project Management, Kogan, 2015
2. R. Panneerselvam& P. Senthil Kumar, Project Management, PHI, 2015
3. Thomas M. Cappels, Financially Focused Project Management, SPD, 2008.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

DATABASE MANGEMENT SYSTEM
(OPEN ELECTIV-III)

Prerequisites: Any programming language.

Course Objectives:

• To provide a sound introduction to Database management systems, Databases and its applications,
• To familiarize the participant to give a good formal foundation on the relational model of data
• To present SQL and procedural interfaces to SQL comprehensively
• To give an introduction to systematic database design approaches conceptual design, logical design ,schema refinement and physical design
• To introduce the concepts of transactions and transaction   are processing and   the issues and techniques relating to concurrency and recovery manager.

Course Outcomes:

On successful completion of this course, it is expected that the students will be able to,

• Design Entity-Relationship Model for enterprise level databases.
• Develop the database and provide restricted access to different users of database and formulate the Complex SQL queries.
• Analyze various Relational Formal Query Languages and various Normal forms to carry out Schema refinement
• Use of suitable Indices and Hashing mechanisms for real time implementation.
• Ability to analyze various concurrency control protocols and working principles of recovery algorithms.

UNIT-I

Introduction to Database System Concepts: Database-System Applications, Purpose of Database Systems, View of Data, Database Language, Database Design, Database Architecture, Database Users and Administrators.

Introduction to the Relation Models and Database Design using ER Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues, Extended E-R Features,

UNIT-II

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions Nested Sub queries, Modification of the Database.

Intermediate and Advanced SQL: Join Expressions, Views, Integrity Constraints, SQL

Data Types, Authorization. Functions and Procedures, Trigger

UNIT-III

Formal Relational Query Languages: The Relational Algebra, Tuple Relational Calculus, The Domain Relational Calculus.

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Decomposition Using Multi valued Dependencies, More Normal Forms.

UNIT-IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+-Tree Index Files, B+-Tree Extensions, Multiple-Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices.

Transactions: Transaction Concept, A Simple Transaction Model, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels.

UNIT-V

Concurrency Control: Lock-Based Protocols, Deadlock Handling, Multiple Granularity, Timestamp-Based Protocols, Validation-Based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, ARIES, Remote Backup Systems.

TEXT BOOKS

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts,
2. Sixth Edition, Tata McGraw-Hill 2006.
3. Raghu Rama Kirshna, Johannes Gchrke, Database Management System, Third
4. Edition, TATA MC Graw Hill, 2003.

REFERENCE BOOKS

1. Peter Rob & Carlos Coronel, Data base Systems design, Implementation and
   a. Management, 7th Edition, 2007.
2. RamezElmasri, Shamkanth B. Navrate, Fundamentals of Database Systems, Pearson
   a. Education, 2008.
3. C.J. Date ,Introduction to Database Systems, Pearson Education

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
3	0	0	3

NANO SCIENCE AND NANO TECHNOLOGY
(OPEN ELECTIVE-III)

Course Objectives:

- Providethe most exciting and novel properties at Nano scale regime
- Explain the interdisciplinary issues in Nano scale science and technology.
- Discuss about the basics of nanotechnology
- Classify and explain the various properties of nanomaterial's
- Describe the various methods for synthesis of nanomaterial's and their applications

COURSE OUTCOMES:

The student will be able to

- Explain the concepts and applications of nanotechnology and the growth techniques of nanomaterials.
- Apply the materials in the Nano scale.
- Discuss about Synthesis Techniques of nanomaterials.
- Classify the different characterization techniques of nanomaterial's
- Explain the applications in the fields of automobiles, textiles and energy

UNIT-I

Introduction: History and Scope, Can Small Things Make a Big Difference?

Quantum confinement, Surface area to Volume ratio,Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges and Future Prospects.

UNIT-II

Unique Properties of Nanomaterials: Microstructure and Defects in Nanocrystalline Materials:Dislocations, Twins,stacking faults and voids, Grain Boundaries,triple and disclinations. **Effect of Nano-dimensions on Materials Behavior:** Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility. **MagneticProperties**: Soft magnetic nanocrystalline alloy, Permanent magnetic nanocrystallinematerials,Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties and Mechanical Properties.

UNIT-III

Synthesis Routes: Bottom up approaches: Physical Vapor Deposition, Inert GasCondensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy,

Sol-gel method,Self-assembly, **Top down approaches:** Mechanical alloying, Nano-lithography.

Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Coldisostatic pressing Spark plasma sintering.

UNIT-IV

Tools to Characterize nanomaterials: X-Ray Diffraction (XRD), Small Angle X-rayscattering (SAXS), Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Ion Microscope (FEM), Three-dimensional Atom Probe (3DAP), Nanoindentation.

UNIT-V

Applications of Nanomaterials: Nano-electronics, Micro- and Nano-electromechanicalsystems (MEMS/NEMS), Nanosensors, Nanocatalysts, Food and Agricultural Industry, Cosmetic and Consumer Goods, Structure and Engineering, Automotive Industry, Water-Treatment and the environment, Nano-medical applications, Textiles, Paints, Energy, Defence and Space Applications, Concerns and challenges of Nanotechnology.

TEXT BOOKS

1. B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday , Text Book of Nano Science and Nano Technology –, University Press-IIM.

2. Charles P. Poole, Jr., and Frank J. Owens,Introduction to Nanotechnology –, Wley India Edition, 2012.

REFERENCE BOOKS

1. B.S. Murthy, P. Shankar, Baldev Raj, B.B. Rath and James Munday , Text Book of Nano Science and Nano Technology –, University Press-IIM.

2. Charles P. Poole, Jr., and Frank J. Owens, Introduction to Nanotechnology –, Wley India Edition, 2012.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem   L   T   P/D   C

                                                     0   0   0   2

COMPREHENSIVE VIVA

Comprehensive viva is intended to train students to face interviews. Students are expected to prepare fundamentals in all core subjects of their branch for taking comprehensive viva.

- It is an oral examination to test the subject knowledge of the student which he gained during the four years of his degree course.

- Three faculty members will be involved in the panel of assessment to evaluate the student's performance. The session marks will be awarded based on his performance.

- The faculty in-charge of the project work will coordinate in all aspects of the comprehension viva.

- Students are to take the guidance, if required, from any faculty of the Department.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
0	0	6	2

TECHNICAL SEMINAR

Student has to select a topic of his / her interest in consultation with the faculty in charge of seminar. He / She can collect information from the books, journals and internet and prepare a report. Make a power point presentation on the topics and present before a committee to evaluate the seminar. Seminar is separate for each student.

- The Objective of technical seminar is to test the students skills on comprehension of any subject of his own interest related to civil engineering profession. It comprises of seminar and report submission.

- The technical seminar will be conducted normally after the I- mid sessional examination of IV yr II-semester

- Three faculty members will be involved in the panel of assessment to evaluate the student's performance. The sessional marks will be awarded based on the seminar and report.

- The faculty in-charge of the project work will coordinate in all aspects of the technical seminar.

- Students are to take the guidance, if required from their guide of project work.

ANURAG GROUP OF INSTITUTIONS
(AUTONOMOUS)

IV Year B.Tech. Civil-II Sem

L	T	P/D	C
0	0	15	10

PROJECT WORK

A graduate is expected to contribute to the industry in various specializations of civil engineering as soon as joining in the industry. Hence it is essential to have training in any one of the specialized areas by taking up a project work.