J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad(M), RR Dist , Telangana-500075
CIVIL ENGINEERING
COURSE STRUCTURE – R14

I B.Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	C110A	English	3	0-0-0	3
2	C110B	Mathematics-I	4	1-0-0	4
3	C110D	Applied chemistry	3	1-0-0	3
4	C115A	Computer programming	3	1-0-0	3
5	C113A	Engineering Drawing-I	1	0-0-3	3
6	C1103	Engineering chemistry lab	0	0-3-0	2
7	C1101	Computer programming lab	0	0-3-0	2
8	C1104	Engineering Workshop	0	0-3-0	2
9	C1105	English Lab	0	0-3-0	2
		Total	**14**	**3-12-3**	**24**

I B.Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	C120A	Technical English	3	0-0-0	3
2	C120B	Mathematics-II	4	1-0-0	4
3	C123A	Engineering Mechanics	4	1-0-0	4
4	C123B	Engineering Drawing-II	1	0-0-3	3
5	C120C	Applied Physics	3	0-0-0	3
6	C125A	Data structures	3	1-0-0	3
7	C1202	Applied Physics Lab	0	0-3-0	2
8	C1201	Data structures Lab	0	0-3-0	2
9	C1205	Engineering & IT workshop	0	0-3-0	2
		Total	**18**	**3-9-3**	**26**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
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CIVIL ENGINEERING
COURSE STRUCTURE – R14

II B.Tech – I Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	C210C	Professional Ethics	3	0-0-0	3
2	C210A	Probability and statistics	3	1-0-0	3
3	C212B	Basic Electrical and Electronics engineering	4	0-0-0	4
4	C211A	Strength of Materials –I	4	1-0-0	4
5	C211B	Surveying	4	0-0-0	4
6	C211C	Fluid Mechanics	3	1-0-0	3
7	C2101	Surveying Lab	0	0-3-0	2
8	C2102	Strength of Materials Lab	0	0-3-0	2
9	C2103	CAD Lab-I	0	0-3-0	2
		Total	**21**	**3-9-0**	**27**

II B.Tech – II Semester

Sl. No.	Code	Subject	L	T-P-D	C
1	C220A	Numerical Methods	3	1-0-0	3
2	C221A	Strength of Materials – II	4	1-0-0	4
3	C221B	Hydraulics & Hydraulic Machinery	4	0-0-0	4
4	C221C	Engineering Geology	3	0-0-0	3
5	C221D	Structural Analysis	4	1-0-0	4
6	C220B	Environmental Studies	3	0-0-0	3
7	C2201	Engineering Geology Lab	0	0-3-0	2
8	C2202	Advanced Surveying Lab	0	0-3-0	2
9	C2203	Comprehensive Assignment	0	0-0-0	2
10	C2204	Gender Sensitization	0	0-0-0	2
		Total	**21**	**3-6-0**	**29**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
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CIVIL ENGINEERING
COURSE STRUCTURE – R14

III B.Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C311A	Design of Reinforced Concrete Structures	4	1-0-0	4
2	C311B	Water Resources Engineering-I	3	0-0-0	3
3	C311C	Concrete Technology	4	1-0-0	4
4	C311D	Geotechnical Engineering –I	4	0-0-0	4
5	C311E	Building Materials, Construction & Planning	4	1-0-0	4
6	**OPEN ELECTIVE:**		3	0-0-0	3
	C311O	Waste Management			
	C311P	Environmental Impact Management			
	C3160	Intellectual Property Rights			
	C3119	Fundamental Operation research			
7	C3101	Fluid Mechanics & Hydraulics Machinery Lab	0	0-3-0	2
8	C3102	Concrete Technology Lab	0	0-3-0	2
		Total	**21**	**3-6-0**	**26**

III B.Tech – II Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C321A	Design of Steel Structures	4	1-0-0	4
2	C321B	Environmental Engineering	3	0-0-0	3
3	C321C	Water Resources Engineering-II	4	0-0-0	4
4	**ELECTIVE - I:**		3	0-0-0	3
	C321D	Construction Technology and Project Management			
	C321E	Advanced Structural Analysis			
	C321F	Urban Disaster Intelligent control system			
	C321G	Watershed Management			
5	C321H	Geotechnical Engineering – II	4	1-0-0	4
6	C321I	Transportation Engineering	4	0-0-0	4
7	C3201	Geotechnical Engineering Lab	0	0-3-0	2
8	C3202	Environmental Engineering Lab	0	0-3-0	2
9	C3203	Industrial Internship	0	0-0-0	2
		Total	**21**	**2-6-0**	**28**

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS
Bhaskar Nagar, Moinabad(M), RR Dist , Telangana-500075

CIVIL ENGINEERING
COURSE STRUCTURE – R14

IV B.Tech – I Semester

Sl. No	Code	Subject	L	T-P-D	C
1	C410A	Management Science For Engineers	4	0-0-0	4
2	C411A	Pavement Design	4	0-0-0	4
3	C411B	Estimating & Costing	4	1-0-0	4
4	**ELECTIVE - II:**		3	0-0-0	3
	C411C	Ground Water Development and Management			
	C411D	Advanced Structural Design			
	C411E	Elements of Earthquake Engineering			
	C411F	Traffic Engineering			
5	**ELECTIVE - III:**		3	0-0-0	3
	C411G	Water Resources Planning and			
	C411H	Finite Element Methods			
	C411I	Disaster Management and Mitigation			
6	C411J	Advanced Foundation Engineering	4	1-0-0	4
7	C4101	Highway Engineering lab	0	0-3-0	2
8	C4103	Soft Skills lab -I	0	0-3-0	2
		Total	**21**	**2-6-0**	**26**

CIVIL ENGINEERING
COURSE STRUCTURE – R14

IV B.Tech – II Semester

Sl.	Code	Subject	L	T-P-D	C
1	C420A	Rehabilitation and Retrofitting of structures	3	0-0-0	3
2	**ELECTIVE - IV:**		3	1-0-0	3
	C420B	Ground Improvement Techniques.			
	C420C	Pre - stressed Concrete Structures.			
	C420D	Airport Planning and Design			
	C420E	Design and Drawing of Irrigation Structures.			
3	**ELECTIVE - V:**		3	1-0-0	3
	C420F	GIS & Remote sensing			
	C420G	Earth& rock fill plans & slope stability			
	C420H	Air pollution and control			
	C420I	Industrial waste water treatment			
4	C4201	Soft skills Lab -II	0	0-3-0	2
5	C4202	Mini Project	0	0-0-0	2
6	C4203	Seminar	0	0-6-0	2
7	C4204	Project Work	0	0-15-0	10
8	C4205	Comprehensive Viva	0	0-0-0	2
		Total	**9**	**2-24-0**	**27**

Note: All End Examinations (Theory and Practical) are of three hours duration.
L – Lecture, T – Tutorial, P – Practical, D – Drawing, C – Credits.
TOTAL CREDITS : 213

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**0-0-0**	**3**

ENGLISH
(Common to all Branches)

UNIT - I:
Academic Vocabulary
-Word Formation   -Word Disintegration/ Synthesis
-Root/Base Word- Word Origin
-Affixation-Prefix & Suffix
-Synonym/Antonym
-Homophone/Homonym/Homograph
Use of Dictionary &Thesaurus
-Phrasal Verbs, Idioms
-One Word Substitutes
-Collocations
-Technical Vocabulary

UNIT II:
Grammar
-Parts of Speech- Introduction to English Grammar
-All about- Noun, Pronoun, Verb, Adverb
- Adjective, Preposition, Conjunction, Interjection
- Articles- Use of Articles A, An and The.
-Punctuations
Tenses
-Tenses in English
-Use of appropriate Tenses in different contexts
-Use of Tenses in Narration

UNIT - III:
Improving Reading Skills
- Reading for Specific Purposes
- Reading for General Information
- Reading for facts
- Reading between/beyond the lines
- Reading for Skimming & Scanning
- Dialogue Reading
- Comprehension

UNIT - IV:
Basics of Writing
-Syntax & Sentence Structure
-Construction of Proper Sentences in English
-Sentences Types- Purposes
-Email Etiquette
-Note Making and Note Taking

UNIT - V:

Common Errors in English

-Subject-Verb Agreement

Text Books:

1. Language In Use - Intermediate: Self-Study Workbook with AnswerKey/2008 Adrian Doff , PB Cambridge University Press.
2. English Vocabulary in Use: Pre-Intermediate & Intermediate(PB +CD ROM)/3rd Edition Stuart Redman Cambridge University Press.

Reference Books:

1. Technical Communication: Principles And Practice (With Dvd) 2nd Edition (English) 2nd Edition Sangeeta Sharma, Meenakshi Raman, Oxford Univesity Press
2. The Fundamental Aspects of Communication Skills/2009,Dr.P.Prasad, S.K Kataria & Sons Active Grammar with Answer Level 1,2&3 Davis Cambridge University Press

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**4**	**1-0-0**	**4**

MATHEMATICS-I
(Common to all branches)

UNIT - I:
Sequences – Series
Basic definitions of Sequences and Series – Convergence and divergence – Ratio test – Comparison test – Integral test – Cauchy's root test – Raabe's test – Absolute and conditional convergence.
Function of Single Variable Rolle's Theorem – Lagrange's Mean Value Theorem – Cauchy's mean value Theorem – Generalized mean value theo- rem (all theorems without proof).

UNIT II:
Function of Several Variables
Functional dependence – Jacobian – Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT - III:
Curve Tracing: Cartesian, polar and parametric curves.
Geometrical applications of Differential Calculus: Radius of Curvature, Centre and Circle of Curvature-Evolutes and Envelopes.

UNIT - IV:
Multiple Integrals: Double and triple integrals – change of order of integration – change of variable

UNIT - V:
Vector Calculus: Gradient-Divergence-Curl and their related properties, Potential function – Laplacian and second order operators. Line integral – work done – surface integrals-Flux of a vector valued functions. Vector integrals theorem: Green's –Stoke's and Gauss's Divergence Theorems (Statement & their verification).

Text Books:
1. Higher Engineering Mathematics: Grewal B.S, Khanna publications, 42nd edition 2012
2. Advanced Engineering Mathematics**:** Jain and S.R.K. Iyangar, Narosa Publications.

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

APPLIED CHEMISTRY
(Common to CE, ME, MIE)

UNIT - I:
Electrochemistry and Batteries: Concept of Electrochemistry, Conductance-Electrolyte in solution, Conductance-Specific, Equivalent and molar conductance, Kolrausch's Law, application of conductance. EMF: Galvanic Cells, Reference Electrode, Nernst equation, galvanic series, Application of EMF measurements. Batteries: Primary and secondary cells, (Lead-Acid cell, Ni-Cd cell, Lithium cells). Applications of batteries. Fuel cells – Hydrogen – Oxygen fuel cells, advantages of fuel cells.

UNIT II: Polymers: Introduction-classification-natural and synthetic polymers; Types of Polymerization (Chain growth & Step growth). Plastics: Thermoplastic & Thermoset resins. Engineering applications of: Teflon, Bakelite, Nylon. Con- ducting polymers- Poly acetylene, polyaniline- conduction, doping, and its application. Fibers – polyester, fiber reinforced plastics (FRP), applications.

UNIT - III: Energy sources: Introduction- fuels, classification – conventional fuels (solid, liquid, gaseous). Calorific value-HCV and LCV. Solid fuels – coal –processing of coal. Liquid fuels – primary – petroleum – refining of petroleum-cracking knocking synthetic petrol – Bergius and Fischer-tropsech's process.

UNIT - IV: Water Technology: Introduction, Hardness: Causes, expression of hardness – units – types of hardness, estimation of temporary & permanent hardness of water. Boiler troubles – Scale & sludge formation, caustic embrittlement, corrosion, priming & foaming Softening of water (Internal & external Treatment-Lime soda, Zeolites, Ion exchange process) Reverse osmosis, electro dialysis.

UNIT - V: Phase rule: Introduction- Phase rule equation –terms involved. One Component system-water system. Two component system- Pd-Ag System and Fe-carbon system. Hardening and annealing.
Nanochemistry : Introduction. Synthesis: Top down and bottom up processes, Properties and Applications and future prospects.

Text Books:
1. **Engineering Chemistry** – Shasi Chawla, Dhantpat Rai publishing Company, New Delhi (2008).
2. **Engineering Chemistry** by S.S. Dara & Mukkati S. Chand & Co,NewDelhi (2006)

Reference Books:
1. **Engineering Chemistry** by P.C Jain & Monica Jain, Dhanpatrai Publishing Company (2008).
2. **Engineering Chemistry** by B. Siva Shankar Mc.Graw Hill Publishing Company Limited, New Delhi (2006)
3. **Engineering Chemistry** J.C. Kuriacase & J. Rajaram, Tata McGraw Hills co., New Delhi (2004).

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**3**	**1-0-0**	**3**

COMPUTER PROGRAMMING
(Common to all branches)

UNIT - I:
Computer fundamentals-Hardware, software, computer language, translators, Compiler, Interpreter, Loader, and linker, Program Development steps- Algorithms, Pseudo code, flow charts, Specification for Converting Algorithms into Programs basic, Introduction to C Language – History, Simple C Pro- gram, Structure of a C Program, Identifiers, Basic data types, user defined data types, Variables, Constants, type qualifiers, Managing Input / Output, Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversions, Simple C Programming examples.

UNIT II:
Selection Statements – if and switch statements, Repetitive statements – while, for, do-while statements, C Programming examples, other statements related to looping – break continue, go to, C Programming examples. Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays, C programming examples.

UNIT - III:
Introduction to Structured Programming, Functions- basics, user defined functions, inter function communication, Standard functions, Storage classes-auto, register, static, extern, scope rules, arrays to functions, recursive functions, example C programs. Command line arguments in C. Strings – Basic concepts, String Input / Output functions, arrays of strings, string handling functions, strings to functions, C programming examples.

UNIT - IV:
Derived types – Structures – Basic concepts, nested structures, arrays of structures, structures and functions, unions, bit fields, C programming examples. Pointers – Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self-referential structures, example C programs.

UNIT - V:
Introduction Using Files in C, Declaration of File Pointer, Opening a File, Closing and Flushing Files, Working with Text Files, Character Input and Output, End of File (EOF). Creating header file and using in the C Pro- gram. Working with Binary Files, Direct File Input and Output, Sequential Versus Random File Access, Files of Records, working with Files of Records, Random Access to Files of Records, Other File Management Functions, Deleting a File Renaming a File. Low-Level I/O. Working with C graphics functions.

Text Books:
1. **Programming in C.** P. Dey and M Ghosh, Oxford University Press.
2. **The C Programming Language**, by Brian W. Kernighan, Dennis M. Ritchie

Reference Books:
1. **C programming** A Problem-Solving Approach by Behrouz A.Forouzan
2. **Programming with C**, B.Gottfried, 3rd edition, Schaum's outlines, TMH.
3. **Graphics Under C** by Yashavant Kanetkar, BPB Publications, 2003**4.**

Programming in C – Stephen G. Kochan, III Edition, Pearson Education
4.C Programming with problem solving, J.A. Jones & K. Harrow,Dreamtech Press

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	L	T-P-D	C
I Year - I Semester	1	0-0-3	3

ENGINEERING DRAWING – I
(Common to all branches)

UNIT - I:
Introduction to Engineering Drawing: Principles of Engineering Drawing and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions. **Scales**: Different types of Scales, Plain scales, Vernier Scale, Diagonal Scale, Scales of chords.

UNIT II:
Construction of curves used in engineering practice:
a) Conic Sections , Ellipse- General, Concentric Circle, Arcs of circle and Oblong Method, Parabola- General, Tangent and Rectangle Methods, Hyperbola- general, Point/Rectangle Method
 b) Cycloid, Epicycloid and Hypocycloid
c) Involute for Circle, Rectangle and Triangle

UNIT - III:
Projections Of Points And Lines: Principles of Orthographic Projections –   Conventions – First and Third Angle, Projections of Points and Lines inclined to planes,   True lengths, traces.

UNIT - IV:
Projections of Planes: Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.

UNIT - V: Projections of Planes: Projections of regular Planes, auxiliary planes and Auxiliary projection inclined to both planes.

Text Books:
1. **Engineering Drawing**, N.D. Bhat / Charotar Publishing House, 2014, 53rd Edition.
2. **Engineering Drawing and Graphics**, Venugopal / New age.,2010

Reference Books:
1. **Engineering drawing** – P.J. Shah.S.Chand.,2007
2. **Engineering Drawing**, Narayana and Kannaiah / Scitech publishers.
3. **Engineering Drawing**- Johle/Tata Macgraw Hill.,2002

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

ENGINEERING CHEMISTRY LAB
(Common to CE, ME, MIE)

List of Experiments:

Introduction: ·

Laboratory safety and precautions. · Preparation of solution. Determination of unknown concentration of given solutions and calculations.

1. Estimation of hardness of water by EDTA method.
2. Determination of percentage purity of pyrolusite.
3. Conductometric titration of strong acid Vs strong base.
4. Effect of dilution on conductance for i) Strong acids, ii) weak acids and iii) Ionic salts.
5. Determination of ferrous iron in cement by colorimetric method
6. Estimation of Copper by Colorimetric method.
7. Determination of viscosity of sample oil by Oswald's viscometer
8. Determination Surface Tension of given unknown liquid using stalganometer
9. Preparation of organic compound Asprin.
10. Preparation of Thiokol rubber

Text Books:

1. **Practical Engineering Chemistry** by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. **Engineering chemistry** by R. N. Goyal and Harrmendra Goel.

Reference Books:

1. **Inorganic quantitative analysis,** Vogel.
2. **Experiments and calculation Engg.** S.S. Dara.
3 **Instrumental methods of chemical analysis, Chatwal**, Anand, Himalaya Publications.

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

COMPUTER PROGRAMMING LAB
(Common to all branches)

EXPERIMENT – I:

Simple C programs to implement basic arithmetic operations – sum, aver- age, product, smallest, largest of the numbers, difference, quotient and remainder of given numbers etc.

EXPERIMENT- II:

Programs on if, else-if, nested if, else if ladder - largest and smallest of given numbers, to find the grade of a student based on marks, roots of a quadratic equation etc.

EXPERIMENT - III:

1. Programs on switch-case – to check the type of a given character, to find the grade of a student etc.
2. Programs on while and do-while- to find factorial, Fibonacci series, GCD, Sin(x), Cos(x) series, to check whether a given number is an Armstrong, Palindrome, Perfect, number conversion, and Prime number etc.

EXPERIMENT - IV:

Programs on "for loop" - sum of n natural numbers, factorial, sin(x), to generate Pascal's triangle etc

EXPERIMENT - V:

1. Programs on nested loops – check for Fibonacci prime, Pyramids of numbers, generation of prime numbers in the given range, multiplication table etc.
2. Programs using break, go to, continue.

EXPERIMENT -VI:

1. Programs on 1-D array-finding Minimum and maximum element, Sorting and Searching etc.
2. Programs on 2-D array – Sum, product and Multiplication of two Matrices etc.

EXPERIMENT – VII:

1. Programs on Functions-Implementation of user defined functions categories, passing of arrays to functions etc.
2. Programs on recursion - factorial of a given integer, GCD of two given integers etc.

EXPERIMENT - VIII

1. Programs on String Handling Functions-Copying, reverse, substring, concatenation.
2. Programs on structure and unions.

EXPERIMENT-IX:

Programs using pointers- pointer basic operations, pointers and functions etc.

EXPERIMENT X :

Programs on pointers and structures, Pointers and arrays, pointers and strings.

EXPERIMENT XI:

Programs on Files-Implementation of file handling functions. Programs on files error handling. Programs on Dynamic memory allocation.

EXPERIMENT XII:

Programs on command line arguments. Programs on preprocessor directives.

EXPERIMENT XIII:

Program draws basic shapes such as circle, line, rectangle, ellipse and dis- play text on screen using c graphics. Smiling face Animation using c graph- ics displaying face at random position on screen.

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - I Semester	**0**	**0-3-0**	**2**

ENGINEERING WORKSHOP

(Common to all branches)

TRADES FOR EXPERIMENTS :

Three exercises from each trade

- (i)   Carpentry
- (ii)   Fitting
- (iii)   Black Smithy
- (iv)   Welding
- (v) Power Tools in Construction, Wood working, Electrical Engineering works and Mechanical Engineering

Trades for Demonstration & Exposure

- (vi)   Plumbing

TEXT BOOKS:

1.   **Work shop manual**-P.Kannaiah, K.Narayana, Scitech Publishers
2.   **Workshop Manual**-Venkat Reddy

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**
I Year - I Semester   **0**   **0-3-0**   **2**

ENGLISH LAB
(Common to all branches)

MULTI- MEDIA LANGUAGE LAB

Experiment/ Activity- 1   Introduction to Phonetics
Experiment/ Activity- 2   Sounds of English - Vowels, Diphthongs
Experiment/ Activity- 3   Consonants
Experiment/ Activity- 4   Introduction to Stress, Rhythm and Intonation
Experiment/ Activity-5   Improving Listening Skills

ENGLISH COMMUNICATION SKILLS LAB

Experiment/ Activity- 6   Self Introduction,
Experiment/ Activity- 7   Introducing others
Experiment/ Activity- 8   Agreeing/Disagreeing and Asking questions
Experiment/ Activity- 9   Just A Minute' Sessions (JAM) & Situational Dialogues
Experiment/ Activity- 10   Describing Objects / Situations / People.
Experiment/ Activity- 11   Oral Presentations - Prepared and Extempore
Experiment/ Activity- 12   Debate

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**0-0-0**	**3**

TECHNICAL ENGLISH
(Common to all branches)

UNIT - I:
Formal & Informal Writing Formal & Informal Writing, Cover Letter

UNIT II:
Writing Techniques -Developing Paragraphs- Cohesion-Developing passage by arranging paragraphs

UNIT - III:
Official Correspondence - Types of Business Correspondence -Technical Vocabulary, Report writing, Applications, Complaints & Requisitions

UNIT - IV:
e-Writing   e-Mail Etiquette

UNIT - V:
Presentation Skills
     - Paper, Seminars, Conferences, Symposia, Workshop presentation
     - Power Point Presentation (Microsoft Office Suit)
     -Project Proposal Presentation

Text Books:
1. **Language in Use - Intermediate: Self-Study Workbook with An- swer Key/2008** Adrian Doff, PB Cambridge University Press.
2. **English Vocabulary in Use: Pre-Intermediate & Intermediate** (PB +CD ROM)/3rd Edition Stuart Redman Cambridge University Press.

Reference Books:
1. **Technical Communication: Principles and Practice** (With Dvd) 2nd Edition (English) 2nd Edition Sangeeta Sharma, Meenakshi Raman, Oxford Univesity Press
2. **The Fundamental Aspects of Communication Skills** /2009, Dr.P. Prasad, S.K Kataria & Sons **Active Grammar with Answer Level**
   1, 2 &3 Davis Cambridge University Press

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

MATHEMATICS – II
(Common to all branches)

UNIT - I:
Differential equations of first order and their applications
Overview of differential equations – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories
Higher Order Linear differential equations and their applications: Linear differential equations of second and higher order with constant coefficients, RHS term of the $f(X)=e^{ax}$, Cosax, Sinax, x^n, e^{ax} $V(x)$, x^n $V(x)$ and method of variation of parameters. Applications on bending of beams, Electrical circuits, simple harmonic motion.

UNIT II:
Laplace transform and its application to Ordinary differential equations Laplace transform of standard functions – Inverse transform – first shifting theorem, Transforms of derivatives and integrals – Unit step function – second shifting theorem –Convolution Theorem-Periodic function – differentiation and integration of Transforms-Application of Laplace transforms to ordinary differential equations.

UNIT - III: Fourier Series
Determination of Fourier coefficients – Fourier series – even and odd functions
– Fourier series in an arbitrary interval- even and odd periodic continuation – Half-range Fourier sine and cosine expansions.

UNIT - IV:
Transforms Fourier Transform: Fourier integral theorem – Fourier sine and cosine integrals. Fourier transforms – Fourier sine and cosine transforms
– properties – inverse transforms – Finite Fourier transforms, Parseval's formula.
Z-Transform: Z-Transform-Properties-Damping rule-shifting rule-Initial & Final value theorems-convolution theorem –solution of difference equations by Z-transform.

UNIT - V:
Partial differential equations Introduction and Formation of partial equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (Standard type) Equations-Classification of PDE-Finite difference methods for: Elliptic, Hyperbolic & Parabolic equations-solution of Heat equation (one dimensional)

TEXT BOOKS:
1. Grewal B.S, "Higher Engineering Mathematics", Khanna publications, 42nd edition 2012
2. Advanced Engineering Mathematics by Jain and S.R.K. Iyengar, Narosa Publications.
REFERENCE BOOKS:
1. Engineering Mathematics-I: B.V.Ramana, Tata Mc Graw Hill Publishing Co. Ltd., New Delhi. 5th edition, 2011.
2. Engineering Mathematics-I, Mathematical Methods by T.K.V. Iyengar & B.Krishna Gandhi & Others, S.Chand

3. Engineering Mathematics-I, Mathematical methods' by G.Shankar Rao, I.K.International Publications.

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**4**	**1-0-0**	**4**

ENGINEERING MECHANICS
(Common to CE, ME & MIE)

UNIT - I:
Introduction to Engineering Mechanics–Basic Concepts. Systems of Forces: Coplanar Concurrent Forces–Forces in Space–Moment of Force and its Application–Couples and Resultant of Force Systems.
Equilibrium of Force Systems: Free Body Diagrams, Equations of Equilibrium - Equilibrium of planar Systems -Equilibrium of Spatial Systems.

UNIT II:
Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures
Centre of Gravity: Centre of gravity of simple body (from basic principles), center of gravity of composite bodies, pappus theorem.

UNIT - III:
Area moment of Inertia: Definition–Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT - IV:
Kinematics: Rectilinear and Curvilinear motions–Velocity and Acceleration– Motion of Rigid Body Types and their Analysis in Planar Motion.
Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation– Central Force Motion Equations of Plane Motion–Fixed Axis Rotation–Rolling Bodies.

UNIT - V:
Work–Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System Fixed Axis Rotation and Plane Mo- tion. Impulse momentum method.
Principle of virtual work: Equilibrium of ideal systems, efficiency of simple machines, stable and unstable equilibriums

Text Books:
1. **Engineering. Mechanics** / Timoshenko & Young. TATA McGraw-Hill Education, 5th Edition.
2. **Engineering Mechanics:** Basudev Bhattacharya, Oxford Univ. Press, New Delhi, Second Edition, 2014.

Reference Books:
1. Engineering Mechanics / S.S. Bhavikatti & J.G. Rajasekharappa
2. Engineering Mechanics / Irving. H. Shames Prentice–Hall.
3. Engineering Mechanics Umesh Regl / Tayal.

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**1**	**0-0-3**	**3**

ENGINEERING DRAWING – II
(Common to CIVIL, ME & MIE)

UNIT - I:
Section of right regular solids, -Prism, Cylinder, Pyramid and Cone-Auxiliary Views.

UNIT II:
DEVELOPMENT OF SURFACES: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

UNIT - III:
INTERSECTION OF SOLIDS: - Intersection of Cylinder Vs Cylinder, CylinderVs Prism, Cylinder Vs Cone.

UNIT - IV:
ISOMETRIC PROJECTIONS: Principles of Isometric Projection – Isometric Scale – Isometric Views– Conventions -Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines, Isometric Projection of spherical Parts

UNIT-V:
ORTHOGRAPHIC PROJECTIONS: Conversion of Isometric Views to Orthographic Views – Conventions

Text Books:
1. **Engineering Drawing**, N.D. Bhat / Charotar Publishing House, 2014, 53rd Edition.
2. **Engineering Drawing** and Graphics, Venugopal / New age. 2010

Reference Books:
1. **Engineering drawing** – P.J. Shah.S.Chand.
2. **Engineering Drawing**, Narayana and Kannaiah / Scitech publishers.
3. **Engineering Drawing**- Johle/Tata Macgraw Hill.

B.Tech. CE	L	T-P-D	C
I Year - II Semester	3	0-0-0	3

APPLIED PHYSICS
(Common to CE,ME,MIE)

UNIT - I: Crystallography-Space Lattice**,** Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Packing Factor of SC, BCC, FCC, Diamond structure, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal System.

XRD and its Applications: Basic Principles of XRD, Bragg's Law, X-Ray diffraction methods: Laue Method, Powder Method, and Applications of XRD.

UNIT II: Defects in solids: Vacancies, Substitution, Interstitial, concentration of Frenkel and Schottky Defects (Qualitative), line defects & Burger's Vector.
Principles of Quantum Mechanics:
Waves and Particles, de Broglie Hypothesis, Matter Waves, Davisson and Germer 's Experiment, Physical Significance of the Wave Function, Schrödinger 's Time Independent Wave Equation ——Particle in a One- Dimensional potential well (Zero-point energy).

UNIT - III: Acoustics of Building Basic Requirement of Acoustically Good Hall, Reverberation and Time of Reverberation, Sabine's Formula for reverberation Time (Quantative treatment), Measurement of Absorption Coefficient of a Material, Factors Affecting the Architectural Acoustics and their Remedies.

Ultrasonic's: Concept of ultrasonic wave generation, Properties of Ultrasonic's, Different methods of generation of Ultrasonic's (Piezostriction and Magneto- striction), Applications of ultrasonic.

UNIT - IV: Physical Optics Interference: Types of Interferences, Interference in thin films (reflected light) - Newton's rings. Diffraction: Types of diffraction, Frounhoffer's Diffraction due to single slit Polarization: Introduction to polarization, Double refraction, Nicol's prism.

UNIT-V: Lasers: Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Einstein's Coefficients and Relation between them, Population Inversion, Lasing Action, Ruby Laser, Helium-Neon Laser, Applications of Lasers

Nanotechnology: Origin of Nanotechnology, Nano Scale, Surface to Vol- ume Ratio, Quantum Confinement, Bottom-up Fabrication: Sol-gel, Top-down Fabrication: ChemicalVapour Deposition, Characterization by TEM.

Text Books:
1. **Applied physics** – p.k.mettal (I.K.International Hosesepvt ltd (New edition)
2. **Engineering Physics**-P.K Palaniswamy (-(Scitech Publications India) Pvt Ltd, Fifth Print 2010.)

Reference Books:
1. **Applied Physics** for Engineers – A.J. Dekker (Macmillan).
2. **Solid State Physics** –S.O.Pillai
3. **Solid State Physics** – M. Armugam (Anuradha Publications).

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B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**3**	**1-0-0**	**3**

DATA STRUCTURES
(Common to all branches)

UNIT - I: Data Structures – Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

UNIT II: Stacks-Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation. Queues-operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue

UNIT - III: Trees – Definitions, Binary tree representation, Binary search tree, binary tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

UNIT - IV: Graphs: Terminology, sequential and linked representation, graph traversals : Depth First Search & Breadth First Search implementation. Spanning trees, Prims and Kruskals method.

UNIT-V: Searching and Sorting – Big O Notation, Sorting- selection sort, bubble sort, insertion sort, quick sort, merge sort, Searching-linear and binary search methods.

Text Books:
1. **Data Structures Using C** Reema Thareja, Oxford University Press,2011 Learning.
2. **Data Structures Using C** (Paperback) by Aaron M. Tenenbaum

Reference Books:
1. **C Programming & Data Structures**, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage
2. **C& Data structures** – P. Padmanabham, Third Edition, B.S. Publications.
3. **Data Structures using C** – A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education

	L	T-P-D	C
B.Tech. CE			
I Year - II Semester	0	0-3-0	2

APPLIED PHYSICS LAB
(Common to CE,ME,MIE)

EXPERIMENT- I: Dispersive power of the material of a prism – Spectrometer

EXPERIMENT- II: Newton's Rings - Radius of curvature of plano convex lens.

EXPERIMENT- III: Frequency of ACSupply by Using Sonometer.

EXPERIMENT- IV : Time constant of an R-C circuit.

EXPERIMENT- V: Time constant of an LCR circuit.

EXPERIMENT- VI: Diffraction Grating using LASER

EXPERIMENT- VII: Torsional pendulum.

EXPERIMENT- VIII: Study the characteristics of LASER source

EXPERIMENT- IX: Study the characteristics of Light emitting diode.

EXPERIMENT- X: Analysis of XRD Spectra.

EXPERIMENT- XI: Energy gap of Semiconductor

EXPERIMENT- XII: Evaluation of numerical aperture of given fiber.

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

DATA STRUCTURES LAB
(Common to all branches)

EXPERIMENT - 1:

Write a C program that uses functions to perform the following operations on singly linked list:

I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists

EXPERIMENT – 2:

Write a C program that uses functions to perform the following operations on doubly linked list.

Creation II) Insertion III) Deletion IV) Traversal

EXPERIMENT - 3:

Write a C program that uses functions to perform the following operations on circular linked list:

I) Creation II) Insertion III) Deletion IV) Traversal

EXPERIMENT - 4:

Write a C program that implement stack operations using

I) Arrays   II) Linked Lists

EXPERIMENT - 5:

I) Write a C program to convert infix expression to postfix expression using stack

II) Write a C program to evaluate postfix expression

EXPERIMENT - 6:

I) Programs using recursion

II) Write a C program to convert infix expression to prefix expression using stack

EXPERIMENT - 7:

Write a C program to implement Linear queue using

I) Arrays   II) Linked Lists

EXPERIMENT - 8:

Write a C program to perform following operations on a circular Queue

I) insertion II) deletion III) search and count

EXPERIMENT - 9:

Write a C program to perform following operations on a circular DeQueue

I) insertion II) deletion III) search and count

EXPERIMENT - 10:

I) Write a C program to implement Linear search

II) Write a C program to implement Binary Search

EXPERIMENT - 11:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Bubble sort II) Selection sort III) Insertion Sort

EXPERIMENT - 12:

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:

I) Merge sort II) Quick sort

EXPERIMENT - 13:

I) Write a C Program to implement binary tree traversals
II) Write a C Program to implement AVL tree operation.

EXPERIMENT - 14:

I) Implementation of a Graph representation using Adjacency Matrix
II) Write a C program to implement graph traversals.

TEXT BOOKS:

1. C Programming & Data Structures: B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
2. Data Structures Using C: Aaron M. Tenenbaum

REFERENCE BOOKS:

1. C& Data structures : P. Padmanabham, Third Edition, B.S. Publications.
2. Data Structures using C : A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Pearson Education / PHI
3. C Programming & Data Structures: E. Balagurusamy, TMH.

B.Tech. CE	**L**	**T-P-D**	**C**
I Year - II Semester	**0**	**0-3-0**	**2**

ENGINEERING & IT WORKSHOP
(Common to CIVIL, ME & MINING)

Three exercises from each trade

EXPERIMENT 1. House-wiring

EXPERIMENT 2. Foundry

EXPERIMENT 3. Tin-Smithy and Development of jobs carried out and soldering.

EXPERIMENT 4. **IT Workshop-I:** Computer hard ware, identification of parts, Disassembly, Assembly of computer to working, condition, Simple diagnostic exercises.

EXPERIMENT 5. **IT workshop-II:** Installation of Operating system windows and Linux.

EXPERIMENT 6. **IT Workshop-III**: Working with Microsoft word, Excel and Power Point

EXPERIMENT 7. **IT Workshop IV**: Internet Browsing and Etiquette.

TRADES FOR DEMONSTRATION & EXPOSURE

EXPERIMENT 8. Machine Shop

Text Books:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. IT Workshop Manual

B.Tech. CE	L	T-P-D	C
II Year - I Semester	3	0-0-0	3

PROFESSIONAL ETHICS
(Common to all branches)

UNIT - I:
Basic Concepts
Introduction, terminology, stake holders, governing edicts, contextual aspects, ethical dilemmas, life skills, emotional, intelligence, Indian and western thoughts on ethics, value education, dimensions of ethics, setting goals in life, importance of morality and ethics, basic ethical principles, moral developments theories, classification of ethical theories, some basic theories, moral issues, moral dilemmas autonomy.

UNIT II:
Professional and professionalism
Introduction, meaning of profession, professionals, professionalism, professional association, professional roles and professional risks, professional accountability, successful professional, ethics and profession, engineering profession, engineering as social experimentation, engineering professionals, engineering ethics, roles of engineers, balanced outlook on law, rights and responsibilities as citizens, professional responsibilities, professional rights.

UNIT - III:
Global issues and safety
Introduction, current scenario, business ethics, environmental ethics, computer ethics, media ethics, war ethics, bio-ethics, research ethics, intellectual property right, safety and risk, assessment of risk, risk and cost, engineer's responsibility for safety, risk benefit, analysis, risk cause and management, case studies, providing for safe exit, ethical issues of safety.

UNIT - IV:
Ethical codes and audits
Introduction, need for ethical codes, sample codes, corporate codes, limitations of the codes, need for ethical audit, ethical profile of organizations, ethical standards and bench marketing, audit brief, ethical auditors, procedure for ethical audit, ethical audit report, examples.

UNIT - V:
Human values and ethical living
Introduction, terminology, domains of learning, human values, attitudes, values, attitudes and professionals, needs of life, harmony in life, what is ethical living, case studies.

Text Books:
1. **Professional ethics** by R. Subramanian, Oxford press.
2. **Professional ethics** and human values by R.S.Nagarajan, New age international.

Reference Books:

1. **Professional ethics** and human value by D.R.Kiran, Tata McGraw Hills education.
2. **Ethics in engineering** by Mike W. Martin and Roland Schinzinger, Tata McGraw Hills education.
3. **Fundamental of Ethics** by Edmund G Seebauer and Robert L.Barry, Oxford university press.

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
IIYear - I Semester	**3**	**1-0-0**	**3**

PROBABILITY AND STATISTICS
(Common to CE,CSE,ME,IT,MIE)

Objectives:
1. This course presents the theory and methods of probability and statistical models needed to support engineering decision making proses
2. The course objectives emphasize the basic concepts of probability & statistics to understand the data representation techniques,
3. To learn discrete and continuous random variables, probability distributions, measure of central tendency, and measure of dispersion.
4. To apply these concepts the statistical inference and hypothesis testing, the regression analysis using least square parameter estimation and statistical way of thinking.

Outcomes:
1. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
2. Able to understand the basic knowledge on fundamental probability concepts, including random variable, probability of an event, additive rules and conditional probability
3. Able to understand the concept of Bayes' theorem
4. Able to understand the basic statistical concepts and measures
5. Able to develop the concept of the central limit theorem

UNIT - I:
Probability
Review of Probability, Definitions of Random variables (Discrete and continuous)
Distributions
Binomial, Poisson & normal distributions related properties. Sampling distributions – Sampling distribution of means (σ known and Unknown)

UNIT II:
Testing of Hypothesis I: Tests of hypothesis point estimations – interval estimations. Large samples, Null hypothesis – Alternate hypothesis type I, & type II errors – critical region, confidence interval for mean testing of single variance. Difference between the mean.
Testing of Hypothesis II: Confidence interval for the proportions. Tests of hypothesis for proportions single and difference between the proportions.

UNIT - III:
Confidence interval for the t- distribution – Tests of hypothesis – t- distributions, F- distributions,distribution. Test of Hypothesis

UNIT - IV:
Correlation & Regression: Coefficient of correlation – Regression Coefficient – The lines of regression – The rank correlation
Curve Fitting: Fitting of straight-second degree curve- exponential curve- power curve by method of Least squares

UNIT - V:
Queuing Theory: Arrival Theorem - Pure Birth process and Death Process
M/M/1 Model.
Time Series analysis: Time series – utility of time series analysis, components of time series. Preliminary adjustments before analyzing time series. Measurement of trend by the method of least squares, method of moments.

TEXT BOOKS:
1. Grewal B.S, "Higher Engineering Mathematics: Khanna publications, 42nd edition 2012.
2. Advanced Engineering Mathematics : Jain and S.R.K. Iyangar, Narosa Publications.

REFERENCES:
1. Engineering Mathematics: B.V.Ramana, Tata McGrawhill Publishing company Ltd New Delhi, 5th edition, 2011
2. Engineering Mathematics-I: G.Shankar Rao, I.K.International Publications.
3. KREYSZIG. E, "Advanced Engineering Mathematics: JohnWiley & Sons Singapore, 10th edition, 2012.

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**0-0-0**	**4**

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CE,ME,MIE)

UNIT - I: Electrical Circuits: Basic definitions, Types of elements, Ohm 's Law, Re- sistive networks, Kirchhoff 's Laws, Inductive networks, Capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT II: DC Machines: Principle of operation of DC Generator – emf equation - types– DC motor types – torque equation – applications – three-point starter.

AC Machines: Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications. Principle of operation of single phase transformers – emf equation-OC and SC tests on 1phase transformer– losses– efficiency and regulation.

UNIT - III: Introduction, classification of instruments, operating principles, essential features of measuring instruments, permanent magnet Moving coil (PMMC) instruments, Moving Iron of Ammeters and Voltmeters (elementary Treatment only) Single phase dynamo wattmeter.

UNIT - IV: Diode and Its Characteristics: P-N junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems) TRANSISTORS: P-N-P and N-P-N Junction transistor, Transistor as an amplifier, SCR characteristics and applications

UNIT - V:
Cathode Ray Oscilloscope: Principles of CRT (Cathode Ray Tube), De- flection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO- Voltage, Current and frequency measurements.

Text Books:
1. **Basic Electrical & Electronics Engineering** by D.P.Kothari & I.J.Nagarath, TMH, 2013.
2. **Principles of Electrical and Electronics Engineering** by V.K.Mehta, S.Chand & Co.

Reference Books:
1. **Introduction to Electrical Engineering** – M.S Naidu and S.Kamakshaiah, TMH Publ.
2. **Basic Electrical Engineering** by Kothari and Nagarath, TMH Publica- tions, 2nd Edition
3. **Essentials of Electrical and Computer Engineering** by David V. Kerns, JR. J. David Irwin

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B.Tech. CE	L	T-P-D	C
II Year - I Semester	4	1-0-0	4

STRENGTH OF MATERIALS-I

UNIT - I: SIMPLE STRESSES AND STRAINS: Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel –
Working stress – Factor of safety – Lateral strain-Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

UNIT II: SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and 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.

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis, Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections, Design of simple beam sections

UNIT - III: SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

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 load-Mohr's theorems, Moment area method – application to simple cases including overhanging beams.

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

UNIT - V: THICK CYLINDERS: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

Text Books:
1. Mechanics of Materials – Dr. R.K.Bansal, Laxmi Publications.
2. Strength of Materials – B. S. Ramamrutham, Dhanpat Rai publishing company

Reference Books:
1. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
2. Strength of Materials by R.S.Khurmi & N.Khurmi, S.Chand publications
3. Strength of Materials by B.C.Punmia, Laxmi publications.

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - I Semester	**4**	**0-0-0**	**4**

SURVEYING

UNIT - I: INTRODUCTION: Plane surveying, Objectives, Principles and classifications.
Chain survey: Distance measurement conventions and methods; use of chain and tape.
COMPASS AND PLANE TABLE SURVEY: Obstacles in distance measurement, field related numerical problems in compass survey, Equipment and procedure for plane table field work.

UNIT II: LEVELING AND CONTOURING: Concept and Terminology, Temporary and permanent adjustments- method of leveling. Characteristics and Uses of contours-methods of conducting contour surveys and their plotting.
COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries, Embankments and cutting for a level section and two level sections, Determination of the capacity of reservoir, volume of barrow pits.

UNIT - III: THEODOLITE: Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. , Traversing, Electronic Distance measurement(EDM)

UNIT - IV: TACHEOMETRIC SURVEY: Trigonometric levelling, Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.
Curves: Types of curves, design and setting out – simple, compound and vertical curves.

UNIT - V: INDTRODUCTION TO ADVANCED SURVEYING : Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

Text Books:
1. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2. Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.

Reference Books:
1. Arthur R Benton and Philip J Taety, Elements of Plane Surying, McGraw Hill – 2000
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004
3. Chandra A M, "Plane Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - I Semester	**3**	**1-0-0**	**3**

FLUID MECHANICS

UNIT - I: INTRODUCTION : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure Pascal's law, Hydro- static law - atmospheric, gauge and vacuum pressure- measurement of pres- sure. Pressure gauges, Manometers: differential and Micro Manometers. and their influences on fluid motion pressure at a point.

HYDROSTATIC FORCES: Hydrostatic forces on submerged plane, Hori- zontal, Vertical, inclined and curved surfaces – Center of pressure. Deriva- tions and problems.

UNIT II:
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 rotational flows. Equation of continuity for one, two, and three dimensional flows – stream and velocity potential functions, flow net analysis.

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, (Navier – stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.

UNIT - III: BOUNDARY LAYER THEORY : Approximate Solutions of Navier Stoke's Equations – Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers (no deviation), BL in transition, separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT - IV: LAMINAR & TURBULENT FLOWS : Reynolds's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

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 Reynold's number – Moody's Chart.

UNIT - V: MEASUREMENT OF FLOW : Pitot tube, Venturimeter and orifice meter – classification of orifices, Flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

Text Books:
1. Fluid Mechanics by Modi and Seth, Standard book house
2. Fluid Mechanics and Machinery by D. Ramdurgaia New Age Publications

Reference Books:
1. Fluid Mechanics by R.K.Bansal, Laxmi publications.
2. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
3. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)

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UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**
II Year - I Semester   **0**   **0-3-0**   **2**

SURVEYING LAB

LIST OF EXPERIMENTS:

EXPERIMENT 1   Survey of an area using chain (closed traverse) & plotting

EXPERIMENT 2   Chaining across obstacles

EXPERIMENT 3   Determination of distance between two inaccessible points using com- pass

EXPERIMENT 4   Surveying of a given area using prismatic compass (closed traverse) and plotting after adjustments

EXPERIMENT 5   Plane table survey: a) Radiation method

EXPERIMENT 6   Plane table survey: b) Intersection method

EXPERIMENT 7   Two point and three point problem in plane table survey.

EXPERIMENT 8   Traversing by plane table survey

EXPERIMENT 9   Fly levelling

EXPERIMENT 10   An exercise of L.S and C.S and plotting

EXPERIMENT 11   Two exercises on contouring

EXPERIMENT 12   Differential levelling

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

	L	T-P-D	C
B.Tech. CE			
II Year - I Semester	0	0-3-0	2

STRENGTH OF MATERIALS LAB

EXPERIMENT 1.   Tension test.
EXPERIMENT 2.   Bending test on (Steel / Wood) Cantilever beam.
EXPERIMENT 3.   Bending test on simply supported beam.
EXPERIMENT 4.   Torsion test
EXPERIMENT 5.   Hardness test
EXPERIMENT 6.   Spring test
EXPERIMENT 7.   Compression test on wood or concrete
EXPERIMENT 8.   Impact test
EXPERIMENT 9.   Shear test
EXPERIMENT 10.   Verification of Maxwell's Reciprocal theorem on beams.
EXPERIMENT 11.   Use of electrical resistance strain gauges
EXPERIMENT 12.   Continuous beam – deflection test.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**
II Year - I Semester   **0**   **0-3-0**   **2**

CAD LAB - I

EXPERIMENT 1:   Introduction to computer aided drafting.
EXPERIMENT 2:   To open and set up a software in system.
EXPERIMENT 3:   Introduction to tools in CAD.
EXPERIMENT 4:   Setting up the coordinate system and units.
EXPERIMENT 5:   Introduction to how to draw in AUTO CAD.
EXPERIMENT 6.   Practice of common symbols used in CAD drawings.
EXPERIMENT 7.   Software for CAD – Introduction to different software.
EXPERIMENT 8.   Practice exercises on CAD software.
EXPERIMENT 9.   Drawing a plan of buildings using software - single storied residential building.
EXPERIMENT 10. Drawing a plan of building using software - multi storied residential building.
EXPERIMENT 11. Drawing a plan of buildings using software - single storied commercial building.
EXPERIMENT 12. Drawing a plan of buildings using software - multi storied commercial building.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

	L	T-P-D	C
B.Tech. CE			
II Year - II Semester	3	1-0-0	3

NUMERICAL METHODS
(Common to CIVIL, MINING)

UNIT - I:
Solution of Algebraic and Transcendental Equations Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton Raphson Method.
Interpolation: Introduction – Finite differences – Forward Difference – Backward difference – Central difference – Symbolic relations and separation of symbols – Difference Equations – Differences of polynomial – Newton's formulae for interpolation – Central difference interpolation Formulae – Gauss Central Difference Formulae – Interpolation with unevenly spaced points.

UNIT II:
Solution for linear systems Matrices and Linear systems of equations: Elementary row transformations- Rank-Echelon form, Normal forms– Existence of solution-Gauss elimination with pivoting-Gauss Jordan Method- Ill conditioned systems-Jacobi iterative method-Gauss seidal method- convergence of iterative methods

UNIT - III:
Three Dimensional Geometry Three Dimensional Geometry : Equation of a sphere – Plane section of a sphere – Tangent Plane – Orthogonal Sphere
– Equation of a cone – Right circular cone – Equation of a cylinder – Right circular cylinder.
Linear Transformations: Properties of Real & Complex Matrices-orthogonal, Linear Transformation – Orthogonal Transformation.

UNIT - IV:
Eigen Values & Eigen Vectors Eigen values and Eigen vectors of Real & complex matrices and their properties. Quadratic forms- Reduction of quadratic form to canonical form – Rank – Positive, Negative definite – semi definite – index – signature- Sylvester law, Singular value decomposition. Cayley- Hamilton – Theorem (with Proof) – Inverse and powers of a matrix by Cayley- Hamilton theorem – Diagonization of matrix.

UNIT - V:
Numerical Differentiation & Numerical solution of IVP's in ODE Numerical Differentiation : Derivatives using Forward, Backward & central difference formulae.
Numerical solution of IVP's in ODE Numerical solution of Ordinary Differential equations: Solution by Taylor 's series-Picard's Method of successive Approximations – Euler's Method- Runge-Kutta Methods – Predictor-Corrector Methods.(Adams-Bash forth – Moulton method)

Text Books:

1. **Grewal B.S, "Higher Engineering Mathematics"**, Khanna publications, 42nd edition 2012
2. **Advanced Engineering Mathematics** by Jain and S.R.K. Iyangar, Narosa Publications.

Reference Books:

1. **Engineering Mathematics** by G.Shankar Rao, I.K.International Publications.

2. **KREYSZIG. E, "Advanced Engineering Mathematics"** JohnWiley & Sons Singapore, 10th edition, 2012.

3. **Veerarajan.T " Engineering Mathematics-I",** Tata McGrawhill Publishing Co.New Delhi, 5th edition, 2006.

B.Tech. CE	**L**	**T-P-D**	**C**
II Year – II Semester	**4**	**1-0-0**	**4**

STRENGTH OF MATERIALS-II

UNIT - I:

TORSION OF CIRCULAR SHAFTS :

Theory of pure torsion – Derivation of Torsion equations : $T/J = q/r = N\grave{e}/L$ – 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 – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs

COLUMNS AND STRUTS :

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load formulae for various end conditions. Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT II:

BEAM COLUMNS : Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading**.**

DIRECT AND BENDING STRESSES : Stresses under the combined action of direct loading 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 - III:

UNSYMETRICAL BENDING:

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

UNIT - IV:

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

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers.

FIXED BEAMS: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads - Shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT - V:

CONTINUOUS BEAMS : Introduction- Clapeyron's theorem of three moments- Analysis of continuous 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.

Text Books:
1. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
2. Strength of materials by S. Ramamrutham- Dhanpat rai publishing company

Reference Books:
1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
3. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	L	T-P-D	C
II Year - II Semester	4	0-0-0	4

HYDRAULICS AND HYDRAULIC MACHINERY

UNIT - I:
OPEN CHANNEL FLOW:
Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors.Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

OPEN CHANNEL FLOW II:
Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT II:
HYDRAULIC SIMILITUDE:
Dimensional analysis-Rayleigh's method and Buckingham's pi theorem. Study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers. Model and prototype relations.

BASICS OF TURBO MACHINERY : Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

UNIT - III:
HYDRAULIC TURBINES – I:
Layout of a typical Hydropower installation – Heads and efficiencies. Classification of turbines-pelton wheel- Francis turbine-Kaplan turbine- working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.

HYDRAULIC TURBINES – II:
Governing of turbines-surge tanks-unit and specific turbines-unit speed- unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation

UNIT - IV:
CENTRIFUGAL-PUMPS :
Pump installation details-classification-work done- Manometric head-mini- mum starting speed-losses and efficiencies-specific speed multistage pumps- pumps in parallel-performance of pumps- Characteristic curves- NPSH-cavitation.

UNIT - V:
HYDROPOWER ENGINEERING:
Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, Estimation of hydropower potential.

Text Books:

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.
2. Fluid mechanics and machinery by D.Ramdurgaia, New age publications.

Reference Books:

1. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi.
2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.
3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

ENGINEERING GEOLOGY

UNIT - I:
INTRODUCTION:
Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS:
Its effect over the properties of rocks, Importance of weathering with reference to dams, reservoirs and tunnels. Weathering of common rock like ⁻Granite

MINERALOGY:
Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties
.Role of study of physical properties of minerals in the identification of minerals.
Study of physical properties of following common rock forming minerals:Feldsper , Quartz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite ,Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chlorite, Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT-II:
PETROLOGY:
Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks.Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

STRUCTURAL GEOLOGY:
Indian stratigraphy, and geological time scale**,** Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints - their important types.

UNIT - III:
Geophysical study:
Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc. Fundamental aspects of Rock mechanics and Environmental Geology

UNIT - IV:
GEOLOGY OF DAMS and RESERVOIRS :
Types of dams and bearing of Geology of site in their selection, Geological considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to

the success of a reservoir. Geological factors influencing water tightness and life of reservoirs, Geo hazards, ground subsidence.

Ground water:

Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, land slides hazards, water in land slides their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, Earthquake and landslides.

UNIT - V:

TUNNELS:

Purposes of tunneling, Effects of Tunneling on the ground. Role of Geological Considerations (lithological, structural and ground water) in tunneling over break and lining in tunnels, Tunnels in rock, subsidence over old mines, minimizing substances.

Text Books:

1. Varghese, P.C., Engineering Geology for Civil Engineering Prentice Hall of India Learning Private Limited, New Delhi, 2012.
2. Venkat Reddy. D. Engineering Geology, Vikas Publishing House Pvt. Lt, 2010.

Reference Books:

1. Muthiayya, V.D. " A Text of Geology", Oxford IBH Publications, Calcutta, 1969
2. Blyth F.G.H. and de Freitas M.H., Geology for Engineers, Edward Arnold, London, 2010.
3. Bell .F.G.. "Fundamentals of Engineering Geology", B.S. Publications. Hyderabad 2011.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE		**L**	**T-P-D**	**C**
II Year - II Semester		**4**	**1-0-0**	**4**

STRUCTURAL ANALYSIS

UNIT - I:
ARCHES :
Types of arches- three and two hinged arches- Circular and parabolic arches- Yielding of supports- Effect of shortening of rib – Effect of temperature changes
- Tied and Linear arch.
SLOPE-DEFLECTION METHOD:
Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT II:
MOMENT DISTRIBUTION METHOD:
Introduction, applications to continuous beams with and without settlement of supports
ENERGY THEOREMS:
Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses

UNIT - III:
MOVING LOADS :
Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length

UNIT - IV:
INFLUENCE LINES:
Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section - Point loads, UDL longer than the span, UDL shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

UNIT - V:
INDETERMINATE STRUCTURAL ANALYSIS:
Indeterminate Structural Analysis –Determination of static and kinematic indeterminacies –Solution of trusses with upto two degrees of internal and external indeterminacies –Castigliano's theorem.
MATRIX METHOD OF ANALYSIS :
Introduction – Different approaches to matrix methods- Static and kinematic indeterminacy- Flexibility and stiffness method for beams and simple frames
Text Books:
1. Analysis of Structures by S.Ramamrutham, Dhanpat Rai publishing company
2. Structural Analysis by S S Bhavikatti – Vikas Publishing House.

Reference Books:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Theory of Structures by Pandit & Gupta; Tata Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL STUDIES
(Common to CE, ME & MINING)

UNIT - I:

Ecosystems & Natural Resources, **Biodiversity:**

Classification of Resources: Living and Non-Living resources, Renewable and Non-Renewable resources. Water resources: use and over utilization, Land resources, land degradation, Forest resources, Mineral resources uses& Exploitation Energy resources: growing energy needs, use of alternate energy sources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem, Food chains, Food webs and ecological pyramids, Flow of energy, Biogeochemical cycles, Biomagnifications, carrying capacity

UNIT II:

Species, Ecosystem Diversity, Hotspots, Value Of Biodiversity, Threats To Biodiversity, Conservation Of Biodiversity : In-Situ And Ex-Situ Conservation & Environmental Pollution And Control: Classification of pollutions and pollutants, causes, effects of water, air, noise pollution, Introduction to control technologies: Water (primary, secondary, tertiary), Air(particulate and gaseous emissions), Soil(conservation and remediation), Noise(controlling devices) Solid waste, (Municipal) types, collection and disposal methods, characteristics of e-waste & hazardous waste, biomedical waste management.

UNIT - III:

Global Environmental Problems And Global Efforts:

Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification, International conventions/protocols: Earth Summit, Kyoto Protocol and Montreal Protocol, green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM). Biological disasters, pandemic and epidemics, Biological warfare.

UNIT - IV:

Environmental Impact Assessment (Eia) And Environmental
Management Plan:

definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, EIA guide lines as per ministry of environment & forest, impact assessment methodologies. Environmental Impact Statement (EIS). Environmental management plan (EMP).

UNIT - V:

Environmental Policy, Legislation, Rules And Regulations & Towards
Sustainable Future:

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of

Green Computing, Green chemistry and low Carbon life styles.: National Environmental Policy, Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Water pollution Cess Act-1977, Forest Conservation Act, solid waste (biomedical waste and hazardous waste)management and handling rules.

Text Books:

1. **Environmental Science And Technology** by M.Anji Reddy   2007.
2. **Principles Of Environmental Science And Engineering** by P.Venugopal Rao

Reference Books:

1. **Tata McgrawHill :** Introduction to Environmental Studies by Benny Joseph
2. **Environmental Studies** by Erach Bharucha 2005, University Grants Commission, University Press.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

	L	T-P-D	C
B.Tech. CE			
II Year - II Semester	0	0-3-0	2

ENGINEERING GEOLOGY LAB

EXPERIMENT 1 :Study of physical properties and identification of minerals Feldsper , Quartz , Flint .

EXPERIMENT 2 :Study of physical properties and identification of minerals Jasper, Olivine , Augite.

EXPERIMENT 3: Study of physical properties and identification of minerals Hornblende , Muscovite , Biotite.

EXPERIMENT 4 : Study of physical properties and identification of minerals Asbestos, Chlorite , Kyanite.

EXPERIMENT 5: Study of physical properties and identification of minerals Garnet, Talc , Calcite.

EXPERIMENT 6: Study of physical properties and identification of minerals,. Pyrite, Hematite , Magnetite.

EXPERIMENT 7: Study of physical properties and identification of minerals, Chlorite, Galena , Pyrolusite.

EXPERIMENT 8: Study of physical properties and identification of minerals Graphite, Magnesite, and Bauxite.

EXPERIMENT 9: Megascopic description and identification of rocks. Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

EXPERIMENT 10: Megascopic description and identification of minerals.

EXPERIMENT 11: Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc

EXPERIMENT 12: Simple Structural Geology problems.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-3-0**	**2**

ADVANCED SURVEYING LAB

LIST OF EXPERIMENTS :

EXPERIMENT 1 : Study of theodolite in detail –practice for measurement of vertical angles

EXPERIMENT 2: Study of theodolite in detail –practice for measurement of horizontal angles.

EXPERIMENT 3: Measurement of horizontal angles by method of repetition and reiteration

EXPERIMENT 4: Trigonometric levelling –height and distance problem (two exercises)

EXPERIMENT 5: Height and distance using principles of tachometry (two exercises)

EXPERIMENT 6: Curve setting- different methods

EXPERIMENT 7: Setting out works for buildings and pipelines

EXPERIMENT 8: Determination of area using total station

EXPERIMENT 9: Traversing using total station

EXPERIMENT 10: Contouring using total station

EXPERIMENT 11: Determination of remote height using total station

EXPERIMENT 12: Distance, gradient, differential height between two inaccessible points using total station

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
II Year - II Semester	**0**	**0-0-0**	**2**

GENDER SENSITIZATION
(Common to all branches)

UNIT - I:
Gender: Why should we study it?, Socialization: Making women, Making Men, Introduction, Preparing For Womanhood, Growing up male, First les- sons in caste, Different masculinities.

UNIT II:
Housework : The Invisible Labour, "My mother does not work", "Share the load", Missing Women: Sex Selection and Its Consequences, Declining sex ratio, Demographic consequences, Point of view, Gender and the structure of knowledge, Further reading : Unacknowledged women artists of Telangana, Sexual Harassment: Say No! Sexual harassment, not eve-teasing, Coping with everyday harassment, Further reading. "Chupulu"

UNIT - III:
  Women's Work: Its Politics and Economics, Fact and fiction, Unrecognized and unaccounted work, Further reading: Wages and conditions of work, Domestic Violence: Speaking Out, Is home a safe place?, When women unite [Film], Rebuilding lives, Further reading: New forums for justice.

UNIT - IV:
Whose History? Questions for Historians and Others, Reclaiming a past, Writing other histories, further reading: Missing pages from modern Telangana history. Gender Spectrum: Beyond the Binary, Two or many?, Struggles with discrimination, Thinking about Sexual Violence, Blaming the victim, "I fought for my life…", Further reading: The caste face of violence.

UNIT - V:
Just Relationships :
Being Together as Equals,Mary kom and Onler, Love and acid just do not mix, Love letters, Mothers and fathers, Further Reading: Rosa Parks – The brave heart.
Text Books:
  1. Towards a world of equals by A.Suneetha Susic Tharu publication Telugu academy Hyderabad.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**

III Year - I Semester   **4**   **1-0-0**   **4**

DESIGN OF REINFORCED CONCRETE STRUCTURES

UNIT - I:

Concept of RC Design

Limit state design, Basic statistical principles, Characteristic loads, Characteristic strength, Partial load & safety factors, Representative stress-strain curves for cold worked deformed bars and mild steel bars, Assumptions in limit sate design, Stress block parameters, I.S 456 Codal provisions, Beams, Limit state design of Singly reinforced, Doubly reinforced T and L beams sections

UNIT II:

Shear, Torsion and Bond

Limit state design of beams for shear and torsion, Concept of bond, Anchorage & Development length, Design examples in simply supported and continuous beams, Detailing.

UNIT - III:

Slabs

Design of one-way slabs, Design of continuous slabs using IS coefficients, Design of two-way simply supported and restrained slabs. Limit state of serviceability for deflection and cracking.

UNIT - IV:

Columns

Design of axially loaded columns of different cross sections, Design of columns under uniaxial bending and bi-axial bending SP-16 charts.

UNIT - V:

Footings

Different types of footings, Design of flat type and sloped type isolated square, rectangular and circular footings. Design of Dog Legged &Open –Well Staircase.

Text Books:
1. Limit state design of reinforced concrete by P.C Varghese, PHI, New Delhi.
2. Fundamentals of reinforced concrete design by M.L. Gambhir, PHI, New Delhi.

Reference Books:
1. Reinforced Concrete Design by S. Unnikrishina.
2. Reinforced Concrete Design by N.Krishna Raju and R.N.Pranesh, New age International Publishers, New Delhi.
3. Design of concrete structures-Arthus H.Nilson, David Darwin. TMH, New Delhi Limit State Design by B.C. Punmia, Ashok Jain and Arun Kumar Jain, Laxmi, Publications Pvt. Ltd., New Delhi.

B.Tech. CE	L	T-P-D	C
III Year - I Semester	3	1-0-0	3

WATER RESOURCES ENGINEERING - I

UNIT - I:

Introduction to Engineering hydrology and its applications:

Hydrologic cycle, types and forms of precipitation, rainfall measurements, types of rain gauges, computation of average rainfall over a basin, Processing of rainfall data, adjustment of record, rainfall double mass curve. Run off factors affecting run off over a catchment, empirical and rational formula

Abstraction from rainfall: Evaporation, factors affecting evaporation, measurement of evaporation, evapotranspiration-Penman and Balney and criddle methods –Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT II:

Distribution of runoff:

Hydrograph analysis flood hydrograph- effective rainfall- baseflow separation-direct runoff-unit hydrograph, definitions and limitations of application of unit hydrograph, derivation of unit hydrograph from direct runoff hydrograph and vice versa S-hydrograph, synthetic unit hydrograph.

UNIT - III:

Ground water occurrence:

Types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, Darcys law, radial flow to wells in unconfined and unconfined aquifers, types of wells, well construction- well development.

UNIT - IV:

 Necessity and importance of irrigation:

Advantages and ill effects of irrigation, types of irrigation, methods of application of irrigation water, Indian agriculture soils, methods of improving soil fertility- crop rotation, preparation, land fall irrigation, standards of quality for irrigation water.

Soil water plant relationship: Vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, Duty and Delta, factors affecting duty-Design discharge for a water course. The depth and frequency of irrigation, irrigation efficiencies-water logging

UNIT - V:

Classification of canals: Design of irrigation canals by Kennedy's and Lacey's theories, Balancing, depth of cutting, IS standards for canal design ,canal lining.

Design discharge over a catchment: Completion of design discharge- rational formula, SCS curve number method, Flood frequency analysis, introductory part only. Stream gauging-measurement and estimation of upstream flow

Text Books:
1. Irrigation and hydraulic structure by S K GARG
2. Irrigation water management by D K MAJUNDAR, PRINTTICE hall of indra

Reference Books:
1. Elementary hydrology by V P SINGH, PHI PUBLICATIONS
2. Irrigation and water resources and water power by P N MODI STANDARD BOOK HOUSE
3. Applied hydrology by Ventechow David R Maidment larry W' Mays Tata MC.GrawHill

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

CONCRETE TECHNOLOGY

UNIT - I:
Cement & admixtures:
Portland cement-composition-Hydration, Setting of cement-Structure of hydrate cement-Test on physical properties-Different grades of cement-Admixtures-Mineral and Admixtures.

UNIT II:
Aggregates:
Classification of aggregate-particle shape & texture-Bond, Strength & other mechanical properties of aggregate-specific gravity, Bulk density, porosity, adsorption & 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 aggregate-Gap grading aggregate-Maximum aggregate size.

UNIT - III:
Fresh concrete:
Workability-Factors affecting workability-Measurement of workability by different tests-Setting times of concrete-Effect of concrete-Effect of time and temperature on workability-Segregation & bleeding-Mixing and vibration of concrete-Step in manufacture of concrete-Quality of mixing water.
Hardened concrete
Water/Cement ratio-Abrams Law-Gel space ratio-Nature of strength of concrete-Maturity concept-Strength in tension & compression-Factors affecting strength-Relation between compression & tensile strength-Curing.

UNIT - IV:
Testing of hardened concrete:
Compression tests-Tension tests- Factors affecting strength-Flexure tests-splitting tests-Non-destructive testing methods-codal provision for NDT.
Elasticity, creep & shrinkage:
Modulus of elasticity-Dynamic modulus of elasticity-Poisson's ratio-Creep of concrete-Factors influencing creep-Relation between creep & time-Nature of creep-Effects of creep-Shrinkage-type of shrinkage.

UNIT - V:
Mix design :
Factors in the choice of mix proportions –Durability of concrete _quality Control of concrete –strategical methods –Acceptance criteria –Proportioning of concrete mixes by various methods –BIS method of mix design.
Special concrete :
Light weight concrete -Light weight aggregate concrete –Cellular concrete –No fines concrete – High density concrete –Fiber Reinforced concrete – Different types of fibers –factors affecting properties of FRC –Applications –Polymer concrete –Types of Polymer concrete – Properties of polymer concrete –Applications –High performance concrete –Self

compacting concrete

Text Books:

1. Properties of Concrete by A.M Nevilie –Low Priced Edition – 4th Edition.
2. Concrete technology by M.S.Shetty –S. Chand &co.:2004.

Reference Books:

1. Concrete Technology by M.L Gambhir .-Tata Mc.Graw Hill Publications, New Delhi.
2. Concrete technology by A.R . Santha Kumar , Oxford university Press, New Delhi.
3. IS 10262-2009 -Concrete mix proportioning – guidelines.

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

GEOTECHNICAL ENGINEERING - I

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 systems – Insitu permeability tests (Pumping in & Out tests)
Effective stress: Total, neutral and effective stresses – Principle of effective stress - quick sand condition - Seepage through soils - Flownets: Characteristics and Uses.

UNIT - III:
Stress distribution in soils: Boussinesq-s and Wester gaard-s theories for point loads, uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under point load along the vertical plane and horizontal plane, and - Newmark-s influence chart for irregular areas.

UNIT - IV:
Compaction: Mechanism of compaction - factors affecting - effects of compaction on soil properties. - Field compaction Equipment - compaction quality control.
Consolidation: Immediate settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves –normally consolidated soil, over consolidated soil and under consolidated soil – preconsolidation pressure and its determination – Terzaghis 1-D consolidation theory.

UNIT - V:
Shear strength of soils : Importance of shear strength –Mohr's - Coulomb Failure theories - Types of laboratory strength tests - strength tests based on drainage conditions - Shear strength of sands and clays – Critical Void Ratio - Liquefaction.

Text Books:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi
2. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.

Reference Books:
1. Geotechnical Engineering by Purushotham Raj
2. Geotechnical Engineering by Manoj Dutta & Gulati S.K - Tata Mc.Grawhill Publishers New Delhi.
3. Soil mechanics by B.Das

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**4**	**1-0-0**	**4**

BUILDING MATERIALS CONSTRUCTION & PLANNING

UNIT - I:
BUILDING STONES, BRICKS, TILES STONE - Building stones, classification of building stones, quarrying pr
ocedures, structural Requirement, dressing, and tools for dressing of stones. BRICKS-Composition of brick earth, manufacturing of brick, structural requirements, field and lab test. TILES - Types of tiles, manufacturing of tiles, structural requirements of tiles.

UNIT II:
CEMENT, LIME, ADMIXTUES Ingredients of cement, manufacturing of cement, field and lab tests. ADMIXTURES - Mineral admixtures, chemical admixtures. LIME-Various ingredients of lime, constituents of limestone and classification of lime, manufacturing of lime.

UNIT - III:
 WOOD, GLASS, PAINTS WOOD-Structure, types of wood, properties of wood, seasoning, defects, alternative material for wood. GLASS Types of glasses, manufacturing of glass. PAINTS-Constituents of paints, types of paints. BUILDING COMPONENTS-Lintel, arches, staircase, floors, roofs, foundation, dcp. JOINARYS-Doors, windows, materials and types.

UNIT - IV:
 MASONRIES AND FINISHING, FORMWORKS BRICK MASONRY- Types, bonds. STONE MASONRY- Types, composite masonry, concrete reinforced bricks, and glass reinforced brick. FINISHING SLOPE- plastering, pointing, and cladding- Types of ACP (Aluminum composite panel). FORMWORKS - requirements, standards, scaffolding, shoring, under pinning.

UNIT - V:
 BUILDING SERVICES AND BUILDING PLANNING BUILDING SERVICES- Plumbing services, water distribution, sanitary lines and fittings, ventilators, functional requirements, systems of ventilators, air conditioning essentials and types, acoustics. CHARACTERISTICS-Absorption, fire protections, fire hazards, classification of fire resistance materials and construction. BUILDING PLANNING - Principles of building planning, classification of building and building by laws.

Text Books:
1. SK Duggal, Building Materials, New Age Publications 4th Edition, April, 2014.
2. B C Punmia, Ashok Kumar Jain and Arun Kumar Jain, Building Construction, Laxmi Publications (P) Ltd., New Delhi, 10th Edition, 2013.

Reference Books:
1. R. Choudly "Construction Technology" Vol. – 1 & 2,2nd Edition, Longman, UK, 1987.
2. P C Varghese, Building Construction, Prentice Hall of India Private Ltd., New Delhi, 2nd Edition, 2007.
3. P C Varghese, Building Construction, Prentice hall of India Private Ltd., New Delhi, 2nd Edition, 2007.

B.Tech. CE		L	T-P-D	C
III Year - I Semester		3	1-0-0	3

WASTE MANAGEMENT
(OPEN ELECTIVE)

UNIT - I:
Introduction to Municipal Solid Waste
Definition – Sources and impact of solid waste on environment ,Classification of solid waste –composition and its determinants of Solid waste –factors influencing generation quality assessment of solid waste –methods of sampling and characterization.

UNIT - II:
Collection : collection of Solid waste –collection services –collection system ,equipments – time and frequency of collection –labour requirement –factors affecting collection – analysis of collection system –collection routes –preparation of master schedules . Transfer and Transport: Need for transfer operation- transfer stations-types-transport means and methods-location of transport stations-manpower requirement-collection routes: transfer stations-selection of location, types and design requirements, operation and maintenance.

UNIT - III:
waste processing and reuse
Processing technologies: Biological, chemical conversation technologies and thermal conversion technologies. Reuse of solid waste energy recovery – incineration- solidification and stabilization of hazardous waste- treatment of biomedical wastes

UNIT - IV:
waste disposal techniques
Introduction, composting, principles of composting, factors affecting composting, vermin composting, waste to energy technique- Landfill technique and design and operating procedure of landfill

UNIT - V:
Solid waste management techniques
Solid waste manangement Hierarchy, waste avoidance / waste prevention, Defination of source   reduction, waste reduction at source using 5r's Technique, solid waste management rules and regulations

Text Books:
1. A.D. Bhide and B.B.Sundaresan, "Solid waste management-Collection,Processing and disposal", Mudrashilpa offset printers,Nagpur, 1st edition, 2001
2. Techobanoglous Thiesssen Ellasen, " Solid Waste Engineering Principles and Management", McGraw-Hill 1997.126

Reference Books:
1. K. Sasi Kumar & S.Gopi Krishna, "Solid Waste Management".
2. Tchobanoglous, Theissen & Vigil, "Integrated Solid Waste Management", McGraw Hill Publication, 1st Edition, 1997.
3. R.E.Landrefh and P.A.Rebers, "Municipal Solid Wastes-Problems & Solutions", Lewis Publications, 1st edition,1997

B.Tech. CE	L	T-P-D	C
III Year - I Semester	3	1-0-0	3

ENVIRONMENTAL IMPACT ASSESSMENT
(OPEN ELECTIVE)

UNIT - I:
Basics concepts 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, EIA methods, Ad-hoc methods, matrix methods, network method, Environmental media quality index method overlay methods cost/benefit analysis.

UNIT - II:
Impact of developmental activities and land use: Introduction and methodology for the assessment of soil and groundwater, delineation of study area, identification of activities, assessment of impact of developmental activities on vegetation and wildlife, environmental of impact of deforestation- causes and effects of deforestation.

UNIT - III:
Procurement of relevant soil quality, impact prediction, assessment of impact significance, identification and incorporation of mitigation measures. EIA of surface water air and biological environment: methodology for the assessment of impacts on surface water environment, air pollution sources, generalized approach for assessment of air pollution impact.

UNIT - IV:
Environmental audit and environmental legislation, objectives of environmental audit, types of environmental audit, audit proto-cell, stages of environmental audit onsite activities, evaluation of audit, data and preparation of audit report, post audit activities .

UNIT - V:
Environmental protection act, the water act, the air (prevention and control of pollution act, motor act, wild life act. Case studies of preparation of environmental impact assessment statements for various industries

Text Books:
1. Environmental impact assessment methodologies, by Y.Anjaneyulu, B.S.Publication, Sultan bazaar Hyderabad.
2. Environmental impact assessment, by Alan Gilpin, Cambridge University Press.

Reference Books:
1. Environmental pollution control by DR H.S.BHATIA – Galgotia Publication Pvt Ltd , Delhi
2. Environmental impact assessment and management publisher :daya author: B Hosetti, A Kumar
3. Environmental science and engineering by J.Glynn and Gary W.Hein Ke – Prentice Hall Publishers.

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B.Tech. CE		**L**	**T-P-D**	**C**
III Year - I Semester		**3**	**1-0-0**	**3**

INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)

UNIT - I:
Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT II:
Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT - III:
Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.
Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV:
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.
Unfair competitiion: Misappropriation right of publicity, False advertising.

UNIT - V:
New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.
International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

Text Books:
1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

Reference Books:
1. Managing Intellectual Property-The Strategic Imperative, Second Edition by Vinod V.Sople, PHI
2. Intellectual Property –Copyrights, Trademarks and patents by Richard Stim, Cengage Learning

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - I Semester	**3**	**1-0-0**	**3**

FUNDAMENTAL OPERATIONS RESEARCH
(OPEN ELECTIVE)

UNIT - I:
Introduction: Development – Definition– Characteristics and Phases – Types of operations. Research models – applications. Allocation: Linear Programming - Problem Formulation – Graphical solution – Simplex method – Artificial variables techniques Big-M method

UNIT II:
Transportation Problem: Formulation – Optimal solution - unbalanced transportation problem – Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem- Traveling Salesman problem.
Sequencing: Introduction – Flow –Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT - III:
Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement
Theory Of Games: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – dominance principle – m X 2 & 2 X n games -graphical method.

UNIT - IV:
Inventory: Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost- Single period model.

UNIT - V: Waiting Lines: Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals
Simulation: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Brief Introduction of Simulation Languages.

Text Books:
1. Operations Research /J.K.Sharma 4e. /MacMilan
2. Operations Research / R.Pannerselvam 2e.,PHI Publications

Reference Books:
1. Operations Research /A.M.Natarajan, P.Balasubramani, A. Tamilarasi/ Pearson Education.
2. Operations Research: Methods & Problems / Maurice Saseini, Arhur Yaspan & Lawrence Friedman

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B.Tech. CE	L	T-P-D	C
III Year - I Semester	**0**	**0-3-0**	**2**

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

EXPIREMENT 1: Calibration of Venturimeter & Orifice meter.

EXPIREMENT 2: Determination of Coefficient of discharge for a small orifice by constant head method.

EXPIREMENT 3: Determination of Coefficient of discharge for a mouthpiece by constant head method.

EXPIREMENT 4: Calibration of contracted Rectangular Notch and / Triangular Notch.

EXPIREMENT 5: Determination of friction factor of a pipe.

EXPIREMENT 6: Determination of Coefficient for minor losses.

EXPIREMENT 7: Verification of Bernoulli's equation.

EXPIREMENT 8: Impact of jet on vanes.

EXPIREMENT 9: Performance test on Pelton wheel turbine.

EXPIREMENT 10: Performance test on Francis turbine.

EXPIREMENT 11: Performance characteristics of a single stage centrifugal pump.

EXPIREMENT 12: Performance characteristics of a multi-stage centrifugal pump.

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UGC AUTONOMOUS

B.Tech. CE		L	T-P-D	C
III Year - I Semester		0	0-3-0	2

CONCRETE TECHNOLOGY LAB

EXPIREMENT 1: Normal Consistency of fineness of cement.
EXPIREMENT 2: Initial setting time and final setting time of cement.
EXPIREMENT 3: Specific gravity of cement .
EXPIREMENT 4:soundness of cement.
EXPIREMENT 5: Compressive strength of cement.
EXPIREMENT 6: Workability test on concrete by compaction factor
EXPIREMENT 7: Workability test on concrete by slump cone test.
EXPIREMENT 8: Workability test on concrete by Vee-bee consistometer.
EXPIREMENT 9: Young's modulus of concrete.
EXPIREMENT 10:compressive strength of concrete.
EXPIREMENT 11: Bulking of sand.
EXPIREMENT 12: Non-Destructive testing on concrete(for demonstration).

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UGC AUTONOMOUS

B.Tech. CE		L	T-P-D	C
III Year - II Semester		4	1-0-0	4

DESIGN OF STEEL STRUCTURES

UNIT - I:
Materials-Manufacturing of iron and steel-type of structural steel-mechanical properties of steel-concepts of plasticity-yield strength-load and combinations-local buckling behaviour of steel-concepts of limit state design-limit state design strength deflection limits serviceability-stability check Bolted connections-IS:800-2007 specifications-Design strength-efficiency of joint prying action-welded connections-type of welded joints specifications-design requirements-Eccentric connections.

UNIT - II:
Design of tension members-Design strength-Design procedure-splice-lug angles Design of compression members-buckling-slenderness ratio-Load carrying capacity-laced columns-battened columns-splice-column base slab base-Gusseted base.

UNIT - III:
Design of beams-plastic moment-bending and shear strength/buckling-built up section-laterally supported beams.

UNIT - IV:
Design of welded plate girder-elements-economical depth-design of main section connections between web and flange-design of bearing stiffener-intermediate stiffeners-design of web splice and flange splice.

UNIT - V:
Design of Roof Trusses-Type of roof trusses-load on roof trusses-purlin design-Analysis and design Roof trusses-Design of connections.

Text Books:
1. Limit State design of Steel Structures by S.K.Duggal, TMH, New Delhi.
2. Design of steel Structure by N.Subramanian, Oxford University Press.

Reference Books:
1. Design of Steel Structures by S.S.BhaviKatti(By limit state methos), IK International Publishing House Pvt.Limited.
2. Limit state Design of Steel Structure by Dr.V L Shaw, Structures Publications, Pune
3. IS.800:2007-Indian Code Practice for Construction in Steel.

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

ENVIRONMENTAL ENGINEERING

UNIT - I:
Introduction**:** Water-born diseases-Protected water supply-population forecast, design period-water demand-factors effecting-fluctuations-fire demand-storage capacity-water quality and testing-drinking water standards. Sources of water: comparison from quality and quantity and other considerations-intakes-infiltration galleries-distribution systems-requirements-methods and layouts.

UNIT - II:
Layout and general outline of water treatment units-sedimentation-principles-design factors-coagulation-flocculation-clarifier design-coagulants-feeding arrangements. Filtration theory-working of slow and rapid gravity filters-multi-media filters-design of filters-troubles in operation comparison of filters-disinfection-theory of chlorination, chlorine demand, other disinfection practices-miscellaneous treatment methods.

UNIT - III:
Distribution systems: Design procedures-hardy cross and equivalent pipe methods, service reservoirs-joints, valves such as sluice valves, air valves, scour valves, and check valves, water meters-laying and testing of pipe lines-pump house.

UNIT - IV:
Conservancy and Water carriage systems: Sewage and storm water estimation-time of concentration-storm water overflows, combined flow-characteristics of sewage-cycles of decay-decomposition of sewage, examination of sewage-BOD-COD equations. Design of sewers-shapes and materials-seewer appurtenances man holes- inverted siphon-catch basins-flushing tanks-ejectors, pumps and pump houses-house drainage-components requirements-sanitary fitting-traps-one pipe and two pipe systems of plumbing-ultimate disposal of sewage-sewage forming-dilution.

UNIT - V:
Layout and general outline of various units in a waste water treatment plant-primary treatments design of screens-grit chambers-skimming tanks-sedimentation tanks-principles of design-biological treatment-trickling filters-standard and high rate. Construction and design of oxidation ponds-sludge digestion-factors affecting-design of digestion tank-sludge disposal by drying-septic tanks working principles and design-soak pits.

Text Books:
1. Water supply and sanitary Engineering by G.S.Birdi, Dhanpat Rai & Sons Publishers.
2. Water supply Engineering, Vol-1, Waste water Engineering, Vol-2, by B.C.Punmia, Ashok Jain and Arun Jain, Lakshmi Publications Pvt Ltd, Newdelhi.

Reference Books:
1. Water and waste water technology by Mark J.Hammar and Mark J.Hammar J R. Prentice Hall of India
2. Water and waste water Engineering by Fair Geyer and Okun.3rd Edition [Print

Replica] Kindle Edition
3. Waste water treatment-concepts and design approach by G.L.Karia and R.A.Christian, Prentice Hall of India.

B.Tech. CE	L	T-P-D	C
III Year - II Semester	4	0-0-0	4

WATER RESOURSES ENGINEERING – II

UNIT - I:
Storage works reservoirs: Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, and 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:
Gravity dams : Forces acting on a gravity dam, causes of failure of earth dam, elementary profile and particle profile of the gravity dam, limiting height of a low gravity dam, factors of safety- stability analysis, foundation of a gravity dam, drainage and inspection galleries.

UNIT - III:
Earth dams: Types of earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam- in 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, high curve and tail water rating curve-USBR and Indian types of strolling basins.

UNIT - IV:
Diversion headworks: Types of diversion headworks-weirs and barrages, layout of diversion headwork-components. Causes and failures of weirs and barrages in permeable foundations-silt ejectors Ans silt excluders weirs on permeable foundations-creep theory-Bligh's ,lane and koala's theories, Determination of uplift pressure-various correction factors- design principles of weirs on permeable foundations using creep theory-exit gradient, upstream and downstream sheet piles-launching apron.

UNIT - V:
Canal falls: Types of falls and there location, design principles of notch fall and sarada type fall. Canal regulation works, principles of design of distributor and head regulators, canal cross regulator-canal outlets , types of canal modules, proportionality sensitivity and flexibility.

Cross drainage works: Selection of site, design principles of aqueduct, siphon aqueduct and super passage. Design of type II aqueduct (under tunnel)

Text Books:
1. Irrigation and water power engineering by B.C.PUNMIA, standard publishers 2001.
2. Hydrology by Ragunath.H.M, Willey,Eastern limited New Delhi 2000.

Reference Books:
1. Elementary hyrology by VP Singh,PHI publications.
2. Irrigation and water resources and water power by PN MODI standard book house.
3. Irrigation water management by DK Majundar,Printice hall of indra.

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT
(ELECTIVE- I)

UNIT - I:
Fundamentals of Construction Technology – Construction Activities – Process – Construction Schedule –
Construction Records – Documents - Codes and Regulations. Material, Equipment and scheduling.

UNIT - II:
Construction Method – Earthwork ,excavators ,rollers, doers, Scrapers – Handling Equipment – Draglines and Clamshells -Concrete Equipment – Handling Equipment – Cranes – Piling – Concrete and Concreting – Form work – Fabrication and Erection. Mechanized Construction – Construction Equipment.

UNIT - III:
Quality -Quality Control, Assurance and Safety – ISO – 9000 Quality Systems –
Safety -Principles on Safety – Personnel, Fire and-Electrical Safety – Environment Protection – Concept of Green Building. Air condition and HVAC systems.

UNIT - IV:
Contract Management – Project Estimation – Types of Estimation – Contract Document – Classification – Bidding –Procurement Process. Construction Claims, Dispute and Project Closure – Source of Claim – Claim Management – Dispute Resolution –Arbitration – Construction Closure – Contract Closure – Documentation.

UNIT - V:
Construction Planning – Project Planning Techniques – Planning of manpower,
Equipment Economics- Finance. Project – PERT – CPM, Resource leveling.

Text Books:
1. Construction Technology by Subir K. Sarkar, Subhajit Saraswati / Oxford University Press, 2009.
2. Construction Project Management - Theory and Practice, Nirajjha, Pearson Education, 2010.

Reference Books:
1. Construction Planning, Equipment and Methods by Peurifacy, Schexnayder, Shapira TMH, 2010.
2. Project Planning and Control with PERT and CPM – B.C. Punmia, K.K. Khandelwala – Laxmi Publication.

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UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**

III Year - II Semester   **3**   **0-0-0**   **3**

ADVANCED STRUCTURAL ANALYSIS
(ELECTIVE -1)

UNIT - I:

Moment distribution method: Application to the analysis of portal frames with non sway frames, sway frames, inclined legs and gable frames.

UNIT - II:

Kani's method-symmetrical frames-Applications to 2-storey-two bay portal frames.

UNIT - III:

Influence lines for indeterminate structures: Muller-Breslau for statically indeterminate beams, influence line diagrams for Reactions, Shearing force and Bending moment in case of Indeterminate beams and Influence line diagrams for member force in statically Indeterminate trusses.

UNIT - IV:

Flexibility Method: Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams Stiffness method: Introduction to the structural analysis by stiffness concept using Matrix approach and application to Plane frames and Plane Trusses.

UNIT - V:

Plastic Analysis: Introduction-Idealized stress-Strain diagram-shape factors for various sections-Moment curvature relationship-ultimate moment-Plastic hinge –Lower and upper bound theorems-ultimate strength and continuous beams.

Text Books:
1. Matrix method of structural Analysis by Pandit and Gupta-Tata Mc.Graw Hill.
2. Analysis of structures Vol.I & II Vazrani and ratwani. Khanna Publications.

Reference Books:
1. Structural Analysis by D.S.Prakash Rao-Sagar books.
2. Structural Analysis Vol.I & II by Bhavi Katti Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill Company.

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**3**	**0-0-0**	**3**

URBAN DISASTER – INTELLIGENT CONTROL SYSTEM
(ELECTIVE-1)

UNIT - I:
Disasters: Types of disaster, significant aspects of disasters, economic impact of disasters, Risk aspects, Hazards and disasters.
Urban Disaster and their environmental impacts: Impact of earthquakes, floods, fires, droughts, land slides, Congestion pollution, accident risk on urban environment policies for remedial measures. Technology to forecast their impact.

UNIT - II:
Technology to Track Urban Disasters: Monitoring profile – cameras, sensors and communication systems engineering profiles – total station, terrestrial scanners, and other survey equipment.
Planning Profile – Impact on Urban Disasters: Planning profile – GPS, satellite technology and photographic technique.

UNIT - III:
Information systems: Geography information systems – different packages and over view, MIS – Architecture, web enabled communication systems – over view.

UNIT - IV:
Intelligent control system: Technology enabled online monitoring system, post evaluation multi criteria systems, fore casting approaches through decision supporting systems.

UNIT - V:
Intelligent transport systems- traffic signal control systems – Dynamic Traffic light sequence – inductive loop technologies – Video Vehicle Detection – Collision Avoidance Systems – Cooperative Systems on Roads – Container Management System. Disasters – case studies on disaster mitigation measures.

Text Books:
1. Disasters – Global challenges and local solutions by Rajib Shaw. R.R. Krishna Murthy, University Press.
2. Sensor Technologies & Date requirement of ITS by Lawerence A. Klein.

Reference Books:
1. Disaster mitigation – Experiences and reflections – Pradeep sahni, Alka Dhameja, Uma Medhuri, PHI.

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UGC AUTONOMOUS

B.Tech. CE		**L**	**T-P-D**	**C**
III Year - II Semester		**3**	**0-0-0**	**3**

WATER SHED MANAGEMENT
(ELECTIVE-1)

UNIT - I:
Introduction: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

UNIT - II:
Characteristics of watershed: Size, Shape, Physiography, slope, Climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watershed. Principles of erosion: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

UNIT - III:
Measures to control erosion: Contour techniques, Ploughing, furrowing, trenching, building, terracing, gully control, rock fill dams, brushwood dam, gabion. Water harvesting: Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT - IV:
Land management: Land use and land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils. Ecosystem management: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

UNIT - V:
Planning of watershed management activities, people participation, preparation of action plan, administrative requirements.

Text Books:
1. Watershed Management by JVS Murthy,-New Age International Publishers.
2. Water Resource Engineering by R.A wurbs and WP James,-Prentice Hall Publishers

Reference Books:
1. Land and Water Management by VVN Murthy,- Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India.

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

GEO-TECHNICAL ENGINEERING - II

UNIT - I:
Soil exploration: Need – Methods of soil exploration, Boring and Sampling methods, Field tests, Penetration Tests, Plate load test, Pressure meter, planning of Programme and preparation of soil investigation report.

UNIT - II:
Earth slope stability: Infinite and finite earth slopes, types of failures, factor of safety of infinite slopes, stability analysis by standard method of slices, Bishop's Simplified method, Taylor's Stability Number, Stability of slopes of earth dams under different conditions.

UNIT - III:
Earth pressure theories: Rankine's theory of earth pressure, earth pressures in layered soils, Coulomb's earth pressure theory, Culmann's graphical method.
Retaining walls: Types of retaining walls, stability of cantilever retaining walls.

UNIT - IV:
Shallow foundations: Types and choice of foundation, Location of depth, Safe Bearing Capacity by Terzaghi, Meyerhof, Skempton and IS Methods. Safe bearing pressure based on N value, allowable bearing pressure, safe bearing capacity and settlement from plate load test, allowable settlements of structures, Settlement Analysis.

UNIT - V:
Pile foundation: Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests, Load carrying capacity of pile groups in sands and clays, Settlement of pile groups.
Well foundations: Types and Different shapes of wells, Components of wells, functions, Design Criteria, Sinking of wells, Tilts and shifts.

Text Books:
1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.

Reference Books:
1. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
2. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
3. Analysis and Design of Substructures – Swami Saran, Oxford and IBH Publishing company Pvt Ltd (1998).

J.B.INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**4**	**0-0-0**	**4**

TRANSPORTATION ENGINEERING

UNIT - I:
Highway development and planning: Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT - II:
Highway geometric design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment Gradients- Vertical curves.

UNIT - III:
Traffic engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.   Traffic regulation and management: Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

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

UNIT - V:
Introduction to railway and airport engineering: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – Crossings and Turnouts. Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram.

Text Books:
1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A textbook of Transportation Engineering – S.P.chadula – S.Chand & Co. Ltd. – (2001).

REFERENCE BOOKS:
1. Principles of Transportation Engineering by Partha Chakroborty & Aminesh Das; Prentice Hall of India, New Delhi.
2. Transport planning and Traffic Engineering by Dr. L. R. Kadiyali

3. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
III Year - II Semester	**0**	**0-3-0**	**2**

GEOTECHNICAL ENGINEERING LAB

EXPERIMENT 1: Liquid limit

EXPERIMENT 2: Plastic limit

EXPERIMENT 3: Field density by Core Cutter Method

EXPERIMENT 4: Field Density by Sand Replacement Method

EXPERIMENT 5: Grain Size Sieve Analysis.

EXPERIMENT 6: Standard and Modified Compaction test.

EXPERIMENT 7: Permeability of soils by Constant and Variable Head Test

EXPERIMENT 8:CBR Test

EXPERIMENT 9: Consolidation Test

EXPERIMENT 10: Unconfined compaction Test

EXPERIMENT 11: Direct Shear Test

EXPERIMENT 12: Vane Shear Test

J.B. INSTITUTE OF ENGINEERING & TECHNOLOGY
UGC AUTONOMOUS

B.Tech. CE   **L**   **T-P-D**   **C**
III Year - II Semester   **0**   **0-3-0**   **2**

ENVIRONMENTAL ENGINEERING LAB

EXPERIMENT 1: Determination of pH .
EXPERIMENT 2: Determination of Turbidity.
EXPERIMENT 3: Determination of Conductivity
EXPERIMENT 4: Determination of Total Dissolved Solids.
EXPERIMENT 5: Determination of Alkalinity.
EXPERIMENT 6: Determination of Acidity.
EXPERIMENT 7: Determination of Chlorides.
EXPERIMENT 8: Determination and Estimation of total solids ,
EXPERIMENT 9: Determination and Estimation of organic solids.
EXPERIMENT 10: Determination and Estimation of inorganic solids.
EXPERIMENT 11: Determination of Iron.
EXPERIMENT 12: Determination of dissolved Oxygen.

B.Tech. CE	L	T-P-D	C
IV Year - I Semester	4	0-0-0	4

MANAGEMENT SCIENCE FOR ENGINEERS

UNIT - I:
Introduction to Managerial Economics, Concepts of Managerial Economics:
Demand Analysis: Law of Demand, Elasticity of demand & Demand Forecasting.
Production and cost Analysis: Production functions, Laws of Returns, Economies of scale.
Cost Concepts: Different types of costs: Variable cost, Fixed cost, Marginal cost, Semi-variable cost. Break-even Analysis.

UNIT II:
Market Structures: Different types of Markets.
Pricing: Methods of Pricing and strategies, Skimming and Penetration Pricing.
Capital budgeting: Estimation of fixed and working capital, Methods & sources of raising capital. Methods of capital budgeting, Traditional and Discounted Techniques.
Financial accounting & Financial Analysis: Overview of financial Accounts, Journal, Subsidiary books, Ledger, Trial Balance and Preparation of Trading Account, Profit & Loss Account and Balance Sheet. Financial Analysis with the help of Ratios

UNIT - III:
Management: Functions of management. Taylor's scientific management theory, Fayol's principles of management.
Designing of organization structures: Different Methods with Merits and demerits and their suitability.
Human Recourse Management: Recruitment, Selection, Training and Development and Permanence Appraisal.

UNIT - IV:
Operation Management: Types of plant layout, Methods of production, work, study-procedure involved in Methods study and work Measurement. Statistical quality control.
X, R, C & P charts.
Project Management: Programme Evaluation and Review Technique (P E R T), critical path method
(C PM). Identification of critical path.

UNIT - V:
Material Management: Objectives, Need for Inventory Control, EOQ, ABC Analysis, VED Analysis, Purchase procedure, stores Management.
Marketing: Functions, Marketing Mix, Marketing strategies based on product life cycle, channels of distributions.

Text Books
1. Managerial Economics& Financial Accounting – Prentice Hall of India: Dr.M.Kasi Reddy, Dr.S.Saraswathi
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2009.

Reference Books

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi, 2009

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

PAVEMENT DESIGN

UNIT - I:
Introduction to pavement design: Variables considered in Pavement Design-Types of Pavements-Functions of individual layers-Factors affecting Pavement Design-wheel loads-Tire Pressure-Contact Pressure-EAL & ESWL concepts-Traffic Analysis-ADT & AADT.

UNIT - II:
Stresses in flexible and rigid pavements: Stresses in Flexible pavements-Layered systems concept-One layer system-Boussinesq two layer system-Burmister theory of Pavement design.
Stresses in Rigid pavements-Relative stiffness of slab-modulus of Subgrade Reaction-stresses due to warping-stresses due to loads-stresses due to friction-Design of tie bars and dowel bars.

UNIT - III:
Flexible and rigid pavement design: Flexible Pavement Design concepts-CBR method of Flexible Pavement design-IRC method of design-Asphalt Institute method and AASHO methods.
Rigid Pavement design concepts-IRC method of Rigid pavement design-PCA method-Importance of Joints in rigid Pavements-Types of joints-use of tie bars and dowel bars.

UNIT - IV:
Material characteristics: Tests on aggregates-Aggregate properties and their importance-Tests on Bitumen-requirements of design mix-Marshall method of mix design.

UNIT - V:
Highway construction and maintenance: Construction: Construction of Bituminous Pavements construction of Cement Concrete Roads-Soil Stabilization-use of Geosynthetics.
Highway maintenance –Pavement failures-failures in flexible Pavements-Rigid Pavement failures Pavement evaluation-Benkelman Beam method.

Text Books:
1. Highway Engineering-S.K.khanna & C.J.Justo, Nemchand& Bros.
2. Principles & Practices of Highway Engineering-Dr.L.R.Kadiyali&Dr.N.BLal, Khanna Publishers.

Reference Books:
1. Principles of Pavement design, Yoder.& Witzorac Mathew, John Wiley & Sons Inc.
2. Pavement Analysis and Design, Yang H. Huang, Prentice Hall Inc.
3. IRC codes for Design of Flexible and Rigid Pavements.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**0-0-0**	**4**

ESTIMATING AND COSTING

UNIT - I:
General items of work in Building: Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating

UNIT - II:
Detailed Estimates of Buildings. Rate Analysis Working out data for various items of work over head and contingent charges. Reinforcement bar bending and bar requirement schedules.

UNIT - III:
Earthwork for roads and canals.

UNIT - IV:
Contracts – Types of contracts – Contract Documents – Conditions of contract.

UNIT - V:
Valuation of buildings. Standard specifications for different items of building construction.

Text Books:
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie.

Reference Books:
1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.).
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

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UGC AUTONOMOUS

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

GROUND WATER DEVELOPMENT AND MANAGEMENT
(ELECTIVE-II)

UNIT - I:
Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.
Ground Water Movement: Permeability, Darcy's law, storage coefficient. Transmissivity, differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system. Ground water flow contours their applications.

UNIT - II:

Steady groundwater flow towards a well in confined and unconfined aquifers – Dupuit's and Theim's equations, Assumptions, Formation constants, yield of an open well Well interface and well tests – Recuperation Test.Unsteady flow towards a well – Non equilibrium equations – Theis' solution – Jocob and Chow's simplifications,Leaky aquifers – Well Interference.

UNIT - III:
Surface and Subsurface Investigation: Surface methods of exploration – Electrical resistivity and Seismic refraction methods. Subsurface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications along with Case Studies in Subsurface Investigation. Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water along with Case studies 100.

UNIT - IV:
Well Construction – Drilling Equipment used for Well Construction – Bore log – Interpretation of Log Data.

UNIT - V:
Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben- Herzberg relation, Shape of interface, control of seawater intrusion. Groundwater Basin Management: Concepts of conjunction use, Case studies.

Text Books:
1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

Reference Books:
1. Groundwater Hydrology by BOWER, John Wiley & sons.
2. Groundwater System Planning & Managemnet – R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

ADVANCED STRUCTURAL DESIGN
(ELECTIVE-II)

UNIT - I:

Design of combined footings   rectangular and trapezoidal, Design of cantilever retaining wall.

UNIT - II:

Design of RCC Water Tanks –circular and Rectangular types.

UNIT - III:

Design of concrete bridges-IRC loading, Design of slabs bridges and T- beam bridge.

UNIT - IV:

Design of steel Gantry girders.

UNIT - V:

Design of steel bridges –loadings –design of plate girder bridges

Text Books:
1. Advanced Reinforced concrete structures by Varghese ,PHI,New Delhi.
2. Reinforced concrete structures Vol – 2 by B. C Punmia , Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications Pvt. Ltd.,New delhi

Is code practice:
1. IS 456-2000
2. IS800-2007

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

ELEMENTS OF EARTHQUAKE ENGINEERING
(ELECTIVE-II)

UNIT - I:

Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics- Seismic waves-Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy released-Earthquake measuring instruments-Seism scope, Seismograph, accelerograph-strong ground motions- Seismic zones of India.

Theory of Vibrations: Elements of a vibratory system- Degrees of Freedom-Continuous system-Lumped mass idealization-Oscillatory motion-Simple Harmonic Motion-Free vibration of single degree of freedom (SDOF) system undamped and damped-critical damping-Logarithmic decrement-Forced vibrations.

UNIT - II:

Conceptual design: Introduction-Functional planning-Continuous load path-Overall form- simplicity and symmetry elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings- flexible buildings framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel-Lateral load resisting systems.

UNIT - III:

Introduction to earthquake resistant design: Seismic design requirements-regular and irregular configurations-basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis- equivalent lateral force method.

Reinforced Concrete Buildings: Principles of earthquake resistant deign of RC members- Structural models for frame buildings- IS code (IS 1893) based methods for seismic design- refitting- Vertical irregularities- Plan configuration problems- Determination of design lateral forces- Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT - IV:

Masonry Buildings: Introduction- Elastic properties of masonry assemblage- Categories of masonry buildings- Behavior of unreinforced and reinforced masonry walls- Behavior of walls- Box action and bands- Behavior of infill walls- Improving seismic behavior of masonry buildings- Load combinations and permissible stresses- Seismic design requirements- Lateral load analysis of masonry buildings.

UNIT - V:

Structural and Non-Structural Elements: Strategies in the location of structural walls- sectional shapes variations in elevation- cantilever walls without openings – Failure mechanism of non-structures- Effects of nonstructural elements on structural system- Analysis of non-structural elements- Prevention of non-structural damage- Isolation of non-structures. Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction- Ductility-definition-ductility relationships-Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility- Ductile detailing considerations as per IS 13920. Behavior of beams and columns in RC buildings during

Earthquakes-Vulnerability of open ground storey and short columns during earthquakes.

Text Books:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press.
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

Reference Books:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros.
3. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

TRAFFIC ENGINEERING
(ELECTIVE-II)

UNIT - I:
Traffic characteristics
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.

UNIT - II:
Highway capacity
Definition of Capacity – Importance of capacity – Factors affecting Capacity- Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor.

UNIT - III:
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.

UNIT - IV:
Traffic control & regulation
Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures- Channelization- Traffic Signals- Saturation Flow - Signal Design by Webster Method – Signal Phasing and Timing Diagrams.

Traffic & 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. 125.

UNIT - V:
Traffic signs and road markings
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. **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.

Text Books:

1. Traffic Engineering and Transportation planning – LK kadiyali – Khanna publishers.
2. Fundamentals of Transportation Engineering - C.S. Papacostas, Prentice Hall (India).

Reference Books:

1. Transportation Engineering – An Introduction – C. J. Khisty, Prentice Hall of India.
2. Principles of Transportation Engineering – Partha Chakroborthy, Animesh Das – Prentice Hall of India.
3. Highway Engineering and Traffic Analysis-Mannering and Kilareski, John wiley Publications.

B.Tech. CE	L	T-P-D	C
IV Year - I Semester	3	0-0-0	3

WATER RESOURCE SYSTEM PLANNING AND MANAGEMENT
(ELECTIVE-III)

UNIT - I:
Introduction: concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

UNIT - II:
Linear programming –I: Formulation linear programming models, graphical method, simplex method, application of linear programming in water resources.
Linear programming – II: Revised simplex method, duality in linear programming, sensitivity and past optimality analysis.

UNIT - III:
Dynamics programming: Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic for resource allocation.
Non-linear optimization techniques: Clerical of method optimization, Kuch-Tucleer, gradential based research techniques for simple unconstrained optimization.

UNIT - IV:
Simulation: application of simulation techniques in water resources.

UNIT - V:
Water –resources economics: Principles of Economics analysis benefit cost analysis socio economic intuitional and pricing of water resources.
Water resources management: Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

Text Books:
1. Water Resources System Analysis – Vedula & Mujumdar – Tata Mc.Graw Hill Company Ltd. 2005.
2. Water Resources Economics - James & Lee. Oxford Publishers 2005.

Reference Books:
1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Water Resources System Planning and Management by Sharad K.Jain, V.P. Singh, 2003.
3. Water Resources System Planning and Management by M.C.Chaturvedi by Tata McGraw-Hill Publishing company.

B.Tech. CE	L	T-P-D	C
IV Year - I Semester	3	0-0-0	3

FINITE ELEMENT METHODS
(ELECTIVE-III)

UNIT - I:
Introduction: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.
Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with   Axi-symmetric loading.

UNIT - II:
One Dimensional FEM: Stiffness matrix for bar element - shape functions for one dimensional element – one dimensional problems.

UNIT - III:
Two Dimensional FEM : Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates.

UNIT - IV:
Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements.
Isoperametric formulation: Concepts of, isoperimetric elements for 2D analysis - formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements – Lagrangian and Serenalipity elements.
To understand the elemental nodal procedure such as CST, lagrangian – Serenalipity elements.

UNIT - V:
Axi-symmetric analysis: Basic principles-Formulation of 4-node Iso-parametric Axi-symmetric element.
Solution techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Books:
1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu -   Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers.

Reference Books:
1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
3. Text book of finite element analysis by P.Seshu – Prentice Hall of India.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**3**	**0-0-0**	**3**

DISASTER MANAGEMENT AND MITIGATION
(ELECTIVE-III)

UNIT - I:
Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.
Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters -Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards.

UNIT - II:
Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions -Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - Human adjustment, perception & mitigation of earthquake.

UNIT - III: Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters,
Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones &
local storms (causes , distribution human adjustment, perception & mitigation), Cumulative atmospheric hazards/disasters : - Floods- Droughts- Cold waves- Heat waves Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation), Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Planetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion
Soil Erosion:- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion,
Chemical hazards/ disasters:- Release of toxic chemicals, nuclear explosion- Sedimentation processes, Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation,
Biological hazards/ disasters: - Population Explosion

UNIT - IV: Emerging approaches in Disaster Management- Three Stages
1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation
Natural Disaster Reduction & Management
a) Provision of Immediate relief measures to disaster affected people
b) Prediction of Hazards & Disasters
c) Measures of adjustment to natural hazards

Mitigation- Institutions

UNIT - V:

a. A regional survey of Land Subsidence, Coastal Disaster, & Disaster in Hills with particular reference to India. Ecological planning for sustainability & sustainable development in India- Sustainable rural development: A Remedy to Disasters -Role of Panchayats in Disaster mitigations

b. Environmental policies & programmes in India- Institutions & National Centres for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & training.

Text Books:
1. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni.
2. R.B.Singh (Ed) Environmental Geography, Heritage Publishers New Delhi,1990.

Reference Books:
1. Savinder Singh Environmental Geography, Prayag Pustak Bhawan, 1997.
2. Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**4**	**1-0-0**	**4**

ADVANCED FOUNDATION ENGINEERING

UNIT - I:
SHALLOW FOUNDATIONS-I: General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification.
SHALLOW FOUN DATIONS-II: Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soilsButton's theory and Siva Reddy analysis.

UNIT - II:
ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS: Analysis and structural design of R.C.C. isolated, combined and strap footings.
DEEPFOUNDATIONS-I: Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests.

UNIT - III:
DEEP FOUNDATIONS – II: Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV:
SHEET PILE WALLS: Cantilever sheet piles and achored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

UNIT - V:
FOUNDATIONS IN PROBLEMATIC SOILS: Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.
DESIGN OF UNDER REAMED PILES FOUNDATIONS: Under reamed piles-principle of functioning of under reamed pileAnalysis and structural design of under reamed pile.

Text Books:
1. Analysis and Design of Foundations and Retaining StructuresShamsher Prakash, Gopal Ranjan and Swami Saran.
2. Foundation Design-Teng.

Reference Books:
1. Analysis and Design of Foundations – E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - I Semester	**0**	**0-3-0**	**2**

HIGHWAY ENGINEERING LAB

Design Concrete Mix Proportioning by Using Indian Standard Method
I. ROAD AGGREGATES:
EXPERIMENT 1. Aggregate Crushing value
EXPERIMENT 2. Aggregate Impact Test.
EXPERIMENT 3. Specific Gravity and Water Absorption.
EXPERIMENT 4. Attrition Test
EXPERIMENT 5. Abrasion Test.
EXPERIMENT 6. Shape tests
II. BITUMINOUS MATERIALS:
EXPERIMENT 7. Penetration Test.
EXPERIMENT 8. Ductility Test.
EXPERIMENT 9. Softening Point Test.
EXPERIMENT 10. Flash and
EXPERIMENT 11.fire point tests.
EXPERIMENT 12. Marshall Stability test

		L	T-P-D	C
B.Tech. CE				
IV Year - I Semester		0	0-3-0	2

SOFT SKILLS LAB-I

Activity/ Experiment = 12

Activity I: Know Yourself/ Self Discovery and Soft Skills

1. Introduction—Importance of Knowing Yourself
   Process of knowing yourself—SWOT analysis
   Benefits of SWOT analysis---Using SWOT analysis
   SWOT analysis grid—questions to complete the grid
2. Introduction –What are soft skills?—importance of soft skills
   Selling your skills—Attributes regarded as soft skills—Soft Skills
   Social Soft Skills—Thinking Soft Skills—Negotiating –Exhibiting your Soft Skills
3. Identifying your soft skills—Improving your soft skills –Train Yourself
   Top 60 soft skills—Practicing soft skills—Measuring Attitudes

Activity II: Time and Stress Management

4. Introduction—The 80-20 rule—take a good look at the people around you—Examine your work
   Sense of time management –around you—examine your work—sense of time management
   Time is money—features of time—three secrets of time management
5. Time management matrix—analysis of time matrix—effective scheduling
   Grouping of activities—five steps to successful time management
   Difficulties in time management—evils of not planning—interesting facts about time
   Deal say of spending a day—time wasters—time savers—realizing the value of time
   Time circle planner.
   Introduction –Meaning—Effects , Kinds , and Sources of Stress
   Case study—spotting stress—stress management tips

Activity III: Developing Positive Attitude

6. Introduction—meaning –features of attitudes—attitude and human behavior :
   Passive, Aggressive and Behavior
   Formation of attitudes—change of attitudes—what can you do to change attitude?
   Ways of changing attitude in a person—attitude in a workplace
   Features of a good team player
7. The power of positive attitude—developing positive attitude
   Obstacles in developing positive attitude—staying negative—examples of negative attitude
   Overcoming negative attitude—negative attitude and its results.

Activity IV   Body Language

8. Introduction –body talk—Voluntary and involuntary body language
   Forms of body language—parts of body language—origin of body language
   Uses of body language—Body language in building interpersonal relations
9. Body language in building interpersonal relations—reasons to study body language
   Improving your body language –types of body language—gender differences
   Body language—shaking hands

Interpreting body language

Activity V Practice in Presentation Skills

10 Types of Presentations

Do's and Don'ts of Presentation Skills

11   Body language in presentation skills

12. Examples—Aspects, etc

TEXTBOOKS:

1. Soft Skills: Know Yourself and Know the World—Dr. K. Alex-S. Chand Publising-2010

REFERENCE BOOKS:

1. Managing Soft skills: K.R. Lakshminarayanan & Murugavel, Scitech Publications-2010

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**0-0-0**	**3**

REHABILITATION AND RETROFITING OF STRUCTURES

UNIT - I:
Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT - II:
Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desication.

UNIT - III:
 Inspection and Testing – Symptoms and Diagnosis of Distress - Damage assessment – NDT.

UNIT - IV:
Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning.

UNIT - V:
Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing. Health Monitoring of Structures – Use of Sensors – Building Instrumentation

Text Books:
1. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)
2. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B. A. Richardson, (1991).

Reference Books:
1. Concrete Technology by A.R. Shantakumar, Oxford University press.
2. Defects and Deterioration in Buildingts, E F & N Spon, London.
3. Non-Destructive Evaluation of Concrete Structures by Bungey.

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**1-0-0**	**3**

GROUND IMPROVEMENT TECHNIQUES
(ELECTIVE-IV)

UNIT - I:
Dewatering: methods of dewatering-sumps, single and multi stage well points-vaccum well points-horizontal wells-foundation drains-blanket drains-pit area for selection of fill material around drains-electro-Osmosis method.

UNIT - II:
Grouting: objectives of grouting-grouts and their properties-grouting methods-ascending, descending and stage grouting-hydraulic fracturing in soils.

UNIT - III:
In-Situ densification methods in granular soils: vibration at the ground surface, impact at the ground surface, vibration at depth, impact at the depth.
In-Situ densification methods in cohesive soils: preloading or dewatering, vertical drains, sand drains, sand wick geo drains, store and lime columns, thermal methods.

UNIT - IV:
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 - V:
Geosynthetics: geo textiles, types, fuctions and applications, geo grids and geo membranes, functions and applications.
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.

Text Books:
1. Engineering Principles of Ground Modification, McGraw-Hill International Edition Hausmann M.R
2. Ground improvement techniques, Purushotham Raj. laxmi publications , new delhi .

Reference Books:
1. Ground improvement, Moosely M.P (1993) Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Ground control and improvement, John Wiley and sons, Newyork, USA.
3. Designing with Geo synthetics,Robert M.Koerner, Prentice Hall New Jercy, USA.

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	L	T-P-D	C
B.Tech. CE			
IV Year - II Semester	3	1-0-0	3

PRESTRESSED CONCRETE STRUCTURES
(ELECTIVE-IV)

UNIT - I:
Introduction: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.
I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT - II:
Losses of prestress: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.
Analysis of sections for flexure; Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT - III:
Design of sections for flexure and shear: Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.
Analysis of end blocks: by Guyon's method and Mugnel method, Anchorage zone strusses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pretensioned members.

UNIT - IV:
Composite section: Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT - V:
Deflections of prestressed concrete beams: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

Text Books:
1. Prestressed Concrete by Krishna Raju; - 5th Edition Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.

Reference Books:
1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons. Codes: BIS code on prestressed concrete, IS 1343-2012.

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B.Tech. CE	L	T-P-D	C
IV Year - II Semester	3	1-0-0	3

AIRPORT PLANNING AND DESIGN
(ELECTIVE-IV)

UNIT - I: Air Transportation Systems

Introduction and history of Air transportation system and Airways-Air transport and the National economy-Growth of air transport and future trends
Aviation organizations and their functions

UNIT - II: Components of Air Transportation

Airports and airways: Site selection, design and planning approaches-Airlines and air passengers-Operating environment-Statutory approvals required

UNIT - III: Airport Planning and Configurations

Types of airport planning studies, Forecasting in aviation -Domestic and International airport planning, Analysis of wind-Runway configurations and Taxiway configurations-Design and analysis of Run-way

UNIT - IV: Planning and Design of the Terminal Area

The passenger terminal system-The terminal planning process-The apron-gate system-Precautions of funnel zone approaches

UNIT - V: Airport Space Traffic Control

Airways and Navigation aids-Air Traffic Control and Its facilities-Air safety & Regulation issues-Inter-Relation of traffic controls of different countries

Text Books:
1. Airport Planning and Design, S K Khanna, Arora M G and Jain S S, Nemchand and Brothers, Roorkee, 1994.
2. Airport Engineering by Rangwala, Charotar Publishing House, 1996

Reference Books:
1. Air Transportation Planning & design – Virendhra Kumar & Statish Chandhra – Gal Gotia Publishers (1999).
2. Airport Planning and Management, Sixth Edition by Seth B. Young, Ph.D., Alexander T.
3. Airport planning and design by Decks and Harbals.

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**1-0-0**	**3**

DESIGN AND DRAWING OF IRRIGATION STRUCTURES
(ELECTIVE-IV)

UNIT I :
Design and drawing of the following hydraulic structures.
 Surplus weir.
Syphon Well Drop

UNIT II
 Trapezoidal notch fall.
 Tank sluice with tower head

UNIT III:
Sloping glacis weir.
Canal regulator

UNIT IV :
under Tunnel.

UNIT V:
 Type III Syphon aqueduct

Text Books:
1. Water Resources Engineering – Principles and Practice by Challa Satyanarayana Murthy, New Age International Publishers.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

B.Tech. CE	L	T-P-D	C
IV Year - II Semester	3	1-0-0	3

GIS AND REMOTE SENSING
(ELECTIVE-V)

UNIT - I:
Introduction to Photogrammetry
Principle and types of aerial photographs, stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.

UNIT - II:
Remote Sensing – I: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units.
Remote Sensing – II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT - III:
Geographic Information System: 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.

UNIT - IV:
GIS Spatial Analysis: Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT - V:
Water Resources Applications-I: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.
Water Resources Applications – II: Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

Text Books:
1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

Reference Books:
1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.

2. Remote Sensing and Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. GIS by Kang – tsung chang, TMH Publications & Co.,

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**1-0-0**	**3**

EARTH AND ROCK FILL PLANS AND SLOPE STABILITY
(ELECTIVE -V)

UNIT - I:
Introduction to Photogrammetry
Earth and rock fill dams : general features, selection of site; merits and demerits of the earth and rock fill dams, classification of earth dams, causes of failure, safe design criteria, instrumentation in earth dams: pore pressure measurements, settlement gauges, inclinometers, stress measurements, seismic measurements

UNIT - II:
Failures, damages and protection of earth dams : nature and importance of failure, piping through embankment and foundations, methods of seepage control through embankments and foundations, design criteria for filters , treatments of upstream and downstream of slopes, drainage control fitter design.

UNIT - III:
Slope stability analysis : Types of failure: Failure surface, planar surfaces, Circular surfaces, non circular surfaces, limit equilibrium methods, total stress analysis versus effective stress analysis, use of hop's pore pressure parameters, short term and long term stability in slopes, Taylor charts

UNIT - IV:
Methods of slope stability methods : methods of slices, effect of cracks, vertical cuts, Bishops analysis, Bishops and Morgenstern analysis, non circular failure surfaces, Janb analysis, slider analysis, seismic stability, stabilization of slopes: slopes reinforcement and photosynthetic/soil nailing/micro piles ectasia treatment(cement time/lime treatment), surface protection(Vegetation/shotcrete)

UNIT - V:
Rock fill dams: Requirements of compacted rockfill, shear strength of rockfill mixtures, rockfill embankments, earth core rock fill dams, stability upstream and downstream slopes

Text Books:
1. Sherard, woodward,zienski and Clevenger.earth and earth rock dams.John wiley sons 1963.
2. Bharat singh and sharma-D -Earth and rock fill Dams ,1999.

Reference Books:
1. Sowers ,gf and sashay ,h.d Earth and rock fill Dams, Williams, R.C and Venice, TS 1965
2. Abramhson, L H Lee , S.N sharma ,S . -slope stability and stabilisation methods john wiley and sons .(2002)

B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**1-0-0**	**3**

AIR POLLUTION AND CONTROL
(ELECTIVE -V)

UNIT - I: Air pollution , definition , slope , significance and episodes , , Air pollutants – classifications – Natural and Artificial – Primary and secondary air pollutants , point ,line and areal sources of air pollution – stationary and mobile sources . Effects of air pollutants on man , material and vegetation :Global effects of air pollution – Green house effect , Heat islands , acid rains , ozone holes etc.

UNIT - II: Meteorology and plume desperation , properties of atmosphere : Heat , pressure , wind forces, Moisture and relative humidity , Influence of meteorological phenomenon on Air quality – wind rose diagram . Lapse rates, pressure systems , winds and moisture , plume behaviour and plume rate models , Gaussian model for plume and desperation.

UNIT - III: control of particulars – control at sources , process changes , Equipment modification , Design and operation control Equipments – settling chambers , cyclone separators , filters and wet scrubbers , electrostatic precipitators.

UNIT - IV: Control of gaseous emissions -general methods of control of NOx and Sox emissions – in plant control measurements of removable and recycling – adaptor-absorption and abduction

UNIT - V: Air quality management – monitoring of SPM , SO2 , NOx and CO emission standards – air sampling – sampling techniques – high volume air sampler – stack sampling – analytic of air pollutants – air quality standards – air pollution control act

Text Books:
1. Air pollution by B.N rao and H.N .N rao – Tata Mc . Graw Hill company .
2. Air pollution by wynk and wiper – Harper & Row , New york

Reference Books:
 1. An introduction to air pollution by R.K Trivedy and P.K , Goel , B .S publications

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B.Tech. CE	**L**	**T-P-D**	**C**
IV Year - II Semester	**3**	**1-0-0**	**3**

INDUSTRIAL WASTE WATER TREATMENT
(ELECTIVE -V)

UNIT - I:
Sources of Pollution-Physical, Chemical, Organic and Biological properties of Industrial Wastes- Differences between industrial and municipal waste waters-Effects of industrial effluents on sewers and Natural Water Bodies.

UNIT - II
Pre and primary treatment –Equalization, Proportioning Neutralization, will Separation by Plantation –Waste Reduction-Volume Reduction – Strength Reduction.

UNIT - III:
Waste Treatment Methods – Nitrification and De-nitrification –Phosphorous removal-Heavy metal removal-Membrane Separation Process- Air Stripping and Absorption Processes- Special Treatment Methods –Disposal of Treated Waste Water.

UNIT-IV: Characteristics and Composition of Waste Water and Manufacturing Processes of industries like Sugar, Characteristics and Composition of industries like Food Processing industries, Steel , Petroleum Refineries.

UNIT-V: Characteristics and Composition of Industries like Textiles,Tanneries,Atomic Energy Plants and other Mineral Processing industries –Joint Treatment of Raw industrial waste water and Domestic Sewage – Common Effluent Treatment Plants (CETP) - Location, Design, Operation and Maintenance Problems-Economical aspects.

Text Books:
    1. Industrial Waste Water Pollution Control by W.Wesley Eckenfelder - McGraw-Hill.
    2.Industrial Waste Treatment by Rao & Datta.

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B.Tech. CE   **L**   **T-P-D**   **C**

IV Year - II Semester   **0**   **0-3-0**   **2**

SOFTSKILLS LAB-II

Group Discussion

    Activity/ Experiment 1: Dynamics of Group discussion—tips for Group Discussion—

    Activity/ Experiment 2: Traits tested in GD

    Activity/ Experiment 3: Non-verbal Communication in GD

    Activity/ Experiment 4: Body language in GD

Interview Skills

    Activity/ Experiment 5: Introduction—types of Interview

    Activity/ Experiment 6: FAQ's in Interview

    Activity/ Experiment 7: Reasons for rejecting a candidate

    Activity/ Experiment 8: On the day of interview

    Activity/ Experiment 9:common mistakes in interview

    Activity/ Experiment 10: Post interview etiquette

    Activity/ Experiment 11: Dress code and tips for job seekers at interview

    Activity/ Experiment 12: Body language in Interview skills

Mock Interview

    Activity/ Experiment 13: Parameters to evaluate students' performance

TEXTBOOKS:

1. Soft Skills: Know Yourself and Know the World—Dr. K. Alex-S. Chand Publising-2010

Reference Books:

  1. **Managing Soft skills:** K.R. Lakshminarayanan & Murugavel, Scitech Publications-2010