1.R20 COURSE STRUCTURE FOR REGULAR BATCH

COURSE STRUCTURE FOR B.TECH I YEAR

B.Tech I Year I Semester

S. No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 1	A41002	Mathematics – I	3	1	0	4.0
2	B S - 2	A41003	Engineering Physics	3	1	0	4.0
3	BS Lab - 1	A41082	Physics Lab	0	0	3	1.5
4	H & S - 1	A41001	English	2	0	0	2.0
5	H&S Lab -1	A41081	English Language Skills Lab (ELSL)	0	0	2	1.0
6	E S -1	A41501	Programming for Problem Solving - I	2	0	0	2.0
7	ES-Lab -1	A41581	Programming for Problem Solving Lab - I	0	0	2	1.0
8	E S - 2	A41301	Engineering Graphics & Modeling	1	0	3	2.5
			Total	**11**	**2**	**10**	**18**

B.Tech I Year II Semester

S .No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 3	A42007	Mathematics – II	3	1	0	4.0
2	B S - 4	A42009	Chemistry	3	1	0	4.0
3	BS Lab - 1	A42086	Chemistry Lab	0	0	3	1.5
4	E S - 3	A42303	Engineering Mechanics	4	0	0	4.0
5	ES Lab -2	A42382	Engineering Workshop	0	1	3	2.5
6	H&S Lab -2	A42084	English Communication Skills Lab (ECSL)	0	0	2	1.0
7	E S - 4	A42502	Programming for Problem Solving - II	2	0	0	2.0
8	ES Lab -3	A42582	Programming for Problem Solving Lab –II	0	0	2	1.0
			Total	**12**	**3**	**10**	**20**

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S –2	A43010	Professional Communication	2	0	0	2
2	BS – 5	A43011	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 5	A43101	Fluid Mechanics	3	0	0	3
4	PC – 1	A43102	Solid Mechanics– I	3	1	0	4
5	PC – 2	A43103	Engineering Geology	3	0	0	3
6	PC – 3	A43104	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	A43181	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	A43182	Engineering Geology Lab	0	0	2	1
9	MC – 1	A43MC1	Environmental Science	2	0	0	-
			Total	**19**	**1**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	BS – 6	A44018	Probability and Statistics	3	0	0	3
2	ES – 6	A44206	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	A44105	Solid Mechanics – II	3	0	0	3
4	PC – 5	A44106	Concrete Technology	3	0	0	3
5	PC – 6	A44107	Structural Analysis	3	0	0	3
6	PC – 7	A44108	Building Materials and construction	3	0	0	3
7	ES Lab – 4	A44183	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab – 3	A44184	Solid Mechanics Lab	0	0	2	1
9	MC – 2	A44MC2	Gender sensitization	2	0	0	-
			Total	**20**	**0**	**4**	**20**

COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S-3	A45021	Managerial Economics and Financial Analysis	3	0	0	3
2	PC –8	A44109	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC – 9	A44110	Geotechnical Engineering	3	0	0	3
4	PC – 10	A44111	Design of Reinforced Concrete Structures	3	0	0	3
5	PE – 1	A44112 A44113 A44114	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	A44115 A44116 A44117	Open Elective	3	0	0	3
7	PC Lab – 4	A44185	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 5	A44186	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	A45TP1	Personality Development & Behavioural Skills	2	0	0	1
			Total	**20**	**0**	**4**	**21**

B. Tech. III Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 11	A46118	Highway Engineering	3	0	0	3
2	PC - 12	A46119	Foundation Engineering	3	0	0	3
3	PC – 13	A46120	Environmental Engineering	3	0	0	3
4	PC – 14	A46121	Water Resources Engineering	3	0	0	3
5	PE – 2	A46122 A46123 A46124	1. Construction Engineering& Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE – 2	A46125 A46126 A46127	Open Elective	3	0	0	3
7	PC Lab – 6	A46187	Environmental Engineering Lab	0	0	2	1
8	H&S Lab- 3	A46088	Advanced Communication Skills Lab	0	0	2	1
9	ES – 7	A46TP1	Quantitative Methods & Logical Reasoning	2	0	0	1
			Total	**20**	**0**	**4**	**21**

COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 15	A47128	Design of Steel Structures	3	0	0	3
2	PC – 16	A47129	Estimation & Costing	3	0	0	3
3	PE – 3	A47130 A47131 A47132	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE – 4	A47133 A47134 A47135	1. Railways Airports and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE – 3	A47136 A47137 A47138	Open Elective	3	0	0	3
6	PC Lab – 7	A47188	Concrete & Highway Materials Lab	0	0	2	1
7	PC Lab - 8	A47189	Computational Lab	0	0	2	1
8	PW-1	A471P1	Industry Oriented Mini Project	0	0	0	3
			Total	**15**	**0**	**4**	**20**

B. Tech. IV Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 17	A48139	Rehabilitation and Retrofitting of structures	3	0	0	3
2	PC – 18	A48140	Remote Sensing & GIS	3	0	0	3
3	--	A481TS	Technical Seminar	0	2	0	2
4	--	A481CV	Comprehensive Viva Voce	0	0	0	2
5	PW-2	A481P2	Major Project	0	0	20	10
			Total	**6**	**2**	**20**	**20**

2.R20 COURSE STRUCTURE FOR FAST-TRACK BATCH

COURSE STRUCTURE FOR B.TECH I YEAR

B.Tech I Year I Semester

S. No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 1	A41002	Mathematics – I	3	1	0	4.0
2	B S - 2	A41003	Engineering Physics	3	1	0	4.0
3	BS Lab - 1	A41082	Physics Lab	0	0	3	1.5
4	H & S - 1	A41001	English	2	0	0	2.0
5	H&S Lab -1	A41081	English Language Skills Lab (ELSL)	0	0	2	1.0
6	E S -1	A41501	Programming for Problem Solving - I	2	0	0	2.0
7	ES-Lab -1	A41581	Programming for Problem Solving Lab - I	0	0	2	1.0
8	E S - 2	A41301	Engineering Graphics & Modeling	1	0	3	2.5
			Total	**11**	**2**	**10**	**18**

B.Tech I Year II Semester

S .No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 3	A42007	Mathematics – II	3	1	0	4.0
2	B S - 4	A42009	Chemistry	3	1	0	4.0
3	BS Lab - 1	A42086	Chemistry Lab	0	0	3	1.5
4	E S - 3	A42303	Engineering Mechanics	4	0	0	4.0
5	ES Lab -2	A42382	Engineering Workshop	0	1	3	2.5
6	H&S Lab -2	A42084	English Communication Skills Lab (ECSL)	0	0	2	1.0
7	E S - 4	A42502	Programming for Problem Solving - II	2	0	0	2.0
8	ES Lab -3	A42582	Programming for Problem Solving Lab –II	0	0	2	1.0
			Total	**12**	**3**	**10**	**20**

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S –2	A43010	Professional Communication	2	0	0	2
2	BS – 5	A43011	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 5	A43101	Fluid Mechanics	3	0	0	3
4	PC – 1	A43102	Solid Mechanics– I	3	1	0	4
5	PC – 2	A43103	Engineering Geology	3	0	0	3
6	PC – 3	A43104	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	A43181	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	A43182	Engineering Geology Lab	0	0	2	1
9	MC – 1	A43MC1	Environmental Science	2	0	0	-
			Total	**19**	**1**	**4**	**20**

B. Tech. II Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	BS – 6	A44018	Probability and Statistics	3	0	0	3
2	ES – 6	A44206	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	A44105	Solid Mechanics – II	3	0	0	3
4	PC – 5	A44106	Concrete Technology	3	0	0	3
5	PC – 6	A44107	Structural Analysis	3	0	0	3
6	PC – 7	A44108	Building Materials and construction	3	0	0	3
7	ES Lab – 4	A44183	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab – 3	A44184	Solid Mechanics Lab	0	0	2	1
9	MC – 2	A44MC2	Gender sensitization	2	0	0	-
			Total	**20**	**0**	**4**	**20**

COURSE STRUCTURE FOR B.TECH III YEAR

B. Tech. III Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S-3	A45021	Managerial Economics and Financial Analysis	3	0	0	3
2	PC –8	A44109	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC – 9	A44110	Geotechnical Engineering	3	0	0	3
4	PC – 10	A44111	Design of Reinforced Concrete Structures	3	0	0	3
5	PE – 1	A44112 A44113 A44114	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	A44115 A44116 A44117	Open Elective	3	0	0	3
7	PC Lab – 4	A44185	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 5	A44186	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	A45TP1	Personality Development & Behavioural Skills	2	0	0	1
			Total	**20**	**0**	**4**	**21**

B. Tech III Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 11	A46118	Highway Engineering	3	0	0	3
2	PC - 12	A46119	Foundation Engineering	3	0	0	3
3	PC – 13	A46120	Environmental Engineering	3	0	0	3
4	PC – 14	A46121	Water Resources Engineering	3	0	0	3
5	PC – 15	A48139	Rehabilitation and Retrofitting of structures	3	0	0	3
6	PE – 2	A46122 A46123 A46124	1. Construction Engineering & Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
7	OE – 2	A46125 A46126 A46127	Open Elective	3	0	0	3
8	PC Lab – 6	A46187	Environmental Engineering Lab	0	0	2	1
9	H&S Lab-1	A46088	Advance Communication Skills Lab	0	0	2	1
10	ES – 2	A46TP1	Quantitative Methods & Logical Reasoning	2	0	0	1
			Total	**23**	**0**	**4**	**24**

COURSE STRUCTURE FOR B.TECH IV YEAR

B. Tech. IV Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 16	A47128	Design of Steel Structures	3	0	0	3
2	PC – 17	A47129	Estimation & Costing	3	0	0	3
3	PC – 18	A48140	Remote Sensing & GIS	3	0	0	3
4	PE – 3	A47130 A47131 A47132	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
5	PE – 4	A47133 A47134 A47135	1. Railways Airports and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
6	OE – 3	A47136 A47137 A47138	Open Elective	3	0	0	3
7	PC Lab – 7	A47188	Concrete & Highway Materials Lab	0	0	2	1
	PC Lab - 8	A47189	Computational Lab	0	0	2	1
8	PW-1	A471P1	Industry Oriented Mini Project	0	0	0	3
			Total	**18**	**0**	**4**	**23**

B. Tech. IV Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	--	A481TS	Technical Seminar	0	2	0	2
2	--	A481CV	Comprehensive Viva Voce	0	0	0	2
3	PW-2	A481P2	Major Project	0	0	20	10
			Total	**0**	**2**	**20**	**14**

3.OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING DEPARTMENT

Category	Course Code	Course Title
OE-1	A44115 A44116 A44117	1. Elements of civil Engineering 2. Smart cities 3. Disaster Management
OE-2	A46125 A46126 A46127	1. Green building Technologies 2. Environmental Pollution & control methods 3. Construction Management
OE-3	A47136 A47137 A47138	1. Remote Sensing & GIS 2. Introduction to earthquake Engineering 3. Solid Waste Management

B.Tech I Year I Semester

S. No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 1	A41002	Mathematics – I	3	1	0	4.0
2	B S - 2	A41003	Engineering Physics	3	1	0	4.0
3	BS Lab - 1	A41082	Physics Lab	0	0	3	1.5
4	H & S - 1	A41001	English	2	0	0	2.0
5	H&S Lab -1	A41081	English Language Skills Lab (ELSL)	0	0	2	1.0
6	E S -1	A41501	Programming for Problem Solving - I	2	0	0	2.0
7	ES-Lab -1	A41581	Programming for Problem Solving Lab - I	0	0	2	1.0
8	E S - 2	A41301	Engineering Graphics & Modeling	1	0	3	2.5
			Total	**11**	**2**	**10**	**18**

MATHEMATICS – I

(Matrices and Calculus)

L	T	P	C
3	1	0	4

B.Tech I Year I Semester - CIVIL
Course Code: A41002

Course Outcomes:

1. Write the matrix representation of system of linear equations and identify the consistency of the system of equations.
2. Find the Eigen values and Eigen vectors of the matrix and discuss the nature of the quadratic form.
3. Analyze the convergence of sequence and series.
4. Discuss the applications of mean value theorems to the mathematical problems, Evaluation of improper integrals using Beta and Gamma functions.
5. Examine the extrima of functions of two variables with/ without constraints.

UNIT-I:

Matrices and Linear System of Equations:

Matrices and Linear system of equations: Real matrices Symmetric, skew symmetric, orthogonal. Complex matrices: Hermitian, Skew Hermitian and Unitary. Rank-Echelon form, Normal form. Solution of Linear Systems Gauss Elimination, Gauss Jordan & LU Decomposition methods.

UNIT-II:

Eigen Values and Eigen Vectors:

Eigen values, Eigen vectors properties, Cayley-Hamilton Theorem (without Proof) Inverse and powers of a matrix by Cayley-Hamilton theorem Diagonolization of matrix- Quadratic forms: Reduction to Canonical form, Nature, Index, Signature.

UNIT-III:

Sequences & Series:

Basic definitions of Sequences and series, Convergence and divergence, Ratio test, Comparison test, Cauchy's root test, Raabe's test, Integral test, Absolute and conditional convergence.

UNIT-IV:

Beta & Gamma Functions and Mean Value Theorems: Gamma and Beta Functions- Relation between them, their properties evaluation of improper integrals using Gamma/ Beta functions. Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Generalized Mean Value theorem (all theorems without proof)–Geometrical interpretation of Mean value theorems.

UNIT-V:

Functions of Several Variables:

Partial Differentiation and total differentiation, Functional dependence, Jacobian Determinant- Maxima and Minima of functions of two variables with constraints and without constraints, Method of Lagrange Multipliers.

Textbooks:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain & Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, Pearson, Reprint, 9th Edition, 2002.

2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 9th Edition, 2006.
3. Advanced Engineering Mathematics, Michael D. Greenberg , 2nd Edition,.

ENGINEERING PHYSICS

B.Tech I Year I Semester - CIVIL
Course Code: A41003

L	T	P	C
3	1	0	4

Course Outcomes:

1. Explain the crystal structure of solids
2. Understand various optical phenomena of matter
3. Explain the working principle of optical fibers and lasers
4. Interpret forced damped harmonic oscillations
5. Apply the knowledge of magnetic behavior of materials

UNIT-I:

Crystallography: Space lattice Unit cell Lattice parameter Crystal systems Bravais lattices, Atomic radius Co-ordination number Structures and Packing fractions of Simple Cubic, Body Centered Cubic and Face Centered Cubic crystals. Miller Indices for Crystal planes and directions, Inter planar spacing of orthogonal crystal systems.

UNIT-II:

Wave Optics: Principle of Superposition, coherence. Interference Interference in thin films by reflection, Newton's Rings. Diffraction Fraunhofer and Fresnel Diffraction, Farunhofer diffraction due to single slit, Plane Diffraction Grating, resolving power of grating (qualitative treatment). Polarization Polarization of light waves, Plane of vibration, plane of polarization, Double refraction, Nicol's Prism, Applications of Polarization.

UNIT-III:

Fiber Optics and Lasers: Introduction, total internal reflection, acceptance angle and numerical aperture, step and graded index fibers, applications of optical fibers. Introduction to interaction of radiation with matter: stimulated absorption, spontaneous emission and stimulated emission, characteristics of a laser, Population inversion, components of a laser: active medium, pumping source, optical resonator. Construction and working of Ruby laser and He-Ne laser. Applications of Lasers.

UNIT-IV:

Waves and Oscillations: Simple harmonic motion, equation of simple harmonic motion, Simple Pendulum, Torsional pendulum, damped harmonic motion-heavy, critical and light damping, energy decay in a damped harmonic oscillator (qualitative treatment), power dissipation, quality factor. Forced vibration, steady state motion of forced damped harmonic oscillator. Amplitude of forced vibration, Resonance.

UNIT-V:

Magnetic Properties of Materials: Introduction to magnetism Basic definitions, Origin of magnetic moment, Bohr magneton. Classification of magnetic materials-Dia, Para, Ferro, Anti-ferro and Ferri magnetic materials, Domain theory of ferromagnetism, Hysteresis curve, Soft and Hard magnetic materials and their applications.

Text books:

1. Engineering Physics, Hitendra K Malk, A. k. Singh, Mcgraw Hill Edition Private Limited.
2. Engineering Physics, P K Palanisamy, Scietech publication.

Reference books:

1. A Text book of Engineering Physics, M N Avadhanulu, P G Kshrsagar, S Chand.
2. Physics Volume I & II, Resnick and Halliday, John Wiley and sons, Inc.

PHYSICS LAB

B.Tech I Year I Semester - CIVIL
Course Code: A41082

L	T	P	C
	0	3	1.5

Course Outcomes:

1. Apply optical phenomena to characterize optical sources and components.
2. Characterize semiconductors and semiconductor devices.
3. Study transient response of RC circuit.
4. Study the properties and resonance mechanisms in mechanical and electrical systems.
5. Evaluate the magnetic Induction along the axis of current carrying coil.

List of Experiments

1. Newton's rings: Determination of the radius of curvature of a given lens by forming Newton's rings.
2. Diffraction grating: Determination of wavelength of a given source using a plane diffraction grating.
3. Dispersive power: Determination of dispersive power of given prism.
4. Single Slit Diffraction using Lasers - Determination of wavelength of a Monochromatic Source (LASER).
5. Energy gap of P-N junction diode: Determination of the energy gap of a semiconductor diode.
6. Light emitting diode: Study of V-I and P-I characteristics of a given light emitting diode.
7. Photo diode: Study of V-I characteristics of photo diode at different intensities.
8. Melde's Experiment: Determination of frequency of electrically maintained tuning fork.
9. Sonometer: Determination of frequency of AC source.
10. Torsional pendulum: Determination of rigidity modulus of a given material.
11. Fly-wheel: Determination of moment of inertia of flywheel.
12. Stewart & Gee's experiment - Determination of magnetic field along the axis of current carrying coil.
13. LCR Circuit- Determination of the resonance frequency of forced electrical oscillator.
14. RC- Circuit – Determination of the time constant of RC-circuit.
15. Optical fiber: Determination of the numerical aperture of optical fiber.

Note: Any 10 experiments are to be performed.

ENGLISH

B.Tech I Year I Semester - CIVIL
Course Code: A41001

L	T	P	C
2	0	0	2

Course Outcomes:

1. Infer the importance of scientific discoveries in promoting social responsibilities.
2. Comprehend the given texts and respond appropriately for technical and professional purposes.
3. Communicate confidently and transfer information into various forms of writing.
4. Understand the importance of health and nutrition for a better society.
5. Present various forms of business writing skills for successful careers.

UNIT-I:

'The Raman Effect' from the prescribed textbook **'English for Engineers'**

Grammar : Articles & Prepositions

Reading : Reading and Its Importance- Techniques for Effective Reading.

Writing : Organizing principles of paragraphs in documents.

Vocabulary: The concept of word Formation, synonyms, antonyms, and standard abbreviations.

UNIT-II:

'Ancient Architecture in India' from the prescribed textbook **'English for Engineers'**

Reading : Improving Comprehension Skills Techniques for good comprehension

Writing : Sentence Structures, Use of phrases and clauses in sentences Writing Formal Letters-Eg. Letter of Complaint, Letter of Requisition, Job Application with Resume.

Vocabulary: Root words and acquaintance with prefixes and suffixes from foreign languages in English, to form derivatives

UNIT-III:

'Blue Jeans' from the prescribed textbook **'English for Engineers'**

Grammar: Tenses: Types and uses.

Reading : Sub-skills of Reading- Skimming and Scanning

Writing : Identifying Common Errors in Writing Subject-Verb agreement in number, gender and person Information Transfer- Process writing

UNIT-IV:

'What Should You Be Eating' from the prescribed textbook **'English for Engineers'**

Reading : Intensive Reading and Extensive Reading

Writing : Nature and Style of Sensible Writing Describing & Defining Identifying common errors in writing

UNIT-V:

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook **'English for Engineers'**

Vocabulary : Technical Vocabulary and their usage **Reading :** Reading Comprehension-Exercises for Practice **Writing :** Cohesive Devices Précis Writing

Technical Reports-Introduction, Characteristics of a Report Categories of Reports, Formats-Structure of Reports (Manuscript Format) Types of Reports - Writing a Report.

Textbooks:

1. English for Engineers, Sudarshana, N. P. and Savitha, C. , Cambridge University Press, 2018.

Reference Books:

1. Effective Technical communication, Muhammed Rizvi, TMH, 2008.
2. Advanced English Grammar, Hewings, Cambridge University Press, 2010.

ENGLISH LANGUAGE SKILLS LAB

B.Tech I Year I Semester - CIVIL
Course Code: A41081

L	T	P	C
0	0	2	1

Course Outcomes:

1. Reproduce speech sounds and improve fluency in language.
2. Understand syllables and consonant clusters for appropriate pronunciation.
3. Exhibit effective professional skills with rhetoric eloquence.
4. Deliver enthusiastic and well-practiced presentation.
5. Learn Task-Based Language Learning (TBLL) through various language learning activities effectively.

Exercise-I:

CALL Lab: Introduction to Pronunciation- Speech Sounds, Vowels and Consonants- Practice for Listening
ICS Lab: Ice-Breaking activity and JAM session

Exercise-II:

CALL Lab: Silent Letters, Consonant Clusters, Homographs
ICS Lab: Common Everyday Situations: Conversations and Dialogues

Exercise-III:

CALL Lab: Syllables
ICS Lab: Communication at Workplace, Social and Professional Etiquette

Exercise-IV:

CALL Lab: Word Accent and Stress Shifts
ICS Lab: Formal Presentations, Visual Aids in Presentations

Exercise-V:

CALL Lab: Intonation, Situational dialogues for practice
ICS Lab: Interviews, Types of Interviews

Reference Books

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan Publishers, 2010.
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010.

PROGRAMMING FOR PROBLEM SOLVING – I

B.Tech I Year I Semester - CIVIL
Course Code: A41501

L	T	P	C
2	0	0	2

B.Tech I Year I Semester Course Outcomes:

1. Design Algorithms and Flowcharts for real world applications using 'C'.
2. Know the usage of various operators in Program development.
3. Design programs involving decision and iteration structures.
4. Apply the concepts code reusability using Functions.
5. Analyze various searching and sorting techniques using Arrays.

UNIT-I

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and Pseudo code, Applications of C language.

Overview of C Language: Introduction, Salient Features of C Language, Structure of a "C" Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input/ Output Statements with suitable illustrative "C" Programs.

UNIT-II

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative "C" Programs.

UNIT-III

Statements in C:

Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, and Switch-Statement with suitable illustrative "C" Programs.

Loop Control Statements: while, do-while and for with suitable illustrative "C" Programs.

UNIT-IV

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vs exit( ), Parameter Passing mechanism: Call-by-Value, Recursion, Storage Classes.

UNIT-V

Arrays: Introduction to Arrays, One-Dimensional Arrays, Two-Dimensional Arrays, Arrays and Functions.

Searching and Sorting: Linear Search, Binary Search, Bubble Sort, Insertion Sort.

Text Books:

1. COMPUTER SCIENCE: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – I

B.Tech I Year I Semester - CIVIL
Course Code: A41581

L	T	P	C
0	0	2	1

Course Outcomes:

1. Apply the specification of syntax rules for numerical constants and variables, data types.
2. Know the Usage of various operators and other C constructs.
3. Design programs on decision and control constructs.
4. Develop programs on code reusability using functions.
5. Implement various searching and sorting techniques using arrays.

Week 1

Ubuntu and Linux Commands.

Week 2

Designing of flowcharts and algorithms using raptor tool

1. Areas of Polygons.
2. Calculation of Simple and Compound Interest.
3. Swapping of Two numbers with and without temporary variable.
4. Checking whether a number is even or odd.
5. Sum of first 'n' natural numbers.
6. Checking a number whether it is divisible by any given number.
7. Evaluation of mathematical expressions.
8. Programs using scanf( ) and printf( ) statements.

Week 3

Programs on operators. (Minimum 4 Programs)

Week 4, 5 & 6

Programs on Conditional Statements. (Minimum 12 Programs)

Week 7, 8 & 9

Programs on Control Statements. (Minimum 12 Programs)

Week 10 &11

Programs on Functions. (Minimum 6 Programs)

Week 12

Programs on One Dimensional Arrays. (Minimum 3 Programs)

Week 13

Programs on Two Dimensional Arrays. (Minimum 2 Programs)

Week 14

Implementation of Linear Search and Binary Search.

Week 15

Implementation of Bubble Sort and Insertion Sort.

Week 16

Review

ENGINEERING GRAPHICS & MODELING

B.Tech I Year I Semester - CIVIL
Course Code: A41301

L	T	P	C
1	0	3	2.5

Course Outcomes:

1. Understand the concepts of engineering drawing of planes, solids and the CAD drawing software.
2. Applying the principles of engineering graphics while drawing the engineering components.
3. Analyse the sectional views for their configurations.
4. Evaluate the surfaces of solids developed for further processing in the engineering applications.

UNIT- I:

Introduction to Engineering Drawing: Principles of engineering graphics and their significance, usage of drawing instruments, conic sections, including the rectangular hyperbola– general method only. Cycloid, Epicycloid, Hypocycloid. Scales plain & diagonal only.

Introduction to CAD: Introduction to CAD software and its importance, standard toolbar/menus and navigation tools used in the software, using basic commands limits, units, grid, test , move, offset ,mirror, rotate, trim, extend, fillet etc. drawing lines using line command. Drawing spline, ellipse, circle, rectangle etc.. Concept of layers and dimensioning.

UNIT- II:

Principles of Orthographic Projections: Conventions. Projections of points, projections of lines (first angle projection) inclined to both planes (traces and midpoint problem to be excluded).

Implementation of CAD: Drawing orthographic projections of points and lines using a CAD package.

UNIT – III:

Projections of the Planes: Projections of regular planes inclined to both the planes. **Projections of Solids:** Projections of regular solids inclined to both the planes (prisms, pyramids, cones and cylinders, Change of potion method only).

Implementation in CAD: Drawing orthographic projection of planes and regular solids using a CAD package.

UNIT- IV:

Sections and Sectional Views of Right Angular Solids: Prism, Cylinder, Pyramid, Cone. Development of surfaces of right regular solids - Prism, Pyramid, Cylinder and Cone.

Implementation in CAD: Concept of hatching, drawing sectional views of solids and the development of right regular solids using a CAD package.

UNIT-V:

Principles of Isometric projection: Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids, conversion of isometric views to orthographic views and vice-versa,

conventions.

Implementation in CAD: Drawing isometric views of simple solids. Drawing isometric views from giving orthographic views and vice-versa using a CAD package.

Note: Implementation in CAD (For Internal Evaluation Weightage Only)

Text Books:

1. Engineering Drawing, Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Charotar Publishing House.

Reference Books:

1. Engineering Graphics, Agrawal B. & Agrawal C. M. (2012), TMH Publication, Text book on Engineering Drawing, Narayana, K.L. & P Kannaiah (2008), Scitech Publishers.
2. Engineering Drawing and Computer Graphics, Shah, M.B. & Rana B.C. (2008), Pearson Education.
3. http://docs.autodesk.com/ACDMAC/2013/ENU/PDFs/acdmac_2013_users_gu ide.pdf

B.TECH I YEAR II SEMESTER

S .No	Course Category	Course Code	Course Title	L	T	P	Credits
1	B S - 3	A42007	Mathematics – II	3	1	0	4.0
2	B S - 4	A42009	Chemistry	3	1	0	4.0
3	BS Lab - 1	A42086	Chemistry Lab	0	0	3	1.5
4	E S - 3	A42303	Engineering Mechanics	4	0	0	4.0
5	ES Lab -2	A42382	Engineering Workshop	0	1	3	2.5
6	H&S Lab -2	A42084	English Communication Skills Lab (ECSL)	0	0	2	1.0
7	E S - 4	A42502	Programming for Problem Solving - II	2	0	0	2.0
8	ES Lab -3	A42582	Programming for Problem Solving Lab –II	0	0	2	1.0
			Total	**12**	**3**	**10**	**20**

MATHEMATICS – II

B.Tech I Year II Semester - CIVIL
Course Code: A42007

L	T	P	C
3	1	0	4

Course Outcomes:

1. Classify the various types of differential equations of first order and first degree and apply the concepts of differential equations to the real world problems.
2. Solve higher order differential equations and apply the concepts of differential equations to the real world problems.
3. Find the Laplace Transform of various functions and apply to find the solutions of differential equations.
4. Evaluate the multiple integrals and identify the vector differential operators physically in engineering problems.
5. Evaluate the line, surface and volume integrals and converting them from one to another by using vector integral theorems.

UNIT-I:

First order Ordinary Differential Equations and their Applications: Formation of Differential equations, Differential equations of first order and first degree: exact, linear and Bernoulli, Applications of ODE: Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

UNIT-II:

Higher Order Linear Differential Equations: Linear differential equations of second and higher order with constant coefficients, RHS term of the type f(X) = e^{ax}, $\sin ax$, $\cos ax$ *and* x^k, $e^{ax}V(x)$, $x^kV(x)$. Method of variation of parameters

UNIT-III:

Laplace Transforms: Laplace transform of standard functions Inverse transform first shifting Theorem, Transforms of derivatives and integrals Unit step function second shifting theorem Dirac's delta function Convolution theorem Periodic function - Differentiation and integration of transforms Application of Laplace transforms to ordinary differential equations.

UNIT-IV:

Multiple Integrals & Vector Differentiation: Multiple integrals - double and triple integrals change of order of integration (Only Cartesian form) change of variables (Cartesian to Polar for double integral, Cartesian to Spherical for triple integral). Gradient- Divergence- Curl and their related properties Potential function Laplacian and second order operators.

UNIT-V:

Vector Integration: Line integral, work done, Surface and Volume integrals. Vector integrals theorems: Green's, Stoke's and Gauss Divergence Theorems (Only Statements & their Verifications).

Text Books:

1. Higher Engineering Mathematics, B.S. Grewal, Khanna Publishers, 36th Edition, 2010.
2. Advanced Engineering Mathematics, Jain &Iyengar, Narosa Publications.

Reference Books:

1. Calculus and Analytic Geometry, G.B. Thomas and R.L. Finney, 9th Edition, Pearson, Reprint, 2002.
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006.
3. Advanced Engineering Mathematics (2nd Edition), Michael D. Greenberg.

CHEMISTRY

B.Tech I Year II Semester - CIVIL
Course Code: A42009

L	T	P	C
3	1	0	4

Course Outcomes:

1. Acquire knowledge of atomic, molecular and electronic changes related to conductivity.
2. Apply the various processes of treatment of water for both domestic and industrial purpose.
3. Apply the knowledge of electrode potentials for the protection of metals from corrosion.
4. Analyze the major chemical reactions that are used in the synthesis of compounds.
5. Apply the knowledge of polymers in every day's life.

UNIT I: Atomic and molecular structure

Introduction, Concept of atomic and molecular orbitals, Crystal field theory- Crystal field splitting patterns of transition metal ion d- orbital- tetrahedral & octahedral geometries.

LCAO, Molecular orbitals of di-atomic molecules: Molecular orbital energy level diagrams of diatomic molecules (N_2, O_2& F_2). Pi-molecular orbitals of butadiene and benzene.

UNIT II: Water Technology

Hardness of water, expression of hardness ($CaCO_3$ equivalent), units and types of hardness. Estimation of temporary and permanent hardness of water by EDTA method. Numerical problems based on hardness of water. Potable water: Characteristics, treatment of water for domestic supply. Desalination of brackish water: Reverse osmosis. Alkalinity of water and its determination. Boiler feed water and its treatment: Internal treatment (Colloidal, Phosphate Calgon conditioning of water). External treatment (Ion –exchange process).

UNIT III: Electrochemistry and corrosion

Electrode, electrode potential, galvanic cell, cell reactions and cell notation, cell EMF, types of electrodes (Calomel electrode and Quinhydrone electrode), Determination of P^H using quinhydrone electrode. Nernst equation, Numerical problems.

Batteries: Introduction to cell and battery, Primary (lithium cell) and secondary cells, (Lead-acid cell, and Lithium-ion cells). Fuel cells – Methanol – Oxygen fuel cell, advantages and engineering applications of fuel cells.

Corrosion: Introduction, types of corrosion: chemical and electrochemical corrosion, factors affecting the rate of corrosion: Nature of the metal - Position of metal in galvanic series, Purity of metal, Nature of corrosion product. Nature of environment - Effect of temperature, Effect of P^H, Humidity. Corrosion control methods: Cathodic protection: Sacrificial anode method and Impressed current cathode method. Protective coatings: Metallic coatings (anodic and cathodic), methods of application on metals- Electroless plating of Ni.

UNIT IV: Stereochemistry

Structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity. Conformations of n-butane.

Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution (SN1 & SN2), addition (addition of HBr to propene, Markownikoff and Anti Markownikoff addition), elimination, oxidation (oxidation of alcohols using $KMnO_4$ & CrO_3), reduction (reduction of carbonyl compounds by $LiAlH_4$ & $NaBH_4$). Synthesis of a commonly used drug molecule- Paracetamol and Asprin.

UNIT V: Polymer Chemistry

Introduction, classification of polymers, types of polymerization (addition and condensation, mechanisms not included). Plastics- types of plastics -Thermoplastics and Thermosetting plastics. Preparation, properties and engineering applications of PVC, Teflon and Bakelite. Fibers: Nylon 6, 6 and Terelene (Dacron). Elastomers: Natural rubber-structure, vulcanization. Synthetic rubbers: Buna-S & Butyl rubber. Conducting polymers: Classification, polyacetylene and applications.

Biodegradable polymers: Types, examples: Polyhydroxy butyrate (PHB), Polyglycolic acid (PGA), Polylactic acid (PLA). Applications of biodegradable polymers.

Text Books:

1. Engineering Chemistry by P.C Jain & Monica Jain, Dhanpat Rai Publishing Company.
2. Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company.

Reference Books:

1. Physical Chemistry, by P. W. Atkins, W.H.Freeman & Company.
2. Text book of Engineering Chemistry by Dr.M.Tirumala Chary & Dr. E.Laxminarayana. Scitech Publicaions (INDIA) Pvt Ltd.,
3. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S.Krishnan

CHEMISTRY LAB

B.Tech I Year II Semester - CIVIL
Course Code: A42086

L	T	P	C
0	0	3	1.5

Course Outcomes:

1. Determination of parameters like hardness, alkalinity and chloride content in water.
2. Estimation of rate constant of a reaction from concentration-time relationships.
3. Determination of physical properties like adsorption, surface tension and viscosity.
4. Synthesize a small drug molecule and analyze a salt sample.
5. Calculation of strength of compound using instrumentation techniques.

Choice of 10-12 experiments from the following:

1. Estimation of total hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of chloride content of water.
4. Estimation of HCl by conductometric titration.
5. Estimation of mixture of acids by conductometric titration.
6. Estimation of HCl by potentiometric titration.
7. Estimation of Fe^{2+} by potentiometry using $KMnO_4$.
8. Determination of the rate constant of a reaction.
9. Determination of surface tension.
10. Determination of viscosity of a lubricant.
11. Chemical analysis of a salt.
12. Synthesis of a polymer/drug.
13. Adsorption of acetic acid by charcoal.
14. Determination of Saponification /acid value of an oil.

Reference Books:

1. Practical Engineering Chemistry by Mukkanti, B.S. Publications, 2010.
2. Volga's Qualitative Inorganic Chemistry by PEAR Publications 2010.

ENGINEERING MECHANICS

B.Tech I Year II Semester - CIVIL
Course Code: A42303

L	T	P	C
4	0	0	4

Course Outcomes:

1. Understand the concepts of engineering mechanics
2. Apply the laws of mechanics for various engineering applications
3. Analyse the motion of body
4. Evaluate performance of various engineering components interms of their energy capacities

UNIT-I:

Introduction to Engineering Mechanics Force Systems: Basic concepts, particle equilibrium in 2D & 3D, rigid body equilibrium, system of forces, coplanar concurrent forces, components in space, resultant, moment of forces and its application, couples and resultant of force system, equilibrium of system of forces, free body diagrams, equations of equilibrium of coplanar systems.

UNIT-II:

Friction: Types of friction, limiting friction, laws of friction, static and dynamic friction, motion of bodies, wedge friction.

UNIT-III:

Centroid and Centre of Gravity: Centroid of lines, areas and volumes from first principle, centroid of composite sections, centre of gravity and its implications. Theorem of Pappus.

UNIT-IV:

Area Moment of Inertia: Definition, Moment of inertia of plane sections from first principles, theorems of moment of inertia, moment of inertia of standard sections and composite sections, Parallel Axis Theorem, Perpendicular Axis Theorem

Mass Moment of Inertia: Mass moment of inertia of composite bodies.

UNIT-V:

Review of Particle Dynamics: Rectilinear motion, Plane curvilinear motion, Relative motion, Work-kinetic energy, power, potential energy.

Kinetics of Rigid Bodies: Basic terms, general principles in dynamics, types of motion, D'Alembert's principle.

Text Books:

1. Engineering Mechanics, Shames and Rao (2006), Pearson Education.
2. Singer's Engineering Mechanics: Statics & Dynamics, K.Vijaya Kumar Reddy and J.Suresh Kumar. B.S.Publications, 3rd edition 2013.

Reference Books:

1. Engineering Mechanics, Andrew Pytel, Jaan Kiusalaas, Cengage Learning, 2014.
2. Mechanics for Engineers, Beer F.P & Johnston E.R Jr. Vector, TMH,
3. Engineering Mechanics, Timoshenko S.P and Young D.H., McGraw Hill International Edition, 1983.
4. Engineering Mechanics, Hibbeler R.C & Ashok Gupta, Pearson Education, 2010.
5. Engineering Mechanics, Tayal A.K., - Statics & Dynamics, Umesh Publications, 2011.
6. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press, 2008.
7. Engineering Mechanics, Volume-II Dynamics, Meriam. J. L., John Wiley & Sons, 2008. S.S Bhavikatti, New Age International Publishers.

ENGINEERING WORKSHOP

B.Tech I Year II Semester - CIVIL
Course Code: A42382

L	T	P	C
0	1	3	2.5

Course Outcomes:

1. Understanding the tools and methods of using to fabricate engineering components
2. Applying the measuring techniques to verify the dimensional accuracy
3. Evaluating various methods and trades of workshop in the component building

(i) Lectures & videos:
Detailed contents:

1. Manufacturing Methods- Metal Forming, Machining, Advanced manufacturing methods (2 lectures)
2. CNC machining, Additive manufacturing (2 lectures)
3. Fitting operations & power tools (1 lecture)
4. House wiring (1 lecture)
5. Carpentry (1 lecture)
6. Plastic moulding (1 lecture)
7. Metal casting (1 lecture)
8. Welding (1 Lecture)

(ii) Workshop Practice:
Detailed contents:

1. Machine shop (Lathe machine)
2. Fitting shop
3. Carpentry
4. House Wiring
5. Welding shop (Arc welding)
6. Tin Smithy

Reference Books:

1. Elements of Workshop Technology, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Manufacturing Engineering and Technology, Kalpakjian S. and Steven S. Schmid, 4th edition, Pearson Education India Edition, 2002.

ENGLISH COMMUNICATION SKILLS LAB

B.Tech I Year II Semester - CIVIL
Course Code: A42084

L	T	P	C
0	0	2	1

Course Outcomes:

1. Understand the variants in pronunciation.
2. Identify the diverse purposes of listening and speaking.
3. Discuss ideas in diverse communicative settings.
4. Exhibit increased confidence in public speaking.
5. Display critical thinking, problem solving and decision making skills through GD's.

Exercise-I:

CALL Lab: Common Indian Variants in Pronunciation Differences between British and American Pronunciation.
ICS Lab: Spoken vs. Written language-Formal and Informal English- Introducing Oneself and Others.

Exercise-II:

CALL Lab: Listening Skill- Its importance Purpose- Process- Types- Barriers- Effective Listening.
ICS Lab:
Features of Good Conversation Strategies for Effective Communication Role-Play- Making Requests and Seeking Permissions - Telephone Etiquette.

Exercise-III:

CALL Lab: Information Transfer
ICS Lab: Descriptions-Narrations-Giving Directions and Guidelines-Giving Instructions- Seeking Clarifications-Asking for and Giving Directions-Thanking and Responding- Agreeing and Disagreeing-Seeking and Giving Advice-Making Suggestions.

Exercise-IV:

CALL Lab: Past Tense Marker and Plural Marker
ICS Lab: Public Speaking- Exposure to Structured Talks - Non-verbal Communication- Making a Short Speech - Extempore

Exercise-V:

CALL Lab: Intonation- Sentence Stress -Weak Forms and Strong Forms.
ICS Lab: Group Discussion, Mock Group Discussion sessions

Reference Books:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian Macmillan Publishers, 2010
2. Speaking English Effectively, Mohan, Macmillan Publishers, 2010

PROGRAMMING FOR PROBLEM SOLVING – II

B.Tech I Year II Semester – CIVIL
Course Code: A42502

L	T	P	C
2	0	0	2

Course Outcomes:

1. Identify various string handling functions in 'C'.
2. Develop programs with user defined data types.
3. Use Dynamic memory allocation functions with pointers.
4. Distinguish between Stacks and Queues.
5. Analyze various Dynamic Data Structures.

UNIT – I

Overview of Arrays and Functions.

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions (strlen( ), strcmp( ), strcat( ),strcpy( ) and strrev( )).

UNIT -II

Structures: Definition and Initialization of Structures, Accessing structure members, Nested Structures, Array of Structures, Structures and Functions, Unions, typedef, Enumerated Data types.

UNIT-III

Pointers: Introduction to Pointers, Pointer Arithmetic, Pointers and Arrays, Pointer to Structure, Pointers and Strings, Parameter passing mechanism: Call by Reference, Pointer to Pointer, Dynamic Memory Allocation.

UNIT-IV

Introduction to Data Structures: Lists and Operations, Linear and Nonlinear Data structures.
Stacks- Introduction to Stacks, Operations, Implementation of Stack using Arrays.
Queues- Introduction to Queues, Operations, Implementation of Queue using Arrays.

UNIT-V

Linked Lists: Introduction to Linked List, Operations on Single Linked List (search, Insertion & Deletion).
Files: Introduction to Files, File Operations (Open, Close, read & Write).

Text Books:

1. Computer Science: A Structured Programming Approach Using C, B.A.Forouzon and R.F. Gilberg, Third edition, 2016.
2. C and Data Structures, Ashok N. Kamthane, Pearson Education.

Reference Books:

1. Problem Solving Using C, M.T. Somashekara, PHI, 2nd Edition 2009.
2. Computer Fundamentals and Programming in C, A.K.Sharma, 2nd Edition, University Press.
3. Programming in C 2/e, PradipDey and Manas Ghosh, Oxford University Press, 2nd

Edition 2011.
4. The Fundamentals of Computers, Rajaraman V., 4th Edition, Prentice Hall of India, 2006.
5. Programming in C, R S Bichker, University Press, 2012.

PROGRAMMING FOR PROBLEM SOLVING LAB – II

B.Tech I Year II Semester – CIVIL
Course Code: A42582

Course Outcomes:

1. Build programs on various string handling functions.
2. Develop applications on user defined datatypes.
3. Apply dynamic memory allocation throughpointers.
4. Implement linear data structures through stacks andqueues.
5. Create linked list dynamically through stacks and queues.

Week 1
Programs on Arrays and Functions. (Minimum 3 Programs)
Week 2 & 3
Programs on Strings with and without string built-in Functions. (Minimum 6 Programs)
Week 4
Programs on Accessing Structures and Nested Structures. (Minimum 3 Programs)
Week 5 & 6
Programs on Array of Structures, Structures and Functions. (Minimum 5 Programs)
Week 7
Programs on Unions, typedef and enum. (Minimum 4 Programs)
Week 8
Programs on Pointers, pointer arithmetic, pointer expression, One Dimensional and Two dimensional arrays. (Minimum 4 Programs)
Week 9
Programs on Pointer to structure, Call by Reference, Pointer to Pointer. (Minimum 3 Programs)
Week 10
Programs on Dynamic Memory Allocation Functions. (Minimum 3 Programs)
Week 11
Programs on Stacks and Queues using Arrays.
Week 12 & 13
Programs on Single Linked List.
Week 14 & 15
Programs on File Operations. (Minimum 6 Programs)
Week 16
Review

COURSE STRUCTURE FOR B.TECH II YEAR

B. Tech. II Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S –2	A43010	Professional Communication	2	0	0	2
2	BS – 5	A43011	Numerical Methods & Partial Differential Equations	3	0	0	3
3	ES – 5	A43101	Fluid Mechanics	3	0	0	3
4	PC – 1	A43102	Solid Mechanics– I	3	1	0	4
5	PC – 2	A43103	Engineering Geology	3	0	0	3
6	PC – 3	A43104	Surveying & Geomatics	3	0	0	3
7	PC Lab – 1	A43181	Surveying & Geomatics Lab	0	0	2	1
8	PC Lab – 2	A43182	Engineering Geology Lab	0	0	2	1
9	MC – 1	A43MC1	Environmental Science	2	0	0	-
			Total	**19**	**1**	**4**	**20**

PROFESSIONAL COMMUNICATION

B.Tech II Year I Semester - CIVIL
Course Code: A43010

L	T	P	C
2	0	0	2

Course outcomes:

After completion of this course students will be able to

CO1:Acquire enhanced personality
CO2:Exhibit appropriate professional etiquette
CO3:Practice team building with strong communication skills
CO4:Develop problem solving skills and decision-making
CO5:Demonstrate effective presentation skills

Unit: I: Self Appraisal

Self Introspection/ Self Retrospection
Introducing self & others
Goal setting
SWOT Analysis,

Unit: II: Professional Etiquette

Etiquette-Telephone Etiquette- Netiquette
Email, Social Network
Behavioural Traits
Case study

Unit: III: Team Building

Leadership skills-Case Studies
Team Essentials
Negotiation Skills
Group Discussion-Functional Aspects

Unit: IV: Logical Thinking and Analytical Reasoning

Decision Making
Problem Solving
Conflict management
Case Study

Unit: V: Presentation Skills

Poster Presentation
Oral Presentation-Individual Presentation, Team Presentation, Thematic Presentation

Text Books:

1. Rao,M.S. Soft Skills Enhancing Employability.New Delhi: I.K.Publishing House,2010.
2. Rao, Nageshwar. Communication Skills. New Delhi: Himalaya Publishing House Pvt.Ltd, 2008

References Books:

1. Ashrif Rizvi. Effective Technical Communication, Tata Mc Grahill, 2011.
2. Daniel G. Riordan & Steven E. Pauley.Technical Report Writing Today, Biztantra Publishers, 2005.

NUMERICAL METHODS &PARTIAL DIFFERENTIAL EQUATIONS

B.Tech II Year I Semester - CIVIL
Course Code: A43011

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Develop skills in solving engineering problems involving Algebraic and transcendental equations.
CO2: Acquires the knowledge of interpolation in predicting future out comes based on the present knowledge and also to fit different types of Curves.
CO3: To know various types of numerical methods in solving engineering problems.
CO4: Classify the nature of second and Higher order partial differential equations and find the solutions of linear and non linear PDE.
CO5: To apply Partial differential Equations in different engineering problems.

UNIT-I: Numerical Techniques: Solution Of Algebraic And Transcendental Equations

Introduction - The Bisection Method- The Method of False Position- The Iteration Method- Newton-Raphson Method. Solving system of linear Non- Homogeneous equations by Jacobi's and Gauss- Seidel Iteration methods.

UNIT-II: Curve Fitting And Numerical Integration

Curve fitting: Fitting a straight line -second degree curve-exponential curve, power curve by method of least squares.

Numerical integration – General Quadrature (Newton's Cote's formula), Trapezoidal rule, Simpson's rule $\left(\frac{1}{3}^{rd} \ \& \frac{3}{8}^{th}\right)$.

UNIT-III: Numerical Solutions Of Ivp's

Numerical solution of Ordinary Differential equations: Introduction- Solution by Taylor's series method- Picard's Method of successive approximations- Single step methods-Euler's Method - Runge-Kutta (second and classical fourth order) Methods- Predictor Corrector method- Adam's - Bashforth method .

UNIT-IV: Partial Differential Equations

Introduction- Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions- Solutions of first order Linear (Lagrange) Equation, Nonlinear Equations- Charpits Method.

UNIT-V: Applications Of Partial Differential Equations

Introduction- Classification of general second order partial differential equations- Method of separation of variables for second order equations- Applications of Partial Differential Equations- One dimensional wave equation – One dimensional heat equation- Steady State two dimensional Heat equation(or Laplace equation).

Text Books

1. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi, 11th Reprint, 2010.
2. Numerical Methods, S. S. Sastry ,– PHI Publications

Reference Books

1. Introductions of Numerical Methods, Jain & Iyengar
2. Numerical Methods, E. Balaguruswamy, Tata-Mc Graw Hil

FLUID MECHANICS

B.Tech II Year I Semester - CIVIL
Course Code: A43101

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand different properties of fluid and the relationship between them.
CO2: Explain the Continuity equation for one dimensional, two dimensional and three dimensional flows.
CO3: Apply the Euler's and Bernoulli's equations in practical civil engineering problems.
CO4: Analyse head losses in pipes and flow between parallel plates.
CO5: Demonstrate the boundary layer concepts and its separation.

UNIT – I

Introduction: Dimensions and units – Physical properties of fluids, specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion pressure at a point, Pascal's law, Hydrostatic law – atmospheric, gauge and vacuum pressure – measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNIT – II

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

UNIT – III

Fluid dynamics and measurement of flow: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stoke's equations (Explanationary), Momentum equation and its application – forces on pipe bend. Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular, trapezoidal and Stepped notches–Broadcrested weirs.

UNIT – IV

Closed conduit flow: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Laws of Fluid friction – Darcy's equation, ,variation of friction factor with Reynold's number – Moody's Chart, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, flow between parallel plates, flow through long tubes, flow through inclined tubes.

UNIT – V

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

Text Books:

1. Hydraulics and Fluid Mechanics (Including Hydraulics Machines), Modi and Seth, Standard book house, 22nd Edition, 2019.

Reference Books:

1. A Textbook of Fluid Machines, R. K. Rajput, S. Chand & Company Ltd, 5th Edition, 2013.

SOLID MECHANICS – I

B.Tech II Year I Semester - CIVIL
Course Code: A43102

L	T	P	C
3	1	0	4

Course Outcomes

After completion of this course students will be able to

CO1: Examine stress – strain, elastic constants and strain energy.
CO2: Analyze the shear force and bending moment diagrams of beams and relationship between them.
CO3: Evaluate the flexural and shear stresses for various beam cross sections.
CO4: Calculate principal stresses and strains using analytical and graphical solutions for the safety using failure theories.
CO5: Determine the deflections of beams with various loadings using different methods.

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 modulii and the relationship between them – Bars of varying section – composite bars – Temperature stresses, Elastic constants.

Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

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.

UNIT – III

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

Shear stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

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

UNIT – V

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.

Text Books

1. Strength of Materials, R.K. Bansal, Lakshmi Publications Pvt. Ltd, 6th Edition, 2015.

Reference Books

1. Mechanics of Structures Vol –I, H.J. Shah and S. B. Junnarkar, Charotar Publishing House Pvt, 31st Edition, 2014.
2. Strength of Materials, D.S Prakash Rao, Universities Press Pvt. Ltd, 2nd Edition,1999.

ENGINEERING GEOLOGY

B.Tech II Year I Semester - CIVIL
Course Code: A43103

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Classify and compare different rocks and minerals across the construction site.
CO2: Identify and build the knowledge on main and most common igneous, sedimentary and metamorphic rocks encountered by foundations and sites.
CO3: Define And Interpret The Geological Structures In The Geological Maps And Cross Sections
CO4: Understand the importance of graphical studies and various geophysical methods.
CO5: Illustrate the factors which affect the dams, reservoirs and tunnels.

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"

UNIT – II

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 some common rock forming minerals.[Examples: Feldsper, Quartiz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite]

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 rocks[eg: Granite, Dolerite, Basalt, Pegmatite, Laerite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate]

UNIT – III

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults uncomfornities, and joints – their important types and case studies. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India, Stabilisation of soils, Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration.

UNIT – IV

Importance of geophysical studies: Principles of geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, Radiometric 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 – V

Geology of Dams, Reservoirs And Tunnels: 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, factor's contributing to the success of a reservoir, geological factors influencing water lightness and life of reservoirs – Purposes of tunneling, effects of Tunneling on the ground role of Geological Considerations (i.e., Lithological, structural and ground water) in tunneling over break and lining in tunnels.

Text Books

1. Engineering Geology, N. Chennakesavulu, Trinity (Laxmi Publications Lmt), 2nd Edition, 2005.

Reference Books

1. Principles of Engineering Geology & Geotechnics, DP Krynine & W R Judd, CBS Publishers,1st E Book Edition, 2018.
2. Engineering Geology, Subinoy Gangopadhyay, Oxford university press, 1st Edition, 2013.
3. Engineering Geology for Civil Engineers, P.C. Varghese, PHI Learning, 1st Edition, 2012.

SURVEYING & GEOMATICS

B.Tech II Year I Semester - CIVIL
Course Code: A43104

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Identify a detailed surveying at any site by any method.
CO2: Ability to use modern survey equipment to measure angles and distances.
CO3: Compute the differences in elevation draw and utilize contour plots, volumes for earthwork.
CO4: Understand the working principles of modern equipment and its methodologies.
CO5: Analyze the basic concept of GPS and its applications.

UNIT – I

Introduction to surveying: Overview of plane surveying (chain, compass, theodolite and plane table), Objectives, Principles and classifications, Scales, Conventional Symbols, Signals.

UNIT – II

Distances and direction: Distance measurement methods, use of chain, tape and electronic distance measurements, meridians, azimuths and bearings, declination, computation of angle.

UNIT – III

Leveling and contouring: Concept and Terminology, Temporary adjustments – method of leveling. Characteristics and Uses of contours – methods of conducting contour surveys and their plotting. Embankments and cutting for a level section and two level sections with and without transverse slopes.

UNIT – IV

Modern field surveying systems: Principle of electronic distance measurements, types of EDM instruments, distomat, total station – parts of a total station – accessories – advantages and applications, field procedure for total station survey, errors in total station survey.

UNIT – V

Introduction to Geomatics: Global positioning systems – segments, GPS measurements, errors in biases, surveying with GPS, Co-ordinate transformation, accuracy considerations, electromagnetic spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, Remote sensing data acquisition, platforms and sensors, visual image interpretation, digital image processing.

Text Books:

1. Surveying (Vol – 1 & 2), Duggal S K, Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 4th Edition, 2004.
2. Remote sensing geographical Information system, Anji Reddy M., B.S. publications, 3rd Edition, 2008.

Reference Books:

1. Surveying and Leveling, R. Subramanian, Oxford University Press, 2nd Edition, 2012.
2. Advanced Surveying (Total Station GIS and Remote Sensing), Satheesh Gopi, R. Sathi Kumar and N. Madhu. Pearson Education India, 1st Edition, 2007.

SURVEYING & GEOMATICS LAB

B.Tech II Year I Semester - CIVIL
Course Code: A43181

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Apply the principle of surveying for civil engineering applications
CO2: Apply the knowledge to ccalculate areas, drawing plans and contour maps using different measuring equipment at field level.
CO3: Identify data collection methods and prepare field notes.
CO4: Understand the working principles of survey instruments, measurement errors and corrective measures
CO5: Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and its methodologies.

List of experiments

1. Survey of an area by chain surveying.
2. Determination of two inaccessible points by using prismatic compass.
3. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
4. Radiation & intersection method by plane table survey.(Any one exercise)
5. Exercise on fly levelling using dumpy level.
6. An exercise on L.S, C.S and Plotting
7. Trigonometric leveling – Heights and distance problem
8. Determination of Area & Remote height using total station
9. Traversing & Contouring using total station
10. Distance, gradient, Diff. height between two inaccessible points using total station
11. Study on use of GPS for data collection
12. Collection of Point Data, Line Data, and Polygon Data using GPS.

ENGINEERING GEOLOGY LAB

B.Tech II Year I Semester – CIVIL
Course Code: A43182

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to
CO1: To study the physical properties and identification of minerals referred under the theory.
CO2: Describe and identify the rocks referred under the theory.
CO3: Illustrate the Microscopic study of rocks.
CO4: Interpret and draw the sections for geological maps showing tilted beds, faults, unconformities etc.,
CO5: Solve the simple structural geological problems.

List of Experiments

1. Study of physical properties and identification of minerals.
2. Study of physical properties and identification of rocks(igneous)
3. Study of physical properties and identification of rocks(sedimentary)
4. Study of physical properties and identification of rocks(metamorphic)
5. Microscopic study of rocks
6. Microscopic study of minerals
7. Study of geological structures like faults and folds
8. Study of geological structures like tilted bed models and unconformities
9. Interpretation and drawing of sections for geological maps showing tilted beds
10. Interpretation and drawing of sections for geological maps showing faults , unconformities.
11. Simple structural geology problems on Strike.
12. Simple structural geology problems on Dip

ENVIRONMENTAL SCIENCE

B.Tech II Year I Semester – CIVIL
Course Code: A43MC1

L	T	P	C
2	0	0	0

Course Outcomes

After completion of this course students will be able to

CO1: Define and explain the structure and functions of ecosystem, value of biodiversity, threats and conservation of biodiversity.
CO2: Explain the limitations of the resources and impacts of over utilization of all natural resources.
CO3: Explain the sources and effects of environmental pollutions and list the available techniques to control the pollution.
CO4: Explain the global environmental issues like climate change, ozone hole and can explain the scope of EIA, Environmental Management Plan, environmental audit and list the EIA methods.
CO5: Mention the salient features of environmental acts and rules, define the sustainable goals along with measures required for the sustainability.

UNIT- I

Ecosystem: Definition, Scope and Importance of ecosystem, Structure and Functions of ecosystem: Food chains, Food Web and Ecological Pyramids, Flow of energy; Bio-magnification.
Biodiversity and Biotic Resources: Introduction, Definition, levels of Biodiversity, Value of biodiversity, Hot spots of biodiversity, Threats to biodiversity, conservation of biodiversity: In-Situ and Ex-situ conservation.

UNIT -II

Natural Resources: Classification of Resources, **Water resources**: use and over utilization of surface and ground water, Dams: benefits and problems, Rain water harvesting; **Energy resources**: growing energy needs, Renewable and Non Renewable Energy resources. **Land resources**: land degradation – Landslide and Soil Erosion; **Forest Resources –** Uses and Exploitation.

UNIT - III

Environmental Pollution And Control: Types of Pollution, Sources, Effects and Control measures of Air Pollution ,Water Pollution ,Soil Pollution and Noise Pollution.

UNIT - IV

Global Environmental Problems and Global Efforts: Green house effect, Global Warming, climate change and their impacts on human environment; Ozone depletion and Ozone depleting substances (ODS); Aid Rains.
Environmental Impact Assessment (EIA): Scope of EIA and EIA methods, scope of Environmental audit and Environmental Management Plan.

UNIT - V

Environmental Policy, Legislation, Rules And Regulations: Salient features of Environmental Protection act, Air (Prevention and Control of pollution) Act- 1981, Water (Prevention and Control of pollution) Act-1974, Forest Conservation Act, Municipal solid waste, Hazardous waste, E-waste, Bio-medical waste, Radioactive waste Rules.
Towards Sustainable Future: Concept of Sustainable Development, Sustainable goals defined by UN, Threats to Sustainability, Environmental Education, Role of IT in Environment, Smart Cities, Concept of Green Building, Low Carbon Lifestyle, Life cycle assessment and Ecological Foot Print.

Text books:

1. Text Book of Environmental Studies, Anubha Kaushik, New age International Publishers, 4th Edition, 2015.
2. Environmental studies, Erach Bharucha, University Grants Commission, University Press, 2nd Edition 2014.

Reference books:

1. Text Book of Environmental Studies, Anubha Kaushik, New age International Publishers, 3rd Edition,2011.
2. Text book of Environmental Science and Technology, M. Anji Reddy, 2nd Edition, 2012.
3. Environmental Science: Towards a Sustainable Future, Richard T. Wright, PHL Learning Private Ltd. New Delhi, 12th Edition 2017.

B. Tech. II Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	BS – 6	A44018	Probability and Statistics	3	0	0	3
2	ES – 6	A44206	Principles of Electrical Engineering	3	0	0	3
3	PC – 4	A44105	Solid Mechanics – II	3	0	0	3
4	PC – 5	A44106	Concrete Technology	3	0	0	3
5	PC – 6	A44107	Structural Analysis	3	0	0	3
6	PC – 7	A44108	Building Materials and construction	3	0	0	3
7	ES Lab – 4	A44183	Computer Aided Drafting Lab	0	0	2	1
8	PC Lab – 3	A44184	Solid Mechanics Lab	0	0	2	1
9	MC – 2	A44MC2	Gender sensitization	2	0	0	-
			Total	**20**	**0**	**4**	**20**

PROBABILITY AND STATISTICS

B.Tech II Year II Semester – CIVIL
Course Code: A44018

L	T	P	C
3	0	0	3

***Course Outcomes*:**
After completion of this course students will be able to
CO1: To differentiate among random variables involved in the probability models which are useful for all branches of engineering.
CO2: Derive relationship among variety of performance measures using probability distributions.
CO3: Acquire elementary knowledge of parametric and non parametric –tests and understand the use of observing state analysis for predicting future conditions.
CO4: Identify and examine situations that generate using problems and able to solve the tests of ANOVA for classified data.
CO5: Apply proper measurements, Indicators and techniques of Correlation and regression analysis.

Course Syllabus

UNIT-I: Probability And Random Variables
Introduction to Probability, Random variables- Discrete and Continuous, Expectation, Probability Distribution Function, Mass Function/ Density Function of a Probability Distribution.
UNIT-II: Probability Distributions
Fitting of Binomial, Poisson & Normal distributions and their properties (only Statements) Moment Generating Functions of the above three distributions and hence finding the mean and variance.
UNIT-III: Sampling Theory & Testing Of Hypothesis I

Sampling Distribution-Definition of Sample, Population, and Types of Sampling. Estimation-Point estimation, Interval estimation, Testing of Hypothesis- Null hypothesis – Alternative hypothesis, Type I, & Type II errors – critical region confidence interval for mean, Testing of hypothesis for single mean and difference between the means for large samples.

Confidence interval for the proportions, Tests of hypothesis for the proportions- single and difference between the proportions for large samples

UNIT-IV: Testing Of Hypothesis II
Small Samples - t-distribution, F-Distribution, χ^2 distribution, ANOVA for one-way classified data

UNIT-V: Correlation, Regression & Curve Fitting
Coefficient of Correlation-Regression coefficients- The lines of Regression- The Coefficient of Rank Correlation.
Curve Fitting- Fitting a Straight line- Second Degree Polynomial- Exponential, Power Curve by Method of Least Squares.

Text Books
1. Probability and Statistics for Engineers, Richard Arnold Johnson, Irvin Miller and John E Freund, New Delhi Prentice Hall.
2. Probability and Statistics, T. K. V. Iyangar others, S. Chand Publications,

.

Reference Books

1. Fundamentals of Mathematical Statistics, S C Guptha and V K Kapoor, S Chand,
2. Introductory Methods of Numerical Analysis, S S Sastry, PHI Learning PVT Ltd,

PRINCIPLES OF ELECTRICAL ENGINEERING

B.Tech II Year II Semester – CIVIL
Course Code: A44206

L	T	P	C
3	0	0	3

.***Course Outcomes:***

After completion of this course students will be able to

CO1**:** understand basics of electrical circuits, parameters, and operation of the transformers in the energy conversion process, electromechanical energy conversion,
CO2**:** Analyze DC machines
CO3**:** Use measuring instruments like voltmeter, ammeter, wattmeter for measuring electrical quantities etc.
CO4**:** Apply the concepts of electrical engineering to design or analyse basic electrical circuits and machinery.

UNIT - I
Introduction To Electrical Engineering
Ohm's law, basic circuit components, Kirchhoff's laws, simple problems.
Network Analysis
Basic definitions, types of elements, types of sources, resistive networks, inductive networks, capacitive networks, and series parallel circuits, star delta and delta star transformation. , Network theorems- Superposition, Thevenins's, Maximum power transfer theorems and simple problems.

UNIT- II
Alternating Quantities
Principle of ac voltages, waveforms and basic definitions, root mean square and average values of alternating currents and voltage, form factor and peak factor, phasor representation of alternating quantities, the J operator and phasor algebra, analysis of ac circuits with single basic network element, single phase series circuits.

UNIT- III
Transformers
Principles of operation, Constructional Details, Ideal Transformer and Practical Transformer, Losses, Transformer Test, Efficiency and Regulation Calculations (All the above topics are only elementary treatment and simple problems).

UNIT- IV
D.C. Machines
D.C GENERATORS
Principle of operation of dc machines, types of D.C generators, EMF equation of D.C generator.
D.C MOTORS
Principle of operation of dc motors, types of D.C motors, torque equation, simple problems

UNIT – V
Electrical Appliances
Fuse, Circuit breakers, difference between fuse and circuit breaker, electrical relay, Types of Batteries, battery backup, RPS, UPS (elementary treatment only), Earthing-types of earthing.

Text Books:
1. Principles of Electrical Engineering, V.K Mehta, Rohit Mehta, S.Chand Publications,
2. Basic Electrical Engineering, T.K.Nagasarkar and M.S. Sukhija, Oxford University Press,.

Reference Books:

1. Basic Electrical Engineering, Abhijit Chakrabarthi, Sudiptanath, Chandrakumar Chanda, Tata-McGraw-Hill,
2. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI,.

SOLID MECHANICS – II

B.Tech II Year II Semester – CIVIL
Course Code: A44105

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Design and safety of the shaft subjected to Torsion and bending moment.
CO2: Calculate the Column capacity for various end conditions due to axial and eccentric loading.
CO3: Apply the concepts of direct and bending stresses to evaluate the safety of Structures.
CO4: Evaluate the stresses and strains in thin shells and Thick Cylinders.
CO5: Determine the stresses due to Unsymmetrical bending of beams and locate the shear centre.

UNIT – I

Torsion of circular shafts: Theory of pure torsion – Derivation of Torsion equations $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending, 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 – springs in series and parallel.

UNIT – II

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 – Perry's formula.

UNIT – III

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 – IV

Thin Shells: 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.

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

UNIT – V

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 axis – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis - Deflection of beams under unsymmetrical bending.

Shear centre: Introduction – Shear centre for symmetrical and unsymmetrical (channel, I, T and L) sections

Text Books:

1) Strength of Materials, R. K. Bansal, Lakshmi Publications House Pvt. Ltd, 6th Edition, 2015.

Reference Books:

1) Strength of Materials, S.S. Bhavikatti, Vikas Publishing House Pvt. Ltd, 4th Edition, 2008.
2)Mechanics of Materials, R. C. Hibbeler, Pearson Education, 9th Edition, 2014.

CONCRETE TECHNOLOGY

B.Tech II Year II Semester – CIVIL
Course Code: A44106

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Understanding the properties of cements and admixtures.
CO2: Analyse the properties of aggregates.
CO3: Evaluate the properties of fresh concrete.
CO4: Analyse the behavior of hardened concrete and durability of concrete.
CO5: Design the concrete mix using IS Code and describe the special concretes.

UNIT – I

Cement: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrate cement – Test on physical properties – Different grades of cement.

Admixtures :Types of admixtures – mineral and chemical 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 & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – III

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.

UNIT – IV

Hardened Concrete : Water / Cement ratio – Abram's Law – Gelspace ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength

Testing of Hardened Concrete: Compression test – Tension tests —Flexure tests – Splitting tests – Non-destructive testing methods.

Elasticity, Creep & Shrinkage– Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – V

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

Special Concretes: Introduction to Light weight concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Polymer concrete – High performance concrete – Self compacting concrete.

Text Books

1. Concrete Technology, M.S.Shetty, S.Chand & Co, 7th Edition, 2015.
2. Concrete Technology, A.R. Santha Kumar, Oxford university Press, New Delhi, 9th Edition, 2012.

Reference Books:

1. Properties of Concrete, A. M. Neville, Pearson publisher, 5th Edition, 2011.
2. Concrete Technology, M.L. Gambhir, Tata Mc. Graw Hill Publishers, New Delhi, 5th Edition, 2004.

STRUCTURAL ANALYSIS

B.Tech II Year II Semester – CIVIL
Course Code: A44107

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Analyze propped cantilever, fixed beams for external loadings and support settlements.
CO2: Understand the concept of Slope deflection, moment distribution method and analysis of continuous beams.
CO3: Examine the beams and arches.
CO4: Analyze the pin-jointed plane frames.
CO5: Draw the influence line diagram for moving loads .

UNIT – I

Propped cantilever and fixed beams: Determination of static and kinematic indeterminacies for beams, Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia, subjected to 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 for Propped Cantilever and Fixed Beams – Deflection of Propped cantilever and fixed beams; effect of sinking of support, effect of rotation of a support..

UNIT – II

Continuous beams: Introduction – Continuous beams, Clapeyron's theorem of three moments – Analysis of continuous beams with constant and variable moments of inertia with one or both ends fixed – continuous beams with overhang, Effects of sinking of supports. Derivation of slope – deflection equation, application to continuous beams with and without settlement of supports. Analysis of continuous beams with and without settlement of supports using Moment Distribution Method, Shear force and Bending moment diagrams.

UNIT – III

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 – Unit Load Method. Deflection of simple beams and statically determinate bent frames.

Arches: Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches. Linear Arch. Eddy's theorem. Analysis of Three hinged arches (Circular and parabolic arches without temperature effect and yielding of support).

UNIT – IV

Analysis of perfect frames: Types of frames – Perfect, Imperfect and Redundant pin jointed frames. Analysis of determinate pin jointed frames using method of joints, method of sections for vertical loads, horizontal loads and inclined loads.

UNIT – V

Moving loads and influence lines: 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. 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. Equivalent uniformly distributed load.

Text Books:

1. Theory of Structures, S. Ramamrutham and R. Narayan, Dhanapat Rai Publishing company (P) Lt, 9th Edition 2015.
2. Structural Analysis (Vol –I & II), V.N.Vazirani and M.M.Ratwani, Khanna Publishers, 17th Edition, 2015.

Reference Books:

1. Structural Analysis (Vol I & II), G.S. Pandit and S. P.Gupta, Tata McGraw Hill Education Pvt. Ltd, 2nd Edition, 2008
2. Structural Analysis (Vol-I & II), S.S. Bhavikatti, Vikas Publishing House Pvt Ltd, 4th Edition, 2011.

BUILDING MATERIALS AND CONSTRUCTION

B.Tech II Year II Semester – CIVIL
Course Code: A44108

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Identify various building materials and to understand their basic properties.
CO2: Understand the minimum standards required to designate and use the materials in construction..
CO3: Discuss type metals and finishes used in the construction process.
CO4: Understand modern materials in general construction practice.
CO5: Recognize the concept of plastering, pointing and various other building services.

UNIT – I

Stones & Bricks: Building stones – classifications and quarrying – properties – structural requirements, Composition of Brick earth – manufacture and structural requirements, classification – Field and laboratory tests on bricks (compressive strength, water absorption, efflorescence, dimension and warpage).
Masonry: Definition and terms used in masonry. Brick masonry, characteristics and requirements of good brick masonry, Bonds in brick work, Header, Stretcher, English, Flemish bond, Stone masonry, Requirements of good stone masonry, Classification, characteristics of different stone masonry, Joints in stone masonry. Types of walls; load bearing, partition walls, cavitywalls.

UNIT – II

Cement &Admixtures: Ingredients of cement – manufacture – Chemical composition – different types of cement and its uses, Hydration – field & lab tests on cements**,** Admixtures – mineral & chemical admixtures – uses.
Tiles, Timber and Glass: Introduction, Classification of Tiles, Tests on Tiles (Water absorption, Bulk density & Abrasion). Timber Structure, Types and properties, seasoning. Glass – properties, classification.

UNIT – III

Metals in constructions: Principle and characterstics of steel, Aluminium, Classification of steel, Tests on metals (Tension, Brittleness test, hardness test)
Paints: Purpose, types, ingredients and defects, Preparation and applications of paints to new and old plastered surfaces, wooden and steel surfaces.

UNIT – IV

Miscellaneous Materials: Gypsum – Classification, Plaster of Paris, Gypsum wall Plasters, Gypsum Plaster Boards, Adhesives, Heat and sound insulating materials, Geosynthetics.
Modern Materials: Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles– Geomembranes and Geotextiles for earth reinforcement.

UNIT –V

Plastering and Pointing: Purpose, materials and methods of plastering and pointing, defects in plastering – Stucco plastering, lathe plastering. Damp proofing **–** causes, effects and methods. Formwork **–** Requirements – types of form work – standards – scaffolding – shoring – underpinning.

Text Books:

1. Engineering Materials, Rangwala, S. Chand and Company Ltd, 29th Edition, 2009.
2. Building Construction, B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications (P) ltd.,10th Edition, 2008.

Reference Books:

1. Building Materials, S. K. Duggal, New Age International, 4th Edition, 2010.
2. Building Materials, P.C. Varghese, PHI, 2nd Edition, 2015.

COMPUTER AIDED DRAFTING LAB

B.Tech II Year II Semester – CIVIL
Course Code: A44183

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

CO1: Assess the Software with aiding source.
CO2: Demonstrate the different modes of commands.
CO3: Draft the plan, Elevation & Sectional Views of the building.
CO4: Develop the components of the building
CO5: Replicate the complete detailing of Building with BIM input.

List of Experiments

1. Introduction to concept of drawings through computer aided drafting (CAD) .
2. Practice exercises on coordinate system reference planes , initial settings, drawing aids , Presentation norms and standards.
3. Practice Exercises on commands- drawing , Modifying, layers, text, blocks and dimensioning.
4. Practice on symbols and signs (materials, Architectural , structural , Electrical, Plumbing)
5. Drawing of single line plan - Single storey buildings .
6. Drawing of plans of Multi storied buildings with Brick thickness (Max G+2)
7. Developing sections and elevations of Single storey buildings
8. Detailing of different types (any 2 types) of doors and its components by using CAD
9. Detailing of different types (any 2 types) of windows and its components by using CAD
10. Exercises on the development of working of building (working drawing) by using CAD
11. Drawing the complete layout of structure (Educational building)
12. Fundamentals of Building Information Modelling (BIM)

SOLID MECHANICS LAB

B.Tech II Year II Semester – CIVIL
Course Code: A44184

L	T	P	C
0	0	2	1

Course Outcomes:

After completion of this course students will be able to
CO1: Demonstrate of materials under impact, hardness, tensile and compressive loads.
CO2: Determine elastic constants by flexural and torsion test.
CO3: Illustrate spring constants under various loadings.
CO4: Understand the deflection of materials under bending
CO5: Compute basic material properties stress and strain.

List of Experiments

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

GENDER SENSITIZATION

B.Tech II Year II Semester – CIVIL
Course Code: A44MC2

L	T	P	C
2	0	0	0

Course Outcomes

After completion of this course students will be able to
CO1: To develop awareness about gender discrimination and take measurable steps to counter it.
CO2: To identify the basic dimensions of biological, sociological, psychological and legal aspects of gender.
CO3: To acquire Knowledge about gendered division of labour in relation to politics and Economics.
CO4: To prepare the students against gender violence.
CO5: To prepare the students to work and live together as equals.

UNIT-I Understanding **Gender**

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1) **Socialization:** Making Women, Making Men (*Towards a World of Equals*: Unit -2)Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

UNIT-II Gender And Biology

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)

Two or Many? Struggles with Discrimination.

UNIT-III Gender And Labour

Housework: the Invisible Labour (*Towards a World of Equals*: Unit -3)

"My Mother doesn't Work." "Share the Load."

Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)

Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

UNIT-IV Issues of Violence

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:

"*Chupulu".*

Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)

Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading:

New Forums for Justice.

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)

Blaming the Victim-"I Fought for my Life…." - Additional Reading: The Caste Face of

Violence.

UNIT-V Gender: Co - Existence

Just Relationships: Being Together as Equals (*Towards a World of Equals*: Unit -12)

Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers.

Additional Reading: Rosa Parks-The Brave Heart.

Text Books:

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

Note: Since it is an Interdisciplinary Course, Resource Persons can be drawn from the fieldsof English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field from engineering departments.

Reference Books:

Menon, Nivedita. Seeing like a Feminist. New Delhi: Zubaan-Penguin Books, 2012

B. Tech. III Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	H&S-3	A45021	Managerial Economics and Financial Analysis	3	0	0	3
2	PC –8	A44109	Hydraulics & Hydraulic Machinery	3	0	0	3
3	PC – 9	A44110	Geotechnical Engineering	3	0	0	3
4	PC – 10	A44111	Design of Reinforced Concrete Structures	3	0	0	3
5	PE – 1	A44112 A44113 A44114	1. Advanced Structural Analysis 2. Building planning & Drawing 3. Air Pollution and Control Methods	3	0	0	3
6	OE – 1	A44115 A44116 A44117	Open Elective	3	0	0	3
7	PC Lab – 4	A44185	Geotechnical Engineering Lab	0	0	2	1
8	PC Lab – 5	A44186	Fluid Mechanics & Hydraulic Machinery Lab	0	0	2	1
9	H&S-4	A45TP1	Personality Development & Behavioural Skills	2	0	0	1
			Total	**20**	**0**	**4**	**21**

MANAGERIAL ECONOMICS & AND FINANCIAL ANALYSIS

B.Tech III Year I Semester – CIVIL
Course Code: A45021

L	T	P	C
3	0	0	3

Course Outcome:
After completion of this course students will be able to

CO1: Understand the nature and scope of business economics.
CO2: Differentiate various forms of business organization.
CO3: Identify the impact of economic variables on the business firms.
CO4: Analyse the demand, supply, production, cost, market structure, pricing aspects.
CO5: Analyse, compare and interpret the financial statement of a company using ratios.

UNIT – I Introduction to Business and Economics: Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.
Economics: Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

UNIT – II Demand and Supply Analysis: Elasticity of Demand: Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting. Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

UNIT- III Production, Cost, Market Structures & Pricing: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale. Cost analysis: Types of Costs. Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, and Monopolistic Competition. Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, and Cost Volume Profit Analysis

UNIT – IV Financial Accounting: Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, and Preparation of Final Accounts.

UNIT - V Financial Analysis through Ratios: Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems)

Text Books:

1. Business Economics - Theory and Applications, D. D. Chaturvedi and S. L. Gupta, International Book House Pvt. Ltd. 2013.
2. Financial Accounting, Dhanesh K Khatri, Tata McGraw Hill, 2011.

Reference Books:

1. Managerial Economics, Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Tata McGraw Hill Education Pvt. Ltd, 2nd Edition, 2012.
2. Financial Accounting for Management, Paresh Shah, Oxford Press, 2nd Edition 2015.

HYDRAULICS & HYDRAULIC MACHINERY

B.Tech III Year I Semester – CIVIL
Course Code: A44101

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Determine the Froude number for a given flow to differentiate concepts of sub-critical, critical, and super-critical flows.

CO2: Compute the non-uniform flow depths for gradually and rapid varied flow.

CO3: Apply dimensional analysis to predict physical parameters that influence the flow in fluid mechanics and use dimensionless parameters

CO4: Compute efficiencies of different types of turbines.

CO5: Use performance curves to predict performance of centrifugal pumps.

UNIT – I

Open channel flow-I

Introduction: Definition of open channel, Comparison between pipe flow and open-channel flow,Types of open channels, Geometric elements and hydraulic properties of an open channel section,Classification of open-channel flows – steady, unsteady, uniform, non-uniform, gradually varied, rapidly varied, spatially varied,

Uniform Flow: through open channel by Chezy's, Manning's, Kutter's, and Bazin formulae;; Computation of normal depth hydraulically efficient channel section.

Critical Flow: Specific energy, critical depth, computation of critical depth, critical, sub-critical, and super critical flows, alternate depths; Transitions – channel with a hump, and change in width.

UNIT – II

Open channel flow-II

Non Uniform flow: Gradually Varied Flow: Basic assumptions; Derivation of differential equation of GVF; Characteristics and classification of flow profiles for Mild, Critical, Steep, horizontal, and adverse slopes; control sections; Computation of GVF by numerical method – Direct-Step method,

Rapidly Varied Flow: Characteristics of RVF; Hydraulic Jump in horizontal rectangular channels – momentum equation formulation for the jump, energy loss; Classification of jumps according to Froude's number; Basic characteristics of the jump - Height of jump, length of jump, location of jump,

UNIT – III

Dimensional Analysis: Philosophy of DA; Principle of Dimensional Homogeneity; Methods used - Rayleigh's method and Buckingham's Pi theorem; Common dimensionless groups in fluid mechanics.

Modelling and Similitude: Geometric, kinematic, and dynamic similarities; Similarity requirements or modelling laws; model and prototype relations; Definition of distorted and non-distorted models.

UNIT – IV

Impact of jets: 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

Turbines: Layout of a typical Hydroelectric power plant; heads and efficiencies- Classification of turbines- pelton wheel turbine- francies turbine- Kaplan turbine; working proportions, velocity diagrams, work done, and efficiencies of turbine; governing of turbines.

UNIT – V

Centrifugal Pumps: Components of a centrifugal pump; Working of a centrifugal pump, classification of pumps; Expression for work done on the impeller; heads of pumps, losses and efficiencies, minimum starting speed, Multistage

pumps - Pumps in series and parallel. Performance of pumps- characteristic curves, Net positive suction head-cavitation.

Text Books:

1. Hydraulics and Fluid Mechanics (Including Hydraulics Machines), Modi and Seth, Standard book house, 22nd Edition, 2019.

Reference Books:

2. A Textbook of Fluid Machines, R. K. Rajput, S. Chand & Company Ltd, 5th Edition, 2013.

GEOTECHNICAL ENGINEERING

B.Tech III Year I Semester – CIVIL
Course Code: A44110

L	T	P	C
3	0	0	3

III Year I Semester

Course outcomes
After completion of this course students will be able to
CO1: Illustrate the soil formation and classification.
CO2: Explain the Hydrostatic effect in soil mass.
CO3: Illustrate the stress distribution mechanism and compaction in soil mass.
CO4: Illustrate the mechanism of consolidation.
CO5: Identify the Shear strength parameters through analytical and experimental approach.

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

UNIT – II
Permeability: Soil water – capillary rise – flow of water through soils – Darcy's law, Permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered soils – Insitu permeability tests (Pumping in & pumping out test).
Effective stress & seepage through soils: Total, neutral and effective stresses – principle of effective stress – quick sand condition – Introduction to Seepage through soils – Flow nets – Characteristics and Uses of flow nets.

UNIT – III
Compaction: Mechanism of compaction – factors affecting compaction – effects of compaction on soil properties. – Field compaction Equipment – compaction quality control.
Stress distribution in soils: Boussinesq's and Westergaard's theories for point loads ,uniformly loaded circular and rectangular areas, pressure bulb, variation of vertical stress under a point load along the vertical and horizontal plane.

UNIT – IV
Consolidation: Types of compressibility – immediate settlement, primary consolidation and Secondary consolidation – stress history of clay; e-p and e-log-p curves – normal consolidation soil, over consolidated soil and under consolidated soil – pre-consolidation Pressure and its determination – Terzaghi's 1-D consolidation theory.

UNIT – V
Shear strength of soils: Introduction of shear strength – Mohr - Coulomb Failure theories – Types of laboratory strength tests – Direct Shear test, Vane shear test – strength tests based on drainage conditions – Tri-Axial test strength envelops – Shear strength of sands – dilatancy, Critical void ratio – Concept of liquefaction.

Text Books:
1. Soil Mechanics and Foundation Engineeringg, Dr. K.R Arora, Standard Publishers and Distributors, Delhi, 7th Edition, 2010

Reference Books:
1. Principles of Foundation Engineering, Braja M. Das, Cengage Learning, 7th Edition, 2011.
2. Basic and applied soil mechanics, Gopal Ranjan & ASR Rao, New Age International Pvt.ltd, New Delhi, 3rd Edition, 2016.

DESIGN OF REINFORCED CONCRETE STRUCTURES

B.Tech III Year I Semester – CIVIL
Course Code: A44111

L	T	P	C
3	0	0	3

Course outcome

After completion of this course students will be able to
CO1: Understand the various design concepts and design a beam under flexure and draw the reinforcement details.
CO2: Design the beam under shear and torsion, Calculate the anchorage and development length and check the serviceability requirements for RC structural elements.
CO3: Analyze and solve various RC slabs and draw the reinforcement details
CO4: Classify short, long columns and draw the reinforcement details
CO5: Explore the design concept of footing & staircase.

UNIT – I

Concepts of RC design: Introduction- Structure - Components of structure - Different types of structures - Loads – Different types of Loads – Dead Load, Live Load, Earthquake Load and Wind Load - Working stress method – Ultimate load method – Limit State method – Stress-strain curve for concrete, steel – Partial safety factor – Characteristic values – Stress Block parameters – IS: 456 2000 provisions.
Design and detailing of beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

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

UNIT – III

Design and detailing of slabs: Design of one way, two way and continuous slabs using IS Codal provisions and coefficients, Cantilever slab / Canopy slab. Introduction to Yield line theory.

UNIT – IV

Design and detailing of short and long columns: Subjected to axial loads, uniaxial and biaxial bending – IS Code provisions.

UNIT – V

Design and detailing of footings and staircase: Different types of footings – Design of isolated, square, rectangular and circular footings – Introduction to combined footings. Design of staircase (dog-leged type)

Text Books:

1. Limit state design of reinforced concrete, Dr. B. C. Punmia, and A. K. Jain, Laxmi Publications, 2nd Edition,2016.

Reference Books:

1. Fundamentals of Reinforced Concrete design, M.L Ghambhir, Prentice Hall of India,5th Edition, 2011.
2. Plain and Reinforced Concrete (Vol. I), Jain & Jai krishna, Nemchand Brother, 8th Edition, 2012.

IS Code

1. IS: 456 2000 Indian Standard plain and reinforced concrete - code of practice (Fourth Revision) Tenth Reprint APRIL 2007

2. SP16, Design Aids for Reinforced Concrete to IS 456:1978

Note : IS: 456 2000 and SP16 need to be provided during examination

ADVANCED STRUCTURAL ANALYSIS (PE1)

B.Tech III Year I Semester – CIVIL

Course Code: A44112

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

CO1: Analyze the continuous beams, portal frames by Kani's method.

CO2: Demonstrate the Indeterminacy of Trusses by Castiglione's second theorem.

CO3: Evaluate the shear forces and bending moments in Two-Hinged arches and to execute secondary stresses due to rise of temperature and Elastic Shortening of rib.

CO4: Analyze the Multi-storey frames by approximate methods for gravity (vertical) and horizontal loads.

CO5: Understand the concept of Matrix method for the analysis of continuous beams and Pin jointed plane frames.

UNIT – I

Kani's method: Analysis of continuous beams and portal frames including side sway due to unsymmetrical vertical loading.

UNIT – II

Indeterminate Trusses: Analysis of trusses having single and two degrees of internal and external indeterminacies – Castigliano's second theorem.

UNIT – III

Two hinged arches: Introduction – classification of two hinged arches – analysis of two hinged parabolic arches, analysis of circular arches – secondary stresses in two hinged arches due to temperature and elastic shortening of rib.

UNIT – IV

Approximate methods of analysis: Introduction – Analysis of multi – storey frames for lateral loads: Portal Method, Cantilever Method. Analysis of multi storey frames for gravity (vertical) loads. Substitute frame method.

UNIT – V

Matrix Methods of Analysis: Introduction – Static and Kinematic Indeterminacy – Stiffness method - Analysis of continuous beams including settlement of supports - Analysis of pin-jointed determinate plane frames – Analysis of single bay single storey frames, including side sway.

Flexibility method -Analysis of continuous beams up to three degrees of the indeterminacy.

Text Books:

1. Theory of Structures, S. Ramamrutham, Dhanpat Rai Publishing Company, 9th Edition, 2015.
2. Strucrual Analysis-II, S.S Bhavikatti, Vikas Publishing house pvt.Ltd, 4th Edition, 2011.

Reference Books:

1. Analysis of Structures (Vol -I and II), Vazrani, M.M Ratwani and S.K Duggal, Khanna publishers, 2009.

BUILDING PLANNING & DRAWING (PE1)

B.Tech III Year I Semester – CIVIL
Course Code: A44113

L	T	P	C
3	0	0	3

Course outcomes
After completion of this course students will be able to
CO1: Identify various building components, conventional signs and symbols.
CO2: Illustrate the building bye-laws and the principles of planning.
CO3: Compute the building services and safety aspects.
CO4: Design and draft the plans of various types of buildings and detailing of doors, windows.
CO5: Understand the elements of perspective drawing involving simple problems.

UNIT – I
Basic components of buildings: Design of various elements of building like various types of footing, open foundation, raft, grillage, pile and well foundation, drawing of frames of doors or windows, various types of door, window, and ventilators, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.
Drawing practice: Sketches of various building components, one drawing sheet of various building components like doors, windows, lintels and arches, stairs foundation etc.

UNIT – II
Building planning: provision on national building code, building bye-laws, open area, setbacks, FAR terminology, principles of architectural composition (ie. Unity, contrast etc) , principles of planning orientation.
Drawing practice: one drawing sheet each of services and interiors of buildings.

UNIT – III
Building Services - Introduction of building services like water supply and drainage, electrification, ventilation and lighting and staircases, fire safety, thermal insulation, acoustics of buildings.
Drawing practice: Detailed planning of one/ two bedroom residential building (One drawing sheet)

UNIT – IV
Design and Drawing of Building: Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors , windows, ventilators and staircases.
Drawing practice: Residential building, Institutional buildings **(**One drawing sheet each)

UNIT – V
Perspective Drawing: Elements of Perspective Drawing involving simple problems, one point and two point Perspectives, principles of energy efficient buildings
Drawing practice: One drawing sheet on each one point and two point Perspectives problem.

NOTE
Two periods per week of drawing class should be conducted. The end examination paper should consist of Part – A and Part – B. Part – A should consist of theory questions on the syllabus while Part – B should consist of 4 questions on drawing out of which 2 to be answered. Weightage for Part – A is 60 % and Part – B is 40 %. In exam drawing board should be provided.

Text Books:
1. Building Planning and Drawing, N Kumar swamy and Kameswar Rao, charator pubications, 7th Edition, 2015.

2. Building planning, Design and scheduling, Gurucharan Singh Jagdish Singh, 2nd Edition, 2008.

Reference Books:

1. Civil Engineering Drawing, D N Ghose, CBS Publication, 2nd Edition, 2010.
2. Building drawing with an integrated approach to built environment , M G Shah, C M Kale & S Y Patki, Mc Graw hil Education, 5th Edition, 2002.

AIR POLLUTION AND CONTROL METHODS (PE1)

B.Tech III Year I Semester – CIVIL
Course Code: A44114

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to
CO1: Find the sources, causes & effects of air pollution.
CO2: Understand the meteorological components and the plume behavior for atmospheric stability conditions.
CO3: Identify the types of equipments to control the particulates at sources.
CO4: Minimize the control measures of NOX, SOX and other gaseous emissions.
CO5: Demonstrate the factors for siting an industry by examining the air quality standards.

UNIT – I

Air Pollution: Definitions, Air Pollution Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources. Effects of Airpollutants on man, material and vegetation; Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc

UNIT – II

Meteorology: plume Dispersion; properties of the atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Significance of various meteorological parameters in air pollution, wind rose diagrams. Lapse Rates, Pressure Systems.

UNIT – III

Control of particulates –Control at Sources-Raw material changes, Process Changes, Equipment modifications or replacement, Equipment's – Settling Chambers, Centrifugal separators or cyclones, , Fabric filters, Electrostatic precipitator and Wet scrubbers.

UNIT – IV

Control of gaseous emissions: Adsorption, Absorption, Combustion, Sox Control technology- Natural dispersion by dilution, Using alternate fuels, removal of sulphur from fuels(Desulfurization),NOx Control technology- NOx control by modification of operating and design conditions- Low Excess air combustion, Decreasing Combustion air temperature, Two stage combustion, Flue gas recirculation.

UNIT – V

Air Pollution Monitoring and management: Environmental guidelines for siting of industries, Environmental impact assessment, Stack emission standards Ambient air quality standards, air pollution control act. Ambient air quality monitoring- location of stations, Duration of sampling period, SPM sampling, Gaseous sampling.

Text Books:

1. Air pollution and Control, K.V.S.G. Murali Krishna, Laxmi Publications, 1st Edition, 2015.

Reference Books:

1. An introduction to air pollution, R.K. Trivedy and P.K. Goel, B.S publications, 2nd Edition,1986.
2. Environmental pollution control engineering, C.S. Rao, New Age International, 2nd Edition, 2006.

GEOTECHNICAL ENGINEERING LAB

L	T	P	C
0	0	2	1

B.Tech III Year I Semester – CIVIL
Course Code: A44185

Course Outcomes

After completion of this course students will be able to
CO1: Demonstrate the engineering properties the soil.
CO2: Illustrate the field bulk and dry density of cohesive and cohesion less soils.
CO3: Classify the Coarse grained soils based on sieve analysis test & a grain size distribution curve.
CO4: Compute the shear strength of cohesive and cohesion less soil.
CO5: Determine the permeability of coarse grained soil and fine grained soil by constant head permeability test and falling head method.

List of Experiments

1. Atterberg's limits
2. Field density- core cutter and sand replacement method
3. Grain size analysis
4. Permeability of soil, constant head test.
5. Permeability of soil variable head test.
6. Compaction test
7. C.B.R test
8. Consolidation test
9. Unconfined compression test
10. Triaxial compression test
11. Direct shear test
12. Vane shear test.

FLUID MECHANICS & HYDRAULIC MACHINERY LAB

B.Tech III Year I Semester – CIVIL
Course Code: A44186

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to
CO1: Examine the calibration of different flow meters.
CO2: Illustrate flow measuring devices used in pipes, channels and notches.
CO3: Determine major and minor losses in pipes.
CO4: Analyse the energy equation for problems in pipe flow.
CO5: Examine the performance characteristics of turbines and pumps.

List of experiments

1. Calibration of venture meter and Orifice meter
2. Determination of coefficient of discharge for a small orifice/mouthpiece by constant head method
3. Calibration of contracted rectangular notch and triangular notch
4. Determination of friction factor of a pipe
5. Determination of coefficient for minor losses.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of hydraulic jump.
9. Performance test on Pelton wheel turbine.
10. Performance test on Kaplan Turbine
11. Performance characteristics of a single stage /multi stage centrifugal pump.
12. Performance characteristics of a reciprocating pump

PERSONALITY DEVELOPMENT AND BEHAVIOURAL SKILLS

B.Tech III Year I Semester – CIVIL
Course Code: A45TP1

L	T	P	C
2	0	0	1

Course Outcomes

After completion of this course students will be able to

CO1: Practice optimistic attitude for an efficient socially viable and multi-faceted personality.

- CO2: Demonstrate functions of non-verbal **communication in formal context.**
- CO3: Build effective individual & team dynamics for professional accomplishments.
- CO4: Analyze appropriate strategic Interpersonal Skills for productive workplace relationships.
- CO5: Correspond in multiple contexts, for varied audiences, across genres and modalities.

Unit – I

Personality Development:

Definition - Various Aspects of Personality Development - Behavioural Traits.
Importance of Soft Skills for personal and professional development - Success stories.

UNIT – II

Non Verbal Communication:

Kinesics, Haptics, Proxemics, Vocalics, Oculesics
Body Language in formal contexts such as Group Discussions, Presentations and Interviews.

UNIT - III

Team Dynamics

Different Types of Teams – Role of an individual – Communicating as a group or team leader
Individual Presentations/Team Presentation - Project Presentations- Case Studies

UNIT-IV

Interpersonal Skills

Time Management - Stress Management - Emotional Intelligence - Conflict Management - Relationship Management

UNIT-V

Digital Correspondence

Role of Multimedia in Communication - Communication in a Digital Edge (Video Conference Etc.)
Social Networking: Importance and Effects.

Text Books:

1. Personality Development and Soft Skills, Barun and K Mitra, Oxford University Press, 2nd Edition, 2016.
2. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success, Gopalaswamy Ramesh, Pearson Education, 2ND Edition 2013.

Reference Books:

1. Developing Communication Skills, Krishna Mohan & Meera Banerji, Macmillan India Ltd, 2nd Edition, 2008.
2. Effective English Communication, Krishna Mohan & Meenakshi Raman, Tata McGraw-Hill Publishing Company Ltd, 2nd Edition, 2008.

B. Tech. III Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 11	A46118	Highway Engineering	3	0	0	3
2	PC - 12	A46119	Foundation Engineering	3	0	0	3
3	PC – 13	A46120	Environmental Engineering	3	0	0	3
4	PC – 14	A46121	Water Resources Engineering	3	0	0	3
5	PE – 2	A46122 A46123 A46124	1. Construction Engineering& Management 2. Ground Improvement Techniques 3. Finite Element Method	3	0	0	3
6	OE – 2	A46125 A46126 A46127	Open Elective	3	0	0	3
7	PC Lab – 6	A46187	Environmental Engineering Lab	0	0	2	1
8	H&S Lab- 3	A46088	Advanced Communication Skills Lab	0	0	2	1
9	ES – 7	A46TP1	Quantitative Methods & Logical Reasoning	2	0	0	1
			Total	**20**	**0**	**4**	**21**

HIGHWAY ENGINEERING

B.Tech III Year II Semester – CIVIL
Course Code: A46118

L	T	P	C
3	0	0	3

Course Outcomes
After completion of this course students will be able to
CO1: Summarize the road developments in India from different periods.
CO2: Apply the concept of geometric design in real time engineering.
CO3: Make use of parameters related to traffic studies.
CO4: Design & model the intersections with specific standards.
CO5: Evaluate the different pavement design methods using IRC standards.

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 – Highway Project.

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 & regulations: Basic Parameters of Traffic-Volume, Speed and Density - Traffic Volume Studies - Data Collection and Presentation - Speed studies - Data Collection and Presentation - Origin & Destination studies, Parking Studies – On street& Off street Parking - Road Accidents - Causes and Preventive Measures - Accident Data Recording – Condition Diagram and Collision Diagrams - Traffic Signs – Types and Specifications – Road Markings - Need for Road Markings-Types of Road Markings - Design of Traffic Signals – Webster Method.

UNIT- IV
Intersection design: Types of Intersections – Conflicts at Intersections – Requirements of At-Grade Intersections - Types of At-Grade Intersections: Channelized and Unchannelized Intersections – Traffic Islands - Types of Grade Separated Intersections - Rotary Intersection – Concept of Rotary – Design Factors of Rotary – Advantages and Limitations of Rotary Intersections.

UNIT -V
Pavement Design: Factors affecting design**,** Highway Materials Introduction, Characteristics of highway materials, Design of Pavements- Design of Flexible pavement by CBR method as per IRC 37-2012 and theory of empirical mechanistic method. Design of rigid pavements as per IRC 58-2015,Stresses in rigid pavement by westergards and IRC methods.

Text Books:
1. Highway Engineering, S.K.Khanna & C.E.G. Justo, Nemchand & Bros., 7th Edition, 2000.

Reference Books:
1. Principles of Traffic and Highway Engineering, Nicholas. J. Garber & Lester A. Hoel, Cengage Learning, 5th Edition,
2. Principles and Practices of Highway Engineering, Dr. L.R. Kadiyali and Dr. N. Blal, Khanna Publications,1st Edition, 2005.
3. Traffic Engineering & Transportation Planning, Dr. L. R. Kadyali, Khanna Publications, 6th Edition, 1997.

FOUNDATION ENGINEERING

B.Tech III Year II Semester – CIVIL
Course Code: A46119

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to
CO1: Organize the preparation and programme of soil investigation.
CO2: Examine the earth pressure theories and stability of retaining walls.
CO3: Evaluate the bearing capacity of soil and allowable settlement.
CO4: Analyse the capacity and settlement of pile foundation.
CO5: Analyse the stability of finite and infinite slopes using various methods.

UNIT – I

Soil Exploration: Need – methods of soil exploration – boring and sampling methods – penetration tests – plate load test – pressure meter – planning of soil exploration programme and preparation of soil investigation report.

UNIT – II

Earth pressure theories: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory

Retaining walls: Types of retaining walls – stability of gravity and cantilever retaining walls against overturning, sliding and, bearing capacity. Drainage from backfill, introduction to reinforced earth walls.

UNIT – III

Bearing capacity and settlement foundation: Types - choice of foundation – location and depth - safe bearing capacity — Terzaghi, Mayerhof, Skempton and IS methods.– Safe bearing pressure based on SPT N – value- Allowable bearing pressure; safe bearing capacity- allowable settlement of structures and plate load test – allowable settlements of structures.

UNIT – IV

pile foundation: Types of piles – load carrying capacity of piles based on static pile formulae – dynamic pile formulae – Pile Capacity through SPT and CPT results - pile load tests - load carrying capacity of pile groups in sands and clays – Settlement of pile groups – negative skin friction

UNIT – V

Slope stability: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish slip circle method, method of slices, Bishop's Simplified method of slices – Taylor's Stability Number-stability of slopes.

Text books

1. Soil Mechanics And Foundation Engineering , K.R. Arora, Standard publishers,7th Edition, 2010.

References

1. Principles of Foundation Engineering, Braja M. Das, Cengage Learning, 7th Edition, 2011.

ENVIRONMENTAL ENGINEERING

B.Tech III Year II Semester – CIVIL
Course Code: A46120

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Predict the population by different methods.
CO2: Design the filter and settling tanks for water treatment.
CO3: Examine the characteristics of sewage.
CO4: Analyse and design the sewers for sewerage system.
CO5: Design different units of sewage treatment plant.

UNIT – I

Introduction: Waterborne diseases – protected water supply – Population forecasts, design period – types of water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards, sources of water – Comparison from quality, quantity and other considerations – intakes – infiltration galleries.

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 – multimedia filters – design of filters – troubles in operation - comparison of filters – disinfection – theory of chlorination, chlorine demand - other disinfection practices- Miscellaneous treatment methods.

UNIT – III

Water distribution systems: Types of layouts of distribution system- design of distribution system- Hardy cross and equivalent pipe methods – service reservoirs – determination of storage capacity. Conservancy and water carriage systems – sewage and storm water estimation – time of concentration –storm water overflows, combined flow-characteristics of sewage– examination of sewage – B.O.D – C.O.D equations.

UNIT – IV

Design of sewers: Hydraulic formulae, Maximum and minimum velocities in sewer, Differences in the design of water supply pipes and sewer pipes, Shapes and materials – sewer appurtenances manholes – 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.

UNIT –V

Design of different units: primary sedimentation tank – design of screens – grit chambers – principles and design of biological treatment – trickling filters, activated sludge process, oxidation diches.

Text books

1. Water Supply Engineering (Vol. 1), B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, 2nd Edition, 2016.
2. Waste water Engineering (Vol. II), B.C. Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt. Ltd, 2nd Edition, New Delhi, 2016.

Reference

1. Sewage Disposal and Air Pollution Engineering , Santhosh kumargarg, Khanna Publications, 24th Edition, 2012.
2. Water Supply and Sanitary Engineering, G.S. Birdie, Dhanpat Rai Publishing Company, 9th Edition,2011.

WATER RESOURCES ENGINEERING

B.Tech III Year II Semester – CIVIL
Course Code: A46121

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to
CO1: Describe the components in the hydrologic cycle and interaction among various processes in the hydrologic cycle
CO2: Analyze the flood and its measurement by means of hydrograph.
CO3: Analyze the phenomenon of Ground water occurrence by means of aquifers.
CO4: Assess the methods of irrigation and its quality with the help of duty delta relationship.
CO5: Design the canals by using standard theories.

UNIT- I

Introduction to engineering hydrology and its applications: hydrologic cycle, Types and forms of precipitation, Rainfall Measurement, Different types of rain gauges, rainfall measurement, computation of average rainfall over a basin, processing of rainfall data- Adjustment of record – rainfall double mass curve. Runoff- factors affecting runoff- runoff over a catchment – Empirical and rational formulae.

Abstraction from rainfall- evaporation, factors affecting evaporation, measurement of evaporation- evapotranspiration- penman and balney & creddle methods- infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT - II

Flood measurement and analysis: Distribution of runoff – Hydrograph analysis flood hydrograph- effective rainfall- base flow-base flow separation- direct runoff hydrograph-Unit Hydrograph, definition and limitations of applications 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, Darcy's law, Steadyradial flow to wells in confined and unconfined aquifer. Types of wells – Well construction- well development.

UNIT - IV

Necessity and importance of irrigation: Types of irrigation, advantages and ill effects of irrigation,. Indian agricultural soils, Rabi and Kharip seasons, methods of improving soil fertility- crop rotation, preparation of land for irrigation, standards of quality for Irrigation water, crop period, base period, kor period, Duty and delta, factors affecting duty, efficiencies. Water Logging

UNIT V

Canals and its design: Classification of canals, Design of Irrigation canals by Kennedy's and Lacey's theories, balancing depth of cutting, IS standards for a canal design, canal lining.
Certain important definitions: GCA, CCA, intensity of irrigation, Design capacity of an irrigation canal, Computation of design capacity. Stream Gauging – measurement and estimation of stream flow.

Text Books:

1. Engineering Hydrology, Jayaram Reddy, Laxmi publications pvt. Ltd., 3rd Edition, 2016.
2. Irrigation and Hydraulic structures, S.K. Grag, Khanna Publishers, 21st Edition. 2009.

Reference Books:

1. Irrigation and water power engineering, B. C. Punmia, P.B.B Lal, A.K. Jain & A.K. Jain, Laxmi publications pvt. Ltd., 16th Edition, 2014.

CONSTRUCTION ENGINEERING & MANAGEMENT (PE2)

B.Tech III Year II Semester – CIVIL
Course Code: A46122

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Understand the behavioural aspect of entrepreneurs, various approaches of time management, their strength and weakness.
CO2: Apply the concepts of project management Techniques.
CO3: Analysis various materials and equipments for construction work.
CO4: Examine on different types of contracts and specifications.
CO5: Outline the labour regulations and safety in construction.

UNIT – I

Management Techniques: Roles, Management theories, Social responsibilities, planning and strategic management, Strategy implementation, Decision making tools and techniques – Organizational structure, Human resource management – motivation performance – leadership.

UNIT – II

Management Applications: Classification of Construction projects, Construction stages, Resources – Functions of Construction Management and its Applications. Preliminary Planning – Collection of Data – Contract Planning – Scientific Methods of Management: Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT, Cost & Time optimization.

UNIT – III

Resource Management: Resource planning – planning for manpower, materials, costs, equipment. Labour, Scheduling, Forms of scheduling – Resource allocation, Budget and budgetary control methods

UNIT – IV

Contracts and Tenders: Contract – types of contract, contract document, specification, important conditions of contract – tender and tender document – Deposits by the contractor – Arbitration, Negotiation – M.Book – Muster roll – stores.

UNIT – V

Management Information System: Labour Regulations: Social Security – welfare Legislation – Laws relating to Wages, Bonus and Industrial disputes, Labour Administration – Insurance and Safety Regulations, Workmen's Compensation Act – other labour Laws – Safety in construction, legal and financial aspects of accidents in construction, occupational and safety hazard assessment, Human factors in safety,

Text Books:

1. Construction Planning and Management, P.S. Gahlot & B.M. Dhir, Wiley Eastern Limited, 2nd Edition,2018.
2. Construction Project Management, Chitkara K.K, Tata McGraw Hill Publishing Co, 4th Edition, 2019.
3. Management Theory and practice, VSP Rao, Excel Books, 2008.

Reference Books:

1. Estimation, costing, specification and valuation in civil engineering, M. Chakraborti, 18th Edition, 2006.

GROUND IMPROVEMENT TECHNIQUES (PE2)

B.Tech III Year II Semester – CIVIL
Course Code: A46123

L	T	P	C
3	0	0	3

Course outcomes
After completion of this course students will be able to
CO1: Illustrate the several Ground modification mechanisms
CO2: Illustrate the Ground Improvement Techniques through mechanical approach.
CO3: Identify the different Hydraulic ground improvement techniques through dewatering techniques.
CO4: Explain the quick settlement techniques through chemical and physical modification.
CO5: Distinguish the inclusion and confinement techniques of ground improvement.

UNIT- I
Introduction to engineering ground modification: Need for Ground Improvement Techniques, Traditional Objectives and Emerging Trends, Identification of soil types, In situ and laboratory tests to characterize problematic soils, Classification of Ground Improvement techniques, Suitability, Feasibility, and Desirability

UNIT- II
Mechanical Modification: Principles of soil densification –Moisture Content, Comparative Effort, Soil type and Preparation, Properties of Compacted soil, Compaction control tests, Specification of compaction requirements in terms of water content and Density, Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

UNIT - III
Hydraulic Modification: Objectives and techniques, Methods of de-watering- sumps and interceptor ditches- single, multi stage well points, vacuum well points, Horizontal wells, Electro-osmosis, Filtration, Drainage and seepage control with Geosythetics, Preloading and vertical drains, Electro-kinetic dewatering.

UNIT - IV
Physical and Chemical Modification: Methods of stabilization, cement, lime, bituminous, chemical stabilization with calcium chloride, sodium silicate and gypsum. Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing

UNIT - V
Modification by Inclusions and Confinement: Soil Reinforcement, Reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, Ground Anchors, Types of ground anchors, Rock bolting and Soil nailing.

Text Books:

1. Engineering Principles of Ground Modifications, Hausmann, M. R., McGraw Hill publication, Indian Edition 1990.
2. Ground Improvement Techniques, Dr. P. Purushothama Raj, Laxmi publication, 3rd Edition, 2016.

References Books:

1. Designing with Geosynthetics, Koerner R. M, Prentice Hall, New Jersey,5th Edition,1994.
2. Earth Reinforcement and soil structures, Jones C. J. F. P, Butterworths, London, revised subsequent Edition,2013.

FINITE ELEMENT METHOD (PE2)

B.Tech III Year II Semester – CIVIL
Course Code: A46124

L	T	P	C
3	0	0	3

Course Outcome

Upon successful completion of this course students will be able to
CO1: Explain plane stress-plane strain equations and develop displacement functions.
CO2: Analyze one-dimensional problems using stiffness matrix.
CO3: Examine the different elements based on continuity and compatibility.
CO4: Illustrate quadrilateral elements using nodal points and shape functions.
CO5: Discuss the solution techniques for static condition.

UNIT – I

Introduction to Finite Element Method: Basic Equations in Elasticity Coordinate system – Natural, Global Coordinate System Coordinates. Stress – Strain equation – concept of plane stress – plane strain advantages and disadvantages of FEM. Element shapes – nodes – nodal degree of freedom— strain displacement relations.

UNIT – II

One dimensional problem: Bar element – Shape functions, stiffness matrix Strain displacement matrix formulation, FEA Beam elements – stiffness matrix – shape function – Analysis of continuous beams – stress strain relation.

UNIT – III

Two dimensional problems: FEA Two dimessional problem – CST – LST element – shape function – stress – strain Relation, Lagrangian – serendipity elements – Hermite polynomials – regular, Irregular 2 D & 3D – Element – shape functions.

UNIT – IV

Isoparametric formulation: Concepts of isoparametric elements for 2D analysis – 4 noded and 8 noded iso- parametric quadrilateral elements.

UNIT – V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Text Book:

1. Introduction to finite Elements in Engineering, Tirupathi R. Chandrupatla and Ashok D. Belegundu, Prentice Hall of India, 4th Edition, 2012.

Reference Book:

1. Finite Element Analysis, P. Seshu, PHI Learning Private Limited, 10th Edition ,2012.
2. Concepts and applications of Finite Element Analysis, Robert D & Cook et al., Wiley India Pvt. Ltd. 3rd Edition, 1988.

ENVIRONMENTAL ENGINEERING LAB

L	T	P	C
0	0	2	1

B.Tech III Year II Semester – CIVIL
Course Code: A46187

Course outcomes

After completion of this course students will be able to
CO1: Understand principles and their practical application in water treatment.
CO2: Determine physical, chemical and biological characteristics of water and wastewater.
CO3: Determine the optimum dose of coagulant.
CO4: Estimate the chloride, nitrate and iron content in water.
CO5: Summarize the solutions using titration, conductivity meter, pH meter, turbidity meter and DO meter.

List of experiments

1. Determination of pH and turbidity
2. Determination of Conductivity and total dissolved solids
3. Determination of Alkalinity and Acidity
4. Determination of Chlorides
5. Determination of Iron
6. Determination of Dissolved Oxygen
7. Determination of Nitrates
8. Determination of Optimum dose of Coagulant
9. Determination of Chlorine Demand
10. Determination of B.O.D
11. Determination of C.O.D
12. Presumptive Coliform test

ADVANCED COMMUNICATION SKILLS LAB

B.Tech III Year II Semester – CIVIL
Course Code: A46008

L	T	P	C
0	0	2	1

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educational English speakers and respond appropriately in different socio-cultural and professional contexts.

1. **Activities on Fundamentals of inter-personal Communication and Building Vocabulary –** Starting a conversation – responding appropriately and relevantly – using the right body language - Role Play in different situations & Discourse Skills – using visuals – Synonyms and antonyms, word roots, one word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.

2. **Activities on Reading Comprehension** – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading & effective googling.

3. **Activities on Writing Skills –** Structure and presentation of different types of writing – letter writing/ Resume writing/ Statement of purpose - E-correspondence/ Technical report writing / Portfolio writing – planning for writing – improving one's writing.

4. **Activities on Presentation Skills –** Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/e-mails/assignments etc.

5. **Activities on Group Discussion and interview Skills –** Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation. Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video – conference and Mock Interviews.

Text Books:

1. Technical Communication by Meenakshi Raman & Sangeeta Sharma, Oxford University 2009.
2. Advanced Communication Skills Laboratory Manual by Sudha Rani, D. Pearson Education 2011.
3. Technical Communication by Paul V. Anderson. 2007. Cengage Learning pvt. Ltd. New Delhi.
4. Business and Professional Communication: Keys for Workplace Excellence. Kelly M. Quintanilla & Shawn T. Wahl. Sage South Asia Edition. Sage Publications. 2011.
5. The Basics of Communication: A Relational Perspective. Steve Duck & David T. Mc Mahan. Sage South Asia Edition. Sage Publications. 2012.
6. English Vocabulary in Use series, Cambridge University Press. 2009
7. Management Shapers Series by Universities Press (India) Pvt. Ltd. Himayatnagar, Hyderabad. 2008.
8. Handbook for Technical Communication by David A. McMurrey & Joanna Buckley. 2012. Cengage Learning.
9. Communication Skills by Leena Sen.PHI Learning Pvt. Ltd. New Delhi. 2009.
10. Handbook for Technical Writing by David A McMurrey & Joanna Buckley Cengage Learning. 2008.
11. Job Hunting by Colm Downess, Cambridge University Press 2008.
12. Master Public Speaking by Anne Nicholls, JAICO Publishing House, 2006.
13. English for Technical Communication for Engineering Students, Aysha Vishwamohan, Tata Mc Graw-Hill. 2009.
14. Books on TOEFL/GRE/GMAT/ICAT/IELTS by Barron's/DELTA/Cambridge University Press.
15. International English for Call Centres by Barry Tomalin and Suhashini Thomas Macmillan Publishers. 2009.

QUANTITATIVE METHODS AND LOGICAL REASONING

B.Tech III Year II Semester – CIVIL
Course Code: A46TP1

L	T	P	C
2	0	0	1

Course Outcomes

After completion of this course students will be able to
CO1:To solve basic and complex mathematical problems in short time.
CO2:To perform well in various competitive exams and placement drives

UNIT – I

1. **Number System:**
   Speed math's, Numbers, Factors, prime & Co primes, LCM & HCF, Divisibility rules, finding unit place digit and last two digits of an expression
2. **Simple Equations:**

Definition of Linear equation, word problems

3. **Ratio, Proportion and Variations:**

Definition of ratio, ratio of Proportion, Comparison of ratios, Compound ratio, Direct and indirect proportion

4. **Percentages:**

Converting fractions and decimal into percentages, successive percentage, populations, expenditure and savings

5. **Profit and loss:**

Relation between Cost price and selling price, Discount and Marked price, Gain or Loss percentages on selling price

6. **Simple and Compound Interest:**

Problems on interest (**I**), amount (**A**), Principal (**P**) and rate of interest(**R**)
Difference between the simple interest and compound interest for 2 and 3 years.

UNIT-II

1.Partnership:

Relation between partners, period of investment and shares

2. Averages and Ages:

Average of different groups, change in averages by Adding, deleting and Replacement of objects, problems on ages.

3. Allegation and mixtures:

Allegation rule, Mean value of the mixture, Replacement of equal amount of quantity.

Time and Work:

Men and Days, Work and Wages, pipes and cisterns, hours and work, Alternate day's concept,**Time and Distance:**
Difference between the average and Relative speeds, reaching the destination late and early, Stoppage time per hour, time and distance between two moving bodies **Trains, Boats and Streams:**
Train crossing man, same and opposite directions, Speed of boat and stream,

UNIT-III

1. **Progressions:**

Arithmetic, Geometric and Harmonic Progressions, Arithmetic Mean, Geometric Mean and Harmonic Mean and their relations.

2. **Quadratic Equations:**

General form of Quadratic equation, finding the roots of Quadratic equation, Nature of the Roots.

3. **Mensurations:**

2D geometry- perimeter, areas, 3D geometry - surface areas, volumes

4. **Permutation and Combination:**

Fundamental rules, problems on permutations & combinations.

5. **Probability**

Definition of probability, notations and formulae, problems on probability.

6. **Data Interpretation and Data Sufficiency:**
   Tabular and Pie-charts, Bar and Line graphs, Introduction to data sufficiency, problems on data sufficiency.

UNIT-IV

1. **Deductions:**
   Statements and conclusions using Venn diagram and Syllogism method
2. **Connectives:**
   Definition of simple and compound statements, Implications and negations for compound statements.
3. **Series completion:**
   Number series, Alphabet series, letter series.
4. **Coding and Decoding:**
   Letter coding, Number coding, Number to letter coding, Matrix coding, Substitution, Mixed letter coding, Mixed number coding, Deciphering individual letter codes by analysis.

5. **Analytical Reasoning Puzzles:**
   Problems on Linear, Double line-up and Circular arrangements, Selections and Comparisons.

6. **Blood Relations:**
   Defining the various relations among the members of a family, Solving Blood Relation Puzzles by using symbols and notations**.** Problems on Coded relations.

UNIT-V

1. **Direction sense test:**
   Sort of directions in puzzles distance between two points, problems on shadows, Application of triangular triplets.
2. **Clocks:**
   Relation between minute-hour hands, angle vs time, exceptional cases in clocks
3. **Calendars:**
   Definition of a Leap Year, Finding the Odd days, Finding the day of any random calendar date, repetition of calendar years.
4. **Cubes and Dices:**
   Finding the minimum and maximum number of identical pieces and cuts, painting of cubes and cuts, problems on dice.
5. **Venn diagrams:**
   Circular representation of given words, Geometrical representation of certain class, set theory based problems.
6. **Number, Ranking and Time sequence test:** Number test, Ranking test, Time sequence test.

Text Books:

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Material
2. R S Agarwal, S.chand, 'A modern approach to logical reasoning'
3. R S Agarwal, S.Chand, 'Quantitative Aptitude'

Reference Books:

1. Quantitative Aptitude-G.L BARRONS
2. Quantitative Aptitude-AbhijitGuha Mc Graw Hills.
3. Quantitative Aptitude-U.Mohan Rao SCITECH

B. Tech. IV Year I Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 15	A47128	Design of Steel Structures	3	0	0	3
2	PC – 16	A47129	Estimation & Costing	3	0	0	3
3	PE – 3	A47130 A47131 A47132	1. Pre stressed Concrete Structure 2. Earthquake Engineering 3. Green Building Technologies	3	0	0	3
4	PE – 4	A47133 A47134 A47135	1. Railway Airport and Harbour Engineering 2. Advanced Structural Design 3. Ground water Hydrology	3	0	0	3
5	OE – 3	A47136 A47137 A47138	Open Elective	3	0	0	3
6	PC Lab – 7	A47188	Concrete & Highway Materials Lab	0	0	2	1
7	PC Lab - 8	A47189	Computational Lab	0	0	2	1
8	PW-1	A471P1	Industry Oriented Mini Project	0	0	0	3
			Total	**15**	**0**	**4**	**20**

DESIGN OF STEEL STRUCTURES

B.Tech III Year II Semester – CIVIL
Course Code: A47128

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to

- CO1: Classify the types of connections and specifications as per IS: 800-2007.
- CO2: Apply the provisions of IS: 800-2007 to design tension members.
- CO3: Analyze and design compression members.
- CO4: Illustrate behavior of beams and design strengths as per IS code.
- CO5: Adapt IS code procedures to design welded plate girder.

UNIT – I

Theory and introduction: Materials – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – and combinations local buckling behavior of steel. Concept of limit State Design – Limit States – Design Strengths- deflection limits – serviceability – stability check, Bolted connections – Riveted connections – IS – 800 – 2007 - specifications – Design strength – efficiency of joint – prying action. Welded connections – Types of welded joints – specifications - design requirements.

UNIT – II

Design of tension members: Design strength – Design procedure – Design of Tension member - Design procedure splice - lug angle.

UNIT – III

Design of compression members: Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns

UNIT – IV

Design of Beams: Design of Beams – Plastic moment – Bending and shear strength / buckling – Built-up sections – laterally / supported beams –Web Buckling and Web Crippling strength.

UNIT – V

Design of Welded Plate girders – elements – economical depth – design of main section – connections between web and flange – design of end bearing stiffenersand intermediate stiffeners.

Text Books:

1. Design of steel structures, N. Subramanian, Oxford University Press, 1st Edition, 2009.
2. Design of steel structures, S. K. Duggal, Tata McGraw-Hill Education, 2nd Edition 2010.

Reference Books:

1. Design of Steel Structures, Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, Tata McGraw-Hill Education pvt. Ltd,2nd Edition, 2012.

IS Codes

1. *IS: 800 – 2007 General construction in steel – code of practice 3rd Edition.*
2. *IS : 875 Part III 2000 Code of practice for design loads for buildings and structures (second Edition)*

Note:IS: 800–2007, IS:875 are provided during the examination

ESTIMATION & COSTING

B.Tech IV Year I Semester – CIVIL
Course Code: A47129

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to
CO1: Summarize the basic principles and standard methods for working out quantities in estimating.
CO2: Determine the earthwork estimate of buildings, roads and canals.
CO3: Estimate the rate analysis of the various items of work.
CO4: Understand the process of contracting for roads and buildings.
CO5: Evaluate the valuation of buildings and provide practical knowledge of standard specifications of items of building construction.

UNIT – I

Introduction: General items of work in Building, Standard Unit Principles of working out quantities for detailed and abstract estimates – Approximate and Detailed Estimate of Buildings. Principles of bar bending (introduction)

UNIT – II

Earthwork Estimation: Methods of estimation of buildings and roads. Canals in cutting.

UNIT – III

Rate Analysis: Unit rate analysis for various items of building works.

UNIT – IV

Contracts: 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, B.N. Dutta, UBS publishers, 27th Edition, 2016.

Reference Books:

1. Estimation, Costing and Specifications, M. Chakraborthi, Laxmi publications, 24th Edition, 2006.
2. Standard schedule of rates and standard data book, public works department.

PRESTRESSED CONCRETE STRUCTURES (PE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47130

L	T	P	C
3	0	0	3

Course Outcomes

After completion of these course students will be able to
CO1: Classify the concepts, principles, types and methods of PSC structures.
CO2: Evaluate the losses of PSC structures.
CO3: Analysis and design of PSC slabs and beams using IS:1343 (2012).
CO4: Explain transmission of prestressing force, end block analysis by different methods.
CO5: Analyse the stress distribution of composite beams and asses the deflection of beams. Understand the different methods of prestressing.

UNIT – I

Introduction: Historic development- General principles of prestressing pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics.
Methods and Systems of pre stressing: Pretensioning and Post tensioning methodsand systems of prestressing like Hoyer system, MagnelBlaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

UNIT – II

Losses of Prestress: Loss of prestress in pretensioned and posttesnioned members due to various causes like elastic shortage of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, slip in anchorage, frictional losses.

UNIT – III

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons- stress diagrams- Elastic design of PSC slabs and beams of rectangular and I sections.
Shear: General Considerations- Principal tension and compression- Improving shear resistance of concrete by horizontal and vertical prestressing and by using inclined or parabolic cables- Analysis of rectangular and I beams for shear – Design of shear reinforcements- IS Code provisions**.**

UNIT – IV

Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by Guyon, Magnel, Zienlinski and Rowe's methods – Anchorage zone reinforcement- IS Provisions

UNIT – V

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- General design considerations.
Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

Text Books

1. Prestressed concrete, N. Krishna Raju, Tata Mc Graw Hill Book Education pvt.ltd, 5th Edition, 2010.
2. Prestressed Concrete, N. Rajagopalan, Narosa Publishing House, 1st Edition,2014.

Reference Books:

1. Design of prestress concrete structures, T.Y. Lin and Burn, John Wiley, New York,1st Edition, 2010.
2. Prestressed concrete, S. Ramamrutham, Dhanpat Rai & Sons, Delhi,2nd Edition, 2010.

EARTHQUAKE ENGINEERING (PE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47131

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Quantify mechanical behaviour of earth's surface, seismic hazards and its effects.
CO2: Identify, formulate and solves engineering problems subjected to dynamic loading conditions.
CO3: Understand the internal parameters of the structures for seismic design source.
CO4: Assess the design component or process to meet desired needs within realistic constraints.
CO5: Analyze and design the members for earthquake resisting parameters.

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 – Seismoscope, Seismograph, accelerograph – strong ground motions – Seismic zones of India.

UNIT – II

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 – Harmonic excitation – Dynamic magnification factor – Excitation by rigid based translation for SDOF system – Earthquake ground motion.

UNIT – III

Conceptual design: Building configurations – Introduction – Functional planning – Continuous load path – Overall form – simplicity and symmetry – elongated shapes – stiffness and strength – Horizontal and Vertical members – Twisting of buildings – Ductility – definition – ductility relationships – flexible buildings – framing systems – choice of construction materials – unconfined concrete – confined concrete – masonry – reinforcing steel.

UNIT – IV

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.

UNIT – V

Seismic Analysis of structures: Principles of earthquake resistant design of RC members – Structural models for frame buildings – Equivalent static analysis of any typical structure.

Text Books:

1. Earthquake Resistant Design of structures, S. K. Duggal, Oxford University Press, 2nd Edition, 2007.
2. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 1st Edition,2016.

Reference Books:

1. Seismic Design of Reinforced Concrete and Masonry Building, T. Paulay and M.J.N. Priestly, John Wiley & Sons, 1st Edition,1994.
2. Eartquake Resistant Design of Buidling structures, Vinod Hosur, Wiley India Pvt. Ltd, 3rd Edition, 1992.

IS Codes

1. IS: 1893 (Part-1) -2002. "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi.
2. IS:4326-1993, " Earthquake Resistant Design and Construction of Building", Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, " Ductile detailing of concrete structures subjected to seismic force" – Guidelines, B.I.S., New Delhi.

GREEN BUILDING TECHNOLOGIES (PE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47132

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

- CO1: Understand the Green building concept and focus on approaches that makes building sustainable.
- CO2: Illustrate Green building assessment and accreditation system.
- CO3: Able to apply low energy building strategies.
- CO4: Design green building to improve sustainability of infrastructure.
- CO5: Classify the economic benefits of green buildings.

UNIT – I

Introduction: The shifting landscape of Green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns. International Building Assessment systems.

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building desingn, Rating system and Professional crentials, Green Building Documentation Requirements

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process,.

UNIT – IV

Low – energy building strategies: Building Energy Issues, High – Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems.

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High – Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings.

Text Books:

1. Sustainable Construction, Charles J. Kibert, John Wiley & sons, 4th Edition, 2016.
2. Sun, Wind & Light- Architectural design strategies, Mark Dekay & G.Z Brown, John Wiley & sons, 3rd Edition, 2014

Reference Books:

1. IGBC Reference Manual (2016)

RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING (PE4)

B.Tech IV Year I Semester – CIVIL
Course Code: A47133

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Define and understand the various components of railways.
CO2: Understand and solve the geometric elements needed for the design of permanent way.
CO3: Define, understand, and design the various components of the airport.
CO4: Define, understand the planning and requirements of a harbor.
CO5: Improve and Visualize the working of intelligent transportation system.

UNIT – I

Introduction to railway : Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge –Creep of Rails- Theories related to Creep – Sleeper density.

UNIT – II

Geometric design of railway track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station& Yards, Signalizing & interlocking.

UNIT – III

Airport engineering: Airport Site selection – Runway Orientation – Basic, Runway Length – Corrections for Elevation – Airport Classification - Runway Geometric design concepts – Factors Controlling Taxiway Layout - Terminal Area – Apron – Hangar – Blast Considerations, Typical Airport Layouts – Wind rose diagram - Runway Lightening system & Marking.

UNIT – IV

Port and harbor engineering: Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids.

UNIT –V

Intelligent transport systems:ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications,ITS architecture components and standards, Overview of ITS implementations in developed countries.

Text Books:

1. Highway, railway, Airport and Harbour Engineering, K.P. Subramanian, Scitech publication, 1st Edition 2010.
2. A Text book of Transportation Engineering, S.P. Chandola, S.Chand & Co. Ltd, 1st Edition, 2001.

Reference Books:

1. A Text Book of Railway Engineering, S.C.Saxena and S.Arora, Dhanpatrai and Sons,7th Edition, 2013.
2. Harbour, Dock and Tunnel Engineering, R. Srinivasan, , Charotar publication, 28th Edition, 2016.
3. Transportation Engineering and planning, C.S. Papacostas, P. Prevedouros, 3rd Edition, 2000.
4. Intelligent Transportation system, Pradeep kumar Sarkar, Amit Kumar Jain PHI learning , 1st Edition, 2018.

ADVANCED STRUCTURAL DESIGN (PE4)

B.Tech IV Year I Semester – CIVIL
Course Code: A47134

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to
CO1: Analyze and design of cantilever retaining wall.
CO2: Apply the provision of IS : 3370-2009 to design water tank.
CO3: Compile the design aspects of flat slabs.
CO4: Adapt the provision of IRC 21-1987 to class AA loading to design T beam girder.
CO5: Summarize the force components and design principles of RCC Chimney.

UNIT – I

Design of Retaining walls: Types of retaining walls, forces on cantilever retaining wall, stability conditions of a cantilever retaining wall, proportioning of cantilever retaining wall, Introduction to counter fort retaining wall

UNIT – II

Design of water tank: Design philosophy and requirements, I.S code recommendations regarding, Detailing in water tank, Design of circular water tank resting on ground (approximate method),I.S code method for design of circular tank, Design of elevated tank with staging

UNIT – III

Design of flat slab: Introduction terminology related with flat slab construction, I.S code provision for flat slab, Analysis and design of flat slab by direct design method, Shear in flat slab, openings in flat slab

UNIT – IV

Design of concrete bridges: IRC loading, Design of R.C slab culvert, Design of T-beam Girder Bridge

UNIT – V

Chimneys: Different components of Chimney, Design of RCC chimney

Text Books:

1. Reinforced Concrete Structures vol II, B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain, Lakshmi Publications Pvt. Ltd, 5th Edition, 2015.
2. Reinforced cement concrete design, Neelam Sharma , S.K. Kataria & sons Publication, revised Edition, 2020.
3. Advanced Reinforced Concrete Structures, N. Krishna Raju., 4th Edition, 2019

Reference Books:

1. Advanced Reinforced Concrete Structures, Varghese, Pranties hall of India pvt ltd,2nd Edition, 2010.
2. Essentials of Bridge Engineering, DeJohn son Victor, Oxford, and IBM publication co pvt ltd, 6th Edition, 2007.

GROUND WATER HYDROLOGY (PE4)

B.Tech IV Year I Semester – CIVIL
Course Code: A47135

L	T	P	C
3	0	0	3

Course outcomes

After completion of this course students will be able to
CO1: Understand different types of aquifers and their characteristics
CO2: Analyse the pumping test data for different aquifers
CO3: Distinguish the surface and subsurface investigation methods of ground water.
CO4: Discuss the methods of artificial recharging of ground water.
CO5: Explain the control of saline water intrusions.

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.

UNIT - II

Ground water and well hydraulics: Analysis of Pumping Test Data – I: Steady flow groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

UNIT - III

Unsteady flow analysis: Pumping Test Data – II: Unsteady flow towards a well – Non equilibrium
Equations – Theis solution – Jocob and Chow's simplifications, Leak aquifers. 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.

UNIT - IV

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.

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, David Keith Todd and Larry W. Mays, John Wiley & Son, New York, 3rd Edition, 2015.

Reference Books:

1. Hydrology, H. M. Raghunath, New Age International (P) Limited Publishers,3rd Edition, 2006
2. Manual on Artificial Recharge of Groundwater, Central Ground Water Board, Ministry of water resources, Govt. of India, 2007.

CONCRETE & HIGHWAY MATERIALS LAB

B.Tech IV Year I Semester – CIVIL
Course Code: A47188

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to
CO1: Examine the experimental strength of aggregate materials as per codal provisions.
CO2: Compute the properties of bituminous materials.
CO3: Determine the properties of cement by conducting the test.
CO4: Define the workability of fresh concrete by conducting tests.
CO5: Estimate the strength of hardened concrete by conducting destructive and non destructive testing.

List of Experiments:

1. Determine the Crushing & Impact value of given coarse aggregate sample.
2. Determine the Specific Gravity and water absorption for given sample of aggregates.
3. Determine Abrasion& Attrition value for given sample of aggregates.
4. Determine Flakiness and Elongation index for given sample of aggregates.
5. Determine the Consistency& Ductility of given Bitumen sample.
6. Determine the Softening point, Flash and Fire point of given Bitumen sample.
7. Determine the Fineness& Standard Consistency of the given cement sample.
8. Determine the Initial & Final setting time of the given cement sample.
9. Determine the Specific Gravity & Soundness of the given cement sample.
10. Determine the Young's Modulus and Compressive strength of given concrete& Cement mortar specimens.
11. Determine the Workability of given fresh concrete sample.
12. Determination of Bulking percentage of given Fine Aggregate sample &Demonstration of NDT.

COMPUTATIONAL LAB

B.Tech IV Year I Semester – CIVIL
Course Code: A47189

L	T	P	C
0	0	2	1

Course Outcomes

After completion of this course students will be able to

- CO1: Encalcate with the usage of recent software's and its applications in the field of civil engineering
- CO2: Analyse the Beam and Slab using Staad Pro software.
- CO3: Assess the frame using the Staad Pro.
- CO4: Interpret the slope stability by using Geo5.
- CO5: Assess the settlement of footing.

List of Experiments

1. Introduction and practice of the basic functions use in the Python computing
2. To develop the programme for Bending moment, Shear force and Deflection at incremental segments of simply supported beam subjected to eccentric point load and UDL throughout the span.
3. Demonstration and explanation on basic commands used in Staad.pro
4. Analyse of Continous beam using Staad.pro
5. Analyse of slab using Staad.pro
6. Analyse of 2D frame using Staad.pro
7. Analyse of space frame using Staad.pro
8. Demonstration of adminstrator settings of Geostudio
9. Analysis of slope stability with homogeneous and stratified soil condition.
10. Stability of slope with retaining wall
11. Settlement analysis of spread footing
12. Analysis of single pile settlement

List of Software Required

1. Staad.pro - Licenced version.
2. Geostudio - Educational version.
3. Python – Open resource.

INDUSTRIAL ORIENTED MINI PROJECT (Summer Vacation between III- II and IV-I)

B.Tech IV Year I Semester – CIVIL
Course Code: A471P1

L	T	P	C
0	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Interpret the literature and develop solutions for framing problem statement.
CO2: Select software techniques for identifying problems.
CO3: Analysis and test the modules of planned project.
CO4: Design technical report and deliver presentations.
CO5: Apply engineering and management principles to achieve project goals.

Content

There shall be an industry-oriented Mini-Project, in collaboration with an industry of department specific specialization, to be taken up during the summer vacation after III year II Semester examination. However, the mini-project and its report shall be evaluated along with the project work in IV year I Semester. The industry oriented mini-project shall be submitted in a report form and presented before the committee. The committee consists of an external examiner, Head of the Department, the Supervisor of the Mini-project and a Senior Faculty member of the department. There shall be no internal marks for industry oriented mini-project.

B. Tech. IV Year II Semester

S. No.	Category	Course Code	Course Title	L	T	P	C
1	PC – 17	A48139	Rehabilitation and Retrofitting of structures	3	0	0	3
2	PC – 18	A48140	Remote Sensing & GIS	3	0	0	3
3	--	A481TS	Technical Seminar	0	2	0	2
4	--	A481CV	Comprehensive Viva Voce	0	0	0	2
5	PW-2	A481P2	Major Project	0	0	20	10
			Total	**6**	**2**	**20**	**20**

REHABILITATION AND RETROFITTING OF STRUCTURES

.

B.Tech IV Year II Semester – CIVIL
Course Code: A48139

L	T	P	C
3	0	0	3

Course Outcomes :
After completion of this course students will be able to

CO1: Illustrate the importance of inspection and maintenance.
CO2: Summarize the Impacts of corrosion and fire damage on structures.
CO3: Identify the damage assessment and testing of structural components.
CO4: Understand the materials and techniques needed for repairs.
CO5: Examine the failures of the structures and health monitoring with Optimization techniques.

UNIT – I
Introduction: Maintenance, Repair and Rehabilitation – Types Of Maintenance –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 structure due to fire–fire rating of structures- Phenomena of Desiccation

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 underwater structures- Guniting – short create – Underpinning. Strengthening methods. Retrofitting – jacketing

UNIT – V
Health monitoring: structures and its health – use of sensors – building instrumentation.

Text Books:

1. Maintenance and repair of civil structures, B.L. Gupta and Amit Gupta, Standard publications, 1st Edition 2007.
2. Concrete Technology, A.R. Shantha Kumar, Oxford university Press, New Delhi,1st Edition, 2010.

Reference Books:

1. Repair and Rehabilitation of Concrete Structures, Poonam I. Modi, Chirag N. Patel, PHI Learning Pvt. Ltd.

REMOTE SENSING AND GIS

B.Tech IV Year II Semester – CIVIL
Course Code: A48140

L	T	P	C
3	0	0	3

Course Outcomes:
After completion of this course students will be able to
CO1: Understand the concepts of Photogrammetry and compute the heights of the objects using parallax.
CO2: Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies.
CO3: Understand the basic concept of GIS and its applications; know different types of data representation in GIS.
CO4: Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems.
CO5**:**Remote sensing gives the provision of understanding about water resources management and monitoring.

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, L R A Narayana, University Press, 1999.
2. Principles of Geo physical Information Systems, Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

Reference Books:

1. Concepts & Techniques of GIS, C.P. Lo, Albert K.W. Yeung, Prentice Hall Publications, 2007.

2. Remote Sensing and Geographical Information systems, M. Anji Reddy, B.S. Publications, 2001.
3. Introduction to Geographical Information Systems, Kang – Tsung Chang, TMH Publications & Co. 4th Edition,2007.

TECHNICAL SEMINAR

B.Tech IV Year II Semester – CIVIL
Course Code: A48140

L	T	P	C
0	2	0	2

Course Outcomes

After completion of this course students will be able to
CO1: Demonstrate the skills in identifying, analysing, and presenting a research topic.
CO2: Demonstrate the quality of knowledge gained from the literature survey on recent technologies.
CO3: Demonstrate the skills developed to communicate effectively on engineering activities with the engineering community.
CO4: Demonstrate ability to effectively manage time in presentation skills.
CO5: Design a technical report with the principal of ethics.

Content

There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding of the topic, and submit it to the department. It shall be evaluated by the departmental committee consisting of the Head of the Department, Seminar Supervisor and a Senior Faculty member.

COMPREHENSIVE VIVA VOCE

B.Tech IV Year II Semester – CIVIL
Course Code: A481CV

L	T	P	C
0	0	0	2

Course Outcomes

After completion of this course students will be able to
CO1: Explain comprehensively to answer questions from all the courses.
CO2: Test Oral Presentation skills by answering questions in a precise and concise manner.
CO3: Build confidence and interpersonal skills.
CO4: Support the students to face interview both in the academic and the industrial sector.
CO5: Improve placements and better performers in their future.

Content

The Comprehensive Viva-Voce will be conducted by a Committee consisting of Head of the Department and two Senior Faculty members of the Department. The Comprehensive VivaVoce is intended to assess the students understanding of the courses he studied during the B. Tech. course of study. There are no internal marks for the Comprehensive Viva-Voce.

MAJOR PROJECT

B.Tech IV Year II Semester – CIVIL
Course Code: A481P2

L	T	P	C
0	0	20	10

Course Outcomes

After completion of this course students will be able to
CO1: Identity, Analyse and apply suitable current techniques and tools to solve a problem in the civil engineering domain and societal issues.
CO2: Function effectively in teams to accomplish a common goal.
CO3: Organise the technical report writing and communication effectively.
CO4: Extend in lifelong activity.
CO5: Define and analyse a problem to assess health, safety and legal issues.

Content

The End Semester Examination of the project work shall commence from IV-I conducted by the same committee as appointed for the industry-oriented mini-project. In addition, the Project Supervisor shall also be included in the committee. The topics for industry oriented mini project, seminar and project work shall be different from one another. The evaluation of project work shall be made at the end of the IV year. The Internal Evaluation shall be on the basis of two seminars given by each student on the topic of the project.

OPEN ELECTIVES OFFERED BY CIVIL ENGINEERING DEPARTMENT

Category	Course Code	Course Title
OE-1	A44115 A44116 A44117	1. Elements of civil Engineering 2. Smart cities 3. Disaster Management
OE-2	A46125 A46126 A46127	1. Green building Technologies 2. Environmental Pollution & control methods 3. Construction Management
OE-3	A47136 A47137 A47138	1. Remote Sensing & GIS 2. Introduction to earthquake Engineering 3. Solid Waste Management

ELEMENTS OF CIVIL ENGINEERING (OE1)

B.Tech III Year I Semester – CIVIL
Course Code: A44115

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to

- CO1: Understand Geological properties and of civil engineering.
- CO2: Plan the concept of different building byelaws and planning principles.
- CO3: Analyse the properties of the fluid changes treatment process.
- CO4: Apply modern tools of surveying
- CO5: Evaluate the principles of highway geometric designs and types of pavements as per IRC standards. .

UNIT – I

Basics of Engineering Geology: Geology - branches of geology - weathering of rocks - mineralogy – definition - importance of study of minerals - classification of minerals - petrology- geological classification of rocks. Soil formation types of soils

UNIT – II

Building materials, building components: Stones – Classification, quarrying and methods of quarrying. Bricks – Components of Brick Building Components – Lintels, arches, walls, staircase, floor and roofs, doors and windows, DPC, Building planning and building byelaws

UNIT – III

Fluid mechanics: Dimensions and units - physical properties of fluids – specific gravity - surface tension -Problems– viscosity –vapor pressure and their influences on fluid motion- Cavitation- Atmospheric , Guage and Vaccum Pressure

UNIT – IV

.**Surveying:** Definition of surveying – principle- types of surveying-objectives and classification –Total Station: Limitation, Advantages– GIS: Applications-GPS.

UNIT – V

Transportation engineering: Highway Development in India – Necessity for Highway Planning- Different Road Development Plans; Classification of Roads - Road Network Patterns, Super elevation Types of Intersections – Introduction to flexible & rigid pavements – advantages – limitations. Parking studies- road accidents and preventive measures- traffic signs- road markings.

Text Books:

1. Engineering Geology, N. Chennakesavulu, Mc-Millan India Ltd, 3rd Edition 2018.
2. Building Construction, Rangawala, Charotar Publishing House Pvt. Ltd, 43rd Edition, 2019.
3. Highway Engineering, S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th Edition, 2000.

Reference Books:

1. A Textbook of Fluid Mechanics and Hydraulic Machines, Dr. R.K.Bansal, Laxmi publications pvt Ltd, 9th Edition, 2015.
2. Engineering Materials, Rangawala, Charotar Publishing House Pvt.Ltd, 1st Edition,2011.
3. Surveying (Volume 1), S K Duggal, MC Graw Hill , 5th Edition, 2019
4. A Text Book of Remote Sensing & Geographical Information System, M.Anji Reddy, BS Publications, 4th Edition, 2012.

SMART CITIES (OE1)

B.Tech III Year I Semester – CIVIL
Course Code: A44116

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to
CO1: Understand the necessity of smart infrastructure and to promote cities that provide quality of life to citizens.
CO2: Explain technology-based solution on smart mobility.
CO3: Illustrate & introduce the smart and sustainable waste and water management for smart cities.
CO4: Apply Energy Efficient strategies in city
CO5:Evaluate economical models for smart infrastructure solution.

UNIT – I

Introduction: Defining Smart cities & Types, Sustainable Development & Cities, Need for smart city,Concept of smart cities, Smart city components and Categories, Potential locations, Physical infrastructure, social infrastructure, Smart City Mission

UNIT – II

Smart Mobility: Objectives & Components of smart mobility, Emerging concepts & strategies,
ICT supported mobility systems in- Real time traffic Information system, Parking Information system, car bike sharing system, Modal split,
Public Mobility – Vehicle & Transport solutions

UNIT – III

Smart Water &**Waste Management:** Functions & Objectives of smart water management, Smart water management solutions, benefits,

Smart waste management objectives & Scope, Waste management Approaches, Smart waste management strategies – Smart Bins, Automated waste Collection system (AWCS),Swachh Bharat Mission

UNIT – IV

Smart Energy: Smart Energy Concept, Objectives & Elements, Strategies for smart Energy-Energy Efficient buildings & use of Renewable energy, smart Grid,

UNIT – V

Towards Smart Cities: Investment for Land, Power, Water, and Highway and Road/ Rail Connectivity, Fuel Pipe Lines, Smart Economics concept & benefits, Smart Governance Functions & Objectives, Smart Cities- Indian case studies

Text Books:

1. Introduction to smart cities, P.P Anil kumar, First Edition,2019.
2. Smart City, Arun Firodia,Vishwesh Pavnaskar Foreword by Dr. Narayana Murthy,Vishwakarma publication, 1st Edition, 2015.

DISASTER MANAGEMENT (OE1)

B.Tech III Year I Semester – CIVIL
Course Code: A44117

L	T	P	C
3	0	0	3

Course Outcomes:

After completion of this course students will be able to

CO1: Understanding the various types of disaster and its effect.
CO2: Illustrate the aspects of Environmental impacts assessment (EIA).
CO3: Demonstrate assessment of risk mitigation.
CO4: Assess the functional impacts of disaster management.
CO5: Integrate the management cycle and risk reduction.

UNIT-I

Introduction To The Different Types Of Disasters:

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, Is, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-II

Environment And Disasters:

Environment, ecosystem and disasters. Climate change – issues and concerns. Industrial hazards and safety measures. Post disaster impact on environment. Impact of developmental projects on disaster risk. Aspects of environmental management for disaster risk reduction. Environmental Impact Assessment (EIA).

UNIT-III

Disaster Risk Mitigation:

Disaster risk assessment (Hazard-Vulnerability-Capacity analysis), Hazard mapping and forecasting. Principles and aspects of Disaster prevention Disaster mitigation Preparedness for damage mitigation and coping with disasters. Capacity building for disaster/damage mitigation (structural and non-structural measures). Contingency planning for damage mitigation of different hazards.

UNIT-IV

Disaster Management:

Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community – based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster responses; Police and other organizations.

UNIT-V

Planning For Disaster Rescue AndRisk Reduction:

Community-hazard profile of the disaster site. DM cycle, Different phases of Disaster Management :Predisaster stage, Emergency stage, Post disaster stage. Implementation of different disaster management phase and Relief mechanism during different disaster stages including cyclones, earthquakes, fire accidents, Tsunami, landslides etc. Disaster Management Act (2005); Disaster Management Policy (2009);

Text Books:

1. Disaster Mitigation: Experiences And Reflections, Pradeep Sahni, 1st Edition 2013.
2. Natural Hazards & Disasters, Donald Hyndman & David Hyndman, Cengage Learning,1st Edition, 2009.

GREEN BUILDING TECHNOLOGIES (OE 2)

B.Tech III Year II Semester – CIVIL
Course Code: A46125

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Understand the Green building concept and focus on approaches that make building sustainable.
CO2: Illustrate Green building assessment and accreditation system.
CO3: Able to apply low energy building strategies.
CO4: Design green building to improve sustainability of infrastructure.
CO5: Classify the economic benefits of green buildings.

UNIT – I

Introduction: The shifting landscape of green buildings, The driving forces for sustainable construction, Ethics and sustainability, Basic Concepts and Vocabulary, Major Environmental and resource concerns. International Building Assessment systems.

UNIT – II

The green building assessment system: Structure of the LEED suite of Building rating systems, LEED Credentials, LEED Building Design and construction Rating system, Green Globes Building Rating Tools, Structure of Green Globes for New Construction, Green Globes Assessment and Certification Process, Green Globes Professional Credentials, IGBC Building design, Rating system and Professional credentials, Green Building Documentation Requirements

UNIT – III

Green building design: Conventional versus Green Building Systems, green materials, material selection criteria, Executing the Green Building Project, Integrated Design Process, Role of the charrette in the design process,.

UNIT – IV

Low – energy building strategies: Building Energy Issues, High – Performance Building Energy Design Strategy, Passive Design Strategy, Building Envelope, Internal Load Reduction, Smart Buildings and Energy Management Systems.

UNIT – V

Green building economics and sustainable construction: General approach, The Business Case for High – Performance Green Buildings, Economics of Green Building, Quantifying Green Building Benefits, Articulating Performance Goals for Future Green Buildings

Text Books:

1. Sustainable Construction, CHARLES J. KIBERT, John Wiley& sons, 4th Edition,2016.
2. Sun, Wind & Light- Architectural design strategies, Mark Dekay & G.Z Brown, John Wiley & sons, 3rd Edition, 2014

Reference Books:

1. IGBC Reference manual (2016)

ENVIRONMENTAL POLLUTION & CONTROL METHODS (OE2)

B.Tech III Year II Semester – CIVIL
Course Code: A46126

L	T	P	C
3	0	0	3

Course Outcome

After completion of this course students will be able to
CO1: Understanding about the various air pollutants and effect on environment.
CO2: Analyze quality of air in the form of air quality index and dispersion modeling.
CO3: Illustrate about water pollution and solid waste management.
CO4: Analysis and measurement of soil contamination.
CO5: Predict types of noise and problems arise due to noise pollution.

UNIT – I

Introduction to air pollution: Air and its composition, Air Pollution, Sources of air pollution and its classification, Major air Pollutants and their characteristics, Specific group pollutants such as CFC, GHG etc, Air Pollutants from various industrial sectors, Impact of air pollution on human health and vegetation.

UNIT – II

Air quality: Introduction to Air quality index and Comprehensive Environmental Pollution Index etc. and its application, Sampling and measurement of air pollutants, Introduction to National Ambient Air Quality Standards.
Impacts of Air Pollution: Extreme air Pollution scenarios: Acid Rain, Global Warming, Smog, Ozone layer depletion etc.

UNIT – III

Water Pollution: Introduction to water pollution, sources of water pollution- Industrial, Agricultural, and Biomedical. Water Management and its Benefits, Impacts of water Pollution
Solid waste Management- Introduction, Definition, Types of solid waste, Municipal Solid Waste management and Industrial Waste Management

UNIT – IV

Soil pollution: Soil contamination by chemical pollutants, sources, Remediation by plants, bioremediation by microorganisms, contamination by inorganic (including heavy metals) and organic pollutants, factors affecting uptake of contaminants, prevention and elimination of contamination, landfills. Effects of atmospheric deposition on various types of soils, cation exchange capacity (CEC) of soils.

UNIT – V

Introduction to noise: Difference between sound and noise, Pitch and Frequency, Sound Pressure, Sound Pressure level (Decibel), and sources of noise and harmful effects of noise, noise measurement and noise control measures.

Text Books:

1. Environmental Pollution Control and Engineering, Rao C.S., New Age International (P) Limited, 1st Edition, 1991.
2. Air Pollution, Perkin, H.G. McGraw Hill, 1st Edition, 1974.

CONSTRUCTION MANAGEMENT

B.Tech III Year II Semester – CIVIL
Course Code: A46127

L	T	P	C
3	0	0	3

Course Outcomes:
After completion of this course students will be able to
CO1: Understand the construction management skills as a member of a multi- disciplinary team.
CO2: Apply to construction planning techniques.
CO3: Analyse construction documents for planning and management of construction processes.
CO4: Apply knowledge, techniques, skills, and tools of the construction industry in construction activities.
CO5:.Understand the legal implications of contract, common, and regulatory law to manage a construction project

UNIT-I

CONSTRUCTION PLANNING AND MANAGEMENT: Significance of Construction Management, Objectives and Functions of Construction Management, Types of Construction, Resources for Construction Industry, Various stages in Construction, Construction Management Team & Types of Organization.

UNIT–II

PROJECT PLANNING: Project Planning Techniques, Planning of Manpower, Materials, Equipment and Finance, Scheduling by Bar Charts, Limitations of Bar Charts.

PERT&CPM: Significance of CPM&PERT Techniques in Construction Management, Project Scheduling, Network Analysis, Cost-Time Analysis in Network Planning, Float; Total float & free float.

UNIT– III

CONTRACT MANAGEMENT: Types of contracts, contract document, specification, important conditions of contract–tender and tender document–Deposits by the contractor

BIDDING: Definition and Process, Various steps in Bidding, M Book- MusterRoll

UNIT–IV

CLAIM MANAGEMENT: Construction claims, Source of claim, Claim Management, Disputes and Dispute resolution, Arbitration and its advantages, project closure, Construction closure, Contract closure.

UNIT–V

REGULATIONS AND SAFETY: Labour Regulations, Social Security – welfare legislation – Laws relating to Wages – Workmen's Compensation Act – Safety in Construction, legal and financial aspects of accidents in construction.

Text Books:

4. Construction Planning and Management, P.S. Gahlot & B.M. Dhir, Wiley Eastern Limited, 2nd Edition,2018.
5. Construction Project Management, Chitkara K.K, Tata McGraw Hill Publishing Co, 4th Edition, 2019.

Reference Books:

1. Fundamentals of Management, Stephen A. Robbins & DavidA. Decenzo & Mary Coulter, 14th Edition, 2016.

REMOTE SENSING & GIS (OE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47136

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to
CO1: Select the type of remote sensing technique / data for required purpose.
CO2: Identify the earth surface features from satellite images.
CO3: Analyze the energy interactions in the atmosphere and earth surface features.
CO4: Prepare thematic maps.
CO5: Interpretations of satellite data for various applications.

UNIT – I

EMR and its interaction with atmosphere &Earth : Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan – Boltzmann and Wien's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II

Platforms and sensors: Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.

UNIT – III

Image interpretation and analysis: Types of Data Products – types of image interpretation – basic elements of image interpretation – visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV

Geographic information system: Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).

UNIT – V

Data entry, storage and analysis: Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

Text Books:

1. Remote Sensing and Image Interpretation, Lille sand T.M., Kiefer, R.W. and J.W. Chipman, John Willey and Sons Asia Pvt. Ltd., 5th Edition, 2004.
2. Introduction to Geographical Information Systems, Kang – Tsung Chang, TMH Publications & Co. 4th Edition,2007.

References Books:

1. Remote sensing and Geographical information system, M. Anji Reddy, B.S. Publications, 4th Edition, 2001.
2. Basics of remote sensing & GIS, S. Kumar, Laxmi publications, 1st Edition, 2016.

INTRODUCTION TO EARTHQUAKE ENGINEERING (OE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47137

L	T	P	C
3	0	0	3

Course Outcomes

After completion of this course students will be able to

CO1: Understand the Interior of Earth surface and the occurrence of earthquake.
CO2: Illustrate the plate tectonics plate and fault attenuation.
CO3: Evaluate the quantitative measure of energy release.
CO4: Compute the mechanical behavior of earth surface and its significance
CO5: Classify different earthquake hazards and its effects.

UNIT – I

Introduction: Interior of the Earth – Earthquakes phenomenon causes of earthquake, Nature and Occurrence of earthquakes– effects of earthquakes, Consequences of Earthquake damage– Terms associated with earthquakes.

UNIT – II

Engineering Seismology: Elastic rebound theory, Plate tectonics; Different plate theories – lithospheric plates – plate margins & Earthquake occurrences - movement of plates, Faults &fault types, Earthquake classification

UNIT – III

Measurements of Earthquakes: Magnitude/Intensity of an earthquake – scales – Energy released – Earthquake measuring instruments – Seismoscope, Seismograph and accelerograph – Interpretation of Seismic Records. Seismic zones of India - Concept of seismic micro zonation.

UNIT – IV

Strong Ground Motion: Response of Structure to Earthquake Motion, Fundamentals of wave motion – seismic wave types. Reflection and refraction of plane waves at a plate boundary - boundary conditions, Energy conversions, focus on Indian earthquakes.

UNIT – V

Seismic Hazard: Introduction to Seismic Hazard, types of hazard, Time parameters of hazards, Local site effects and evaluation methods.

Concepts of Earthquake resistant building: Building configurations – Introduction – Functional planning – Continuous load path – Characteristics of Buildings.

Text Books:

1. Earthquake Resistant Design of structures, Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd, 1st Edition, 2016.
2. Earthquake Resistant Design of structures, S. K. Duggal, Oxford University Press, 2nd Edition,2007.

Reference Books:

1. Introduction to Earthquake Engineering, Hector Estrada & Luke S Lee, CRC Press, Taylor & Francis Group, 3rd Edition, 2017.
2. Earthquake Resistant Design of Buidling structures, Vinod Hosur, Wiley India Pvt. Ltd, 3rd Edition,1992.
3. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy, 2005.

SOLID WASTE MANAGEMENT (OE3)

B.Tech IV Year I Semester – CIVIL
Course Code: A47138

L	T	P	C
3	0	0	3

Course Outcomes
After completion of this course students will be able to

CO1: Illustrate the hierarchical structure in solid waste management and an integrated solution.
CO2: Apply the legal legislation, economic analysis of the solid waste management system.
CO3: Identity route optimization for a solid waste collection and transport system.
CO4: Understand legal and economical points related to general solid waste management.
CO5: Plan site selection for a landfill.

UNIT I
Waste Management: Solid waste problem, meaning and definition of solid waste, concept and classification of municipal solid waste, Impacts of solid waste on environment.

UNIT II
solid waste management rules and Regulations: Developing a solid waste collection and transfer system, characterizing waste generation, Determining public and private collection or transfer options.

UNIT III
Waste management techniques: Solid waste management Hierarchy, waste prevention, definition of source reduction, waste reduction at source using 5R's Technique,

UNIT IV
Waste disposal Techniques: Waste disposal, composting, principles of composting, factors affecting composting, vermi composting, waste to energy techniques, Landfill technique and design and operating procedure of landfill

UNIT V
Solid waste management of Biomedical waste, plastic and E-waste: Biomedical waste – sources and generation, biomedical waste management, plastic – Dangers of plastic wastes, Recycling and disposal of plastic wastes, E – wastes – Definition, Health hazards, E – waste management and conclusion

Text Books:

1. Solid waste Management, K. Sasi Kumar & S. Gopi Krishna, Prentice-Hall Publishers, 1st Edition, 2009.
2. Solid waste Management, Jagbir Singh & A.L. Ramanathan, I K International Publishing House Pvt Ltd, 1st Edition, 2009.

Reference Books:

1. Management of Municipal Solid waste, T.V. Ramachandra, The Energy and Resources Institute, TERI, 1st Edition, 2009.
2. Municipal Solid waste Management in India, Subhrabaran Das & KorobiGogoi, VDM Verlag Publisher, 1st Edition, 2010.
3. Handbook of Solid Waste Management, George Tchobanoglous and Frank Kreith, McGraw-HILL, 2nd Edition , 2002.