

Detailed Syllabus
Under
Autonomy
Implemented from Academic Year
2016-2017

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PRINCIPAL
NARULA INSTITUTE OF TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

Vision of the Institute

To develop responsible citizens who would 'think global and act local' and become the change agents of society to meet the challenges of future.

Mission of the Institute

To impart high quality Engineering and Management education to the budding professionals and provide the ambience needed for developing requisite skills to make a mark of excellence in Education, Business and Industry.

Departmental Vision

To produce a new generation of Civil Engineers by providing state-of-the-art education in Civil Engineering recognized worldwide for excellence. This would be guided by extensive research in technology and management for industrial and social needs for sustainable development.

Departmental Mission

Our endeavour is to make the department the highest seat of learning, prepare Engineers equipped with strong conceptual Foundation coupled with practical insight meet global Business changes.

Program Educational Objectives (PEOs)

PEO 1 Graduates will be able to analyze, design and propose a feasible solution to civil engineering problems by applying basic principles of mathematics, science and engineering.

PEO 2 Graduates will be inculcated with necessary professional skills, effective oral and written communication to be productive engineers.

PEO 3 Graduates will be able to work as a team in intra and interdisciplinary end over for development of new ideas and products to serve in contemporary societal contexts.

PEO 4 Graduates will be able to face challenges of the world economic order by incorporating expertise gained by faculty in consultancy work, for educating students, involving modern tools and techniques.

PEO 5 Graduates will achieve a high level of technical and managerial expertise to achieve excellence, outstanding leadership to succeed in positions in civil engineering profession with higher threshold start in employment background.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

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

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

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

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

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

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

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

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

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

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

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

PSO1: Graduates will be able to apply technical skills and modern engineering tools for civil engineering day to day practice.

PSO2: Graduates will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.

PSO3: Graduates will be able to pursue of lifelong learning and professional development to face the challenging and emerging needs of our society.

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 1st Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Group A: ECE, EE, BME, AEIE/EIE

Group B: CSE, IT, FT, ME,CE

First Year First Semester

CURRICULUM

A. THEORY							
SI No	Paper Code	Theory	Contact Hours /Week				Credit Points
			L	T	P	Total	
1	M 101	Mathematics -I	3	1	0	4	4
2	CH 101/ PH 101	Chemistry (Gr. A) / Physics - I(Gr. B)	3	1	0	4	4
3	EE 101/ EC 101	Basic Electrical Engineering (Gr. A) / Basic Electronics Engineering (Gr. B)	3	1	0	4	4
4	HU 101	Communicative English	2	0	0	2	2
5	ME 101	Engineering Mechanics	3	1	0	4	4
Total of Theory						18	18
B. PRACTICAL							
7	HU181	Extra Curricular Activity (NSS/ NCC)	0	0	2	2	1
8	HU191	Lang. Lab. and Seminar Presentation	0	0	2	2	1
9	CH 191/ PH191	Chemistry Lab (Gr. A) / Physics -I Lab(Gr. B)	0	0	3	3	2
10	EE 191/ EC 191	Basic Electrical Engineering Lab (Gr. A) /Basic Electronics Engineering Lab(Gr. B)	0	0	3	3	2
11	ME 191	Engg Drawing & Graphics(Gr A)/ Workshop Practice (Gr-B)	0	0	3	3	2
Total of Practical						13	08

Syllabus:

Theory

Paper Name: Mathematics –I

Paper Code: M101

Total Contact Hours: 40

Credit: 4

Prerequisite: Any introductory course on matrix algebra, calculus, geometry.

Course Objective: The purpose of this course is to provide fundamental concepts matrix algebra, Calculus of Single and Several Variables and Vector Analysis.

Course outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M101.1: Recall the distinctive characteristics of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis.

M101.2: Understand the theoretical concept of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis.

M 101.3: Apply the principles of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis to solve various problems.

Course contents:

MODULE I [10L]

Matrix Algebra: Elementary row and column operations on a matrix, Rank of matrix, Normal form, Inverse of a matrix using elementary operations, Consistency and solutions of systems of linear equations using elementary operations, Linear dependence and independence of vectors, Concept & Properties of different matrices (unitary, orthogonal, symmetric, skew-symmetric, hermitian, skew-hermitian), Eigen values and Eigen vectors of a square matrix (of order 2 or 3), Characteristic polynomials, Caley-Hamilton theorem and its applications, Reduction to diagonal form (upto 3rd order).

MODULE II [10L]

Calculus-I (Functions of single variable): Rolle's theorem, Mean value theorem- Lagrange & Cauchy, Taylor's and Maclaurin's theorems, Expansion of simple functions by Taylor's and Maclaurin's Theorems, Fundamental theorem of integral calculus, Evaluation of plane areas, volume and surface area of a solid of revolution and lengths, Convergence of Improper integrals, Beta and Gamma Integrals - Elementary properties and the Inter relations.

MODULE III [12L]

Calculus-II (Functions of several variables): Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives, Total Differentiation, Derivatives of composite and implicit functions, Euler's theorem on homogeneous functions, Chain rule, Maxima and minima of functions of two variables – Lagrange's method of Multipliers, Change of variables- Jacobians (up to three variables), Double and triple integrals.

Paper Name: Physics -I
Paper Code: PH 101
Total Contact Hours: 41
Credit: 4

Pre requisites: Knowledge of Physics upto 12th standard.

Course Objective:

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

Course Outcome:

At the end of the course students' should have the

PH 201.1 : Ability to state and recall ➤ De-Broglie hypothesis, and Heisenberg's Uncertainty Principle ➤ Amplitude and Velocity Resonance ➤ Malus's Law, Brewster's Law ➤ Characteristics of LASER light	PO1 Or GA1
PH 201.2 : Ability to understand and explain ➤ Polarizer and analyzer ➤ basic principles and different types of LASER and Optical Fibre ➤ structure of solids, Miller indices ➤ theory of Matter Wave, equation of motion of Matter Wave ➤ wave function and its role in representing wave nature of matter	PO2 Or GA2
PH 201. 3 : Ability to apply the knowledge of ➤ mechanical vibration in electrical circuits ➤ superposition principle in Newton's ring phenomenon, diffraction phenomenon	PO3 Or GA3

➤ quantum nature of e.m. waves for production of laser ➤ total internal reflection in transmitting light through optical fibres ➤ x-ray diffraction in crystal structure ➤ probability interpretation in Heisenberg's uncertainty principle	
PH 201.4 : Ability to analyze ➤ grating as many slits system ➤ role of Q factor in a resonating circuit, conditions of different types of resonance ➤ minimum requirements for lasing action ➤ importance of light as a carrier of information ➤ the failures of classical physics in microscopic situation and need of quantum physics ➤ Einstein's A, B coefficient and predict the wavelength domain of Lasing action ➤ Requirement of Miller indices for describing crystallographic planes	PO2 Or GA2
PH 201.5 : Ability to evaluate / justify / compare ➤ X-ray production process is inverse of the process of Photoelectric Effect. ➤ different crystallographic structures according to their Co-ordination number and packing factors ➤ the outcome of Photo-electric effect, Compton effect and Davisson-Germer experiment to justify wave-particle duality of matter	PO12 Or GA12

Course contents

Module 1 (8L):-

Oscillations

Simple harmonic motion: Concepts with examples, Superposition of SHMs in two mutually perpendicular directions: Lissajous' figures, Engineering Applications and related Numerical problems

2L

Damped vibration: Differential equation and its solution, Logarithmic decrement, quality factor, Engineering Applications and related Numerical problems.

3L

Forced vibration: Differential equation and solution, Amplitude and Velocity resonance, Sharpness of resonance, relevant applications including LCR circuits, Numerical problems

3L

Module 2 (10L):-

Classical Optics:

Interference of light: Wave nature of light (Huygen's principle), Conditions of sustained interference double slit as an example; qualitative idea of spatial and temporal coherence, conservation of energy and intensity distribution; Newton's ring (qualitative descriptions of working principles and procedures-no deduction required). Engineering applications, Numerical Problems. 3L

Fresnel's biprism (beyond the syllabus).

1L(ext)

Diffraction of light: Fresnel and Fraunhofer class, Fraunhofer diffraction for plane transmission grating (elementary treatment of intensity distribution for N-slits), single slit and double slits as examples, missing order, Rayleigh criterion, resolving power of grating and microscope (Definition and formula; no deduction required). Engineering Applications, Numerical Problems. 4L

Polarization: Definition, plane of polarization, plane of vibration, Malus law, fundamental concepts of plane, circular and elliptical polarizations (only qualitative idea) with examples, Brewster's law, Double refraction: ordinary and extraordinary rays, Nicol's prism, Engineering applications, Numerical problems. 3L

Module 3 (9L):-

Quantum Physics:

Quantum Theory: Inadequacy of classical physics; Planck's quantum hypothesis- Qualitative (without deductions), particle concept of electromagnetic wave (example: photoelectric and Compton effect; qualitative discussions only), wave particle duality; phase velocity and group velocity; de Broglie wave; Davisson and Germer experiment. 4L

Quantum Mechanics 1: Concept of wave function, Physical significance of wave function, Probability interpretation; wave function normalization condition and its simple numerical applications; uncertainty principle-applications, Schrödinger equation (no mathematical derivation). 4L

Module 4 (6L):

X-ray & Crystallography

X-rays – Origin of Characteristic and Continuous X-ray, Bragg's law (No derivation), Determination of lattice constant, Applications, Numerical problems. 2L

Elementary ideas of crystal structure - lattice, basis, unit cell, Fundamental types of lattices – Bravais lattice, Simple cubic, fcc and bcc, **hcp** lattices, (use of models in the class during teaching is desirable) Miller indices and miller planes, Co-ordination number and Atomic packing factor, Applications, Numerical problems. 4L

Module 5 (8L):

Modern Optics-I:

Laser: Concepts of various emission and absorption process, working principle of laser, metastable state, Population Inversion, condition necessary for active laser action, optical resonator, ruby laser, He-Ne laser, **semiconductor laser**, Einstein A and B coefficients and equations, industrial and medical applications of laser. 5L

Fibre optics and Applications: Principle and propagation of light in optical fibres- Numerical aperture and Acceptance angle, V number, Types of optical fibres (material, refractive index, mode), Losses in optical fibre- attenuation, dispersion, bending, Numerical problems. 3L

Recommended Text Books for Physics I (PH101//201):**Oscillations:**

1. Classical Mechanics- J. C. Upadhyay (Himalya Publishers)
2. Classical Mechanics-Shrivastav
3. Classical Mechanics-Takwal & Puranik (TMH)
4. Sound-N. K. Bajaj (TMH)
5. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
6. Principles of Acoustics-B. Ghosh (Sridhar Publisher)
7. A text book of sound-M. Ghosh (S. Chand publishers)
8. Electricity Magnetism- Chattopadhyay & Rakshit (New Central Book Agency)
9. A text book of Light- K.G. Mazumder & B. Ghosh, (Book & Allied Publisher)
10. R.P. Singh (Physics of Oscillations and Waves)
11. A.B. Gupta (College Physics Vol.II)
12. Chattopadhyay and Rakshit (Vibration, Waves and Acoustics)

Classical Optics & Modern Optics-I:

13. A text book of Light- K.G. Mazumder & B. Ghosh, (Book & Allied Publisher)
14. A text book of Light-Brijlal & Subhramaniam, (S. Chand publishers)
15. Modern Optics-A. B. Gupta (Book & Allied Publisher)
16. Optics-Ajay Ghatak (TMH)
17. Optics-Hecht
18. Optics-R. Kar, Books Applied Publishers
19. Möller (Physical Optics)
20. E. Hecht (Optics)
21. E. Hecht (Schaum Series)
22. F.A. Jenkins and H.E. White
23. C.R. Dasgupta (Degree Physics Vol.3)

Quantum Physics

24. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
25. Quantum Mechanics-Bagde Singh (S. Chand Publishers)
26. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
27. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
28. Quantum Mechanics-Bransden (Pearson Education Ltd.)
29. Perspective of Modern Physics-A. Beiser (TMH)
30. Eisberg & Resnick is published by Wiley India
31. A.K. Ghatak and S. Lokenathan

[illegible]

Paper Name: Basic Electronics Engineering

Paper code: EC101

Total Contact Hours: 40

Credits: 4

Prerequisites

A basic course in Electronics and Communication Engineering Progresses from the fundamentals of electricity, direct current (DC) devices and circuits , series and parallel circuits to the study of active and passive components, Ohm's Law, Kirchoff's Law i.e. KVL,KCL, Ampere's Law etc.

Course objectives:

Students will be able to Analyze the behaviour of semiconductor diodes in Forward and Reverse bias . To design a half wave and full wave rectifiers , Explore V-I characteristics of Bipolar Junction Transistor n CB, CE & CC configurations. To acquire the basic engineering technique and ability to design and analyze the circuits of Op-Amps. Students will be able to explain feedback concept and different oscillators . They will also be familiar with the analysis of digital logic basics and measuring Electronic devices. Students will have knowledge about characteristics of FET.

Course Outcomes:

EC 201.1	Study PN junction diode, ideal diode, diode models and its circuit analysis, application of diodes and special diodes.
EC 201.2	Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration, differentiation on electronic signals.
EC 201.3	Study the concepts of both positive and negative feedback in electronic circuits.
EC 201.4	Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.
EC 201.5	Learn how the primitives of Boolean algebra are used to describe the processing of binary signals.

Course contents

Module-I: Basics of semiconductor

6L

Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, E-k and Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic (p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only (no derivation) , mass action law , charge neutrality in semiconductor, Einstein relationship in semiconductor , Numerical problems on- Fermi level, conductivity, mass action law, drift and diffusion current.

Module-II: P-N Junction Diode and its applications

8L

junction formation and depletion region , energy band diagram of p-n junction at equilibrium and barrier energy , built in potential at p-n junction , energy band diagram and current through p-n junction at forward and reverse bias, V-I characteristics and current expression of diode , temperature dependencies of V-I characteristics of diode , p-n junction breakdown – conditions , avalanche and Zener breakdown , Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers circuits and operation (I_{DC} , I_{rms} , V_{DC} , V_{rms}) , ripple factor without filter, efficiency ,PIV,TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

Module-III : Bipolar junction transistor(BJT)

6L

Formation of PNP/NPN Transistors ,energy band diagram, current conduction mechanism , CE ,CB,CC configurations , transistor static characteristics in CE ,CB and CC mode, junction biasing condition for active, saturation and cut-off modes ,current gain α , β and y , early effect.

Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias , D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.

BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

Module-IV: Field effect transistor (FET)

4L

Concept of field effect, channel width modulation Classification of FETs-JFET, MOSFET, operating principle of JFET. drain and transfer characteristics of JFET (n-channel and p-channel), CS,CG,CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), Numerical Problems .

Module-V: Feedback and Operational Amplifier

10L

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion.

Operational amplifier – electrical equivalent circuit ,ideal characteristics , Non ideal characteristics of op-amp – offset voltages ;bias current ;offset current; Slew rate ; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and non-inverting amplifier , Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower ; basic differentiator and integrator.

Problems on Characteristics of Op-amp, CMRR, slew rate, amplifier and application of Op-amp to be discussed. Any other relevant problems related to topic may be discussed or assigned.

2L

Module-VII: Digital Electronics

4L

Text Books:

- ### Reference Books:

- ## CO-PO Mapping

[illegible]

Paper Name: Communicative English

Paper Code: HU101

Total Contact Hours: 26

Credits: 2

Pre requisites:

Basic knowledge of high school English.

Course Objectives:

Designed to meet the basic survival needs of communication in the globalized workplace, including knowledge of and competency in the use of macro-skills in reading and writing proficiency, functional grammar and usage.

Course Outcomes:

At the end of this course, students will be

HU101.1: Able to comprehend and communicate in English through exposure to communication skills theory and practice.

HU101.2: Apply the basic grammatical skills of the English language through intensive practice.

HU101.3: Able to develop reading and comprehension skills.

HU101.4: Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.

HU101.5: Able to apply/illustrate all sets of English language and communication skills in creative and effective ways in the professional sphere of their life

Course Content:

The proposed revised syllabus is as follows:

Module 1: Communication: Interface in a Globalized World [5L]

- a. Definition of Communication & Scope of Communication
- b. Process of Communication—Models and Types
- c. Verbal—Non-Verbal Communication, Channels of Communication
- d. Barriers to Communication & surmounting them

[to be delivered through case studies involving intercultural communication]

Module 2: Vocabulary and Reading [5L]

- a. Word origin—Roots, Prefixes and Suffixes, Word Families, Homonyms and Homophones
- b. Antonyms and Synonyms, One-word substitution

- c. Reading—Purposes and Skills
- d. Reading Sub-Skills—Skimming, Scanning, Intensive Reading
- e. Comprehension Practice (Fiction and Non fictional Prose/Poetry)

Texts:

- (i) Isaac Asimov, *I Robot* (—Robbie OR —Little Lost Robot)
- (ii) George Orwell, —Shooting an Elephant
- (iii) Ruskin Bond, —The Cherry Tree OR —The Night Train at Deoli
- (iv) Robert Frost, —Stopping by the Woods on a Snowy Evening.

f. Precis Writing

(Use of daily newspapers for reading practice is recommended)

Module 3: Functional Grammar and Usage [6L]

- a. Articles, Prepositions, Verbs
- b. Verb-Subject Agreement
- c. Comparison of Adjectives
- d. Tenses and their Use
- e. Transformation of Sentences (Singular-Plural, Active-Passive, Direct-Indirect, Degrees of Comparison)
- f. Error Correction

Module 4: Business writing [10L]

- a. Business Communication in the Present-day scenario
- b. Business Letters (Letters of Inquiry, Sales Letters, Complaint and Adjustment Letters, Job Application Letters)
- c. Drafting of a CV and Résumé
- d. Memo, Notice, Advertisement, Agenda, Minutes of Meetings
- e. E-mails (format, types, jargons, conventions)

References:

1. Raymond Murphy. *English Grammar in Use*. 3rd Edn. CUP, 2001.
2. Seidl & McMordie. *English Idioms & How to Use Them*. Oxford:OUP,1978.
3. Michael Swan. *Practical English Usage*. Oxford:OUP,1980.
4. Simeon Potter. *Our Language*. Oxford:OUP,1950.
5. Pickett, Laster and Staples. *Technical English: Writing, Reading & Speaking*. 8th ed. London: Longman,2001.
6. IIT Kanpur, English Language & Communication Skills (ENG 112 C)syllabus.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU101.1	-	-	1	-	-	1	-	1	3	3	3	3
HU 101.2	-	-	-	-	-	2	-	-	2	3	3	3
HU 101.3	-	3	2	2	-	3	2	2	3	3	3	3
HU 101.4	-	-	-	2	-	2	-	-	3	3	2	3
HU 101.5	-	2	1	-	-	2	2	1	3	3	2	3

Paper Name: Engineering Mechanics
Paper Code: ME101
Total Contacts Hours: 45
Credit: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

Course Objective:

1. Understand the vector and scalar representation of forces and moments.
2. Describe static equilibrium of particles and rigid bodies in two dimensions and three dimensions including the effect of friction
3. Analyze the properties of surfaces & solids in relation to moment of inertia.
4. Illustrate the laws of motion, kinematics of motion and their interrelationship.
5. Study the concepts of engineering mechanics on deformable materials under applied loads.

Course Outcome:

Upon successful completion of the course, student should be able to:

ME 101.1. Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

ME 101.2. Study the effect of friction in static and dynamic conditions.

ME 101.3. Understand the different surface properties, property of masses and material properties.

ME 101.4. Analyze and solve different problems of kinematics and kinetics.

Course Content:

Module1: Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector). 2L

Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i, j, k ; Cross product and Dot product and their applications. 3L+1T

Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces. 4L+1T

Module2: Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equation of equilibrium. 3L+1T

Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction. 3L+1T

Module3: Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadrilateral, composite areas consisting of above figures. 4L+1T

Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone. 3L+1T

Principle of virtual work with simple application. 1L+1T

Module4: Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety. 2L+1T

Module5: Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs. 3L+1T

Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion). 2L+1T

Module6: Kinetics of particles: Newton's second law; Equation of motion; D'Alembert's principle and free body diagram; Principle of work and energy; Principle of conservation of energy; Power and efficiency. 3L+2T

Books

Recommended

1. Engineering Mechanics [Vol-I & II] by Meriam & Kraige, 5th ed. – Wiley India
2. Engineering Mechanics: Statics & Dynamics by I.H. Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda – Chhaya Prakashani
6. Engineering Mechanics by Basudeb Bhattacharyya – Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
ME101.1	3	3	2	2	-	-	-	-	1	-	-	-
ME101.2	3	3	2	2	-	-	-	-	1	-	-	1
ME101.3	3	2	3	2	1	-	-	-	1	-	-	1
ME101.4	3	3	3	3	-	-	-	-	1	-	1	-

Practical

Paper Name: Lang. Lab. and Seminar Presentation

Paper Code: HU191

Total Contact Hours: 26

Credit: 1

Pre requisites: Basic knowledge of LSRW skills.

Course Objectives: To train the students in acquiring interpersonal communication skills by focussing on skill acquisition techniques and error feedback.

Course Outcome:

HU191.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU191.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU191.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU191.4: Able to analyze communication behaviors.

HU191.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

Course Contents:

Module 1: Introduction to the Language Lab

- a. The Need for a Language Laboratory
- b. Tasks in the Lab
- c. Writing a Laboratory Notebook

Module 2: Active Listening

- a. What is Active Listening?
- b. Listening Sub-Skills—Predicting, Clarifying, Inferencing, Evaluating, Notetaking
- c. Contextualized Examples based on Lab Recordings

Module 3: Speaking

- a. Speaking (Choice of words, Speech Syntax, Pronunciation, Intonation)
- b. Language Functions/Speech Acts
- c. Speaking using Picture Prompts and Audio Visual inputs
- c. Conversational Role Plays (including Telephonic Conversation)
- d. Group Discussion: Principles and Practice

Module 4: Lab Project Work

- a. Keeping a Listening Log
- b. Writing a Film Review/Advertisements

References:

1. IT Mumbai, **Preparatory Course in English** syllabus
2. IIT Mumbai, **Introduction to Linguistics** syllabus
3. Sasikumar et al. *A Course in Listening and Speaking*. New Delhi: Foundation Books, 2005.
4. Tony Lynch, *Study Listening*. Cambridge: Cambridge UP, 2004.

CO-PO-Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU 191.1	-	3	-	-	-	3	2	1	3	3	3	3
HU 191.2	-	3	-	2	-	3	-	-	3	3	3	3
HU 191.3	-	3	-	-	-	3	-	-	3	3	3	3
HU 191.4	-	3	2	3	-	3	2	-	3	3	3	3
HU 191.5	-	3	2	2	-	2	-	3	3	3	3	3

Paper Name: Physics I Lab
Paper Code: PH 191
Total Contact Hours: 40
Credit: 4

Pre requisites: Knowledge of Physics upto 12th standard.

Course Outcome of Physics-I practical (PH 191)

At the end of the course students' should have the

PH 191.1 : Ability to define, understand and explain ✓ Error estimation, Proportional error calculation ✓ superposition principle in Newton's ring, Fresnel's biprism, laser diffraction ✓ Basic circuit analysis in LCR circuits	PO1
PH 191.2 : Ability to conduct experiments using ➤ LASER, Optical fibre ➤ Interference by division of wave front, division of amplitude, diffraction grating, polarization of light ➤ Quantization of electronic energy inside atom ➤ Torsional pendulum	PO4
PH 191.3 : Ability to participate as an individual, and as a member or leader in groups in laboratory sessions actively	PO9
PH 191.4 : Ability to analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments	PO10

General idea about Measurements and Errors (One Mandatory):

- i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
- ii) Proportional error calculation using Carey Foster Bridge.

Any 7 to be performed from the following experiments

Experiments on Oscillations & Elasticity:

1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.
2. Experiments on Lissajous figure (using CRO).

3. Experiments on LCR circuit.
4. Determination of elastic moduli of different materials (Young's modulus and Rigidity modulus)

Experiments on Optics:

5. Determination of wavelength of light by Newton's ring method.
6. Determination of wavelength of light by Laser diffraction method.
7. Determination of numerical aperture and the energy losses related to optical fiber experiment
8. Measurement of specific rotation of an optically active solution by polarimeter.

Experiments on Quantum Physics:

11. Determination of Planck's constant using photoelectric cell.
12. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.

****In addition it is recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.**

Probable experiments beyond the syllabus:

1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
2. Study of half-wave, quarter-wave plate (beyond the syllabus)
3. Study of dispersive power of material of a prism.
4. Study of viscosity using Poiseuille's capillary flow method/using Stoke's law.
5. Measurement of nodal and antinodal points along transmission wire and measurement of wavelength.
6. Any other experiment related to the theory.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH 191.1	2											
PH 191.2	1											
PH 191.3				2								
PH 191.4									3			

Paper Name: Basic Electronics Engineering Lab

Paper Code: EC191

Total Contact Hours: 36

Credit: 2

Prerequisites

A basic course in electronics and Communication engineering Progresses from the fundamentals of electricity, active and passive components, basic electronics laws like Ohm's law, Ampere's law

Course objectives:

Students will become familiar with the circuit design using semiconductor diodes in Forward and Reverse bias, They will also be able to design rectifiers like half-wave, full-wave rectifiers etc. using diodes. The ability of circuit design with Bipolar Junction Transistor in CB, CE & CC configurations will be improved. The students will acquire the basic engineering technique and ability to design and analyze the circuits of Op-Amp. Basic concepts and Circuit design with logic gates will be developed in the students. The students will be able design circuit using FET .

Course Outcomes:

EC191.1	Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
EC191.2	Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
EC191.3	Determination of input-offset voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
EC191.4	Able to know the application of Diode, BJT & OPAMP.
EC191.5	Familiarization and basic knowledge of Integrated Circuits

Course contents:

List of Experiments:

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, millimeters etc.
2. Familiarization with measuring and testing equipment like CRO, Signal generator etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.
7. Study of I-V characteristics of Field Effect Transistors.
8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

- ## CO-PO Mapping

[illegible]

Paper Name: Workshop Practice
Paper Code: ME191
Total Contact Hours: 36
Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

Course Objective:

1. To understand the basic knowledge of Workshop Practice and Safety.
2. To identify and use of different hand tools and other instruments like Hand Saw, Jack Plane, Chisels etc and operations like such as Marking, Cutting etc used in manufacturing processes.
3. To get hands on practice in various machining metal joining processes such as Welding, Brazing, Soldering, etc.

Course Outcome:

Upon successful completion of this course, the student will be able to:

ME192.1 Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

ME192.2 Identify Instruments of a pattern shop like Hand Saw, Jack Plane, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.

ME192.3 Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.

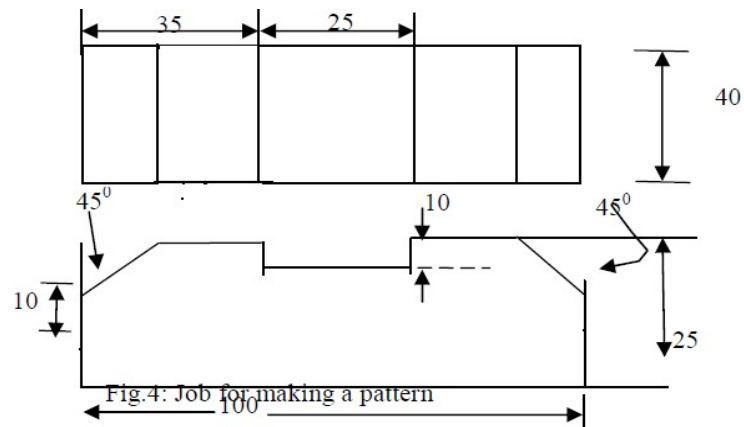
ME192.4 Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

Course contents

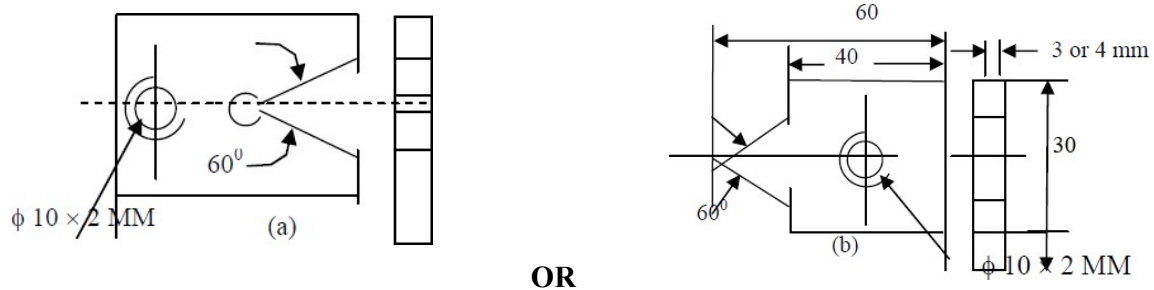
List of Activities:

Sl. No.	Syllabus	Contact Hrs
Module 1	Pattern Making	6
Module 2	Sheet Metal Work	6
Module 3	Fitting	9
Module 4	Machining in Lathe	9
Module 5	Welding	6

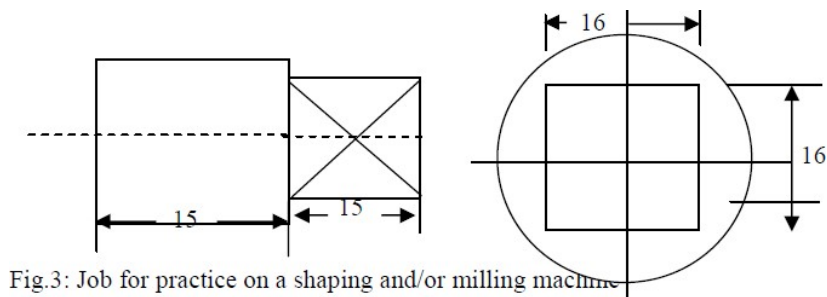
MODULE 1 – PATTERN MAKING.



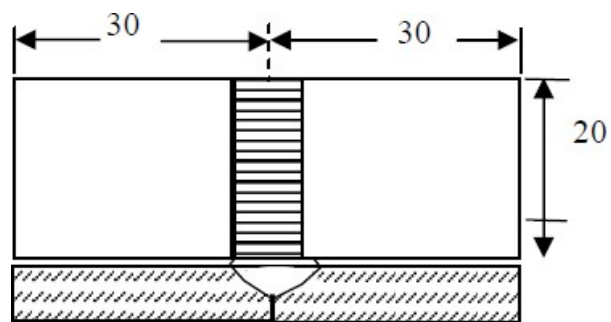
MODULE 3- FITTING SHOP.



MODULE 4 – MACHINING IN LATHE & SHAPING M/C



MODULE 5 – WELDING



CO-PO Mapping:

CO Codes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
ME 192.1	2	-	-	-	-	2	-	1	-	-	1	-
ME 192.2	2	-	-	-	-	1	-	2	-	-	-	-
ME 192.3	2	-	-	-	-	1	-	1	-	-	-	-
ME 192.4	1	-	-	-	1	3	-	3	-	-	-	1

Sessional

Paper Name: Extra Curricular Activity (NSS/ NCC)

Paper Code: XC 181

Total Contact hours: 20

Credit: 1

Course Objectives: The objectives of the course are as follows:

- To increase student awareness about the weaker and unprivileged sections of society
- To expose students to environmental issues and ecological concerns
- To make students self aware about their participatory role in sustaining society and the environment

Course contents

List of Activities:

- a) Creating awareness in social issues
- b) Participating in mass education programmes
- c) Proposal for local slum area development
- d) Waste disposal
- e) Environmental awareness
- f) Production Oriented Programmes
- g) Relief & Rehabilitation work during Natural calamities

Creating awareness in social issues:

1. Women's development – includes health, income-generation, rights awareness.
2. Hospital activities – Eg. writing letters for patients, guiding visitors
3. Old age home – visiting the aging in-mates, arranging for their entertainment.
4. Children's Homes - visiting the young in-mates, arranging for their entertainment
5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
6. Gender issues- Developing an awareness, to link it with Women's Cell of college

Participating in mass education programmes

1. Adult education
2. Children's education

Proposal for local slum area development

One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

Environmental awareness

- Resource conservation – Awareness to be developed on water, energy, soil.
- Preservation of heritage monuments- Marches, poster campaigns
- Alternative energy consciousness amongst young school-children.
- Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.

- Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes

5. Working with people and explaining and teaching improved agricultural practices

6. Rodent control and pest control practices;
7. Soil-testing, soil health care and soil conservation;
8. Assistance in repair of agricultural machinery;
9. Work for the promotion and strengthening of cooperative societies in villages;
10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
11. Popularization of small savings and
12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

- g) Assisting the authorities in distribution of rations, medicine, clothes etc.;
- h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;
- i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
- j) Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 2nd Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Group A: ECE, EE, BME, AEIE/EIE

Group B: CSE, IT, FT, ME, CE

First Year Second Semester

CURRICULUM

A. THEORY							
Sl No	Paper Code	Theory	Contact Hours /Week				Credit Points
			L	T	P	Total	
1	M 201	Mathematics -II	3	1	0	4	4
2	CH 201/ PH 201	Chemistry (Gr. B) / Physics - I(Gr. A)	3	1	0	4	4
3	EE 201/ EC 201	Basic Electrical Engineering (Gr. B) / Basic Electronics Engineering (Gr. A)	3	1	0	4	4
4	CS 201	Computer Fundamentals & Principle of Computer Programming	3	1	0	4	4
5	ME 201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
Total of Theory						20	20
B. PRACTICAL							
7	CS291	Computer Fundamentals & Principle of Computer Programming Lab	0	0	3	3	2
8	CH 291/ PH291	Chemistry Lab (Gr. B) / Physics -I Lab (Gr. A)	0	0	3	3	2
9	EE 291/ EC 291	Basic Electrical Engineering Lab (Gr. B) /Basic Electronics EngineeringLab (Gr. A)	0	0	3	3	2
10	ME 291	Engg. Drawing & Graphics(Gr B)/ Workshop Practice (Gr-A)	0	0	3	3	2
Total of Practical						12	08
C.SESSIONAL							
11	MC 281	Soft Skill Development	0	0	2	2	0

Syllabus:

Theory

Paper Name: Mathematics-II

Paper Code: M 201

Total Contact Hours: 40

Credit: 4

Prerequisite: Any introductory course on calculus.

Course Objective: The purpose of this course is to provide fundamental concepts Ordinary Differential Equations, Graph Theory and Laplace Transform.

Course outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M 201.1: Recall the distinctive characteristics of Ordinary Differential Equations, Graph Theory and Laplace Transform.

M 201.2: Understand the theoretical workings of various algorithms related to graph theory and the theorems of differential equation and Laplace transforms.

M 201.3: Apply the principles of differential equation, graph theory and Laplace transforms to solve various problems.

Course contents:

Module I: [10L]

Ordinary differential equations (First order): First order and first degree Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation, General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation), Applications related to Engineering problems.

Module II [10L]

Ordinary differential equations (Higher order): General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations, Solution of simultaneous linear differential equations, Applications related to Engineering problems.

Module III [10L]

Basic Graph Theory: Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph, Walks, Paths, Circuits, Euler Graph, Cut-sets and cut-vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph, Tree, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using Kruskal's and Prim's algorithm.

**** Extra lecture hours may be taken for this module**

Laplace Transform (LT): Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of $t f(t)$, LT of $f(t)/t$, LT of derivatives of $f(t)$, L.T. of $\int f(u) du$. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT: Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT. Applications related to Engineering problems.

Combinatorics: Fundamental Principles, Permutations, Combinations, Binomial Coefficients.

1. E. Kreyszig, Advanced engineering mathematics (8th Edition), John Wiley,1999.
2. B.S.Grewal, Higher Engineering Mathematics, Khanna Publications,2009.
3. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Narosa Pub. House,2008.

4. W. E. Boyce and R. DiPrima, Elementary Differential Equations (8th Edition), John Wiley, 2005.
5. R.K. Ghosh and K.C. Maity, An Introduction to Differential Equations, New Central Book Agency.
6. V. K. Balakrishnan, Graph Theory, Schaum's Outline, TMH.
7. J. Clark and D. A. Holton, A first course at Graph Theory, Allied Publishers LTD.
8. D. B. West, Introduction to Graph Theory, Prentice-Hall of India.
9. N. Deo, Graph Theory, Prentice-Hall of India.
10. J. Bird, Higher Engineering Mathematics (4th Edition, 1st India Reprint), Elsevier, 2006.
11. L. Rade and B. Westergen, Mathematics Handbook: for Science and Engineering (5th edition, 1st Indian Edition), Springer, 2009.
12. Murray R. Spiegel, Laplace Transform, Schaum's Outline Series, McGRAW-HILL.

[illegible]

Paper Name: Chemistry
Paper Code: CH 201
Total Contact Hours: 40
Credit: 4

Pre requisites: 10+2 science with chemistry

Course Objective

Understanding of the fundamental theories and applications of thermodynamics, electrochemical principles in modern electrochemical cells and to get an insight into electronic structure of crystals and nanomaterials. Learning about the Synthesis, properties and applications of polymers , fuels and alternative energy sources & their significance in petrochemical industries. Analyzing water quality for its various parameters & its significance in industries

Course Outcome

CH201.1: Able to apply fundamental concepts of thermodynamics in different engineering applications.

CH201.2: Able to analyze & design simple and technologically advanced electrical and energy storage devices.

CH201.3: Able to synthesize nanomaterials, composites, polymers.

CH201.4: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries , and technical fields.

CH201.5: Able to apply the knowledge of different fuels and corrosion to different industries

CH201.6: Able to analyse water quality parameter for its various parameters & its significance in industries.

Course contents

Module 1 [8L]

Chemical Thermodynamics –I

Concept of Thermodynamic system: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: Different statements, mathematical form.

Internal energy: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.

2L

Enthalpy: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.

Heat Capacity: Definition, Classification of Heat Capacity (C_p and C_V): Definition and General expression of C_p - C_V . Expression of C_p - C_V for ideal gas.

Reversible and Irreversible processes: Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P , V and T), slope of P - V curve in adiabatic and isothermal process.

Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation.

3L

2nd law of thermodynamics: Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature(brief).

Evaluation of entropy: characteristics and expression, physical significance. Work function and free energy: Definition, characteristics, physical significance, mathematical expression of ΔA and ΔG for ideal gas, standard free energy and chemical potential, Condition of spontaneity and equilibrium reaction.

3L

Module 2 [7L]

Reaction Dynamics

Reaction laws: rate and order; molecularity; zero and first order kinetics, second order kinetics (same reactant concentration), Pseudounimolecular reaction, Arrhenius equation.

3L

Mechanism and theories of reaction rates (Content beyond the syllabus)

Solid state Chemistry

Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency).

Role of silicon and germanium in the field of semiconductor, n-type, p-type semiconductor, photo voltaic cell, fabrication of integrated circuits.

4L

Module 3 [8L]

Electrochemistry

Conductance

Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte).

1L

Electrochemical cell

Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, calomel half cell (representation, cell reaction, expression of potential, Discussion, Application).

3L

Concept of battery

Battery and Commercial electrochemical cell: Dry cell, acid storage cell, alkaline storage cell, fuel cell (construction, representation, cell reaction, expression of potential, discussion, application).

2L

Corrosion and its control

Introduction, cause and effect of corrosion, types of corrosion: dry, wet and other: Electrochemical corrosion, galvanic corrosion, passivation and protective measure.

2L

Module 4 [12L]

Structure and reactivity of Organic molecule

Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations and substitution reactions.

3L

Polymers

Concepts, classifications and industrial applications. Polymer molecular weight (number avg. weight avg.: Theory and mathematical expression only), Poly dispersity index (PDI).

Polymerization processes: addition and condensation polymerization (mechanism not required), degree of polymerization, Copolymerization, stereo-regularity of polymer, crystallinity (concept of Tm) and amorphicity (Concept of Tg) of polymer.

Preparation, structure and use of some common polymers: plastic (HDPE, LDPE, PVC, PP, PMMA, Polyester, PTFE, Bakelite), rubber (natural rubber, SBR), fibre (nylon 6, nylon 6,6), Vulcanization of rubber, Conducting polymers and bio-polymers. **7L**

Nanomaterial

Basic principles of nano science and technology, classification, preparation, properties and application of nanomaterial. **2L**

Module 5 [5L]

Industrial Chemistry

Fuels

Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Proximate analysis of coal, Calorific value.

Liquid fuel: Petroleum, classification of petroleum, Refining, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Biodiesel.

Gaseous fuels: Natural gas, water gas, Coal gas, bio gas, CNG, LPG **3L**

Water

Introduction, source of water, water quality parameter, specification for drinking water (BIS and WHO standards), Chlorination of Water, Types of hardness- Units, Brief Softening methods. **2L**

Short overview of water treatment plants (Content beyond the syllabus)

Reference Books

1. Engineering Chemistry: Bandyopadhyay and Hazra
2. Physical Chemistry: P.C. Rakshit
3. Organic Chemistry: Finar, vol-1
4. Engineering Chemistry: B. Sivasankar, Tata Mc Graw Hill, 2008
5. A Text book of Engineering Chemistry: S.S. Dara, 10th Edition, S. Chand & Company Ltd., New Delhi, 2003.
6. Engineering Chemistry Simplified: S. Nandi and R. Bhattacharyya, Chayya Prakashani Pvt. Ltd.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CH201.1	3	1	-	-	-	-	-	-	-	-	-	-
CH201.2	3	2	1	-	-	-	-	-	-	-	-	-
CH201.3	-	-	2	-	2	-	-	-	-	-	-	1
CH201.4	2	-	1	-	2	-	-	-	-	-	-	-
CH201.5	2	-	-	-	-	-	2	-	-	-	-	1
CH201.6	-	-	2	-	-	-	1	-	-	-	-	-

Paper Name: Basic Electrical Engineering
Paper Code: EE 201
Total Contact Hours: 41
Credit: 4

Pre requisite: Basic 12st standard Physics and Mathematics

Course Objective:

Basic electrical engineering is an introductory course in electrical engineering. Students are introduced to simple applied electrical circuits, theories and practice to impart skill set to have visualization of electrical engineering applications. It is a course suitable for students pursuing electrical engineering as well as other related engineering disciplines.

Course Outcomes:

At the end of this course, students will able

EE 201.1: To understand and analyse basic electric and magnetic circuits.

EE 201.2: To understand and analysis the AC single phase and three phase circuit

EE 201.3: To understand and analysis of the basic principles of various electrical machines

Course Contents:

DC CIRCUITS (7L)

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source equivalence and conversion, Network Theorems-Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

MAGNETIC CIRCUITS (3L)

Concept of Magnetic circuit, B-H curve, Analogous quantities in magnetic and electric circuits, Faraday's law, iron losses, self and mutual inductance, Energy stored in magnetic field.

AC SINGLEPHASECIRCUITS (8L)

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R,L,C circuit, Combination R,L,C in AC series , parallel and series parallel circuits with phasor diagrams, impedance and admittance, Power factor, Power in AC circuit, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.

THREE PHASE CIRCUITS (3L)

Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.

DC MACHINES (6L)

Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Torque Equation ,Speed Torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control).

Computer Fundamentals & Principle of Computer Programming

Code: CS 201

Total No. of Lectures: 40

Credits: 4

Prerequisites:

1. Number system
2. Boolean Algebra

Course Objective(s)

1. To develop the programming skills of students
2. To know the principles of designing structured programs
3. To write basic C programs using
 - i) Selection statements
 - ii) Repetitive statements
 - iii) Functions
 - iv) Pointers
 - v) Arrays
 - vi) Strings

Course Outcome:

CS201.1 Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.

CS201.2 Write, Compile and Debug programs in C language and use different data types for writing the programs.

CS201.3 Design programs connecting decision structures, loops and functions.

CS201.4 Explain the difference between call by value and call by address.

CS201.5 Understand the dynamic behavior of memory by the use of pointers.

Use different data structures and create / manipulate basic data files and developing applications for real world problems.

Course content

Fundamentals of Computer: (10 L)

History of Computer, Generation of Computer, Classification of Computers 1L

Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices 2L

Binary and Allied number systems representation of signed & unsigned numbers, BCD, ASCII, Binary number Arithmetic – Addition and Subtraction (using 1's complement and 2's complement) 2L

Logic gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR - only truth tables, logic gate symbols and logic equations for gates only 1L

Assembly language, high level language, machine level language, compiler and assembler (basic concepts) 1L

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX 1L

Problem solving-Algorithm & flow chart 2L

C Fundamentals: (30 L)

Variable and Data Types:

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements 3L

C Operators & Expressions:

Arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operators, special operators - type conversion, C expressions, precedence and associativity.

Input and Output: Standard input and output, formatted output - printf, formatted input scanf, bitfields 5L

Branching and Loop Statements:

Statement and blocks, if - else, switch, goto and labels, Loops - while, for, do while, break and continue 3L

Fundamentals and Program Structures:

auto, external, static and register variables

Functions, function types, function prototypes, functions returning values, functions not returning values, scope rules, recursion, C preprocessor and macro 6L

Arrays, Strings and Pointers:

One dimensional arrays, Two-dimensional arrays, Multidimensional arrays. Passing an array to a function

Character array and string, array of strings, Passing a string to a function, String related functions

Pointers, Pointer and Array, Pointer and String, Pointer and functions, Dynamic memory allocation 6L

Files handling with C:

formatted and unformatted files, Command line arguments, fopen, fclose, fgetc, fputc, fprintf, fscanf function 4L

Structures and Unions:

Basic of structures, arrays of structures, structures and pointers, structures and functions 3L

Text book:

Kerninghan B.W. & Ritchie D.M. - The C Programming Language

Gottfried - Programming with C Schaum

Kanetkar Y. - Let us C

Balaguruswamy - Programming in C

Recommended reference Books:

Pohl and Kelly - A Book on C

Kerninghan, B.W. - The Elements of Programming Style

Schied F.S. Theory and Problems of Computers and Programming

Rajaraman V. Fundamental of Computers

M.M.Oka Computer Fundamentals,EPH

Leon Introduction to Computers,Vikas

Leon- Fundamental of Information Technology,Vikas

Ram B. Computer Fundamentals, New Age International

Ravichandran D. Programming in C, New Age International

Xavier C. Introduction to Computers, New Age International

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	PO9	PO10	PO11	PO12
CS201.1	3	3										
CS201.2		2										
CS201.3	3	3										
CS201.4												
CS201.5	3		3	3	3							

Paper Name: Engineering Thermodynamics & Fluid Mechanics
Paper Code: ME 201
Total Contact Hours: 48
Credits: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

Course Objective:

1. To understand the basic principles of thermodynamics, heat and work transfer.
2. To acquire the knowledge of basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
3. To get the knowledge of thermodynamic properties of a pure substance and inter-relationships between key properties of a system or state possessed by the substance.
4. To understand the basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

Course Outcome:

Upon successful completion of this course, the student will be able to:

ME 201.1 Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

ME 201.2 Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.

ME 201.3 Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)

ME 201.4 Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

Course content

Module 1:

8L+3T

Basic Concepts of Thermodynamics

Introduction: Microscopic and Macroscopic viewpoints

Definition of Thermodynamic systems: closed, open and isolated systems Concept of Thermodynamics state; state postulate.

Definition of properties: intensive, extensive & specific properties. Thermodynamic equilibrium

Thermodynamic processes; quasi-static, reversible & irreversible processes; Thermodynamic cycles. Zeroth law of thermodynamics. Concept of empirical temperature.

Heat and Work

Definition & units of thermodynamic work.

Examples of different forms of thermodynamic works; example of electricity flow as work. Work done during expansion of a compressible simple system

Definition of Heat; unit of Heat

Similarities & Dissimilarities between Heat & Work

Ideal Equation of State, processes; Real Gas

Definition of Ideal Gas; Ideal Gas Equations of State.

Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic & polytropic processes.

Equations of State of Real Gases: Van der Waal's equation; Virial equation of state.

Properties of Pure Substances

p-v, T-s & h-s diagrams of pure substance like H₂O

Introduction to steam table with respect to steam generation process; definition of saturation, wet & superheated status.

Definition of dryness fraction of steam, degree of superheat of steam.

Module 2:

4L+3T

1st Law of Thermodynamics

Definition of Stored Energy & Internal Energy 1st Law of Thermodynamics for cyclic processes Non Flow Energy Equation.

Flow Energy & Definition of Enthalpy.

Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation.

Module 3:

6L+3T

2nd Law of Thermodynamics

Definition of Sink, Source Reservoir of Heat.

Heat Engine, heat Pump & Refrigerator; Thermal efficiency of Heat Engines & coefficient of performance of Refrigerators

Kelvin – Planck & Clausius statements of 2nd Law of Thermodynamics Absolute or Thermodynamic scale of temperature, Clausius Integral Entropy

Entropy change calculation for ideal gas processes. Carnot Cycle & Carnot efficiency PMM-2; definition & its impossibility

Module 4:

6L+3T

Air standard Cycles for IC engines

Otto cycle; plot on P-V, T-S planes; Thermal efficiency Diesel cycle; plot on P-V, T-S planes; Thermal efficiency

Rankine cycle of steam

Chart of steam (Mollier's Chart)

Simple Rankine cycle plot on P-V, T-S, h-s planes Rankine cycle efficiency with & without pump work (Problems are to solved for each module)

Module 5:

9L+3T

Properties & Classification of Fluids

Ideal & Real fluids

Newton's law of viscosity; Newtonian and Non-Newtonian fluids

Compressible and Incompressible fluids

Fluid Statics

Pressure at a point

Measurement of Fluid Pressure

Manometers: simple & differential U-tube

Inclined tube

Fluid Kinematics

Stream line

Laminar & turbulent

flow external &

internal flow

Continuity equation

Dynamics of ideal fluids

Bernoulli's equation

Total head; Velocity head; Pressure head
Application of Bernoulli's equation**Measurement of Flow rate: Basic principles**

Venturimeter, Pilot tube, Orificemeter

(Problems are to be solved for each module)**Engineering Thermodynamics**Text:

- 1 Engineering Thermodynamics - P K Nag, 4th edn, TMH.

References:

- 1 "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylen published by WileyIndia.
- 2 Engineering Thermodynamics – Russel & Adeliyi (Indian edition), OUP
- 3 Engineering Thermodynamics – Onkar Singh, New Age International Publishers Ltd.
- 4 Basic Engineering Thermodynamics – R Joel, 5th Ed., Pearson

Fluid MechanicsText:

- 1 Fluid Mechanics and Hydraulic Machines - RBansal

References:

- 1 Introduction to Fluid Mechanics and Fluid Machines - S.K. Som and G. Biswas, 2nd edn, TMH
- 2 Fluid Mechanics by A.K. Jain.

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
ME201. 1	3	3	2	2	-	1	1	1	1	-	1	2
ME201. 2	3	3	2	2	-	1	2	-	1	-	1	2
ME201. 3	2	2	1	1	-	2	1	-	-	-	-	1
ME201. 4	3	3	2	2	-	1	1	-	-	-	1	1

Practical

Paper Name: Computer Fundamentals & Principle of Computer Programming Lab

Paper Code: CS291

Total Contact Hours: 36

Credit: 2

Prerequisites:

3. Basic Computer Knowledge

Course Objective(s):

1. To develop an understanding of the design, implementation, and compilation of a C program
2. To gain the knowledge about pointers, a fundamental for understanding data structure issues
3. To understand the usage of user defined data type for application development

Course Outcome:

CS291.1. Understanding the working of different operating systems like DOS, Windows, Linux.

CS291.2. Write, Compile and Debug programs in C language.

CS291.3. Design programs connecting decision structures, loops.

CS291.4. Exercise user defined functions to solve real time problems.

CS291.5. Inscribe C programs using Pointers to access arrays, strings, functions, structures and files.

Experiment should include but not limited to the following:

- Some basic commands of DOS, Windows and Linux Operating System, File handling and Directory structures, file permissions, creating and editing simple C program, compilation and execution of C program.
- Writing C Programs on variable, expression, operator and type-casting.
- Writing C Programs using different structures of if-else statement and switch-case statement.
- Writing C Programs demonstrating use of loop (for loop, while loop and do-while loop) concept and use of break and continue statement.
- Writing C Programs demonstrating concept of Single & Multidimensional arrays.

- Writing C Programs demonstrating concept of Function and Recursion.
- Writing C Programs demonstrating concept of Pointers, address of operator, declaring pointers and operations on pointers.
- Writing C Programs demonstrating concept of structures, union and pointer to structure.
- Writing C Programs demonstrating concept of String and command line arguments.
- Writing C Programs demonstrating concept of dynamic memory allocation.
- Writing C Programs demonstrating concept of File Programming.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO	PO9	PO10	PO11	PO12
CS291.1	3	3										
CS291.2		2										
CS291.3	3	3										
CS291.4												
CS291.5	3		3	3	3							

Paper Name: Chemistry Lab

Paper Code: CH 291

Total Contact Hours: 36

Credit: 2

Pre requisites: 10+2 science with chemistry

Course Objective

Acquiring knowledge on Standard solutions and the various reactions in homogeneous and heterogenous medium. Understanding the basic principles of pH meter and conductivity meter for different applications and analyzing water for its various parameters. Synthesis of Polymeric materials and Nanomaterials.

Course Outcome

CH291.1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CH291.2: Able to work as an individual also as a team member

CH291.3: Able to analyse different parameters of water considering environmental issues

CH291.4: Able to synthesize nano and polymer materials.

CH291.5: Capable to design innovative experiments applying the fundamentals of chemistry

Course contents

List of Experiments:

1. To Determine the alkalinity in given water sample.
2. Redox titration (estimation of iron using permanganometry)
3. To determine calcium and magnesium hardness of a given water sample separately.
4. Preparation of phenol-formaldehyde resin (Bakelite).
5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water).
7. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
8. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
9. Determination of dissolved oxygen present in a given water sample.
10. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution).

Innovative experiment:

Preparation of silver nano-particles.

Note: From the list of 10 (Ten) experiments a minimum of 7 (seven) experiments shall have to be performed by one student of which Sl. No. 4 (Preparation of Bakelite) has to be mandatory.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CH 291.1	3	2	1	1	1	1	-	-	2	-	-	-
CH 291.2	-	-	-	-	-	-	-	-	3	-	-	-
CH 291.3	-	-	-	-	-	2	3	-	-	-	-	1
CH 291.4	-	-	-	-	2	1	-	-	-	-	-	-
CH 291.5	2	-	2	-	1	-	-	-	-	-	-	1

Paper Name: Basic Electrical Engineering LAB
Paper Code: EE 291
Total Contact Hours: 36
Credit: 2

Pre requisites:

1. Basic Physics and applied physics.
2. Basic Mathematics.
3. Basic concept of Electric Circuit

Course Objective:

1. Provide knowledge for the analysis of basic electrical circuit.
2. To introduce electrical appliances, machines with their respective characteristics.

Course Outcome:

COs	CO Statement
EE 291.1	Identify common electrical components and their ratings.
EE 291.2	Make Circuit connection by wires of appropriate ratings.
EE 291.3	Understand the usage of common electrical measuring instruments
EE 291.4	Understand the basic characteristics of transformers and electrical machines

Course contents

LIST OF EXPERIMENTS

1. Characteristics of Fluorescent, Tungsten and Carbon filament lamps
2. Verification of Thevenin's and Norton's Theorem
3. Verification of Superposition Theorem
4. Calibration of Ammeter and Wattmeter
5. Study of R-L-C series circuit
6. Open circuit and short circuit test of a single phase Transformer
7. Starting, Reversing of a and speed control of D.C shunt motor
8. Test on single phase Energy Meter
9. Familiarization of PMMC and MI type Meter
10. Familiarization with house wiring practice

CO-PO mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EE 291.1	2	3		1	3				1		2	1
EE 291.2	2		2	1	3				1	1		
EE 291.3		3				3	2				2	1
EE 291.4	3						1			2	2	2

Paper Name: Engineering Drawing & Graphics
Paper Code: ME 291
Total Contact Hours: 36
Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

Course Objective:

- To learn basics of drafting and use of drafting tools.
- To know about engineering scales, dimensioning and various geometric curves.
- To Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.
- To acquire the knowledge of Computer Aided drafting using design software.

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME 291.1. Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

ME 291.2. Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

ME 291.3. Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

ME 291.4. Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

Course contents:

List of Experiments:

1. Lines, Lettering, Dimensioning, Scales (Plain scale & diagonal Scale).
2. Geometrical Construction and Curves – Construction of Polygons, Parabola, Hyperbola & ellipse
3. Projection of Points, Lines and Surfaces – orthographic projection- first angle and third angle projection, projection of lines and surfaces-Hexagon
4. Projection of Solids – (Cube, Pyramid, Prism, cylinder and Cone)
5. Sectional Views – for simple solid objects
6. Introduction to Computer Aided Drafting – using auto cad & / or similar software- Introduction to Cartesian and polar coordinate systems, absolute and relative coordinates; Basic editing commands: line, point, trace, rectangle, polygon, circle, arc, ellipse, polyline; editing methods; basic object selection methods – window and crossing window, erase, move, copy, offset, fillet, chamfer, trim, extend, mirror; display command; zoom, pan, redraw, regenerate; simple dimensioning and text, simple exercises.

CO Codes	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
ME 291.1	2	-	1	2	-	1	-	-	1	-	-	1
ME 291.2	3	-	2	2	-	1	-	-	1	1	-	1
ME 291.3	2	2	2	1	-	1	-	-	1	-	-	1
ME 291.4	1	-	2	2	2	1	-	-	1	1	-	1

SESSIONAL

Paper Name: Soft Skills Development

Paper Code: MC-281

Total Contact hours: 26

Course Objectives:

The objectives of this course are as follows:

- To expose the students to different aspects of corporate life and workplace behavior
- To introduce workplace behavioral norms, etiquettes and standards
- To equip students to face interviews, presentations and other professional interactions

MODULE	CONTENT
One	Communication Training
Two	Communication Training (Accent Neutralization)
Three	Business Etiquette
Four	CV / Resume Writing
Five	Corporate Life and Protocols
Six	Group Discussion
Seven	Leadership Skill
Eight	Team Work
Nine	Public Speaking and Interview Basics
Ten	Business Telephone Etiquette
Eleven	Reading skill

MODULE ONE – COMMUNICATION TRAINING (2L)

1. Organisational Communication and Structure.
2. Vocabulary related to Corporate Operation.
3. Modes of Communication (Telephone, Conference Call, Team Huddle, Public Relation etc.
4. Communication with Clients, Customers, Suppliers etc.
5. Verbal and Non-Verbal Communication, Proxemics and Para Language.
6. Vocabulary Building (Synonym / Antonym / One word Substitution etc.)

MODULE TWO- COMMUNICATION TRAINING (ACCENT NEUTRALISATION) (2L)

7. Mother Tongue Influence
8. Vowel Sounds and Consonantal Sounds
9. Pronunciation and Neutral Accent.
10. Intonation.
11. Rate of Speech, Pausing, Pitch Variation and Tone.

MODULE THREE – BUSINESS ETIQUETTE (2L)

12. Presenting oneself in the Business Environment.
13. Corporate Dressing and Mannerism.
14. Table Etiquette (Corporate Acculturation, Office parties, Client/Customer invitations etc.)
15. Multi Cultural Etiquette.
16. Cultural Difference.
17. E-mail Etiquette.

MODULE FOUR – JOB APPLICATION AND CV / VIDEO RESUME(2L)

- 18. Format (Chronological, Skill Oriented, Functional etc.)
- 19. Style and Appearance.
- 20. Writing Tips and Video Content Presentation tips.
- 21. Types of Cover Letter or Job Application Letter.

MODULE FIVE - INTRODUCTION TO CORPORATE LIFE AND PROTOCOLS (2L)

- 22. Introduction of Companies (Domain Specific)
- 23. Opportunities and Growth Plan.
- 24. Performance and Corporate Behaviour.
- 25. Service Level Agreement and Corporate Jargon.
- 26. Networking and Adapting to Culture, Technology and Environment.

MODULE SIX – GROUP DISCUSSION (2L)

- 27. Introduction, Definition and Purpose.
- 28. Types of Group Discussion.
- 29. Strategies and Protocols of Group Discussion.
- 30. Skills and Parameters of Evaluation.
- 31. Practice Session and Video Viewing Task.

MODULE SEVEN – LEADERSHIP SKILL (2L)

- 32. Leadership Theories.
- 33. Traits and Skills of the Leader.
- 34. Roles, Duties and Responsibilities.
- 35. Case Study of Leaders.
- 36. Interpersonal relationship with Team.

MODULE EIGHT – TEAM WORK (2L)

- 37. Concept of Team Culture.
- 38. Stages of Team Development (Forming, Storming, Norming, Performing, Adjourning)
- 39. Team Working Agreement (Participation, Decision Making, Problem Solving.
- 40. Conflict Management, Flexibility, Negotiation Skill.
- 41. Team Building (Assess, Plan, Execute and Evaluate)

MODULE NINE – PUBLIC SPEAKING AND INTERVIEW BASICS (2L)

- 42. Extempore.
- 43. JAM.
- 44. Interview Skill
- 45. Interview over Telephone, Video Conference Interview etc.

MODULE TEN – BUSINESS TELEPHONE ETIQUETTE (2L)

- 46. Five Phases of a Business Call.

47. Pitch, inflection, Courtesy and Tone.
48. Understanding, Rate of Speech, Enunciation.
49. Hold Procedure.
50. Cold and Hot Transfer protocols.
51. Dealing with Different Types of Customers (Irate, Talkative, Turnaround etc.)

MODULE ELEVEN- READING SKILL

52. Vocabulary from context, speed reading, skimming, inferring, comprehension test etc.

ASSESSMENT		
1.	Viva	10
2.	Personal Skill Enhancement Log	25
3.	Movie Making: Video Resume	25
4.	Term End Project	40

LIST OF REFERENCE:

1. Effective Communication and Soft-Skills: Strategies for Success, Nitin Bhatnagar and Mamta Bhatnagar, Pearson, 2012.
2. Soft Skills: Know yourself and know the World, Dr. K. Alex, S Chand, 2009.
3. Soft Skills at Work: Technology for Career Success, Beverly Amer, Course Technology, 2009.
4. The Pronunciation of English, Daniel Jones, Cambridge University Press, 1998.
5. Global Business Etiquette: A Guide to International Communication and Customs, Jeanette S. Martin and Lillian H. Chaney, Praeger, 2012.
6. The CV Book: Your Definitive Guide to Writing the Perfect CV, James Innes, Pearson.
7. Understanding American Business Jargon: A Dictionary, W. Davis Folsom, Greenwood Press, 2005.
8. Navigating Corporate Life, Stanley Tyo.
9. Group Discussion: A Practical Guide to Participation and Leadership, Kathryn Sue Young, Julia T. Wood, Gerald M. Phillips and Douglas J. Pedersen, Waveland Press Inc., 2007.
10. The Leadership Skills Handbook, Jo Owen, Kogan Page, 2006.
11. Teamwork Training, Sharon Boller, ASTD Press, 2005.
12. Public Speaking for Success, Dale Carnegie, Penguin, 2005.
13. Effective Interviewing Skills, Tracey A. Swift and Ivan T. Robertson, BPS Books, 2000.
14. Telephone Etiquette: Making Lasting First Impressions, Theo Gilbert-Jamison, Performance Solutions, 2013.
15. Reading Comprehension Strategies: Theories, Interventions and Technologies, Danielle S. McNamara, Lawrence Earlbaum Associates, 2007.
16. www.mindtools.com.

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 3rd Semester

Autonomy Curriculum and Syllabus of B.Tech Programme

Implemented from the Academic Year 2016

Second Year Third Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/Week	Total Credits
THEORY:			L	T	P	Total	
ES	M(CS) 301	NUMERICAL METHODS	3	0	0	3	3
BS	PH(CE) 301	PHYSICS – II	3	0	0	3	3
PC	CE 301	SURVEYING – I	2	1	0	3	3
PC	CE 302	STRENGTH OF MATERIAL	2	2	0	4	3
PC	CE 303	BUILDING MATERIAL AND CONSTRUCTION	2	1	0	3	3
PC	CE 304	ENGINEERING GEOLOGY	2	1	0	3	2
PRACTICAL:							
ES	M(CS) 391	NUMERICAL METHODS LAB	0	0	3	3	2
PC	CE 391	STRENGTH OF MATERIAL LAB	0	0	3	3	2
PC	CE 392	ENGINEERING GEOLOGY LAB	0	0	2	2	1
BS	PH(CE) 391	PHYSICS LAB	0	0	2	2	2
SESSIONAL:							
MC	MC381	TECHNICAL SKILL DEVELOPMENT	0	0	2	2	2 units
		TOTAL: ELEVEN	14	5	11	31	24

Syllabus:

Theory

Paper Name: **Numerical Methods**

Paper Code: **M(CS) 301**

Contact: 32

Credit: 3

Pre requisites: Concept of Calculus and Algebra.

Course Objective: The purpose of this course is to provide basic understanding of the derivation and the use of the numerical methods along with the knowledge of finite precision arithmetic.

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M(CS) 301.1: Recall the distinctive characteristics of various numerical techniques and the associated error measures.

M(CS) 301.2: Understand the theoretical workings of various numerical techniques and to solve the engineering problems.

M(CS) 301.3: Apply the principles of various numerical techniques to solve various problems.

Course contents:

MODULE I: NUMERICAL METHOD I

Approximation in numerical computation: Truncation and rounding errors, Propagation of errors, Fixed and floating-point arithmetic.
(2L)

Interpolation: Newton forward/backward interpolation, Stirling & Bessel's Interpolation formula, Lagrange's Interpolation, Divided difference and Newton's divided difference Interpolation.
(7L)

Numerical integration: Newton Cotes formula, Trapezoidal rule, Simpson's 1/3 rule, Weddle's Rule, Romberg Integration, Expression for corresponding error terms.
(5L)

Numerical solution of a system of linear equations: Gauss elimination method, Tridiagonal matrix algorithm, LU Factorization method, Gauss-Seidel iterative method, Successive over Relaxation (SOR) method.
(6L)

Paper Name: PHYSICS - II

Paper Code: PH(CE) 301

Total Contact Hours: 36

Credit: 3

Pre requisites: Knowledge of Physics up B.Tech. 1st year Physics-I course

Course Objective: The Physics-II course will provide

- exposure to the physics of materials that are applied in civil engineering
- an insight into the science & technology of next generation and related technicalities through quantum mechanics
- advanced materials for civil engineering
- concept of fundamental particles and associated applications in semiconductors

Course Outcome:

PH (CE) 301.1: state

- insulating and magnetic materials
- operator formalism in Quantum Mechanics
- categories of storage devices
- various types of nanostructures and their applications
- ultrasonic sound and its industrial applications
- energy band theory
- impact of defects in crystal structure
- condition of good acoustics of a building

PH (CE) 301.2: apply the knowledge of

- Magnetism and semiconductors in data storage
- Motion of charges under a field in CRT
- Band theory in explaining electron transport in solids
- Magnetostriction and piezoelectricity in ultrasonic sound generation and detection
- Reverberation principle in design of building acoustics

PH (CE) 301: analyze

- Role of degenerate states in predicting energy bands of semiconductors
- Which type of magnetic materials to be used for data storage purpose
- Role of quantum confinement in inducing novel features of a nanomaterial
- Quantum size effects and size quantization in quantum dot nanostructure

Beyond the syllabus to meet to CO:

- ✓ Basics of probability interpretation
- ✓ Failures of band theory in organic semiconductors

Course contents:

Module 1: Electric and Magnetic properties of materials (7L)

Module 1.01: Insulating materials: 3L

Dielectric Material: Concept of Polarization, the relation between **D**, **E** and **P**, Polarizability, Electronic (derivation of polarizability), Ionic, Orientation & Space charge polarization (no derivation), internal field, Clausius-Mossotti equation, ferroelectric and piezoelectrics (Qualitative study).

Module 1.02: Magnetic materials and storage devices: 4L

Magnetic Field & Magnetization M , relation between B , H , M . Bohr magneton, susceptibility, Diamagnetism- & Paramagnetism - Curie law (qualitative discussion), Ferromagnetism- Curie Temperature, Weiss molecular field theory (qualitative) & Curie-Weiss law, concept of θ_p , Hysteresis, Hard ferromagnets, Comparison and applications of permanent magnets (storage devices) and Soft ferromagnets (Permalloys, Ferrites etc.).

Module 2: Building Acoustics, Ultrasound and infrasound (6L)

: Building Acoustics: Introduction, bel, decibel-their physical significance, Reverberation, reverberation time, Sabine's formula (statement only), remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies. 2L

: Ultrasound-Introduction, definition and properties –Production of ultrasonics by Piezo-electric crystal and magnetostriction method; Detection of ultrasonics; Engineering & Medical applications of Ultrasonics (Non-destructive testing, cavitations, measurement of gauge). **Infrasound** – Introduction and definition, production, application: Seismography (concept only). 4L

Module 3: Quantum Mechanics-II (7L)

Formulation of quantum mechanics and Basic postulates- superposition principle, orthogonality of wave function, expectation value; operator correspondence, Commutator. Measurements in Quantum Mechanics-Eigen value, Eigen function, Schrödinger's equation as energy eigen value equation. 4L

Application of Schrödinger equation – Particle in an infinite square well potential (1-D and 3-D potential well; Discussion on degenerate levels), 1D finite barrier problem and concept of quantum tunnelling (solve only $E < V_0$). 3L

Module 4: Statistical Mechanics (4L)

Concept of energy levels and energy states. Microstates, Macrostates and thermodynamic probability, MB, BE, FD, statistics (Qualitative discussions)- physical significance, conception of bosons, fermions, classical limits of quantum statistics, Fermi distribution at zero & non-zero temperature, Concept of Fermi level. 4L

Module 5: Solid state physics (8L)

: Introduction to Band theory (mention qualitatively improvement over free electron theory)- Kronig-Penny model (qualitative treatment)-Energy-band ($E-k$) diagram, formation of allowed and forbidden energy bands, Concept of effective mass – electrons and holes, crystal momentum. 3L

: Defects: Point defects; line defects; Dislocations, Types of dislocations, Planar defects, stacking faults, twins, grain boundaries, defect propagation (qualitative). 3L

: Vibration in solids: Lattice vibrations – Mono and diatomic lattice, concept of phonon, specific heat of solids-Dulong-Petit law, Einstein, Debye theory (qualitative discussion). 2L

Module 6: Physics of Nanomaterials (3L)

Reduction of dimensionality, properties of nanomaterials, Quantum wells (two dimensional), Quantum wires (one dimensional), Quantum dots (zero dimensional); Quantum size effect

3L

[illegible]

Paper Name: SURVEYING - I

Paper Code: CE 301

Total Contact Hours: 36

Credit: 3

Pre requisites: Student should have knowledge about measurement and mathematical knowledge

Course Objective: The objective of this course is appreciate of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment and also have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in surveying.

Course Outcome:

CE 301.1	Students will summarize surveying techniques that will remain correct for long period of time.
CE 301.2	Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.
CE301.3	Students will learn about Area & Volume calculation.
CE301.4	Students will evaluate about Trigonometrically leveling.
CE301.5	Students will analyze about simple & complex problems of different instrument methods of Survey.

Course contents: SURVEYING -I

CONTACTS : 2L+1T=3HRS

CREDITS :3

TOTAL: 36 HRS

Module-1: [1L]

Introduction: Definition, classification of surveying, objectives, history of surveying, modern trends in surveying, principles of surveying

Module-2: [5L+3T]

Chain surveying: Chain and its types, optical square, cross staff. Reconnaissance and site location, locating ground features by offsets – field book. Chaining for obtaining the outline of structures, methods for overcoming obstacles, conventional symbols, plotting chain survey and computation of areas, errors in chain surveying and their elimination problems. Triangulation and Traversing. [5L+3T]

Module-3: [5L+3T]

Compass surveying: Types of compasses, use and adjustments, bearings, local attraction and its adjustments. Chain and compass surveying of an area, booking and plotting. Adjustments of traverse, errors in compass surveying and precautions - problems. [5L+3T]

Module-4 : [2L+2T]

Plane table surveying: Equipment, leveling, orientation, different methods of survey, two and three point problems, errors and precautions. [2L+2T]

Module-5 : [6L+2T]

Levelling: Introduction, basic definitions, levelling instruments and their features, temporary adjustment of levels, sensitiveness of bubble tube. Methods of levelling – differential, profile & fly levelling, cross sectional and reciprocal levelling. Effect of curvature and refraction, reducing errors and eliminating mistakes in levelling. Permanent adjustments of dumpy level. Modern levels –Tilting level, Automatic levels, precise levels. Plotting longitudinal sections and cross sections. Measurement of area and volume. Trigonometrical Levelling [6L+2T]

Module-6 : [3L+1T]

Contouring: Topographic map, characteristics of contour, contour interval. Methods of locating contours, Interpolation of contours. [3L+1T]

Module-7 : [2L+1T]

Minor Instruments: Clinometers, Planimeter (mechanical and digital)

Text / Reference Books:

Sl No	Title	Author
1	Surveying:- Vol - I & II	B.C. Punmia
2	Surveying & Leveling	R. Subramanian (OXFORD)
3	Surveying& Leveling Vol - I [Part I & II]	T.P.Kanetkar & Kulkarni
4	Surveying:- Vol - I & II	S.K. Duggal
5	Fundamental of Engineering Survey	J.K. Ghosh (Studium Press, Roorkee)
6	Higher Surveying	Dr. A. M. Chandra
7	Surveying	R.B. Gupta & B.K. Gupta
9	Plane and Geodetic Surveying (Vol - I & II)	David Clark
10	Fundamental of Surveying	S. K. Roy
11	Surveying	Saikia & Das (PHI)

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE301.1	3	3	3	2	3	1	1	1	3	3	3	3
CE301.2	3	3	3	2	2	2	1	1	3	2	3	2
CE301.3	-	-	-	-	-	-	-	-	-	-	-	-
CE301.4	3	3	3	3	2	2	1	1	3	2	2	2
CE301.5	3	3	3	3	2	1	1	1	3	2	1	2
CE301	3	3	3	2.5	2.25	1.5	1	1	3	2.25	2.25	2.25

Paper Name: STRENGTH OF MATERIAL

Paper Code: CE 302

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have the knowledge about Elements of Civil Engineering & Mechanics.

Course Objective: The objective of this course is elaborate on the knowledge of engineering mechanics (statics) and to teach the students the purpose of studying strength of materials with respect to civil engineering design and analysis. The course introduces the students to the concepts of engineering mechanics of materials and the behavior of the materials and structures under applied loads.

Course Outcome:

CE 302.1	Interpret the concepts of stress and strain at a point as well as the stress-strain relationships for homogenous, isotropic materials.
CE 302.2	Analyze the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
CE 302.3	Demonstrate the capability to conduct experiments, as well as to analyze and interpret data
CE 302.4	Ability to classify a component to meet desired needs within realistic constraints of safety.

Course contents: STRNGTH OF MATERIALS

CONTACTS: 2L+2T=4HRS

CREDITS: 3

TOTAL: 42 HRS

Module-1: [5L+4T]

Review of Basic Concepts of Stress and Strain: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Bulk Modulus; Factor of safety. Beam Statics: Support reactions, concepts of redundancy, axial force, shear force and bending moment diagrams for concentrated, uniformly distributed, linearly varying load, concentrated moments in simply supported beams, cantilever and overhanging beams[5L+4T]

Module-2: [6L+7T]

Symmetric Beam Bending: Basic kinematic assumption, moment of inertia, elastic flexure formulae and its application, Bending and shear stress for regular sections, shear centre, centre of gravity[3L+4T]

Deflection of statically determinate beams: Fundamental concepts: Elastic curve, moment Curvature relationship, governing differential equation, boundary conditions: Direct integration solution [3L+3T]

Module-3: [5L+5T]

Analysis of determinate plane trusses: Concepts of redundancy, Analysis by method of joints, Method of sections. [3L+2T]

Two Dimensional Stress Problems: Principal stresses, maximum shear stresses, Mohr's circle of stresses, construction of Mohr's circle, applications. [2L+3T]

Module-4: [5L+5T]

Introduction to thin cylindrical & spherical shells: Hoop stress and meridional - stress and volumetric changes. [2L+2T]

Torsion: Pure torsion, torsion of circular solid shaft and hollow shafts, torsional equation, torsional rigidity, closed coil helical; springs [1L+1T]

Columns: Fundamentals, criteria for stability in equilibrium, column buckling theory, Euler's load for columns with different end conditions, limitations of Euler's theory – problems, eccentric load and secant formulae. [2L+2T]

Text / Reference Books:

SI No	Name	Author	Publisher
1	Elements of Strength of Material	S. P. Timoshenko & D. H.	EWP Pvt. Ltd
2	Engineering Mechanics of Solids	E. P. Popov	Pearson Education
3	Strength of Materials	R. Subramanian	OXFORD University Press
4	Strength of Material	S S Bhavikatti	Vikas Publishing House Pvt. Ltd
5	Engineering Mechanics I by	J. L. Mariam	John Willey
6	Engineering Mechanics	I. H. Shames	PHI
7	Fundamentals of Strength of Material	Nag & Chandra	WIE

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE302.1	3	3	3	3	-	-	-	-	-	1	-	2
CE302.2	3	3	3	2	1	-	-	-	-	1	-	3
CE302.3	2	3	3	3	1	1	-	-	1	1	1	2
CE302.4	3	2	3	3	1	-	2	-	-	-	-	1
CE302	2.75	2.75	3	2.75	1	1	2	-	1	1	1	2

Paper Name: BUILDING MATERIAL AND CONSTRUCTION

Paper Code: CE 303

Total Contact Hours: 36

Credit: 3

Pre requisites: No Pre Requisite required (NPR)

Course Objective: The objective of this course is know the student about the basic building materials, properties and their applications., to know the smart building materials, external paints and their uses,to understand different types of masonries and their applications

Course Outcome:

CE 303.1	Students will summaries basic knowledge about various kind of materials used in construction work.
CE 303.2	Students will differentiate about different types of building foundation i.e. shallow and deep foundation, their mechanisms and uses.
CE 303.3	summaries knowledge about various structural members of a building like-walls, door, window, stair, flooring, roof etc.
CE 303.4	Extend to apply their knowledge at the time of decision making for application of structural member including material used.

Course contents: BUILDING MATERIAL AND CONSTRUCTION

CONTACTS: 2L+1T =3HRS

CREDITS: 3

TOTAL: 42 HRS

Module-1: [7L+4T]

Bricks: Classification, Characteristics of good bricks, Ingredients of good brick earth, Harmful substance in brick Earth, Different forms of bricks, testing of bricks as per BIS. Defects of bricks. Fly ash bricks [2L+1T]

Aggregates: Classification, Characteristics, Deleterious substances, Soundness, Alkali – aggregates reaction, Fine aggregates, coarse aggregates, testing of aggregates [2L+1T]

Lime: Impurities in limestone, Classification, Slaking and hydration, Hardening, Testing, Storage, Handling [1L+1T]

Cement: OPC: Composition, PPC, Slag cement, Hydration, setting time **Concrete:** Types, ingredients, W/C ratio, Workability, Different grades in cement concrete, Tests on cement concrete [2L+1T]

Module -2: [8L+3T]

Mortars: Classification, Uses, Characteristics of good mortar, Ingredients. Cement mortar, Lime mortar, Lime cement mortar, special mortars [2L+1T]

Wood and Wood Products: Classification of Timber, Structure, Characteristics of good timber, Seasoning of timber, Defects in Timber, Diseases of timber, Decay of Timber,

Preservation of Timber Testing of Timber, Veneers , Plywood, Fibre Boards, Particle Boards, Chip Boards , Black Boards, Button Board and Laminated Boards, Applications of wood and wood products [2L+1T]

Paints, Enamels and Varnishes: Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood, surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish [2L]

Miscellaneous Materials: Gypsum: Classification, Plaster of Paris, Heat and sound insulating materials, Geo-synthetics [2L+1T]

Module -3: [6L+4T]

Foundations: Function of Foundations, Essential requirement of good foundation, Different types of shallow and deep Foundations. Uses of Spread foundation, pile and well foundation [2L+2T]

Brick masonry: Definitions, Rules for bonding, Type of bonds – stretcher bond, Header bond, English bond, Flemish Bond, Comparison of English Bond and Flemish Bond (one and one and half brick thick wall). Cavity wall [2L+1T]

Wall, Doors and Windows: Load bearing wall, Partition wall, Reinforced brick wall Common types of doors and windows of timber and metal [2L+1T]

Module -4[9L+5T]

Stairs: Technical Terms, Requirements of good stair, Dimension of steps, Classification, Geometric design of a dog legged stair case, Elevation and cross section of different type of stair cases.[2L+2T]

Flooring: Components of a floor, selection of flooring materials, Brick flooring, Cement concrete flooring, mosaic, marble, Terrazzo flooring, Tiled roofing [3L+1T]

Plastering and Pointing: Plastering with cement mortar, Defects in plastering, pointing, white washing, colour washing, Distempering [2L+1T]

Roofs: Types, Pitched roofs and their sketches, Lean – to roof, coupled and collared roofs, King Post – Truss, Queen post truss and Simple steel Truss , Roof Covering materials: AC sheets GI sheet [2L+1T]

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Building Materials	S.K. Duggal	
2	Building Materials	P.C. Varghese	PHI
3	Engineering Materials	S.C. Rangwala	
4	Concrete Technology	M. S. Shetty	
5	Concrete Technology[	A.M. Neville & J.J. Brooks	Pearson Education
6	Building Construction		
7	Building Construction and Foundation Engineering		

CO-PO mapping

[illegible]

Paper Name: ENGINEERING GEOLOGY

Paper Code: CE 304

Total Contact Hours: 36

Credit: 2

Pre requisites: Basic knowledge of Geography & Earth Science

Course Objective: The objective of the course to

To make the students knowledgeable to understand , apply and explore Geological parameters, Rock and other materials and activity related to earth science.

Course Outcome:

CE304.1	Students will have knowledge about Engineering properties of Rocks and their Minerals.
CE304.2	Student will be appraised about Dam, reservoir, tunnel
CE304.3	Student will understand about Earthquake phenomena.
CE304.4	Student will be able to carry out Physical exploration
CE304.5	Student will be able to estimate various geological parameters by use of modern tools & techniques

Course contents: ENGINEERING GEOLOGY

PAPER CODE :CE304

CONTACTS : 2L +1T =3HRS

CREDITS

:2 TOTAL: 36 HRS

Module-1: [2L]

Geology and its importance in Civil Engineering [2L]

Module-2: [2L+1T]

Mineralogy: Definition, internal and external structure of minerals, Classification and physical properties of minerals. [2L+1T]

Module-3: [2L+2T]

Classification of rocks:

- a) Igneous rocks: Origin, mode of occurrence, forms & texture, classification and engineering importance.
- b) Sedimentary rocks: Process of sedimentation, classification and engineering importance.
- c) Metamorphic rocks: Agents and types of metamorphism, classification and engineering importance.[2L+2T]

Module-4: [1L+1T]

Weathering of rocks: Agents and kinds of weathering, soil formation & classification based on origin. [1L+1T]

Module-5:[1L]

Geological work of rivers: Origin and stages in the system, erosion, transportation and deposition.[1L]

Module-6: [3L+1T]

Structural geology: Introduction to structural elements of rocks, dip & strike, definition, description, classification of folds, faults and joints, importance of geological structures in Civil Engineering. [3L+1T]

Module-7: [2L+1T]

Earthquakes and seismic hazards: Causes and effects, seismic waves and seismographs, Mercalli's intensity scale and Richter's scale of magnitude [2L+1T]

Module-8: [2L+1T]

Engineering properties of rocks: Porosity, permeability, compressive strength, tensile strength and abrasive resistance [2L+1T]

Module-9: [2L+1T]

Rocks as construction materials: Qualities required for building and ornamental stones, foundations, concrete aggregate, railway ballast, road metal, pavement, flooring and roofing [2L+1T]

Module-10: [3L+1T]

Geophysical exploration: Methods of Geophysical Exploration, electrical resistivity method field procedure –sounding and profiling, electrode configuration, interpretation of resistivity data. Geophysical surveys in ground water and other Civil Engg. Projects. [3L+1T]

Module-11: [2L+2T]

Applied Geology: Surface and subsurface geological and geophysical investigations in major Civil Engg. Projects. Geological studies of Dams and reservoir sites, Geological studies for selection of tunnels and underground excavations. [2L+2T]

Module-12: [2L+1T]

Landslides: Types of landslides, causes, effects and prevention of landslides [2L+1T]

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Engineering and General Geology	Parvin Singh	Katson publishing house Delhi 1987
2	Engineering Geology for Civil Engineers	D. Venkat Reddy	Oxford, IBH, 1995.
3	Principles of petrology	Tyrell	Asia, Bombay
4	Structural Geology	Marland P. Billings	Wiley eastern Prentice-Hall, U.S.A.
5	Ground Water hydrology	Todd D.K.	John Wiley & Sons, Second edition, 1980.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE304.1	3	2	1	2	1	-	1	1	1	1	1	2
CE304.2	3	2	1	2	1	-	1	1	1	1	1	2
CE304.3	3	2	2	2	2	1	1	1	1	1	1	-
CE304.4	3	3	3	3	3	-	-	1	-	2	1	1
CE304.5	3	2	1	3	3	2	1	1	2	2	1	2
CE304	3	2.2	1.6	2.4	2	1.5	1	1	1.25	1.4	1	1.75

Practical

Paper Name: NUMERICAL METHODS LAB

Paper Code: M(CS) 391

Total Contact Hours: 36

Credit: 2

Pre requisites: Basics of procedural programming (C/C++).

Course Objective:

1. To introduce the fundamentals of numerical methods used for the solution of engineering problems.
2. To improve the computer skills of the students.

Course Outcome:

M(CE)391.1: To understand numerical methods and how they apply to computer engineering.

M(CE)391.2: To apply the knowledge of these methods to solve practical problems.

M(CE)391.3: Be competent with loss of significant digits in numerical calculations.

M(CE)391.4: Master using the bisection method, Newton's method, and the secant method in single variable root finding.

Course contents:

1. Assignments on Newton forward /backward, Lagrange's interpolation.
2. Assignments on numerical integration using Trapezoidal rule, Simpson's 1/3 rule, Weddle's rule.
3. Assignments on numerical solution of a system of linear equations using Gauss elimination, Gauss Jacobi and Gauss-Seidel iterations.
4. Assignments on numerical solution of Algebraic Equation by Bisection method, Regula-Falsi method, Newton-Raphson method.
5. Assignments on ordinary differential equation: Euler's method, Euler's modified method, Runge-Kutta methods.
6. Simple problems as assignment on Measures of Central Tendency- mean, median, mode, Measures of Dispersion- variance, standard deviation. Problems related to engineering field.

Implementation of numerical methods on computer through C/C++ and commercial Software Packages: Matlab / Scilab / Labview / Mathematica/NAG ([Numerical Algorithms Group](#)/Python).

Text Books:

1. Shishir Gupta & S. Dey, Numerical Methods, TMH
2. C. Xavier: C Language and Numerical Methods.
3. Jain, Iyengar, & Jain: Numerical Methods (Problems and Solution).
4. Pal and Das: Discrete Mathematics, U N Dhur and Sons.
5. D. S. Sancheti & V. K. Kapoor : Statistics Theory , Method & Application, Sultan chand & sons , Newdelhi

Reference Books:

1. Balagurusamy: Numerical Methods, Scitech.
2. Baburam: Numerical Methods, Pearson Education.
3. N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
4. Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M(CE)391.1:	3	2	-	-	2	-	-	-	-	-	-	-
M(CE)391.2:	2	3	2	-	3	-	-	-	-	-	-	3
M(CE)391.3:	-	3	1	2	-	-	-	-	-	-	-	-
M(CE)391.4:	-	2	3	3	-	-	-	-	-	-	-	-
M(CE)391	2.5	2.5	2	2.5	2.5	-	-	-	-	-	-	3

Paper Name: STRENGTH OF MATERIAL LAB

Paper Code: CE 391

Total Contact Hours: 36

Credit: 2

Pre requisites: Student should have the knowledge about strength of materials theory.

Course Objective: This course provides students opportunities to become familiar with standard mechanical testing methods and fundamental properties of engineering materials, and to develop report writing proficiency

Course Outcome:

CE 391.1	Measure tensile and compressive strength of a specimen for applying in a practical design based project work
CE391.2	Determine hardness, impact strength, fatigue strength to analyze the application of a specific material for a given design requirements for different loading conditions of structures.
CE391.3	Observe bending in beams and calculate the bending stresses which further builds the foundation of using modern analysis softwares.
CE391.4	Judge the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.

Course contents: STRENGTH OF MATERIAL LAB

CONTACTS: 3P=3HRS

CREDITS: 2

Tension test on Structural Materials: Mild Steel and Tor steel (HYSD bars)

Compression Test on Structural Materials: Timber, bricks and concrete cubes

Bending Test on Mild Steel/Tor Steel

Torsion Test on Mild Steel Circular Bar

Hardness Tests on Ferrous and Non-Ferrous Metals: Brinnel and Rockwell Tests

Impact Test: Izod and Charpy

Text / Reference Books:

- Soil testing by T.W. Lamb (JohnWilley)
- SP-36 (Part-I & Part –II)
- Soil Mechanics Laboratory Manual by B. M. Das, OXFORD UNIVERSITY PRESS
- Measurement of engineering properties of soil by E.Jaibaba Reddy & K. Ramasastry

CO Codes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE391.1	1	-	3	-	-	-	-	-	3	-	2	-
CE391.2	1	-	2	-	-	-	-	-	2	-	2	-
CE391.3	1	-	2	-	3	1	-	1	2	-	2	-
CE391.4	1	2	3	-	-	-	-	-	2	-	2	-

Paper Name: ENGINEERING GEOLOGY LAB

Paper Code: CE 392

Total Contact Hours: 24

Credit: 1

Pre requisites: Student should have the knowledge about Engineering geology theory.

Course Objective:

To make the students capable to identify and study properties of rock and minerals . They also should be able to use modern tools linemicroscope.

Course Outcome:

CE392.1	Student should acquire knowledge about engg. properties of rocks and their minerals.
CE392.2	Student should be able to identify rocks and minerals
CE392.3	Student should be able to use modern tools live microscope to explore samples.
CE392.4	Student should be able to interpret map.

Course contents: ENGINEERING GEOLOGY LAB

PAPER CODE :CE 392

CONTACTS :3P=3HRS

CREDITS:2

Identification of Rocks and Minerals [Hand Specimens]

Identification of Rocks and Minerals [Hand Specimens]

Study of Geological maps, interpretation of geological structures

Thickness problems, Borehole problems

Text / Reference Books:

Sl no	Name	Author	Publisher
1	Engineering and General Geology	Parvin Singh	Katson publishing house Delhi 1987
2	Engineering Geology for Civil Engineers	D. Venkat Reddy	Oxford, IBH, 1995.
3	Principles of petrology	Tyrell	Asia, Bombay
4	Structural Geology	Marland P. Billings	Wiley eastern Prentice-Hall, U.S.A.
5	Ground Water hydrology	Todd D.K.	John Wiley & Sons, Second edition,1980.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE392.1	3	2	1	2	1	-	1	1	1	1	1	1
CE392.2	3	2	2	3	2	1	2	-	1	1	-	1
CE392.3	2	2	1	3	3	2	-	1	1	1	1	1
CE392.4	2	2	2	1	1	3	1	1	-	1	-	1
CE392	2.5	2	1.5	2.25	1.75	2	1.33	1	1	1	1	1

Paper Name: PHYSICS LAB

Paper Code: PH(CE)391

Total Contact Hours: 24

Credit: 2

Pre requisites: Knowledge of Physics upto B. Tech. 1st year Physics-I course

Course Objective:

The Physics-II course will provide

- exposure to the physics of materials that are applied in civilengineering
- an insight into the science & technology of next generation and related technicalities through quantummechanics
- advanced materials for civilengineering
- concept of fundamental particles and associated applications in semiconductors

Course Outcome: At the end of the course students would be able to

PH(CE)391.1:demonstrate

- ✓ Dipolar magneticbehaviour
- ✓ Action ofcapacitors
- ✓ Fermi levels and band gap in asemiconductor
- ✓ Function of Light emittingdiode
- ✓ Magnetic and semiconductor storagedevices
- ✓ Motion of electron under cross fields

PH(CE)391.2:conduct experiments using

- Insulators, Semiconductors (extrinsic and intrinsic), Light emittingdiodes
- Cathode rayoscilloscope
- Various types of magneticmaterials
- Determination of velocity of ultrasonic wave using piezoelectriccrystal

PH(CE)391.3:Function effectively as an individual, and as a member or leader in laboratory sessions

PH(CE)391.4: communicate effectively, write reports and make effective presentationusing available technology

- on presentation of laboratory experimentreports
- on presentation of innovativeexperiments

Course contents: Course Content

***At least 7 experiments to be performed during the semester**

Experiments onModule 1: Electric and Magnetic properties of materials (7L)

1. Study of dipolar magnetic fieldbehavior.
2. Study of hysteresis curve of a ferromagnetic material usingCRO.
3. Use of paramagnetic resonance and determination of Lande-g factor using ESRsetup.
4. Measurement of Curie temperature of the given sample.
5. Determination of dielectric constant of given sample (frequency dependent)/Measurement of losses in a dielectric using LCRcircuits.

Experiments on Module 2: Building Acoustics, Ultrasound and infrasound (6L)

6. Determination of velocity of ultrasonic wave using piezoelectric crystal.

Experiments on Module 3: Quantum Mechanics-II (7L)

7. Determination of Stefan's radiation constant.
8. To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells & measurement of maximum workable power.
9. Measurement of specific charge of electron using CRT.

Experiments on Module 5: Solid state physics (8L)

10. Study of lattice dynamics.
11. Determination of band gap of a semiconductor.
12. Determination of Hall co-efficient of a semiconductor and measurement of Magneto resistance of a given semiconductor

****In addition to regular 7 experiments it is **recommended** that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.**

Probable experiments beyond the syllabus:

1. Determination of thermal conductivity of a bad conductor by Lees and Chorlton's method.
2. Determination of thermal conductivity of a good conductor by Searle's method.
3. Study of I-V characteristics of a LED.
4. Study of I-V characteristics of a LDR
5. Study of transducer property: Determination of the thermo-electric power at a certain temperature of the given thermocouple.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH (CE) 391.1	3	2	-	-	-	-	-	-	-	-	-	1
PH (CE) 391.2	1	2	-	3	-	-	-	-	-	-	-	1
PH (CE) 391.3	1	2	-	-	-	-	-	-	3	-	-	1
PH (CE) 391.4	1	2	-	-	-	-	-	-	-	3	-	1
PH (CE) 391	1.5	2	-	3	-	-	-	-	3	3	-	1

SESSIONAL

Paper Name: TECHNICAL SKILL DEVELOPMENT

Paper Code: MC381

Total Contact Hours: 24

Credit: 2

Pre requisites: Student should have knowledge about basic of civil engineering, drawing etc

Course Objective: Graduates of the program will be capable of operating effectively in a professional environment by demonstrating technical communication skills, the ability to procure work, the ability to interact effectively with construction professionals, and an understanding of both ethical issues in Civil engineering.

Course Outcome:

MC381. 1	Student will be able to analyze critical and reflective thinking abilities in different domain of civil engineering
MC381. 2	Student will be able to organize responsible decision-making and personal accountability
MC381. 3	Student will be able to discover ability to work effectively with those different from themselves
MC381. 4	Student will be able to interpret a commitment to social justice in different civil engineering domain.

Course contents: TECHNICAL SKILL DEVELOPMENT

CONTACTS: 2P=2HRS

CREDITS:2

Basic Building Plan

Basic Foundation Details of Building

Basic Quantity Survey for Civil Construction Site

Details of Different Project nature in Laboratories.

Details of Observation of Live Project in Survey Lab

Details of Basic Materials for constructions.

Industrial visit

Seven segment LED/LCD Display

Text / Reference Books:1.

1. Building Materials by S.K.Duggal

2. Foundation Analysis & Design by J.E. Bowels from McGrawHill

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC381.1	2	1	-	-	-	2	-	-	-	-	-	-
MC381.2	1	2	-	-	-	3	-	2	2	1	-	2
MC381.3	-	1	1	-	-	2	-	2	2	2	1	-
MC381.4	-	2	-	-	-	3	1	3	2	2	-	2
MC381	1.5	1.5	1	-	-	2.5	1	2.33	2	1.67	1	2

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 4th Semester

Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016

Second Year Fourth Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/Week	Credits
THEORY:			L	T	P	Total	Total
HS	HU401	ENVIRONMENTAL SCIENCE	2	0	0	2	2
BS	M401	MATHEMATICS - III	3	1	0	4	4
PC	CE 401	SURVEYING - II	2	2	0	4	3
PC	CE 402	STRUCTURAL ANALYSIS - I	3	1	0	4	3
PC	CE 403	CONCRETE TECHNOLOGY	3	1	0	4	3
PC	CE 404	SOIL MECHANICS	3	1	0	4	3
PRACTICAL:							
PC	CE 491	SURVEYING PRACTICE – I	0	0	3	3	2
PC	CE 492	BUILDING PLANNING AND DRAWING	0	0	3	3	2
PC	CE 493	CONCRETE LAB	0	0	3	3	2
HS	HU481	TECHNICAL REPORT WRITING & LANGUAGE PRACTICE	0	0	2	2	1
		TOTAL: NINE	16	6	11	33	25

Syllabus:

Theory

Paper Name: ENVIRONMENTAL SCIENCE

Paper Code: HU401

Total Contact Hours: 24

Credit: 2

Pre requisites: qualified B.Tech 1st year

Course Objective(s)

- Be able to understand the natural environment and its relationships with human activities.
- Be able to apply the fundamental knowledge of science and engineering to assess environmental and health risk.
- Be able to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues.
- Be able to solve scientific problem-solving related to air, water, noise & land pollution.

Outcome(s)

- To understand the natural environment and its relationships with human activities.
- To apply the fundamental knowledge of science and engineering to assess environmental and health risk.
- To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
- Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

Course Content:

1. General

6L

Natural Resources: Forest Resource, water resource, mineral resource, energy resources: alternative source of energy

Population Growth: Exponential Growth, logistic growth, Maximum sustainable yield, demography

Disaster Management: Types of disasters (Natural & Man-made), Floods, Earthquake, Tsunamis, Cyclones, landslides (cause, effect & control)

Ecology & Ecosystem: Elements of ecology, definition of ecosystem- components types and function, Food chain & Foodweb,
Structure and function of the following ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems

Environmental Management: Environmental impact assessment, Environmental laws and protection act of India(The Environment protection Act, Air pollution Act, Water Act, Wildlife Protection Act) , Hazardous waste(management and Handling)Rules.

2. Air pollution and control

7L

Sources of Pollutants: point sources, nonpoint sources and manmade sources
primary & secondary pollutant

Types of air pollutants: primary & secondary pollutant ; Suspended particulate matter, oxides of carbon, oxides of nitrogen, oxides of sulphur, particulate, PAN, Smog (Photochemical smog and London smog),

Effects on human health & climate: Greenhouse effect, Global Warming, Acid rain, Ozone Layer Depletion

Air pollution and meteorology: Ambient Lapse Rate, Adiabatic Lapse Rate, Atmospheric stability & Temperature inversion

control of air pollution (ESP, cyclone separator, bag house, catalytic converter, scrubber (ventury)),

3. Water Pollution

7L

Classification of water (Ground & surface water)

Pollutants of water, their origin and effects: Oxygen demanding wastes, pathogens, nutrients, Salts, heavy metals, pesticides, volatile organic compounds.

Surface water quality parameters: pH, DO, 5 day BOD test, BOD reaction rate constants, COD. Numerical related to BOD

Lake: Eutrophication [Definition, source and effect].

Ground water: Aquifers, hydraulic gradient, ground water flow (Definition only), ground water pollution (Arsenic & Fluoride; sources, effects, control)

Quality of Boiler fed water: DO, hardness, alkalinity, TDS and Chloride

3.7 Layout of waste water treatment plant (scheme only).

4. Land Pollution

2L

Types of Solid Waste: Municipal, industrial, commercial, agricultural, domestic, hazardous solid wastes (bio-medical), E-waste

Solid waste disposal method: Open dumping, Land filling, incineration, composting, recycling (Advantages and disadvantages).

Waste management: waste classification, waste segregation, treatment & disposal

5. Noise Pollution

2L

Definition of noise, effect of noise pollution on human health,

Average Noise level of some common noise sources

Definition of noise frequency, noise pressure, noise intensity, noise threshold limit value, equivalent noise level, L_{10} (18 hr Index) .

Noise pollution control.

Text Books

1. A Textbook of Environmental Studies, Shashi Chawla. Tata McGraw Hill Education Private Limited

References/Books

1. Environmental Studies, Dr. J P Sharma, University Science Press
2. Environmental Engineering, J K Das Mohapatra, Vikas Publication

CO- PO Mapping

CO	Statement	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	Able to understand the natural environment and its relationships with human activities	2	2	3	-	-	2	3	3	-	-	1	2
2	The ability to apply the fundamental knowledge of science and engineering to assess environmental and health risk	3	3	3	1	1	2	3	3	-	-	1	2
3	Ability to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues	3	3	3	2	1	2	3	3	-	-	1	2
4	Acquire skills for scientific problem-solving related to air, water, noise & land pollution.	1	1	1	1	2	2	3	3	-	-	1	2
CH 401(AVERAGE)		2	2	2	1	1	2	3	3	-	-	1	2

Paper Name: MATHEMATICS - III

Paper Code: M 401

Total Contact Hours: 42

Credit:4

Pre requisites: Any introductory course on Calculus and Combinatorics.

Course Objective:

The purpose of this course is to provide fundamental concepts of Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equation, Partial Differential Equations.

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M 401.1: Recall the distinctive characteristics of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equation, Partial Differential Equations.

M 401.2: Understand the theoretical workings of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, and Partial Differential Equations to evaluate the various measures in related field.

M 401.3: Apply various principles of Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, Partial Differential Equations to solve various problems.

Course contents:

MODULE I:

Fourier Series and Fourier Transform:

Sub-Topics: Introduction, Periodic functions: Properties, Even & Odd functions: Properties, Special wave forms: Square wave, Half wave Rectifier, Full wave Rectifier, Saw-toothed wave, Triangular wave. Euler's Formulae for Fourier Series, Fourier Series for functions of period 2π , Fourier Series for functions of period T , Dirichlet's conditions, Sum of Fourier series. Examples. Theorem for the convergence of Fourier Series (statement only). Fourier Series of a function with its periodic extension. Half Range Fourier Series: Construction of Half range Sine Series, Construction of Half range Cosine Series. Parseval's identity (statement only). Examples.

Fourier Transform:

Sub-Topics: Fourier Integral Theorem (statement only), Fourier Transform of a function, Fourier Sine and Cosine Integral Theorem (statement only), Fourier Cosine & Sine Transforms. Fourier, Fourier Cosine & Sine Transforms of elementary functions. Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation. Examples. Fourier Transform of Derivatives. Examples. Convolution Theorem (statement only), Inverse of Fourier Transform, Examples.

Discussions on application of the topic related to CE

10L

MODULE II:

Probability Distributions: Definition of random variable. Continuous and discrete random variables. Probability density function & probability mass function for single variable only. Distribution function and its properties (without proof). Examples. Definitions of Expectation & Variance, properties & examples. Some important discrete distributions: Binomial, Poisson. Continuous distributions: Normal. Determination of Mean, Variance and standard deviation of the distributions. Correlation & Regression analysis, Least Square method, Curve fitting.

Discussions on application of the topic related to CE

10L

MODULE III:

Calculus of Complex Variable

Introduction to Functions of a Complex Variable, Concept of Limit, Continuity and Differentiability. Analytic functions, Cauchy-Riemann Equations (statement only). Sufficient condition for a function to be analytic. Harmonic function and Conjugate Harmonic function, related problems. Construction of Analytic functions: Milne Thomson method, related problems.

Complex Integration.

Concept of simple curve, closed curve, smooth curve & contour. Some elementary properties of complex Integrals. Line integrals along a piecewise smooth curve. Examples. Cauchy's theorem (statement only). Cauchy-Goursat theorem (statement only). Examples. Cauchy's integral formula, Cauchy's integral formula for the derivative of an analytic function, Cauchy's integral formula for the successive derivatives of an analytic function. Examples. Taylor's series, Laurent's series. Examples.

Zeros and Singularities of an Analytic Function & Residue Theorem.

Zero of an Analytic function, order of zero, Singularities of an analytic function. Isolated and non-isolated singularity, essential singularities. Poles: simple pole, pole of order m . Examples on determination of singularities and their nature. Residue, Cauchy's Residue theorem (statement only), problems on finding the residue of a given function, Introduction Conformal transformation, Bilinear transformation, simple problems.

Discussions on application of the topic related to CE

12L

MODULE IV:

Basic concepts of Partial differential equation (PDE):

Origin of PDE, its order and degree, concept of solution in PDE. Introduction to different methods of solution: Separation of variables, Laplace & Fourier transform methods.

Topic: Solution of Initial Value & Boundary Value PDE's by Separation of variables, Laplace & Fourier transform methods.

PDE I: One dimensional Wave equation.

PDE II: One dimensional Heat equation.

PDE III: Two dimensional Laplace equation.

Introduction to series solution of Ordinary differential equation (ODE): Validity of the series solution of an ordinary differential equation. General method to solve $P_0 y'' + P_1 y' + P_2 y = 0$ and related problems to Power series method. Brief review on series solution of Bessel & Legendre differential equation. Concepts of generating functions.

Discussions on application of the topic related to CE

12L Text Books:

1. Rathor, Choudhari, Discrete Structure And Graph Theory.
2. Gupta S. C and Kapoor V K: Fundamentals of Mathematical Statistics - Sultan Chand & Sons. 3. Lipschutz S: Theory and Problems of Probability (Schaum's Outline Series) - McGraw Hill Book Co.
4. Spiegel M R: Theory and Problems of Probability and Statistics (Schaum's Outline Series) - McGraw Hill Book Co.
5. Goon A.M., Gupta M K and Dasgupta B: Fundamental of Statistics - The World Press Pvt.Ltd.
6. Spiegel M R: Theory and Problems of Complex Variables (Schaum's Outline Series) - McGraw Hill Book Co.
7. Bronson R: Differential Equations (Schaum's Outline Series) - McGraw Hill Book Co.
8. Ross S L: Differential Equations - John Wiley & Sons.
9. Sneddon I. N.: Elements of Partial Differential Equations - McGraw Hill Book Co.
10. West D.B.: Introduction to Graph Theory - Prentice Hall
11. Deo N: Graph Theory with Applications to Engineering and Computer Science - Prentice Hall.
12. Grewal B S: Higher Engineering Mathematics (thirtyfifth edn) - Khanna Pub.
13. Kreyzig E: Advanced Engineering Mathematics - John Wiley and Sons.
14. Jana- Undergraduate Mathematics
15. Lakshminarayan- Engineering Math 1.2.3
16. Gupta- Mathematical Physics (Vikas)
17. Singh- Modern Algebra
18. Rao B: Differential Equations with Applications & Programs, Universities Press
19. Murray: Introductory Courses in Differential Equations, Universities Press

Paper Name: SURVEYING - II
Paper Code: CE 401
Total Contact Hours: 42
Credit: 3

Pre requisites: Student should have the knowledge about surveying -I

Course Objective: The objective of this course is appreciate of the need for lifelong learning through the discussion of recent changes in survey procedures and equipment and also have the ability to apply knowledge of mathematics, science, and engineering to understand the measurement techniques and equipment used in I surveying.

Course Outcome:

CE 401.1	Students will predict about different aspects of Traverse with the help of Theodolite.
CE 401.2	Students will analyze the method of triangulation
CE 401.3	Students will evaluate the different types of curves and methods to set them out.
CE 401.4	They will interpret different modern techniques using Surveying instrument such as Total Station, GPS etc.

Course contents: SURVEYING -II

CONTACTS: 2L+2T =4HRS

CREDITS: 3

TOTAL: 42 HRS

Module-I: [3L+3T]

Theodolite surveying: Components of a Theodolite, Adjustments, Horizontal and vertical angle measurements, Trigonometric leveling, problems on heights & distances, traverse table, co-ordinates.

Module-II: [3L+3T]

Tachometer: Definition, Principles of stadia, tangential systems, Details of stadia system. Analytic tachometer, Horizontal and inclined sight with staff vertical and normal for both fixed and movable hair tachometer, Errors in tachometer methods.

Module-III: [2L+2T]

Triangulation: Adjustments of station and figure, Leveling adjustment, Method of equal shifts.

Module-IV: [8L+8T]

Curve surveying :

(1) Simple curves Definition, Notations Designations, Elements of simple curve, Setting out by linear methods and Rankine's tangential method. Two Theodolite and tachometric method [3L+3T]

(2) Introduction to Compound and reverse curves, vertical curve: types [2L+2T]

(3) Transition curves: lemniscates, cubic spiral, cubic parabola, settingout[3L+3T]

Module-IV: [3L+3T]

Remote Sensing:Introduction to remote sensing and its application in civil engineering,

Uses of Various Instruments:Total Station, GPS etc.

Text / Reference Books:

Sl No.	Title	Author
1	Surveying:- Vol - I & II	B.C. Punmia
2	Surveying & Leveling	R. Subramanian (OXFORD)
3	Surveying& Leveling Vol - I [Part I & II]	T.P.Kanetkar & Kulkarni
4	Surveying:- Vol - I & II	S.K. Duggal
5	Fundamental of Engineering Survey	J.K. Ghosh (Studium Press, Roorkee)
6	Higher Surveying	Dr. A. M. Chandra
7	Surveying	R.B. Gupta & B.K. Gupta
9	Plane and Geodetic Surveying (Vol - I & II)	David Clark
10	Fundamental of Surveying	S. K. Roy
11	Surveying	Saikia & Das (PHI)
12	Surveying and levelling	N.N Basak

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE401.1	3	3	2	3	-	2	1	1	3	3	3	3
CE401.2	3	3	3	2	2	2	1	2	2	2	2	2
CE401.3	3	3	3	3	2	1	1	2	3	1	1	2
CE401.4	3	3	3	3	3	2	1	1	3	2	3	3
CE401	3	3	2.92	2.92	2.33	1.75	1	1.5	2.92	2	2.25	2.25

Paper Name: STRUCTURAL ANALYSIS - I

Paper Code: CE 402

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have knowledge about the basic of strength of materials.

Course Objective: The objective of this course is to able student to model loads on structures using current codes and standard specification and also able to idealize and analyze statically determinate.

Course Outcome:

CE 402.1	Identify determinacy and indeterminacy of structure
CE 402.2	Different procedures to calculate slope and deflection for determinate structure.
CE 402.3	Define strain energy and its application
CE 402.4	Interpret Influence line diagram and its detail application
CE 402.5	Analyze three hinged Arch and cable suspension bridge.

Course contents: STRUCTURAL ANALYSIS-1

CONTACTS: 3L+1T=3HRS

CREDITS: 3

TOTAL: 42 HRS

Module-1: [6L+2T]

Review of basic concept of mechanics:Equilibrium, Free body diagram, Determinate and

Indeterminate structures, Stability, Degree of indeterminacy for different types of structures: Beams, Frames, Trusses

Module-2: [6L+2T]

Analysis of determinate structures: Portal frames, Three hinged arches, cables and suspension bridges

Module-3: [7L+3T]

Strain energy:Due to axial load, bending and shear, Torsion; Castigliano's theorems, theorem of minimum potential energy, Muller Breslau Principle, principle of virtual work, Maxwell's theorem of reciprocal deflection, Betti's law

Module-4: [6L+2T]

Deflection of determinate structures:Moment area and Conjugate beam method, Energy methods, Unit load method for beams, Deflection of trusses and simple portal frames

Module-5: [5L+3T]

Influence line diagrams: Statically determinate beams and trusses under series of concentrated and uniformly distributed rolling loads, criteria for maximum and absolute maximum moments and shears.

Text / Reference Books:

Sl no	Name	Author	Publishers
1	Engineering Mechanics of Solids	By E. P. Popov	Pearson Education
2	Basic structural Analysis	C.S. Reddy	TMH
3	Statically indeterminate structures	C. K. Wang	McGraw-Hill
4	Structural Analysis (Vol I & Vol II)	S S Bhavikatti	Vikas Publishing House Pvt. Ltd
5	Structural Analysis	Ramammurtham	
6	Structures	Schodek & M. Bechhold	Pearson Education

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE402.1	3	3	2	2	-	-	-	-	-	-	-	3
CE402.2	3	3	2	2	-	-	-	-	-	-	-	3
CE402.3	3	3	3	3	1	1	-	-	-	2	-	2
CE402.4	3	3	3	3	-	-	-	-	-	3	-	3
CE402.5	3	3	2	2	2	-	-	-	-	3	-	2
CE402	3	3	2.4	2.4	1.5	1	-	-	-	2.67	-	2.8

Paper Name: CONCRETE TECHNOLOGY

Paper Code: CE 403

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have knowledge about the building materials and construction.

Course Objective: The objective of this course is to produce knowledge to the student ingredients of concrete, specific uses, mix design of concrete, special type of concrete

Course Outcome:

CE 403.1	Identify the functional role of ingredients of concrete
CE 403.2	Student should be able to gather knowledge to mix design philosophy
CE403.3	Student will be able to differentiate various types of cement used for various specific purpose
CE 403.4	Student will be able to apply fundamental knowledge in the fresh and hardened properties of concrete
CE 403.5	Student will be able to design ordinary and control concretes, replacement of cement and their specific applications

Course contents: CONCRETE TECHNOLOGY

CONTACTS: 3L+1T=4HRS

CREDITS: 3

TOTAL: 36 HRS

Module-1: [4L+2T]

Introduction:- Concrete as a Structural Material, Good Concrete Manufacture of Portland Cement, Chemical Composition of Cement, Hydration of Cement, Heat of Hydration

Module-2: [9L+3T]

Types of Cement:- ordinary, Rapid hardening, low-heat, sulphate resisting, Portland slag, Portland pozzolana, super sulphated cement, white cement. Tests on cement and cement paste – fineness, consistency, setting time, soundness, strength. [3L+1T]

Water & Aggregates– Classification, Mechanical and Physical Properties, Deleterious Substances, Alkali-Aggregate Reaction, Sieve Analysis, Grading Curves, Fineness modulus, Grading Requirements. Testing of Aggregates – Flakiness, Elongation Tests, Aggregate Crushing Value, Ten Percent Fines Value, Impact Value, Abrasion Value. Quality of Water – Mixing Water, Curing Water, Harmful Contents. [6L+2T]

Module-3: [9L+3T]

Properties of Fresh Concrete– Workability, Factors Affecting Workability, Slump Test, Compacting Factor Test, Flow Table Test, Segregation, Bleeding, Setting Time, Mixing and Vibration of Concrete, Mixers and Vibrators, curing, Methods, Maturity. [3L+1T]

Strength & durability of Concrete– Water/Cement ratio, Gel/Space ratio, Strength in Tension, Compression, Effect of Age on Strength, Relation between Compressive and Tensile Strength,

Fatigue Strength, Stress Strain Relation and Modules of Elasticity, Poisson's Ratio, Shrinkage and Creep, Compression Test on Cubes, Cylinders, Non-Destructive Tests. [6L+2T]

Module-4: [9L+3T]

Permeability of concrete, Chloride & Sulphate attack on concrete, carbonation of concrete [3L+1T]

Admixtures – different types (chemical and mineral), effects, uses, Retarders and Super plasticizers. Mix Design by I.S. 10262(2009) Code method. [3L+1T]

Special concrete: Light-weight, Polymer and Fiber-reinforced concrete. [3L+1T]

Text / Reference Books:

SL NO	NAME	Author	publisher
1	Concrete Technology	Neville	Pearson Education
2	Concrete Technology	M.S. Shetty	S.Chand
3	Concrete Technology	A. R. Santakumar	OXFORD University Press
4	Concrete Technology	M.L. Gambhir	Tata McGraw Hill
5	Text book of Concrete Technology	P.D. Kulkarni	Tata McGraw Hill

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE403.1	3	2	3	3	-	-	2	-	-	-	1	3
CE403.2	3	3	3	2	3	1	2	-	-	1	1	2
CE403.3	3	1	2	1	3	-	-	1	-	1	-	1
CE403.4	3	-	2	-	3	2	2	-	-	-	-	2
CE403.5	3	3	-	2	2	2	3	-	1	1	-	2
CE403	3	2.25	2.5	2	2.75	2.67	2.25	1	1	1	1	2

Paper Name: SOIL MECHANICS

Paper Code: CE 404

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have knowledge about the basic of strength of materials, physics and chemistry.

Course Objective: To provide students with basic understanding of physical and mechanical properties of soil, together with knowledge of basic engineering procedures to identify factors controlling soil behavior and methods to determine soil properties. Students will acquire basic knowledge in engineering design of geotechnical systems

Course Outcome:

CE404.1	Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils
CE404.2	Compute the groundwater seepage and distribution of groundwater pressure.
CE404.3	Calculate the applied stress beneath the ground surface.
CE404.4	Demonstrate that you know the fundamental difference in the strength and deformation characteristics of cohesive and cohesion less soils.
CE404.5	Analyze field and laboratory data to determine the strength and deformation properties of cohesive and cohesion less soils.
CE404.6	Determine settlements due to consolidation of soil

Course contents: SOIL MECHANICS-I

CONTACTS: 3L+1T=4HRS

CREDITS: 3

TOTAL: 36 HRS

Module-I: [6L+2T]

Origin & formation of Soil:-Types, Typical Indian Soil, Fundamental of Soil Structure, Clay Mineralogy. [2L+1T]

Soil as a Three Phase System :-Weight- Volume Relationship, Measurement of Physical Properties of Soil: Insitu Density, Moisture Content, Specific Gravity, Relative Density.[4L+1T]

Module-II: [8L+3T]

Particle Size Distribution :-By Sieving, Sedimentation Analysis. [2L+1T]

Index Properties of Soil:- Attarbergs Limits- Determination of Index Properties of Soil by Casagrandes Apparatus, Cone Penetrometer, Soil Indices. [3L+1T]

Soil Classification :-As per Unified Classification System, As per IS Code Recommendation, AASHTO Classification, Field Identification of Soil, Consistency of Soil. [3L+1T]

Module-III: [7L+2T]

Soil Moisture :-Darcy,s Law, Capillarity in Soil, Permeability, Determination of Coefficient of Permeability of Soil in Laboratory, Permeability for Stratified Deposits. [4L+1T]

[illegible]

Practical

Paper Name: SURVEYING PRACTICE – I

Paper Code: CE 491

Total Contact Hours: 36

Credit: 2

Pre requisites: Student should have knowledge about the basic Basic Survey Theory

Course Objective: Student will be able to function as a member of a team and Have the ability to use techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcome:

CE 491.1	To interpret horizontal measurement with the help of Chain & Compass Surveying in the field.
CE491.2	To enumerate about Plane Table surveying.
CE491.3	To estimate vertical measurement with the help of Leveling in the field.
CE491.4	To apply indirect methods & demonstration of minor instruments.

Course contents: SURVEYING PRACTICE-I

CONTACTS: 3P=3HRS

CREDITS: 2

Chain surveying

Preparing index plans, Location sketches, Ranging, Preparation of map, Heights of objects using chain and ranging rods, Getting outline of the structures by enclosing them in triangles/quadrilaterals, Distance between inaccessible points, Obstacles in chain survey.

Compass surveying

Measurement of bearings, Preparation of map, Distance between two inaccessible points by chain and compass, Chain and compass traverse

Plane Table survey

Temporary adjustments of plane table and Radiation method, Intersection, Traversing and Resection methods of plane tabling, Three-point problem

Leveling

Temporary adjustment of Dumpy level, Differential leveling, Profile leveling and plotting the profile, Longitudinal and cross sectioning, Gradient of line and setting out grades, Sensitiveness of Bubble tube

Contouring:

Direct contouring, Indirect contouring – Block leveling, Indirect contouring – Radial contouring, Demonstration of minor Instruments.

Text / Reference Books:

Sl No.	Title	Author
1	Surveying:- Vol - I & II	B.C. Punmia
2	Surveying & Leveling	R. Subramanian (OXFORD)
3	Surveying& Leveling Vol - I [Part I & II]	T.P.Kanetkar & Kulkarni
4	Surveying:- Vol - I & II	S.K. Duggal
5	Fundamental of Engineering Survey	J.K. Ghosh (Studium Press, Roorkee)
6	Higher Surveying	Dr. A. M. Chandra
7	Surveying	R.B. Gupta & B.K. Gupta
9	Plane and Geodetic Surveying (Vol - I & II)	David Clark
10	Fundamental of Surveying	S. K. Roy
11	Surveying	Saikia & Das (PHI)

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 491.1	3	2	3	-	-	2	1	1	3	2	2	1
CE 491.2	3	3	3	-	-	2	1	1	3	3	3	-
CE 491.3	3	3	3	-	-	2	1	1	3	2	3	1
CE 491.4	3	3	3	-	-	2	1	1	3	3	3	2
CE 491	3	2.75	3	-	-	2	1	1	3	2.25	2.75	1.33

Paper Name: BUILDING PLANNING AND DRAWING

Paper Code: CE 492

Total Contact Hours: 36

Credit: 2

Pre requisites: Student should have knowledge about building materials and construction and also mathematics

Course Objective: The objective of this course is to make student able to Learn to sketch and take field dimensions and to take data and transform it into graphic drawings and Auto Cad skills.

Course Outcome:

CE 492.1	Prepare simple layout of buildings.
CE 492.2	Produce working drawings for individual components like doors and windows etc.
CE 492.3	Develop line diagram, building section, elevation, key plan and sectional elevation.
CE 492.4	Illustrate hand drafting any parts of a building and implement the regulations for layout of plan.

Course contents: BUILDING PLANNING AND DRAWING

CONTACTS: 3P=3HRS

CREDITS: 2

Foundations

Spread foundation for walls and columns; Footing for a RCC column, raft and pile foundations

Doors and Windows

Glazed and paneled doors of standard sizes; Glazed and paneled windows of standard sizes; special windows and ventilators

Stairs

Proportioning and design of a dog-legged, open well RCC stair case for an office / Residential building; Details of reinforcements for RCC stair cases; Plan and elevation of straight run, quarter turn, dog-legged and open well staircases.

Roofs Types of sloping roof, lean-to roofs, RCC roof with details of reinforcements

Trusses

King post and Queen post trusses.

Functional Design of Buildings

To draw the line diagram, plan, elevation and section of the following:

Residential Buildings (flat & pitched roofs), Office Buildings (flat roof), School. The designs must show positions of various components including lift well and their sizes.

Introduction to drawing by using software package

Text / Reference Books:

Sl No	Title	Author
1	Principles of Building Drawing	Shah & Kale
2	Text Book of Building Construction	Sharma & Kaul
3	Building Construction	B C Punmia
4	Civil engineering drawing	M.Chakraborty

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 492.1	3	2	-	1	2	-	-	-	1	-	-	1
CE 492.2	3	2	-	1	2	-	-	-	1	-	-	1
CE 492.3	3	2	-	1	2	-	-	-	1	-	-	1
CE 492.4	3	2	-	1	2	-	-	-	1	-	-	1
CE 492	3	2	-	1	2	-	-	-	1	-	-	1

Paper Name: CONCRETE LAB

Paper Code: CE 493

Total Contact Hours: 36

Credit: 2

Pre requisites: Student should have the basic knowledge about concrete technology theory

Course Objective: The objective of this course is to understand the characteristics and behavior of civil engineering materials used in buildings and infrastructure. Students will learn standard principles and procedure to design prepare and/or test materials such as concrete mix design including field test methods for fresh concrete. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.

Course Outcome:

CE 493.1	Identify the functional role of ingredients of concrete
CE 493.2	Apply this knowledge to mix design philosophy to get different grade of concrete
CE 493.3	Student should be able to test of different concrete property to specify quality of concrete
CE 493.4	Student shall learn to work in a team to achieve the objective

Course contents: CONCRETE LAB

CONTACTS:3P=3HRS

CREDITS: 2

Tests on cement—specific gravity, fineness, soundness, normal consistency, setting time, compressive strength on cement mortar Cubes.

Tests on fine aggregate—specific gravity, bulking sieve analysis, fineness modulus, moisture content, bulk density, voids and Deleterious materials.

Tests on coarse aggregate—specific gravity, sieve analysis, fineness modulus, bulk density and voids.

Tests on Fresh Concrete: Workability : Slump, Vee-Bee, Compaction factor tests

Tests on Fresh Concrete: Workability : Slump, Vee-Bee, Compaction factor tests

Hardened Concrete: Compressive strength on Cubes, Split tensile strength, Static modulus of elasticity, Flexure tests , Non destructive testing (Rebound hammer & Ultrasonic pulse velocity)

Mix Design—As per IS 10262(2009) method

Text / Reference Books:

SL NO	NAME	Author	publisher
1	Concrete Technology	Neville	Pearson Education
2	Concrete Technology	M.S. Shetty	S.Chand
3	Concrete Technology	A. R. Santakumar	OXFORD University Press
4	Concrete Technology	M.L. Gambhir	Tata McGraw Hill
5	Text book of Concrete Technology	P.D. Kulkarni	Tata McGraw Hill

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 493.1	3	2	2	2	2	-	-	-	1	1	-	1
CE 493.2	3	2	2	2	2	1	1	1	1	-	-	1
CE 493.3	3	2	2	2	2	1	-	-	1	-	-	1
CE 493.4	1	1	1	1	1	-	1	1	3	2	2	1
CE 493	2.5	1.75	1.75	1.75	1.75	1	1	1	1.5	1.5	2	1

SESSIONAL

Paper Name: TECHNICAL REPORT WRITING & LANGUAGE PRACTICE

Paper Code: HU481

Total Contact Hours: 24

Credit: 1

Pre requisites: Communication Competence

Course Objective: Enhance LSRW Skills and develop the skills of Public Speaking, Team Building Logical Argument through Presentation techniques.

Course Outcome:

CO	Statement
CO1	Able to develop advanced verbal and non verbal communication skills through Power Point presentation.
CO2	Able demonstrate interpersonal skills through Group Discussion both for organizational communication and campus recruitment drive.
CO3	Able to face various types of interviews.
CO4	Able to be industry ready professionals by various personality development programs.

Course contents: 1. Power Point Presentation

2. Group Discussion

3. Interviewing Skills

4. Personality Development

Text / Reference Books: Technical communication By Meeenakshi Raman and Sangeeta Sharma; Oxford Publication.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU 481.1	–	-	-	-	-	2	-	-	3	3	3	3
HU 481.2	-	-	-	-	-	3	-	-	3	3	3	3
HU 481.3	-	-	-	-	-	2	-	-	3	3	3	3
HU 481.4	-	-	-	-	-	3	-	-	3	3	3	3
HU 481	-	-	-	-	-	2.5	-	-	3	3	3	3

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 5th Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Third Year Fifth Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/Week	Credits
THEORY:			L	T	P	Total	Credits
HS	HU502	VALUE AND ETHICS IN PROFESSION	2	0	0	2	2
PC	CE 501	STRUCTURAL DESIGN – I	2	2	0	4	3
PC	CE 502	QUANTITY SURVEYING, SPECIFICATION AND VALUATION	2	1	0	3	2
PC	CE 503	STRUCTURAL ANALYSIS - II	3	1	0	4	3
PC	CE 504	FOUNDATION ENGINEERING	3	1	0	4	3
PE -I	CE 505A	HYDRAULICS	3	1	0	4	4
	CE 505B	WATER SUPPLY AND PLUMBING					
	CE 505C	WASTE WATER AND TREATMENT					
PRACTICAL							
PC	CE 591	SURVEYING PRACTICE - II	0	0	3	3	2
PC	CE 592	SOIL MECHANICS LAB - I	0	0	3	3	2
PC	CE 593	CIVIL ENGINEERING LAB	0	0	3	3	2
SESSIONAL:							
MC	MC 581	PRESENTATION SKILL	0	0	2	2	2 units
		TOTAL: TEN	15	6	11	32	23

Syllabus:

Theory

Paper Name: VALUE AND ETHICS IN PROFESSION

Paper Code: HU502

Total Contact Hours: 24

Credit: 2

Pre requisites:

Course Objective: To create awareness on professional ethics and Human Values

Course Outcome: On Completion of this course student will be able to

Co.1	Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.
Co.2	understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
Co.3	understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
Co.4	Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
Co.5	acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

Course contents:

Module: 1. Introduction: Definition of Ethics; Approaches to Ethics: Psychological, Philosophical, Social.

Module: 2. Psycho-social theories of moral development: View of Kohlberg; Morality and Ideology, Culture and Morality, Morality in everyday Context.

Module: 3. Ethical Concerns: Work Ethics and Work Values, Business Ethics, Human values in organizations: Values Crisis in contemporary society
Nature of values: Value Spectrum of a good life.

Module: 4. Ethics of Profession:

Engineering profession: Ethical issues in Engineering practice, Conflicts between business demands and professional ideals.

Social and ethical responsibilities of Technologists. Codes of professional ethics. Whistle blowing and beyond, Case studies.

Module: 5. Self Development: Character strengths and virtues, Emotional

Intelligence, Social intelligence, Positive cognitive states and processes

(Self-efficacy, Empathy, Gratitude, Compassion, and Forgiveness).

Module: 6. Effects of Technological Growth:

Rapid Technological growth and depletion of resources, Reports of the Club of Rome. Limits of growth: sustainable development Energy Crisis: Renewable Energy Resources, Environmental degradation and pollution. Eco-friendly Technologies. Environmental Regulations, Environmental Ethics

Appropriate Technology, Movement of Schumacher; Problems of man, machine, interaction.

Text / Reference Books:

1. Stephen H Unger, Controlling Technology: Ethics and the Responsible Engineers, John Wiley & Sons, New York 1994
(2nd Ed)
2. Deborah Johnson, Ethical Issues in Engineering, Prentice Hall, Englewood Cliffs, New Jersey 1991.
3. A N Tripathi, Human values in the Engineering Profession, Monograph published by IIM, Calcutta 1996.

CO-PO mapping

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
Co-1	-	-	-	-	-	1	1	1	1	2	-	-
Co-2	-	-	-	-	-	1	1	3	1	2	-	-
Co-3	-	-	-	-	-	3	2	3	-	1	-	-
Co-4	-	-	-	-	-	3	2	1	-	-	-	-
Co-5	-	-	-	-	-	3	2	2	-	1	3	-

Paper Name: STRUCTURAL DESIGN – I

Paper Code: CE 501

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have knowledge about how to solve analysis of structural problem.

Course Objective: 1. Student will be able to perform analysis and design of reinforced concrete members and connections and be able to identify and interpret the appropriate relevant industry design codes.

2. To become familiar with professional and contemporary issues in the design and construction of reinforced concrete members.

Course Outcome:

CE501.1: Exhibit the knowledge of concrete design philosophies, by working and limit state methodology

CE501.2: Design the structural details of beam and slab

CE501.3: Design the structural details of column

CE501.4: Interpret and use the I.S Code specifications

CE501.5: Explain the detailing of the structural components

Course contents:

CONTACTS: 2L+2T=4HRS

CREDITS: 3

TOTAL: 42 HRS

Module-I: [1L+1T]

Introduction: Principles of design of reinforced concrete members - Working stress and Limit State method of design.

Module-II: [3L+3T]

Working stress method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces - Balanced, under reinforced and over reinforced beam/ slab sections; design of singly and doubly reinforced sections.

Module-III: [2L+2T]

Limit state method of design: Basic concepts and IS code provisions (IS: 456 2000) for design against bending moment and shear forces; concepts of bond stress and development length; Use of 'design aids for reinforced concrete' (SP:16).

Module-IV: [3L+3T]

Analysis, design and detailing of singly reinforced rectangular, "T", "L" and doubly reinforced beam sections by limit state method.

Module-V: [2L+2T]

Design and detailing of one-way and two-way slab panels as per IS code provisions

Module-VI: [2L+2T]

Design and detailing of continuous beams and slabs as per IS code provisions

Module-VII: [2L+2T]

Staircases: Types; Design and detailing of reinforced concrete doglegged staircase

Module-VIII: [3L+3T]

Design and detailing of reinforced concrete short columns of rectangular and circular cross sections under axial load. Design of short columns subjected to axial load with moments (uniaxial and biaxial bending) – using SP 16.

Module-IX: [3L+3T]

Shallow foundations: Types; Design and detailing of reinforced concrete isolated square and Rectangular footing for columns as per IS code provisions by limit state method.

Limit state method should be followed for serial number 4 to 9 as above as per IS 456 - 2000

Text / Reference Books:

Name	Author	Publishers
IS: 456- 2000 “Indian Standard for Plain and reinforced concrete – code of practice	Bureau of Indian Standard	
SP:16 Design Aid to IS 456		
Reinforced Concrete Design by	Pillai and Menon	TMH
Reinforced concrete Limit state design	Ashok K. Jain, Arun kv jain, B.C. Punmia	Laxmi publication
Reinforced concrete	S.N.Sinha	TMH
Fundamentals of reinforced concrete	N.C.Sinha and S.K. Roy	S.Chand & Co
Limit State Design of Reinforced Concrete	P. C. Varghese	PHI
Reinforced Concrete	S. K. Mallick and A. P. Gupta	Oxford IBH
Reinforced cement Concrete Design	Neelam Sharma	S.K. hataria & sons

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE501.1	3	3	3	2	-	1	2	1	-	3	3	2
CE501.2	3	3	3	3	-	2	-	-	-	1	2	2
CE501.3	3	3	3	2	-	-	-	-	-	-	2	2
CE501.4	3	3	3	2	-	-	-	-	-	-	2	2
CE501.5	3	3	3	2	-	-	-	-	-	1	2	2
CE501	3	3	3	2.2	-	1	2	1	-	1.67	2.2	2

Paper Name: QUANTITY SURVEYING, SPECIFICATION AND VALUATION
Paper Code: CE502
Total Contact Hours: 36
Credit: 2

Pre requisites: Student should have knowledge about building construction and material details.

Course Objective: The objective of this course is to give the students basics knowledge of estimating and valuation of civil engineering works. After completing this course the students will also be able to analyze the rates and estimate the various construction works

Course Outcome:

CE502.1: Student will be able to prepare specification for using materials of construction and its items of works.

CE502.2: Student will be able to illustrate a detailed estimation of material consumption and abstracts for entire construction projects

CE502.3: Student will learn how to analyze the rates for different items of works including labor and material.

CE502.4: Interpret fundamental concepts of valuation

CE502.5: Students will be able to identify various legal issues related to construction.

Course contents: QUANTITY SURVEYING, SPECIFICATION AND VALUATION
CONTACTS: 2L +2T= 4HRS CREDITS:3 TOTAL: 40HRS

Unit I: Different types of estimates, Concept of items of work, unit of measurement, unit rate of payment. Quantity estimate of a single storied building. Bar bending schedule. Details of measurement and calculation of quantities with cost, bill of quantities, abstract of quantities. Quantity estimate of Road, Underground reservoir, Surface drain, Septic tank

Unit II: Analysis and schedule of rates for Earthwork, brick flat soling, DPC, PCC and RCC, brick work, plastering, flooring and Finishing.

Unit III: Specification of materials: Brick, cement, fine and coarse aggregates; Specification of works: PCC, RCC, First class brickwork, cement plastering and pointing, white washing, colour washing, distempering, lime punning, painting and varnishing

Unit IV: Basic concept of Values and cost, gross income, outgoing, net income, scrap value, salvage value, market value, Book Value, Sinking fund, capitalized value, Year of purchase, depreciation, obsolescence, deferred income, freehold and leasehold property, Mortgage, rent fixation, valuation table.

Text / Reference Books:

1. B. N. Datta, Costing, Estimation and Valuation, UBSPublication
2. S. C. Rangwala, Estimating & Costing (Civil Engg.), CharotarPublication
3. G. S. Birdie, A text book of Estimating & Costing, Dhanpat Rai & Sons
4. S. C. Rangwala, Valuation of Real properties, CharotarPublication
5. Estimating, Costing, Specification & Valuation In Civil Engineering by M. Chakraborty

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE502.1	3	3	2	2	1	2	1	-	-	-	2	2
CE502.2	3	3	3	2	-	-	-	-	-	-	1	2
CE502.3	3	3	3	1	-	-	-	-	-	-	2	2
CE502.4	3	3	3	2	-	-	-	-	-	-	2	2
CE502.5	3	3	3	2	1	2	-	-	2	2	2	2
CE502	3	3	2.8	1.8	1	2	1	-	2	2	1.8	2

Paper Name: STRUCTURAL ANALYSIS - II

Paper Code: CE503

Total Contact Hours: 42

Credit: 3

Pre requisites: Should have knowledge about structural analysis -I

Course Objective: The objective of this course is to give the students basics knowledge of use the techniques, skills, and modern engineering tools like stiffness and flexibility method necessary for engineering practice and also knowledge to identify, formulate and solve structural analysis problems using moment distribution method

Course Outcome:

CE503.1: Apply basic methods of analysis of indeterminate structures

CE503.2: Illustrate knowledge of advanced methods of analysis of indeterminate structures

CE503.3: To solve structural analysis problems involving analysis of two pinned arches

CE503.4: To analyze structural analysis problems involving moving loads

Course contents: STRUCTURAL ANALYSIS – II

CONTACTS: 2L +2T=4HRS

CREDITS:3

TOTAL: 40HRS

Unit-I: Analysis of two hinged and rigid arches, Suspension bridges with two hinged stiffening girder, redundant frames, Consistent Deformation methods, strain energy method.

Unit-II: Slope Deflection Method: Continuous beams and portals by slope deflection due to load, settlements and temperature variation.

Unit-III: Moment-distribution method. Continuous beams and portals frame by moment distribution due to load, settlements and temperature variation.

Unit-IV: Flexibility Method: Elemental flexibility matrices of bar elements, formation of structural flexibility matrix from the elemental ones. Solution of trusses and rigid portals. Stiffness Method: Member stiffness matrix, stiffness matrix equation; solution of trusses and rigid portals.

Unit-V: Influence lines for propped cantilevers, continuous beams and two hinged arches. Muller-Breslau's principle. Introduction to Finite element technique.

Text / Reference Books:

Name	Author	Publishers
Engineering Mechanics of Solids	By E. P. Popov	Pearson Education
Basic structural Analysis	C.S. Reddy	TMH
Statically indeterminate structures	C. K. Wang	McGraw-Hill
Elastic analysis of structures	Kennedy and Madugula	Harper and Row
Structural Analysis (Vol I & Vol II)	S S Bhavikatti	Vikas Publishing House Pvt. Ltd
Structural Analysis	Ramammurtham	
Structures	Schodek & M. Bechhold	Pearson Education

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE503.1	3	3	2	2	1	-	-	-	-	-	-	2
CE503.2	3	2	2	2	2	-	-	-	-	-	-	2
CE503.3	3	3	2	2	2	-	-	-	-	-	-	2
CE503.4	3	3	2	3	2	-	-	-	-	-	-	2
CE503	3	2.75	2	2.25	1.75	-	-	-	-	-	-	2

Paper Name: FOUNDATION ENGINEERING

Paper Code: CE504

Total Contact Hours: 42

Credit: 3

Pre requisites: Student should have knowledge about basic of Soil Mechanics.

Course Objective: Application of soil mechanics and other related techniques to design of foundation. Methods and site and soil exploration; bearing capacity and settlements; shallow and deep foundation; bracing and retaining structures. Case studies.

Course Outcome:

CE504.1: Describe bearing capacity of soil.

CE504.2: Define earth pressure theories

CE504.3: Design of shallow foundations

CE504.4: Classify piles & their loading capacity for deep foundation.

CE504.5: Compare methods & process of Geotechnical Exploration and Ground Improvement techniques

Course contents: FOUNDATION ENGINEERING

CONTACTS: 3L+1T=4HRS

CREDITS: 3

TOTAL: 36 HRS

Module-1: [3L+1T]

Earth Pressure Theories: -Plastic equilibrium of soil, Earth pressure at rest, Active & passive Earth pressure, Rankin's & Coulombs earth pressure theories, wedge method of analysis, estimation of earth pressure by graphical construction (Culmann method).

Module-2: [6L+2T]

Retaining Wall & sheet pile structures:Proportions of retaining walls, stability checks, cantilever and anchored sheet piles, free earth and fixed earth method of analysis of anchored bulk heads, coffer dam structures types.

Module-3: [3L+1T]

Stability of slopes:Analysis of finite and infinite slopes, Swedish And friction circle method, Taylor's stability number, Bishop's method of stability analysis.

Module-4: [3L+1T]

Site Investigation & Soil Exploration:Planning of sub-surface explanation, methods, sampling, samples, Insitu tests: SPT, SCPT, DCPT, field vane shear, Plate load test.

Module-5: [3L+1T]

Shallow foundations :Safe bearing capacity, Terzaghi's bearing capacity theory, effect of depth of embedment, water table, eccentricity of load, foundation shape on bearing capacity, Bearing capacity as per IS 6403

Module-6: [3L+1T]

Settlement analysis of shallow foundation: Immediate and consolidation settlement, correction for rigidity and dimensional effects, settlement in various types of soil, IS-1904 and 8009 recommendations, Allowable bearing capacity

Module-7: [6L+2T]

Deep foundations: Pile: Types, load transfer mechanism Determination of load carrying capacities of piles by static and dynamic formulae, Recommendations of IS 2911, Pile group: Group efficiency, Negative skin friction, pile load test.

Text / Reference Books:

Name	Author	Publishers
Principles of Geotechnical Engineering	B. M. Das	Thomson Book Store
Text book of Soil Mechanics & Foundation Engineering	V.N.S. Murthy	CBS Publisher's & Distributors
Geotechnical Engineering – Principles and Practice	Coduto	Pearson Education
Soil Mechanics	Lambe & Whitman	WIE
Basic & Applied Soil Mechanics	Gopal Ranjan & A.S.R.Rao	Wiles Eastern Ltd
SP 36 (Part I) Numerical Problems – Geotechnical Engineering	Rao & Venkatramaiah	University Press

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE504.1	2	2	2	2	1	1	1	2	3	1	2	3
CE504.2	2	2	2	3	2	2	1	2	3	1	2	3
CE504.3	2	2	1	2	1	1	1	1	2	1	1	2
CE504.4	2	1	1	2	3	2	1	1	2	1	2	2
CE504.5	1	2	1	2	2	2	1	1	2	1	2	3
CE504	1.8	1.8	1.4	2.2	1.8	1.6	1	1.4	2.4	1	1.8	2.6

Paper Name: HYDRAULICS

Paper Code: CE505A

Total Contact Hours: 42

Credit: 4

Pre requisites: Basic knowledge of Fluid Mechanics

Course Objective: Students will understand and be able to apply fundamental concepts and techniques of hydraulics and hydrology in the analysis, design, and operation of water resource systems.

Course Outcome:

CE505A.1: Students will be able to recognize with different water resources terminology like hydrology, ground water, hydraulics of pipelines and open channel.

CE505A.2: Students will be able to explain and be able to use the energy and momentum equations.

CE505A.3: Students will be able to separate flow in closed pipes, and design and recommend of pipes including sizes.

CE505A.4: Students will be able to summarize pumps classification and be able to select a system curve used in pump selection.

CE505A.5: Students will be able to categorize and order pumps (single or multiple) for different hydraulic applications.

CE505A.6: Students will be able to identify with open channel cross sections, hydrostatic pressure distribution and Manning's law.

Course contents: HYDRAULICS

CONTACTS: 3L+1T=4HRS

CREDITS: 4

TOTAL: 36 HRS

Module-1: [3L+1T]

Center of pressure, Stability of floating bodies, Meta center, Difference between weir and barrage, Types of weirs, Selection of site.

Module-2: [6L+2T]

Weir and notches, Rectangular, Triangular, Submerged weirs, Theories of seepage and design of weirs and barrages. Failures of hydraulic structure founded on pervious foundation.

Module-3: [3L+1T]

Friction in pipes, Head loss due to friction, Drag-Weisbach Equation, Variation of friction factor with wall roughness,

Hydraulic structure for canals --- Canal falls---Necessity, locations, Types, Trapezoidal notches fall,

Module-4: [3L+1T]

Water hammer---speed of pressure wave, Slow and rapid closure

Cross drainage work, Necessity, type, selection of suitable type (Introduction only)

Module-5: [6L+2T]

Steady uniform flow in open channel, Mannings and Bazin's formula, Hydraulically efficient cross section, Varied flow through open channel, gradually varied & rapidly varied flows.

Dam (General): Definition, classification of Dams, Types of Earthen Dams, Methods of Construction,

Module 6: [6L+2T]

Introduction of Hydraulic Turbines and various type of Pumps. Gravity Dam: Typical cross-section, Concept of High and low Gravity Dam.

Text / Reference Books:

Name	Author	Publishers
Fluid Mechanics	Modi & Seth	Standard Book House, New Delhi
Fluid Mechanics	A.K.Jain	Khanna Publishers, New Delhi
Fluid Mechanics & Machinery	H. M. Raghunath	CBS Publishers, New Delhi
Fluid Mechanics and Fluid Machines	S. K. Som & G. Biswas	Tata McGraw Hill.
Fluid Mechanics, Hydraulics and Fluid Machines	S. Ramamrutham	Dhanpat Rai
Water Supply Engineering	Santosh Kumar Garg	Khanna Publishers

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE505A.1	3	2	1	-	-	-	-	-	-	-	-	-
CE505A.2	2	3	1	-	-	-	-	-	-	-	-	-
CE505A.3	3	2	1	-	1	-	-	-	-	-	-	-
CE505A.4	2	3	1	-	1	-	-	-	-	-	-	-
CE505A.5	3	2	1	-	1	-	-	-	-	-	-	-
CE505A.6	3	1	2	-	1	-	-	-	-	-	-	-
CE505A	2.67	2.17	1.16	-	1	-	-	-	-	-	-	-

Paper Name: WATER SUPPLY AND PLUMBING

Paper Code: CE505B

Total Contact Hours: 42

Credit: 4

Pre requisites: Student should knowledge about hydraulic

Course Objective: Student should be able to make technology choice to deal with water quality issues, operate and maintain working treatment systems and do troubleshooting of the problems in these systems. The student will be able to apply the knowledge gained from the subject in EIA studies for water component and water pollution control strategies.

CourseOutcome:

CE505B.1: Student will be able to apply appropriate treatment to raw water i.e. surface water/ground water useful for domestic as well as drinking purpose, industries liquid waste and reuse of water.

CE505B.2: Student will be able to calculate and recommend the pipe- network for water supply and Sewage disposal effectively.

CE505B.3: Student may clarify and identify the impurities present in water used for domestic, different types of industrial as well as construction works.

CE505B.4: Student will able to produce and select water distribution and sewer-network system.

CE505B.5: Student will able to clarify raw water as per the standard practices.

CE505B.6: Student able to select and implement building plumbing work effectively.

Course contents: WATER SUPPLY AND PLUMBING

CONTACTS: 2L +2T=4HRS

CREDITS:3

TOTAL: 40HRS

Unit I: Water Demands and Importance Necessity of Planned Water Supply. – Various Types of Water Demands, Water Requirements of a town or city, The Per Capita Demand, Factors affecting per Capita Demands, Variations in Demands, Effects of Variations in Demand on the Design Capacities of Different Components of a Water Supply Scheme, Design Periods, Population Data and Population Growth, Population Forecasting Method

Unit II: Sources of Water and Study of Sources of Water -Hydrologic Cycle, Precipitation, Types of Precipitation, Rainfall and Measurement, Average Annual Rainfall, Minimum Rainfall, Index of Wetness, Run off and Estimation of Run off, Surface Sources of water, Subsurface Sources of Water, Development of Ground Water, Various Forms of Underground Sources, Wells, Open Wells, Dug Well, Tube Wells, Comparative Study of Surface and Subsurface Supplies

Unit III: Intake Structure – Definition and Introduction, Types of Conduits, Hydraulics of Flow and Design of Pressure Pipes as Gravity Mains, Flow in Pipe System, Various types of Pipe System, Pipe Appurtenances

Unit IV: Conduits for Transporting Water-Definition and Introduction, Types of Conduits, Hydraulics of Flow and Design of Pressure Pipes as Gravity Mains, Flow in Pipe System, Various types of Pipe System, Pipe Appurtenances

Unit V: Water Quality - Characteristics of Water, Water Borne Diseases and their control Quality Standards for Municipal and Industrial Supply.

Unit -VI Purification of Water Supplies-Screening, Course and Fine Screens, Theory of Sedimentation, Sedimentation Tanks, Sedimentation Aided with Coagulation ,Analysis of Flocculent Settling, Chemicals used for Coagulation, Coagulation Sedimentation Plant. Sedimentation Tank, Filtration, Filter Material, Types of Filters, Rapid Gravity Filter, Slow Sand Filter, Rapid Gravity Filter and Pressure Filter. Disinfection Methods, Chlorination, Methods of Removing Temporary Hardness and Permanent Hardness, Removal of Iron, Manganese, De-fluoridation of Water, Removal of Radioactive from water, Desalination of Brakish Water.

Unit -VII Distribution System, Layouts of Distribution System, Requirements, Arrangement of Distribution Pipes and Other Accessories, Method of Distribution System, Pressure in Distribution System, Systems of Supply

Unit -VIII Water Supply Plumbing Systems in Buildings and Houses, Plumbing Systems in Water Supplies, The House Water Connections, Stop Cocks, Water Taps and Bib Cocks, Pipe Fittings, Pipe Fittings, Storage of Water Buildings, Design Considerations for Water Piping Systems

Text / Reference Books:

Name	Author	Publishers
Engineering Hydrology	K. Subramanya	Tata McGraw-Hill
A Text Book of Hydrology-	P. Jaya Ram Reddy	Laxmi Publications-New Delhi
Hydrology & Water Resource Engineering-	S.K Garg	Khanna Publishers.
Hydrology Principles, Analysis and Design	H. M. Raghunath.	
Hydraulics of Groundwater	J. Bear	McGraw-Hill
Water Resources Engineering Through Objective Questions	K. Subramanya	Tata McGraw-Hill

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE505B.1	3	2	1	-	1	1	-	-	-	-	-	-
CE505B.2	2	3	2	-	1	1	-	-	-	-	-	-
CE505B.3	3	2	2	-	1	-	-	-	-	-	-	-
CE505B.4	3	2	2	-	1	-	-	-	-	-	-	-
CE505B.5	3	2	1	-	1	-	-	-	-	-	-	-
CE505B.6	2	3	1	-	1	-	-	-	-	-	-	-
CE505B	2.67	2.33	1.5	-	1	1	-	-	-	-	-	-

Paper Name: WASTE WATER AND TREATMENT

Paper Code: CE505C

Total Contact Hours: 42

Credit: 4

Pre requisites: Fluid Mechanics or an equivalent course in fluid flow or hydraulics.

Course Objective: Explore the relationship between the natural water cycle and human water use, and understand the principles of water resources planning and total water management. Describing the physical, chemical, and biological processes necessary for designing and managing drinking water treatment processes and water conveyance and distribution systems and the physical, chemical, and biological processes necessary for designing and managing primary, secondary, tertiary and advanced wastewater treatment processes and solids handling systems.

Course Outcome:

CE505C.1: Students will be able to summarize the quality parameters typically used to differentiate wastewater and judge the different classes of treated wastewater

CE505C.2: Students will be able to describe various types of process units used for preliminary, primary and secondary treatment and explain how they achieve the target level of treatment

CE505C.3: Students will be able to identify and summarize emerging technologies for advanced wastewater treatment and water recycling

CE505C.4: Students will be able to differentiate water and wastewater treatment on solid wastes management.

CE505C.5: Students will be able to choose a treatment system for a given wastewater to select a specified end use which will conduct basic design of treatment units

CE505C.6: Students will be able to differentiate the parameters that characterize the constituents in potable water and wastewater and Understand fundamental water chemistry.

Course contents: WASTE WATER AND TREATMENT

CONTACTS: 2L +2T=4HRS

CREDITS: 3

TOTAL: 38HRS

Unit I: Estimating the Design Sewage Discharge -Estimating Sewage Discharge, Design Periods for Different Components of a Sewerage Scheme, Future Forecasts and Estimating Design Sewage Discharge, Variations in Sewage Flow and their Effects.

Unit II: Hydraulic Design of Sewers and S.W Drain Sections-Difference in the Design of Water Supply Pipes and Sewer Pipes and Sewer Pipes, Hydraulic Formulas for Determining Flow Velocities in Sewers, Effect of flow variations on Velocity in a Sewer, Hydraulic Characteristics of Circular Sewer, Various Forms of Underground Sources, Use of Tables and Nomograms for Hydraulic Computations for the Design of Sewers, Limitation on Depth of Flow, Egg Shaped Sewer

Unit III: Quality and Characteristics of Sewage-Decomposition of Sewage, Characteristics of Sewage

Unit IV: Disposing of the Sewage Effluents-Disposal by Dilution, Disposal of Wastewaters in Rivers and Self, Disposal on Land for Irrigation, Dilution Method Vs Land Disposal Method

Unit V: Treatment of Sewage-Classification of Treatment Processes, Screening, Types of Screens, Their Designs and Cleaning, Grit Removal basins, Grit Chambers, Sedimentation, Principle of Sedimentation, Sedimentation Tank, Sedimentation Aided with Coagulation, Contact Beds for Biological Filtration of Sewage, Trickling Filters for Biological Filtration of Sewage, Recirculation of Treated Sewage and its Use in High Rate Trickling Filters, Secondary Sedimentation, Sludge and its Moisture Content, Sludge Digestion Process, Secondary Treatment Through Activated Sludge Process, Secondary Treatment Through Rotating Biological Contractors, Oxidation Ponds and Aeration Lagoons, Anaerobic Stabilization Units

Text / Reference Books:

Name	Author
Waste Water Treatment and Water Management : Water Treatment and Management	Anamika Srivastava
INDUSTRIAL WASTE WATER TREATMENT	A. D. Patwardhan

CO-PO MAPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE505C.1	2	2	-	-	-	-	1	-	-	-	-	-
CE505C.2	2	2	3	-	1	-	-	-	-	-	-	-
CE505C.3	3	2	1	-	-	-	-	-	-	-	-	-
CE505C.4	3	2	1	-	1	2	-	-	-	-	-	-
CE505C.5	3	2	1	-	1	2	-	-	-	-	-	-
CE505C.6	2	3	1	1	-	-	-	-	-	-	-	-
CE505C	2.5	2.16	1.4	1	1	2	1	-	-	-	-	-

Practical

Paper Name: SURVEYING PRACTICE - II

Paper Code: CE591

Total Contact Hours: 36

Credit: 2

Pre requisites: Should have knowledge about surveying Theory.

Course Objective: To make knowledge of survey.

Course Outcome:

CE591.1: Students will be able to operate instruments like Theodolite for angle measurements

CE591.2: Students will be able to explain about different readings & calculations with the help of Total Station.

CE591.3: Students will apply the importance of precision and accuracy in taking observations

CE591.4: Students will be able to pointed out Curve in the field

Course contents:

MODULE NO	CONTENT	TEACHING HOURS
1	- Study of TransitTheodolite - Measurement of horizontal angle by repetitionmethod - Measurement of horizontal angle by reiterationmethod - Measurement of verticalangle - Setting out work Simple Curve (Right-Handed) - Theodolite traversing-included angle method	

Text / Reference Books:

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE591.1	3	3	3	2	1	-	2	1	2	2	2	-
CE591.2	3	3	3	3	3	2	2	-	3	2	2	2
CE591.3	3	3	3	3	3	2	1	1	2	2	2	3
CE591.4	3	3	3	-	1	2	-	3	2	2	2	2
CE591	3	3	3	2.67	2	2	2.33	2.67	2.25	2	2	2.33

Paper Name: SOIL MECHANICS LAB - I

Paper Code: CE592

Total Contact Hours: 36

Credit: 2

Pre requisites:

Course Objective: Provide civil engineering students with the basic knowledge to carry out field investigations and to identify soils in geotechnical engineering practice and educate civil engineering students in performing and interpretation laboratory tests for evaluating soil property.

Course Outcome:

CE592.1: Identify soils with reference to their characteristics

CE592.2: Describe the behavior and effect of water in soils

CE592.3: Examine modes of soil behavior

CE592.4: Calculate and plot soil strength parameters

CE592.5: Interpret different methods of improving soil stability including reference to compaction plant

CE592.6: Illustrate a variety of laboratory tests on soils

CE592.7: Calculate soil properties from test results

Course contents: SOIL MECHANICS LAB-I

CONTACTS:3P=3HRS

CREDITS: 2

1. Field identification of different types of soil as per Indian standards [collection of field samples and identifications without laboratory testing], determination of natural moisture content.
2. Determination of specific gravity of i) Cohesion less ii) cohesive soil
3. Determination of In situ density by core cutter method & sand replacement method.
4. Grain size distribution of cohesionless soil by sieving & fine-grained soil by hydrometer analysis.
5. Determination of Atterberg's limits (liquid limit, plastic limit & shrinkage limit).
6. Determination of coefficient of permeability by constant head permeameter (coarse grained soil) & variable head permeameter (fine grained soil).
7. Determination of compaction characteristics of soil.

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE592.1	3	1	2	3	3	2	1	-	1	3	2	2
CE592.2	3	3	2	2	3	2	1	1	-	2	3	1
CE592.3	3	2	1	2	1	3	1	2	-	2	1	2
CE592.4	2	3	2	3	1	1	2	1	2	1	2	3
CE592.5	2	3	3	2	2	1	1	1	2	1	2	2
CE592	2.6	2.4	2	2.4	2	1.8	1.2	1.25	1.67	1.8	2	2

Paper Name: CIVIL ENGINEERING LAB

Paper Code: CE593

Total Contact Hours: 36

Credit: 2

Pre requisites: Student should have the basic knowledge about building material and construction and also should have knowledge about basic concrete property.

Course Objective: The objective of this course is to understand the characteristics and behavior of civil engineering materials used in buildings and infrastructure. Students will learn standard principles and procedure to design prepare and/or test materials such as concrete mix design including field test methods for fresh concrete. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.

Course Outcome:

CE593.1: Test of beams for deflection, flexure and shear

CE593.2: Experiments on Concrete, including Mix design

CE593.3: Illustrate knowledge on Non destructive testing (NDT) equipments – Rebound hammer, Ultra sonic pulse velocity meter

Course contents:

Determination of physical properties of bricks:

Size, shape, weight, water absorption, efflorescence test, crushing strength test

Determination of physical properties of Coarse Aggregate:

Abrasion, Crushing and Impact Test of Coarse Aggregate

Determination of physical properties of Structural Steel:

Stress Strain Behavior for the tensile test of Mild Steel and HYSD Bar

Structural Behavior of RC Beam:

Load deflection behavior of flexural beam member for flexure

Survey using Total Station

RDM(Remote Distance Measurement), REM(Remote Elevation Measurement), Horizontal & Vertical Angle determination using Total Station

Text / Reference Books: Properties of concrete by A.M Neville, Trans-Atlantic Publications

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE593.1	3	1	1	3	3	-	1	1	2	3	-	1
CE593.2	3	2	3	2	2	1	1	-	2	1	2	2
CE593.3	3	2	2	2	3	2	2	2	1	-	2	1
CE593	3	1.67	2	2.33	2.67	1.5	1.33	1.5	1.67	2	2	1.33

SESSIONAL

Paper Name: PRESENTATION SKILL

Paper Code: MC581

Total Contact Hours: 24

Credit: 2

Pre requisites: None

Course Objective: Presentation skills course will improve participants' public speaking skills and knowledge and also know how to prepare presentation.

Course Outcome:

MC581.1: Able to develop advanced skills of Technical Communication in English through Revision of LSRW skills learnt.

MC581.2: Able demonstrate improved interpersonal skills through Group Discussion both for organizational communication and campus recruitment drive.

MC581.3: Able to face various types of interviews.

MC581.4: Able to be industry ready professionals by various personality development programs

Course contents:

Unit-1:

Preparation of presentation:

What, how, for whom, structure, principles and presentation technique, business presentation specifications, Report Writing, Developing Effective Presentation Skills.

Oral Presentation: Principles of oral presentation, factors affecting presentation, sales presentation, training presentation, conducting surveys, speeches to motivate, effective presentation skills.

Power Point Presentation: Craft your message, Make a visuals, Include proper Content of your presentation.

Unit-2:

Verbal & Nonverbal communication during presentation

Verbal communication: jawbreakers, argumentation, usable and unsuitable phrases
Communication skills – listening, empathic reaction, how to question, stealing the show, opening door question Conflict situation solving, attack from the audience – communication skills as a work experience, vicious circle of attack and defense

Nonverbal communication: how to manage stress, what to do with hands, legs, activating the audience with nonverbal communication, body language

Unit-3:

Project Submission & Feedback

Work with audience: ice-breaking, get them in the mood, work with emotions, visualization tools, nonstandard situations Improvisation and unprepared presentations Personal typology, professional typology, social aspect, man-woman view.

Feedback: appreciation and critique, Paradigm of human cooperation – why there could be problems to start the communication and what to do with it – Defense against manipulation, how to say NO, stress management, Image and etiquette

Unit-4:

Advanced Techniques in Technical Communication

Interview through telephone/video-conferencing; Power-point presentation: structure and format; Using e-mail for business communication; Standard e-mail practices; Language in e-mail; Using internet for collecting information; Referencing while using internet materials for project reports; Writing for the media.

CO-PO mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MC581.1	–	-	-	-	-	2	-	-	3	3	3	3
MC581.2	-	-	-	-	-	3	-	-	3	3	3	3
MC581.3	-	-	-	-	-	2	-	-	3	3	3	3
MC581.4	-	-	-	-	-	3	-	-	3	3	3	3
MC581	-	-	-	-	-	2.5	-	-	3	3	3	3

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 6th Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Third Year Sixth Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/Week	Credits
THEORY:			L	T	P	Total	
HS	HU 603	ECONOMICS FOR ENGINEERS	2	1	0	3	2
PC	CE 601	STRUCTURAL DESIGN – II	2	2	0	4	3
PC	CE 602	ENVIRONMENTAL ENGINEERING	2	1	0	3	2
PC	CE 603	HIGHWAY AND TRANSPORTATION ENGINEERING	2	1	0	3	2
PE-II	CE 604A	ENGINEERING MATERIALS	2	2	0	4	4
	CE 604B	ELECTRICAL AND ELECTRONICS MEASUREMENT					
	CE 604C	MATERIAL HANDLING					
OE-I	CE 605A	OPERATION RESEARCH	2	2	0	4	4
	CE 605B	HUMAN RESOURCE MANAGEMENT					
	CE605C	STUDIES ON SIX SIGMA					
PRACTICAL:							
PC	CE 691	Transportation& Highway Engineering Lab	0	0	3	3	2
PC	CE 692	Structural Design And Detailing	0	0	3	3	2
PC	CE 693	Soil Mechanics Lab – II	0	0	3	3	2
PC	CE 681	Computer Aided Analysis & Design	0	0	2	2	1
		TOTAL: TEN	12	9	11	32	24

PAPER NAME: ECONOMICS FOR ENGINEERS

PAPER CODE: HU603

CONTACTS: 2L

CREDITS: 2 TOTAL: 20 HRS

1. Prerequisites:

The Course of Economics and Accountancy for Civil Engineering introduces students the concepts and conventions of Economics and Accounting principles, policies and methods. It emphasizes the application of basic Microeconomic and Macroeconomic concepts to current economic events such as scarcity, opportunity cost, supply and demand, elasticity, market efficiency, consumer/producer behavior, market structures, time value of money and stabilization policy. In addition, the course will examine the basic accounting and cost concepts to evaluate and project business performance. A combination of theory and practice will be tailored towards exuding engineering economics concepts.

Due to globalization and economic complexity, engineers are now required to have an in-depth understanding of the markets and how changes in these markets affect their bottom line. These can include a variety of things, such as understanding interest rates required to increase or sustain levels of capital stock, opportunity cost, net present value for calculating the value of investments, basic cost and revenue analysis, and more. Once we understand the mechanisms for learning engineering economics and its importance to 21st century engineers, it becomes apparent that this field will play a growing role in shaping successful engineers.

2. Course Objectives:

- To make fundamentally strong base for decision making skills by applying the concepts of economics.
- To educate the students on how to systematically evaluate the various cost elements of a typical manufactured product, an engineering project or service, with a view to determining the price offer.
- To prepare engineering students to analyze profit/revenue data and carry out make economic analysis in the decision making process to justify or reject alternatives/projects.

3. Course Outcome (CO):

- **CO1 : To Identify alternative uses for limited resources and obtain appropriate data.**
- **CO2 : To introduce and expand upon key economic concepts and to place them in a real world context facilitating practical insights.**
- **CO3 : To establish a framework of basic economic theory which can be extended and applied at later stages of the degree program.**
- **CO4 : To develop an appreciation of the importance of economic forces in shaping the contemporary world.**
- **CO5 :To employ critical thinking skills to analyze financial data as well as the effects of different financial accounting methods on the financial statement.**

- CO6 :To apply cost accounting principles to evaluate and project business performance.
- CO7 :To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making.

4. Syllabus Description :

Subject Name :Economics for Engineers

Subject Code : HU 603

Contracts: 2L

Credits- 2

Course Contents :

Part – I : Economics

Module - 1.Introduction :Meaning, Nature and Scope of Economics**(1L)**

Module - 2. Theory of Demand and Supply :Concept of demand, Determinants of demand, Individual and Market Demand, Exception to the law of demand. Concept of Supply, Shift in Demand and Supply Curve, Determinants of equilibrium price and quantity, Elasticity of Demand and Supply. **(2L)**

Module - 3. Theory of Production :Production Function, Types of Production Function , Law of Variable Proportions and Law of Return to Scale, Producer's Equilibrium **(2L)**

Module - 4.Theory of Costs : Cost Function, Types of Cost Function, Different Cost curves, Relation between Average and marginal cost, Relationship between Short Run costs and Long Run costs**(1L)**

Module - 5.Market Structure : Features, Short run and Long run Equilibrium aspects under Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly. **(2L)**

Module-6.Macroeconomic Aggregates and Concepts : GDP, GNP. Concepts and Measurement of National Income .Problems of National Income Accounting. Concept of Business Cycle.**(1L)**

Module -7.Inflation :Concept , Causes and Remedies of Inflation. **(1L)**

Part –II : Accountancy

Module - 1. Introduction to Financial, Cost & Management Accountancy:(1L)

Difference between Financial, Cost and Management Accountancy, Accounting Estimates & Principles, Cost Concepts and Classification of Cost

Module -2.Analysis of Income Statement and Balance Sheet: **(3L)**

Basic concept of Journal ,Preparation of Income Statement and Balance Sheet, Analysis of statement using significant Ratios.

Module -3.Cost Sheet: **(3L)**

Preparation of Cost sheet, Estimated Cost Sheet, Significance of Cost Sheet

Module - 4. Cost Volume Profit Analysis:

(3L)

Income Statement, Contribution, P/V Ratio, Break-Even Point, Margin of Safety, Short term decision making: Make or Buy, Shut-down point, Export Pricing, Opportunity and Sunk cost, Key Contribution etc.

5. Textbook and References :

1. Modern Economic Theory : K.K. Dewett. S.Chand

**2. Fundamentals of Economic Principles and problems : A. Banerjee & D. Maumder.
ABS Publishing House.**

3. Engineering Economics: R.PaneerSeelvan: PHI

**3. Accounting and Finance for Managers: Dr. Shantanu Chakra borty &Dr. AnupamKarmakar. Law Point
Publication**

6. CO – PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO8	PO9	PO10	PO11	PO12
CO1		3										2	
CO2	3		2				3					2	
CO3				2	2	3						2	2
CO4				3	3							2	2
CO5												2	
CO6												2	
CO7												2	
HU 603	3	3	2	2.5	2.5	3	3					2	2

PAPER NAME: STRUCTURAL DESIGN -II**PAPER CODE: CE601CONTACTS: 2L +2T =4HRS CREDITS: 3 TOTAL: 42 HRS****Prerequisites:**

A basic concept of material properties and behavior with basic knowledge of structural analysis and structural elements behavior under different loading pattern. Knowledge of stress and strain with fundamental concept of Engineering mechanics.

Course Objective:

Students will be able to analyse the behaviour of steel structure under different type of loading. To design a connection using IS:800-2007 and satisfy the serviceability and strength parameters. To acquire the knowledge to design tension, compression, members columns, beams. Using the codal Stipulation and basic knowledge of structural analysis students will be able to design plate girders and gentry girders considering lateral buckling.

Course Outcome:

CE 601.1 Understand various types of design methodology as per limit and working stress method
CE 601.2 Interpret different type of connections
CE 601.3 Design compression, tension and beam members
CE 601.4 Analyze column bases
CE 601.5 Design plate girder, uses of stiffeners
CE 601.6 Interpret and uses I.S Code specifications.

Course contents:**Module-I: [1L+1T]**

Materials and Specification:- Rolled steel section, types of structural steel, specifications, Residual stress

Module-II: [4L+4T]

Structure connections: Riveted, welded and bolted including High strength friction grip bolted joints– types of riveted & bolted joints, assumptions, failure of joints, efficiency of joints, and design of bolted riveted, fillet and butt welded joints for axial load, IS code provisions.

Eccentric connection:- Riveted & bolted joints subjected to torsion & shear, tension & shear, design of riveted, bolted & welded connection.

Module-III: [2L+2T]

Tension members: Design of tension members, I.S code provisions. Permissible stresses, Design rules, Examples

Module-IV: [4L+4T]

Compression members: Effective lengths about major & minor principal axes, I.S code provisions. Permissible stresses, Design rules, Design of one component, two components and built up compression members under axial load, Examples.

Built up columns under eccentric loading: Design of lacing and batten plates, Different types of Column Bases- Slab Base, Gusseted Base, and Connection details.

Module-V: [4L+4T]

Beams: Permissible stresses in bending, compression and tension, lateral buckling. Design of rolled steel sections, plated beams. Simple Beam end connections, beam -Column connections. I.S code provisions

Module-VI: [3L+3T]

Plate girders: Design of webs & flanges, Concepts of curtailment of flanges – Riveted & welded web stiffeners, web flange splices - Riveted, welded& bolted. I.S code provisions

Module-VII: [3L+3T]

Gantry Girder: Design gantry girder considering lateral buckling – I.S code provisions.

IS 800 – 2007 to be followed for all IS code provisions.

Text Books:

Design Of Steel Structures - S.K.Duggal Tata Mc-Graw Hill , New Delhi New Delhi

Reference Books:

Design of Steel structures N. Subramanian Oxford University Press

Design of steel structures A.S.Arya and J.L.Ajmani Nemchand& Bros.,

Design of steel structures, Vol. I & II Ramachandra

Design of steel structures PasalaDayaratnam – A.H.Wheeler& Co Ltd. 1990

Design of steel structures B.S.Krishnamachar and D.AjithaSinha – Tata McGraw – Hill publishing Co. Delhi.

Design of steel structures- Ramamurtham

IS 800 – 2007(Latest Revised code) Bureau of Indian Standard

S.P.: 6(1) – 1964 Structural Steel Sections Bureau of Indian Standard

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 601.1	3	3	3	3	3	3	-	-	-	-	-	-
CE 601.2	-	2	3	3	-	3	-	-	-	-	-	-
CE 601.3	-	2	-	3	3	3	-	2	-	-	-	-
CE 601.4	-	-	2	3	2	2	-	2	-	-	-	-
CE 601.5	-	2	2	3	2	2	-	-	-	-	-	-
CE 601.6	3	1	3	-	3	3	-	-	-	-	-	-
CE 601	3	2	2.6	3	2.6	2.6	-	2	-	-	-	-

PAPER NAME: ENVIRONMENTAL ENGINEERING**PAPER CODE: CE602****CONTACTS: 2L +1T =3HRS****CREDITS: 2****TOTAL: 36 HRS****Prerequisites:**

The basic concept of hydraulics with knowledge of pressure, loss etc calculation. Fundamentals of chemistry and preliminary knowledge of Quantity estimation.

Course Objective:

Students will gain knowledge on water demand and source of water they will acquire knowledge on water quality and its parameters. To be familiar with water distribution Network and water treatment procedures and methodology. Students will be familiar with sewage and Drainage and will be able to design sewer. Students will be acquainted with wastewater characteristics, pollution and wastewater treatment.

Course Outcome:

CE 602.1	Students will be able to understand key current environmental problems like level of pollution
CE 602.2	Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
CE 602.3	Be able to analyze an industrial activity and identify the environmental problems.
CE 602.4	Be able to plan strategies to control, reduce and monitor pollution.
CE 602.5	Be able to select the most appropriate technique to purify and/or control the emission of pollutants.
CE 602.6	Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity

Course contents:**Module-I: [2L+1T]**

Water demands: -Water demands; Per capita demand; Variations in demand; Factors affecting demand; Design period; Population forecasting

Module-II: [2L+1T]

Sources of water: Surface water sources; ground water sources

Module-III: [2L+1T]

Water Quality: Impurities in water; Water quality parameters; Standards for potable water.

Module-IV: [2L+1T]

Conveyance of water: Hydraulic design of pressure pipes

Module-V: [4L+2T]

Water Treatment: Typical flow chart for surface and ground water treatments; Aeration, Plain sedimentation, Sedimentation with coagulation, Water Softening, Filtration, Disinfection.

Module-VI: [4L+2T]

Water Distribution: Analysis of distribution network; Storage and distribution reservoirs; Capacity of reservoirs.

Module-VII: [2L+1T]

Sewage and Drainage: Definition of Common Terms, Quantity estimation for sanitary sewage and storm sewage.

Module-VIII: [2L+1T]

Sewer Design: Hydraulic design of sewers, Partial flow diagrams and Nomograms

Module-IX: [2L+1T]

Wastewater Characteristics & Water pollution: Physical, chemical and biological characteristics, DO, BOD and COD, pollution characteristics of typical industries, suggested treatment

Module-X: [2L+1T]

Wastewater Treatment: Typical flow chart for wastewater treatment; Primary Treatments; Secondary Treatments: Activated Sludge Process, Trickling Filter Process, Septic Tank

Text Books:

Environmental Engineering, S.K. Garg, Khanna Publishers

Reference Books:

Water Supply, Waste Disposal and Environmental Pollution Engineering, A.K. Chatterjee Khanna Publishers.
Environmental Engineering, Vol.II, P. N. Modi,
Environmental Modelling, , Rajagopalan Oxford University Press.
Environmental Engineering P. V. Rowe TMH

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 602.1	-	3	-	-	-	1	2	1	-	-	-	-
CE 602.2	-	-	2	-	1	1	-	-	-	-	-	-
CE 602.3	1	1	1	2	-	-	-	-	-	-	-	-
CE 602.4	-	-	2	-	2	-	-	-	-	-	-	-
CE 602.5	1	-	1	2	2	-	-	-	-	-	-	-
CE 602.6	-	-	-	-	-	-	2	1	-	2	3	-
CE 602	1	2	1.5	2	1.6	1	2	1	-	2	3	-

PAPER NAME: HIGHWAY AND TRANSPORTATION ENGINEERING**PAPER CODE: CE603****CONTACTS: 2L +1T =3HRS****CREDITS: 2TOTAL: 36****HRS**

Pre requisites: Student should have knowledge about measurement and mathematical knowledge

Course Objective: The objective of this course is appreciate of the need for lifelong learning through the discussion of recent changes and studies of highway and transportation engineering, also have the ability to apply knowledge of mathematics, science, and engineering to understand the design techniques and equipment used in highway engineering.

Course Outcome:

CE 603.1	Students will receive the introduction and history of highway engineering and economics also which will remain correct for long period of time.
CE 603.2	Students will calculate and design the different component of the highway such as sight distances, horizontal curves, superelevation, extra widening, transition curves and gradient, vertical curves etc.
CE 603.3	Students will learn about the design criteria of pavements by IRC guideline.
CE 603.4	Students will get the knowledge about the traffic engineering and components of traffic such as traffic signs, signals, design of traffic signals design, rotary intersection, Volume studies, speed studies etc.
CE 603.5	Students will examine and test materials of highway such as Soil, Stone Aggregate, Bitumen, Marshal Stability Test etc. Also get knowledge about construction of highway.

Course contents:**Module-I: [2L+1T]**

Introduction to Highway Engineering– Role of transportation, Modes of transportation, History of Road Development, Nagpur Road Plan, Bombay Road Plan and Lucknow Road Plan, Road Plan 2021, Road Patterns, Jayakar Committee Report, saturation system, factors controlling highway alignment; engineering surveys for highway alignment and location.

Module-II: [2L+1T]

Highway Economics- Highway financing (pay as you go method and credit financing method) , quantifiable and non-quantifiable benefits to highway users, cost of vehicle operation, annual cost method, and benefit-cost ratio method.

Module-III: [4L+2T]

Highway Geometric Design- Cross section elements, design factors, carriageway, camber, shoulder, PIEV theory, sight distances, horizontal curves, superelevation, extra widening, transition curves and gradient, vertical curves.

Module-IV: [6L+3T]

Pavement Design– Evaluation of soil sub grade, sub-base, base and wearing courses; design factors for pavement thickness, failure of flexible and rigid pavements. IRC method of flexible pavement design (IRC 37-2001 & IRC 37-2012) Westergaard's analysis of wheel load stresses in rigid pavements; frictional stresses and warping stresses; IRC method for design of rigid pavements (IRC 58-2011).

Module-V: [6L+3T]

Traffic Engineering- Traffic Characteristics, Volume studies, speed studies, capacity, density, traffic control devices: road marking, signs, signals, design of traffic signals, rotary intersection design, parking studies.

Module-VI: [4L+2T]

Highway Materials and Construction- Tests on Soil, Stone Aggregate, Bitumen, Marshal Stability Test, tar and asphalt, Road construction methods, water bound macadam, surface dressing, bituminous carpeting, bituminous bound macadam and asphaltic concrete, cement concrete road construction.

Text Books:

High Way Engineering Khanna& Justo Nemchand& Brothers, Roorkee

Reference Books:

Principles of Transportation Engineering P. Chakraborty& A. Das PHI

Transportation Engineering- C.J Khisty& B.K Lall.

I.S Specifications on Concrete , Aggregate & Bitumen Bureau of Indian Standard

Relevant latest IRC Codes (IRC-37 – 2001, IRC 58 – 2002, IRC 73 - 1980, IRC 86 - - 1983, IRC 106 – 1990, IRC 64 – 1990, IRC 15- 2002 Indian Road Congress

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 603.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 603.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 603.3	-	-	-	-	-	-	-	-	-	-	-	-
CE 603.4	3	3	3	3	2	2	1	1	3	2	2	2
CE 603.5	3	3	3	3	2	1	1	1	3	2	1	2
CE 603	3	3	3	2.5	2.25	1.5	1	1	3	2.25	2.25	2.25

PAPER NAME: ENGINEERING MATERIALS

PAPERCODE: CE604A CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 42HRS

Prerequisites:

Knowledge of materials and metals, Definition of crystal, Knowledge of alloys etc.

Course Objective:

Introduction and behaviour of metals and crystals structure.

Introduction of phase diagram.

Introduction of Iron Carbide system and metal alloys.

Mechanical properties and different types of treatments of metals and materials.

Use of polymers.

Course Outcome:

CE 604A.1	Understanding the behaviour and properties of materials
CE 604A.2	Understanding the features of crystals and alloys
CE 604A.3	Uses of polymers, ceramic etc

Course contents:

Module-I: [2L+1T]

Introduction: Material Science—its importance in engineering; Classification of Materials—metals, polymers, ceramics, composites; Advanced materials—semiconductors, smart materials, nano-materials; Review atomic structure, Atomic bonding in solids—bonding forces and energies; ionic/covalent/metallic bonding.

Module-II:[2L+1T]

Crystal Structure: Fundamental concepts; Unit cells; seven crystal systems; singlecrystal, polycrystalline and non-crystalline materials; Metallic crystal structures—FCC, atomic packing factor, BCC & HCP structures.

Module-III:[1L+1T]

Imperfections in Metals: Point defects due to vacancy & impurities, alloys, solid solutions; Dislocations—linear defects, interfacial defects, grain boundaries.

Module-IV: [2L+1T]

Phase Diagrams: Definition and basic concepts; solubility limit; Phase equilibrium, one component phase diagram, binary phase diagram, interpretation of phase diagrams.

Module-V: [1L+1T]

Iron-carbon System: allotropy of iron, iron-iron carbide phase diagram, properties and uses of plain carbon steel.

Module-VI: [3L+3T]

Classification of Metals and Alloys- compositions, general properties and uses:

Ferrous alloys: Classification—low carbon steels, medium carbon steels, high carbon steels, stainless steels, alloy steels, tool and die steel, cast irons.

Non-ferrous alloys: Copper & Copper alloys; Aluminum alloys; Zinc alloys; Nickel alloys; Lead & Tin alloys.

Module-VII: [3L+3T]

Mechanical Properties of Materials: Elastic properties of materials—tensile and compressive stress and strain, stress-strain behaviour, modulus of elasticity (Young's modulus), yield strength, tensile strength, plastic deformation, true stress and strain; Ductility; Resilience; Toughness, impact tests; Hardness—Brinell, Rockwell and Vickers hardness and their testing procedures, correlation between hardness and tensile strength; Fatigue strength; Effect of temperature on tensile strength & impact properties, creep failure.

Module-VIII: [3L+3T]

Heat Treatment: Definition and purposes; Heat treatment processes for steels—Hardening, structural change during heating and cooling, factors affecting hardening; Tempering; Austempering; Normalizing; Annealing—full annealing, spheroidising annealing, stress-relieving, recrystallisation annealing; Precipitation or Age Hardening of non-ferrous alloys.

Module-IX: [2L+1T]

Polymers & Elastomers: Definition; How polymers are made- polymerization; Polymer molecular structures; Thermoplastics & Thermosets; Special characteristics like low sp.gravity, optical, electrical & thermal property, decorative color, easy formability, low corrosion etc. Use of polymer sand elastomers.

Module-X: [1L+1T]

Ceramic Materials: What is ceramics; common ceramic materials and their characteristics; How ceramics are made—sintering and vitrification process; Ceramic structures; Properties and applications.

Module-XI: [1L+1T]

Composite materials: What is composites; Polymers matrix and their applications; Metal matrix and ceramic matrix composites and their applications; How composites are made.

Module-XII: [1L+1T]

Corrosion and Degradation of Engineering Materials: Definition; Types of corrosion—uniform, pitting, crevice, galvanic, stress corrosion cracking and erosion; Corrosion control — material selection, environment control, proper design.

Module-XIII: [1L+1T]

Materials Selection Methodology: Selection of material based on required properties, availability and cost of material, environmental issues.

Text Books:

Materials Science and Engineering by W.D. Callister and adapted by R. Balasubramaniam, Wiley India, 2010 Ed.

Reference Books:

Engineering Materials: properties and selection by Budinski & Budinski, 9th Ed., Prentice Hall India

Engineering Materials and Metallurgy by R.Srinivasan, 2nd Ed., Tata McGraw Hill.

Materials & Processes in Manufacturing by E.P.Degarmo and adapted by Black & Kosher, 10th Ed., Wiley India.

Materials Science and Engineering by V.Raghavan, 5th Ed., Prentice Hall India.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 604A.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 604A.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 604A.3	1	1	1	1	3	2	3	2	3	3	2	1
CE 604A.4	3	3	3	3	2	2	1	1	3	2	2	2
CE 604A.5	3	3	3	3	2	1	1	1	3	2	1	2
CE 604A	2.6	2.6	2.6	2.2	2.4	1.6	1.4	1.6	3	2.4	2.2	2

PAPER NAME: ELECTRICAL & ELECTRONICS MEASUREMENT
PAPERCODE: CE604B CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 34HRS

Paper Name: Electrical and Electronic Measurement

Paper Code: CE 604B

Total Contact hours: 34

Credit: 3

Pre-requisites: Concepts of basic Electrical Engineering

Course Objectives:

1. To learn the operation and construction of different type of measuring instruments.
2. To understand the basic of wattmeter and energy meter.
3. To learn the concept of various type of electronic instruments.
4. To develop gain knowledge on measurement of power and energy.
5. To relate the working of different types of instruments
6. To develop an understanding of the operation principle of CRO.

Course outcome:

On completion of the course students will be able to:

COs	CO Statement
CE 604B.1	Understand the basics of Electrical measuring system and their classification
CE 604B.2	Student will be able to measurement of voltage and current by the use of CT and PT for extending instruments ranges.
CE 604B.3	Understand and measure of Resistance, Inductance, Capacitance, Power, and Energy
CE 604B.4	Student will be able to understand the function of cathode ray oscilloscope with block diagram.
CE 604B.5	Internal and general repairing of instruments and problem solving capacity

Course contents:

MODULE I [6L]

Measurements: Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, and noise

Analog meters: General features, Construction, Principle of operation and torque equation of Moving coil, Moving iron, Electrodynamometer, Induction instruments • Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and multipliers.

MODULE II [10L]

Instrument transformer: Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of Current & Potential transformer, errors. Measurement of Power: Principle of operation of Electrodynamics & Induction type wattmeter. Wattmeter errors. Measurement of resistance: Measurement of medium, low and high resistances, Megger.

MODULE III [11L]

Measurement of Energy: Construction, theory and application of AC energy meter, testing of energy meters. Explain working and application of DC bridge: Wheatstone bridge, Kelvin's double bridge AC Bridges: Measurement of Inductance, Capacitance and frequency by AC bridges. (Maxwell's bridge, Hay bridge, Schering bridge)

MODULE IV [7L]

Cathode ray oscilloscope (CRO): Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO. Electronic Instruments: Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter, Digital frequency meter, Signal generator.

Text books :

- 1) A course in Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney, Dhanpat Rai & sons.
- 2) Electrical Measurement & Measuring Instruments, E.W. Golding & F.C. Wides, Wheeler Publishing.
- 3) Electronic Instruments, H.S. Kalsi, Tata Mc-Graw hill, 2nd Edition.

Reference books:

- 1) Sensors & Transducers, D. Patranabis, PHI, 2nd edition.
- 2) Digital Instrumentation, A.J. Bouwens, Tata Mc-Graw hill.
- 3) Modern Electronic instrumentation & Measuring instruments, A.D. Heltric & W.C. Copper, Wheeler Publication.
- 4) Instrument transducers, H.K.P. Neubert, Oxford University press.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE604B.1	2	2	2	3	1	-	-	-	-	-	-	1
CE604B.2	3	2	2	2	1	-	-	-	-	-	-	1
CE604B.3	2	2	2	2	2	-	-	-	-	-	-	1
CE604B.4	3	2	2	3	2	-	-	-	-	-	-	1
CE604B	2.5	2	2	2.5	1.5	-	-	-	-	-	-	1

PAPER NAME: MATERIAL HANDLING

PAPERCODE: CE604C CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 42HRS

Prerequisites: Student should have knowledge about the materials and the working principals of machines.

Course Objective:

To inculcate the essentials of Civil Engineering field to the students of all branches of Engineering

To provide the students an illustration of significance of the civil engineering practices.

Classification of materials and mechanical handling

Basic concept of cranes, EOT, conveyor

Load handling attachments of machines and elementary design of AGV.

Course Outcome:

CE 604C.1	Ability to identify about the materials and the load characteristics.
CE 604C.2	Understanding the working principal of different types of conveyors, elevators
CE 604C.3	Understanding the working principal of Cranes, load handling instrument.
CE 604C.4	Understanding the principal and design of AGV, EOT.

Course contents:

Module 1:[3L+3T]

Classification of Material, Bulk and unit load characteristics, Classification of mechanical handling equipment's

Module 2: [4L+4T]

Different types of elevators, working principles and simple calculations of elevators, Theory of Belt conveyor, construction, salient parts, capacity and elementary design of conveyor

Module 3: [4L+4T]

Construction and elementary design of screw conveyor, Scraper conveyor and trolley conveyor, Gravity chute, feeder and other accessories of conveyors

Module 4:[4L+4T]

Classification and elements of cranes, Pulley block, wire ropes, chains, sheaves, sprockets and drum, Load handling attachments. Hand operated winch with spur, Hoisting pulley block

Module 5:[6L+6T]

Electric overhead travelling crane (EOT), Travelling mechanisms, Hoisting mechanisms. Jib and pillar cranes, Derricks and mobile cranes. Forklift trucks and manipulators, Flexible robotised handling systems, Automated guided vehicles (AGV), principles and elementary design.

Text Books:

S. Ray, Introduction to Materials Handling, New Age Int. Pub.

Reference Books:

T. K. Ray, Mechanical Handling of Materials, Asian Books Pvt. Ltd.

T.H. Allegri, Materials Handling: Principles and Practices, CBS Publishers and Distributors.

J.A. Apple, Material Handling System Design, John Wiley & Sons

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 604C.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 604C.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 604C.3	3	3	2	2	1	1	2	2	2	1	1	2
CE 604C.4	3	3	3	3	2	2	1	1	3	2	2	2
CE 604C.5	3	3	3	3	2	1	1	1	3	2	1	3
CE 604C	3	3	2.8	2.4	2	1.5	1	1	2.8	2	2	2.5

PAPER NAME: OPERATIONS RESEARCH
PAPERCODE: CE605A CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 42HRS

Prerequisites: Basic concepts of Probability distribution , statistical estimation, regression analysis and ANOVA, Basic Mathematics

Course Objectives:

- 1) To study various optimization techniques in real world problems related to civil engineering
- 2) To study the inventory models
- 3) To study about assigning jobs to people in an efficient way
- 4) To study about sequencing techniques
- 5) To understand transportation model utility in construction industry

Course Outcome:

CO-1. At the end of the course, the students will be able to identify and develop operational research models from the verbal description of the real System.

CO-2. Apply the mathematical tools that are needed to solve optimisation problems.

CO-3. Use mathematical software to solve the proposed models.

CO-4. Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decisionmaking processes in Management Engineering.

Course contents:

Module 1:[5L+5T]

Introduction: Definition and scope of operations research (OR), OR model, solving the OR model, art of modeling, phases of OR study. Linear Programming: Two variable Linear Programming model and Graphical method of solution, Simplex method, Dual Simplex method, special cases of Linear Programming, duality, sensitivity analysis.

Module 2 : [5L+5T]

Transportation Problems: Types of transportation problems, mathematical models, transportation algorithms, Assignment: Allocation and assignment problems and models, processing of job through machines.

Module 3: [5L+5T]

Network Techniques: Shortest path model, minimum spanning Tree Problem, Max-Flow problem and Min-cost problem.

Project Management: Phases of project management, guidelines for network construction, CPM and PERT.

Module 4: [3L+3T]

Theory of Games: Rectangular games, Minimax theorem, graphical solution of 2 x n or m x 2 games, game with mixed strategies, reduction to linear programming model. Quality Systems: Elements of Queuing model, generalized poisson queuing model, single server models.

Module 5: [3L+3T]

Inventory Control: Models of inventory, operation of inventory system, quantity discount. Replacement: Replacement models: Equipments that deteriorate with time, equipments that fail with time.

Text Books:

Wayne L. Winston, "Operations Research" Thomson Learning, 2003.

Reference Books:

Hamdy H. Taha, "Operations Research-An Introduction" Pearson Education, 2003.

R. Panneer Seevam, "Operations Research" PHI Learning, 2008.

V.K.Khanna, "Total Quality Management" New Age International, 2008

P. M. Karak – "Linear Programming and Theory of Games", ABS Publishing House

Ghosh and Chakraborty, "Linear Programming and Theory of Games", Central Book Agency

M. V. Durga Prasad – "Operations Research", CENGAGE Learning

CO-PO Mapping:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1						3	2		3			3
CO-2						1		1		3		1
CO-3						2						1
CO-4						3	2		3	3		2
CE 605A						2.25	2	1	3	3		2.33

PAPER NAME: HUMAN RESOURCE MANAGEMENT

PAPERCODE: CE605B CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 30HRS

Prerequisites: Basic concepts of Management and Planning

Course Objectives:

- 1) Explain the importance of human resources and their effective management in organizations
- 2) Demonstrate a basic understanding of different tools used in forecasting and planning human resource needs
- 3) Outline the current theory and practice of recruitment and selection and demonstrate the ability to prepare a selection strategy for a specific job.
- 4) Evaluate a benefits package that supports the organization's strategy in line with HRM cost-containment policies and practices and Recommend actions based on results of the compensation analysis and design compensation schemes that are cost effective, that increase productivity of the work force, and comply with the legal framework
- 5) Explain their understanding of the administrative complexities of providing a full array of benefits to employees and the ways and means of delivering these benefits

Course Outcome:

CO-1: On completion of this course the students will be able to know resource

CO-2: planning and management in construction.

CO-3: Plan and manage key human resource functions within organizations.

CO-4: Contribute to employee performance management and organizational Effectiveness

Course contents:

Module 1:[2L+2T]

Introduction – Nature and scope of HRM, HRM: functions and objectives of HRM, HRM model, evaluation of HRM, need of HRD in the context of globalization.

Module 2 : [3L+3T]

Human Resource Planning-Importance of HRP, Factors affecting HRP, Planning process Manpower calculations: techniques of manpower planning for company project, Various HRD parameters, functional skills, supervisory skills, entrepreneurship skills

Module 3: [5L+5T]

Recruitment & Selection & Training- Recruiting Human resources: Nature, purpose and importance of recruitment, Factors governing recruitment, Recruitment process Selecting Human Resources: Organisation for selection, selection process, barriers to effective selection, selection in India Inducting and Placing: Evaluation of orientation program, Problems of orientation, typical orientation program.

Module 4: [2L+2T]

wage & Salary -Remuneration: Remuneration of personnel, Factors Influencing employees remuneration, various method of deciding the remuneration wage policy in India Job evaluation, Performance appraisal, Merit rating.

Module 5: [3L+3T]

Managing HR Activities- Labour Laws: Contract Labour Act, Equal Remuneration Act, Minimum Wage , Payment of wage, Gratuity, Bonus payment.

Text Books:

Aswathappa K, “Human Resource Management”, Tata McGraw Hill, Vth Edition, 2008

Reference Books:

DeNisi A.S., Griffin R.W., “Human Resource Management”, Biztantra Publishers, II Edition, 2009

Loosemore M., Dainty A., Lingard H., “Human Resource Management in Construction Projects”, Spon Press, 2003

Monappa A, "Personnel Management", Tata McGraw Hill, New Delhi, 1997

Rao T, "HRD in the New Economic Environment", Tata McGraw Hill

William J Bruns Jr. "Performance Measurement, Evaluation and Incentives", Tata McGraw Hill.

Gary Dessler, Human Resource Management - (8th ed.,) Pearson Education, Delhi

CO-PO Mapping:

CO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1					2	1	2		3			3
CO-2						1		1	3	3		3
CO-3					1	2				3		1
CO-4						3	2		3	3		2
CE 605B					1.5	2.33	2	1	3	3		2.25

PAPER NAME: STUDIES ON SIX SIGMA

PAPERCODE: CE605C CONTACTS: 2L+2T=4HRS CREDITS:4

TOTAL: 42HRS

Prerequisites:

Should have knowledge of Mathematics and Statistics.

Course Objective:

1. To translate the selection, application and implementation of a Six Sigma project including roles and responsibility of team members
2. Collect appropriate data from process to support problem solving.
3. Create details flowchart and process maps.
4. Demonstrate ability to control and monitor process.

Course Outcome:

CE 605C.1	Understand requirement of implementation of Six Sigma.
CE 605C.2	Relate Six Sigma concept to the overall business mission and objective.
CE 605C.3	Understand Six Sigma methodology including DMAIC.
CE 605C.4	Employ Six Sigma skills to lead a successful process improvement project for a meaningful result.

Course contents:

Module 1:[2L+2T]

Introduction – General History of Six Sigma, Evolution and Value of Six Sigma, The Basics and meaning of Six Sigma, Basic Concepts of variation.

Module 2 : [2L+2T]

Six sigma Roles and responsibilities, Implementing Six Sigma, Six Sigma Roadmap, Process Mapping, Lean Principles and Value Stream Mapping, Selection and defining Six Sigma Projects.

Module 3: [2L+2T]

Becoming a Customer and Market-Driven Enterprise, Voice of the customer, Customer Expectations and Needs, Linking Six Sigma Projects to Strategies

Module 4: [2L+2T]

Attributes of Good Metrics, Using Resources Wisely, Project Management Using the DMAIC and DMADV Models

Module 5: [2L+2T]

The Lean enterprise, The History of Lean, Understanding lean, Lean & Six Sigma, The seven elements of waste

Module 6: [2L+2T]

The Define Phase – Defining a process, Critical to Quality Characteristics, Cost of Poor Quality, Basic Six Sigma Metrics, Pareto Analysis

Module 7: [2L+2T]

The Measure Phase – Process Definition, Cause and effect / Fishbone Diagram, Basic Probability and Statistics, X-Y Diagram, Normal Distribution and Normality, Precision & Accuracy, Process Capability

Module 8: [2L+2T]

The Analyze Phase- Pattern of Variation, Multi-Vari Analysis, Inferential Statistics, Sampling Techniques & Uses, Central Limit Theorem, Hypothesis Testing, Confidence Intervals, Analysis of Variance (ANOVA)

Module 9: [2L+2T]

Improve Phase: Simple linear Regression, Correlation, Regression Equations, Residual analysis, Multiple and Non- linear regression, Data transformation, Box Cox.

Module 10: [3L+3T]

The Control Phase: Lean Controls, Control Methods for 5S, Kanban, Poka – Yoka (Mistake Proofing), Statistical process Control (SPC), Data collection of SPC, Six Sigma Control Plans, Cost benefit analysis, Elements of control Plan, Elements of Response Plan.

Text Books:

Simplified six sigma methodology tools and implementation- N. Gopala Krishnan, PHI

Eight steps to problem solving- six sigma- Mohit Sharma, Zorba Books

Reference Books:

Six Sigma Handbook – PYZBEK

ASQ Certified Six Sigma Handbook – American Society of Quality.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE605C.1	3	1		1		-	-	-	-	-	-	1
CE605C.2	2	1	1	1	1	-	-	-	-	-	-	1
CE605C.3	3	3	3	2	2	-	-	-	-	-	-	1
CE605C.4	3	3	3	3	3	-	-	-	2	2	2	1
CE 605	2.75	2	2.33	2.33	2				2	2	2	1

PRACTICAL SUBJECT NAME: TRANSPORTATION & HIGHWAY ENGINEERING LAB

PAPER CODE: CE691

CONTACTS: 3P=3HRS

CREDITS: 2

Pre requisites: Student should have the basic knowledge about Highway&Transportation engineering.

Course Objective: The objective of this course is to understand the characteristics and behavior of highway materials used in highway engineering. Students will learn standard principles and procedure to design prepare and/or test materials such as B.M. & S.D.B.C. mix design including Marshal Stability Test. Know how to select materials based on their properties and their proper use for a particular facility under prevailing loads and environmental conditions.

Course Outcome:

CE 691.1	Identify the functional role of different materials of highway engineering.
CE 691.2	Apply this knowledge to mix design philosophy to get different suitable B.M. & S.D.B.C. Mix.
CE 691.3	Student should be able to test of existing highway and examine the quality of that highway by Benkelman Beam Test.
CE 691.4	Student shall learn to work in a team to achieve the objective.

Course contents:

1. **Tests on highway materials** – Aggregates- Impact value, los-Angeles Abrasion value water absorption, Elongation & Flakiness Index.
2. **Bitumen & bituminous materials** – Specific Gravity, Penetration Value, Ductility, Softening Point, Loss on Heating, Flash & Fire Point Test.
3. **Stripping value test**
4. **Design of mix gradation** for mix seal surfacing Design of B.M. & S.D.B.C. Mix
5. **Marshal Stability Test.**
6. **Benkelman Beam Test.**

Text Books:

Highway material testing(Laboratory Manual)by S.K. Khanna and CE.G. Justo
Relevant IS & I.R.C. codes.

Reference Books:

BIS codes on Aggregates & Bituminous materials

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 691.1	3	2	2	2	2	-	-	-	1	1	-	1
CE 691.2	3	2	2	2	2	1	1	1	1	-	-	1
CE 691.3	3	2	2	2	2	1	-	-	1	-	-	1
CE 691.4	1	1	1	1	1	-	1	1	3	2	2	1
CE 691	2.5	1.75	1.75	1.75	1.75	1	1	1	1.5	1.5	2	1

PRACTICAL SUBJECT NAME: STRUCTURAL DESIGN AND DETAILING

PAPER CODE: CE692

CONTACTS: 3P=3HRS

CREDITS: 2

Pre requisites: Student should knowledge about rcc and steel structure design of various structural components and building structure.

Course Objective: Student should be able to design structural components and RCC and steel structure .Students will be able to understand about the members of structure , different loading condition how it behaves and where to use such member

Course Outcome:

CE 692.1	Design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision.
CE 692.2	Design & detailing of a i) simply supported R.C.C Beam ii) Continuous T- Beam
CE 692.3	Student should be able to Design & Detailing of columns, isolated and combined footing.
CE 692.4	Design of different units: Slab, beam column, roofing and staircase from floor plan of a multistoried frame building, typical detailing of a two way floor slab.
CE 692.5	Problems on general consideration and basic concepts
CE 692.6	Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875
CE 692.7	Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875
CE 692.8	Design & drawing of the components of a roof truss

Course contents:

1. General considerations: Design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision.
2. Design & detailing of a i) simply supported R.C.C Beam ii) Continuous T- Beam.
3. Design & Detailing of columns, isolated and combined footing
4. Design & detailing of a i) simply supported one way slab ii) One way Continuous slab.
5. Design of different units: Slab, beam column, roofing and staircase from floor plan of a multistoried frame building, typical detailing of a two way floor slab.
6. Problems on general consideration and basic concepts
7. Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875
8. Design & drawing of the following components of a roof truss:

Members of the roof truss.

Joints of the roof truss members
 Purlins
 Gable bracings
 Column with bracings
 Column base plate
 Column foundation

Text Books:

R.C.C design: Punmia, Jain, Jain

Design Of Steel Structures - S.K.Duggal Tata Mc-Graw Hill , New Delhi New Delhi

Reference Books:

Reinforced cement concrete design- Nilam shrama

Design of Steel structures N. Subramanian Oxford University Press

Design of steel structures A.S.Arya and J.L.Ajmani Nemchand& Bros.,

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 692.1	3	2	2	2	2	-	-	-	1	1	-	1
CE 692.2	3	2	2	2	2	1	1	1	1	-	-	1
CE 692.3	3	2	2	2	2	1	-	-	1	-	-	1
CE 692.4	3	1	1	1	1	-	1	1	3	2	2	1
CE 692.5	3	3	3	1	1	1	1	1	2	1	2	1
CE692.6	3	2	2	2	2	1	1	1	1	2	3	1
CE 692.7	3	2	2	1	1	1	1	1	3	3	2	1
CE 692.8	3	2	2	2	2	1	1	1	2	3	2	1
CE 692	3	2	2	1.63	1.63	0.75	0.75	0.75	1.75	1.38	1.38	1

PRACTICAL SUBJECT NAME: SOIL MECHANICS LAB-II**PAPER CODE: CE693****CONTACTS: 3P=3HRS****CREDITS: 2****Prerequisites:**

Basic course on soil mechanics with understanding of soil parameters, behavior and response against loading.

Course Objective:

Students will be able to access unconfined compressive strength of soil, shear parameter of soil by direct shear test and undrained shear strength by vane shear test . Students will be familiar with fractional test standard penetration test.

Course Outcome:

CE693.1	Ability to calculate the compressive strength of soil
CE693.2	Ability to perform shear strength of soil
CE693.3	Ability to understand standard penetration test
CE693.4	Ability to understand consolidation parameters of soil

Course contents:

1. Determination of compressibility characteristics of soil by Oedometer test (co-efficient of consolidation & compression Index)
2. Determination of unconfined compressive strength of soil
3. Determination of Shear parameter of soil by Direct shear test
4. Determination of undrained shear strength of soil by Vane shear test.
5. Determination of shear parameter of soil by Triaxial test (UU)
6. Standard Penetration Test
7. Expt No. 6 by large groups in the field.

Text Books:

Soil testing by T.W. Lamb (John Willey)

Reference Books:

SP-36 (Part-I & Part –II)

Soil Mechanics Laboratory Manual by B. M. Das, OXFORD UNIVERSITY PRESS

Measurement of engineering properties of soil by E.Jaibaba Reddy & K. Ramasastri.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE693.1	3	3	-	3	3	-	-	-	-	2	-	2
CE693.2	3	3	-	3	3	-	-	-	-	2	-	2
CE693.3	3	3	-	3	3	-	-	-	-	2	-	2
CE693.4	3	3	-	3	3	-	-	-	-	2	-	2
CE693	3	3	-	3	3	-	-	-	-	2	-	2

PRACTICAL SUBJECT NAME: COMPUTER AIDED ANALYSIS AND DESIGN**PAPER CODE: CE681****CONTACTS: 2P=2HRS****CREDITS: 1****Prerequisites:**

Fundamentals of computer operation with basic knowledge of Structure Analysis and Design for different structural components with basic knowledge of engineering drawing.

Course Objective:

Students will be familiar with features of detailing and design of structure by using software detailing of different structural elements and analysis and design of those by using softwares.

Course Outcome:

CE 681.1 Students will be able to integrate the role of graphic communication in the engineering design process

CE 681.2 Students will be able to use CAD software to generate a computer model and technical drawing for a simple, well-defined part or assembly.

CE 681.3 Students will be able to apply basic concepts to develop construction (drawing) techniques and produce 2D Orthographic Projections

CE 681.4 Understand and demonstrate dimensioning concepts and techniques

CE 681.5 Become familiar with the use of Blocks, Design Center, and Tool Palettes, Solid Modeling concepts and techniques

Course contents:

1. Introduction and important features of a software dealing with analysis and design of structures
2. Analysis and design of a multistoried building using software.
3. Preparation of detailed drawings of different structural elements including ductility detailing.
4. RCC Slab, beam, column and footing design.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 681.1	1	2	1	1	3	-	-	-	-	3	2	-
CE 681.2	1	2	1	1	3	-	-	-	-	3	2	-
CE 681.3	1	2	1	1	3	-	-	-	-	3	1	-
CE 681.4	1	2	1	1	3	-	-	-	-	3	1	-
CE681.5	1	2	1	1	1	-	-	-	-	1	-	-
CE 681	1	2	1	1	2.6	-	-	-	-	3	1.5	-

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 7th Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Fourth Year Seventh Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/Week	Credits
THEORY:			L	T	P	Total	
PC	CE 701	Water Resource And Irrigation Engineering	2	1	0	3	2
PE-III	CE702A	Bridge Engineering	3	1	0	4	4
	CE 702B	Prestressed Concrete					
	CE 702C	Structural Dynamics And Earthquake Engineering					
PC	CE 703	Construction Planning And Management	2	2	0	4	3
OE-II	CE704A	Transportation Engineering	3	1	0	4	3
	CE 704B	Traffic Engineering & Planning					
	CE 704C	Urban Planning					
PRACTICAL:							
PC	CE 791	ENVIRONMENTAL ENGINEERING LAB	0	0	3	3	2
SESSIONAL:							
PW	CE 781	Project I	0	0	6	6	4
MC	MC 782	Seminar	0	0	0	0	2 Units
PW	CE 782	Civil Engineering Practice Sessional	0	0	3	3	3
PW	CE 783	Industrial Training	0	0	0	0	3
		TOTAL: NINE	10	5	12	27	24

PAPER NAME: WATER RESOURCE AND IRRIGATION ENGINEERING**PAPER CODE: CE701 CONTACTS: 2L +1T = 3HRS CREDITS: 2 TOTAL: 36 HRS****Prerequisites:**

Basic course in Hydraulic Engineering with emphasis on behavior and utilization of groundwater with basic knowledge of interpretation of charts and mathematics.

Course Objective:

Students will gain knowledge on the hydrologic cycle, rainfall Calculation and measurement and frequency analysis of rainfall intensity curve. students will also be familiar with direct and indirect method of stream flow measurement to acquire the basic engineering technique of calculating hydrograph S curve flood routing. students will gain knowledge on irrigation methods duty, delta and crop seasons. To acquire knowledge on Canal irrigation and design of Alluvial channel by silt theories kennedy's method, lacey's theory. Familiarity with water logging and Drainage with basic knowledge on groundwater flow, Darcy's law, well tube well.

Course Outcome:

CE 701.1	The student will be able to acquire knowledge of Hydrological Cycle and its component.
CE 701.2	The student will be able to understand irrigation water, use of irrigation water in farm land, different irrigation methods & effective usage of water resources.
CE 701.3	The student will be able to analyse Ground water and Surface water conveyance system.

Course Contents:**Module-I: [3L+1T]**

Catchment area and Hydrologic cycle, Measurement of rainfall – Rain gauges, Estimation of missing rainfall data, checking of consistency, Optimum number of Rain gauges. Calculation of average rainfall over area – different methods, Frequency analysis of rainfall intensity duration curve. Rainfall mass curve, hyetograph, Examples

Module-II: [3L+1T]

Evaporation, evapo -transpiration and infiltration: Processes, Factors affecting run off, estimation of run-off, rainfall run off relationship

Module-III: [3L+1T]

Stream flow measurement: Direct and indirect methods, Examples. Stage-discharge relationships

Module-IV: [3L+1T]

Hydrographs; characteristics: Base flow separation. Unit Hydrographs, Derivation of unit hydrographs, S-curve, flood routing.

Module-V: [3L+1T]

Types of Irrigation systems, methods of irrigation: Water requirements of crops: Crop period or Base period, Duty & Delta of a crop, relation between Duty & Delta, Duty at various places, flow Duty & quantity Duty, factors affecting Duty, measures for improving Duty of water, crop seasons

Module-VI: [3L+1T]

Canal Irrigation: Introduction, classification of irrigation canals, efficient section, certain important definitions, Time factor, Capacity factor, full supply coefficient, Nominal duty, Channel losses, Examples

Module-VII: [3L+1T]

Design of unlined alluvial channels by silt Theories: Introduction, Kennedy's theory, procedure for design of channel by Kennedy's method, Lacey's theory, design procedure using Lacey's theory, examples

Module-VIII: [3L+1T]

Water logging and drainage: Causes, effects and prevention of water logging. Type of open drains and closed drains (introduction only). Lining of Irrigation Canals: Objectives, advantages and disadvantages of canal lining, economics and requirements of canal lining

Module-IX: [3L+1T]

Introduction to ground water flow, Darcy law; Wells: Definition, Types-open well or Dug well, Tube well, open well-shallow open well, deep open well, cavity formation in open wells, construction of open wells, Yield of an open well – Equilibrium pumping test, Recuperating test, examples, Tube wells – Strainer type, cavity type, slotted type. Examples

Text Books:

Irrigation Engineering & Hydraulic structures- S.K Garg

Reference Books:

Fluid Mechanics - A.K.Jain

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 701.1	1	2	3	2	-	1	-	-	-	-	-	-
CE 701.2	1	-	3	1	-	1	-	-	-	-	-	-
CE 701.3	-	1	2	1	-	-	-	-	-	-	-	-
CE 701	1	1.5	2.69	1.2	-	1	-	-	-	-	-	-

PAPER NAME: BRIDGE ENGINEERING**PAPER CODE: CE702A****CONTACTS: 3L +1T =4HRS****CREDITS: 4****TOTAL: 42 HRS**

Pre requisites: Student should have knowledge about how to solve analysis of structural problem, reinforced concrete structure design and steel structure design.

Course Objective: Student will be able to know about the bridges and perform analysis of different types of bridges and also able to design of reinforced concrete and steel bridges of different types.

Course Outcome:

CE702A.1	Exhibit the knowledge of the history of bridges and know about the IRC guidelines
CE702A.2	Design the RCC bridges of different type.
CE702A.3	Design the Balanced Cantilever Bridges.
CE702A.4	Design the steel bridges of different type.
CE702A.5	Exhibit the knowledge of Composite Bridges and Cable Stayed Bridges.

Course contents:**Module-I: [3L+1T]**

Introduction: Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development. I.R.C Loads. Analysis of IRC Loads, Impact factors, Other loads to be considered, Importance of Hydraulic factors in Bridge Design.

Module-II: [3L+1T]

Reinforced concrete solid slab bridge: Introduction, General design features, Effective width method. Simply supported and cantilever Slab Bridge, analysis and design.

Module-III: [3L+1T]

Box Culvert: Introduction, Design method and Design example.

Module-IV: [3L+1T]

Beam and Slab Bridges: Introduction, Design of interior panel of slab. Pigeauds method, Design of longitudinal girder, Calculation of longitudinal moment, design example.

Module-V: [3L+1T]

Balanced Cantilever Bridges: General Features, Arrangement of supports, design features Articulation, Design example.

Module-VI: [3L+1T]

Steel Bridges: General features, types of stress, Design example.

Module-VII: [3L+1T]

Plate Girder Bridge: Elements, design, lateral bracing, Box- girder Bridges.

Module-VIII: [6L+2T]

Composite Bridges: General aspects, method of construction, analysis of composite section, shear connectors, design of composite beam.

Module-IX: [5L+1T]

Cable Stayed Bridge: General features, Philosophy of design.

Text Books:

Bridge engineering by Krishnaraju

Reference Books:

Principle & Practice of Bridge Engineering S.P. Bindra– Dhanpat Rai Pub

Essentials of bridge engineering D.J. Victor

Bridge engineering Ponnuswamy

Design of Bridge Structures T.R. Jagadesh, M.A. Jayaram

Design of concrete bridges by Aswani, Vizirani , Ratwani

Design of steel structures Arya&Ajmani

Concrete Structures Vaziram&Ratwani

Structures design and drawing Krishnamurthy

Relevant IS & IRC codes

CO-PO Mapping:

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>
CE702A.1	3	3	3	2	-	1	2	1	-	3	3	2
CE702A.2	3	3	3	3	-	2	-	-	-	1	2	2
CE702A.3	3	3	3	2	-	-	-	-	-	-	2	2
CE702A.4	3	3	3	2	-	-	-	-	-	-	2	2
CE702A.5	3	3	3	2	-	-	-	-	-	1	2	2
CE702A	3	3	3	2.2	-	1	2	1	-	1.67	2.2	2

PAPER NAME: PRESTRESSED CONCRETE**PAPER CODE: CE702B****CONTACTS: 3L +1T =4HRS****CREDITS: 4****TOTAL: 42 HRS****Prerequisites:**

Basic understanding of R.C.C. design and analysis with fundamental knowledge of limit state behavior of R.C.C. with basic knowledge of structural analysis

Course Objective:

Students will gain knowledge on pre-stressed concrete behavior analysis methods, stress calculation, losses, limit state design criteria and methods. student will be familiar with anchorage zone stress in post tension member. Basic knowledge on composite construction of pre-stressed and in situ concrete. Preliminary idea on partial pre-stressing and non stressed reinforcement.

Course Outcome:

CE702B.1 The student will get basic concept of pre-stressing materials and procedures.
CE702B.2 Detail understanding on losses in prestressed
CE702B.3 Become familiar with IS Codes on Prestressing.
CE702B.4 Understand design of various parts of a prestressed structure for many kind of loading.
CE702B.5 Detail Idea on anchorage zone and composite members

Course contents:**Module-I: [6L+2T]**

Introduction of Pre-stressed concrete: Materials, pre-stressing system, analysis of prestress and Bending stress, losses
Shear and torsional resistance: design of shear reinforcement, design of reinforcement for torsion
Shear and bending
Deflections of pre-stressed concrete members: Importance, factors, short term and long term Deflection

Module-II: [6L+2T]

Limit state design criteria: Inadequacy of elastic and ultimate load method, criteria for limit states, strength and serviceability. Design of sections for flexure: methods by Lin and Magnel

Module-III: [5L+1T]

Anchorage Zone stresses in post tensioned members: Stress distribution in end block, anchorage zone reinforcement

Module-IV: [6L+2T]

Composite construction of pre-stressed and in-situ concrete: Types, analysis of stresses Statically Indeterminate structures: advantages of continuous member, effect of pre stressing, methods of achieving continuity and method of analysis of secondary moments

Module-V: [6L+2T]

Pre-stressed concrete poles and sleepers:Design of sections for compression and bending

Module-VI: [3L+1T]

Partial pre-stressing and non pre-stressed reinforcement

Text Books:

Prestressed Concrete, Fourth Edition, N Krishna Raju McGraw Hill

Reference Books:

Design of Prestressed Structures, T.Y.Lin and N.H.Burns, Wiley Eastern Ltd

Fundamentals of Prestressed Concrete, N.C.Sinha and S.K.Roy

Prestressed Concrete, S.Ramamurthan

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE702B.1	3	2	2	-	-	-	1	-	-	-	-	-
CE702B.2	3	2	1	2	-	-	1	-	-	-	-	-
CE702B.3	-	2	1	-	1	3	1	-	-	-	-	-
CE702B.4	2	2	3	2	2	-	1	-	-	-	-	-
CE702B.5	2	2	1	2	2	-	1	-	-	-	-	-
CE702B	2.5	2	1.6	2	1.66	3	1	-	-	-	-	-

PAPER NAME: STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING

PAPER CODE: CE 702C

CONTACTS: 3L+1T =4HRS

CREDITS: 4

TOTAL: 36 HRS

Pre requisites: Student should knowledge about earthquake ,retrofitting and dynamics of the structure

Course Objective: Student should be able to deal dynamic behaviour and dynamics of structure as well as earthquake resistant design properly

Course Outcome:

CE702C.1	Student will be able know Degrees of freedom, Undamped single degree freedom system, Damped single degree freedom system
CE702C.2	Student will be able to know about <i>Response of single degree freedom system due to harmonic loading</i>
CE702C.3	Student will be able to know about Duhamel's Integral, Response due to constant force, Rectangular load, Introduction to numerical evaluation of Duhamel's integral of undamped system.
CE702C.4	Student will able to know about Fundamentals: Elastic rebound theory, Plate tectonics, Definitions of magnitude, Intensity, Epicenter etc., Seismographs, Seismic zoning, Response of Simple Structural Systems
CE702C.5	Student will able to know about <i>Principles of earthquake resistant design</i>

Course contents:

Module-I: [4L+2T]

Theory of vibrations: Degrees of freedom, Undamped single degree freedom system, Damped single degree freedom system, Natural frequency, modes of vibration, Introduction to multiple degree freedom system

Module-II: [5L+3T]

Response of single degree freedom system due to harmonic loading: Undamped harmonic excitation, Damped Harmonic excitation

Module-III: [4L+2T]

Response due to Transient loading: Duhamel's Integral, Response due to constant force, Rectangular load, Introduction to numerical evaluation of Duhamel's integral of undamped system.

Module-IV: [3L+1T]

Elements of seismology: Fundamentals: Elastic rebound theory, Plate tectonics, Definitions of magnitude,

Intensity, Epicenter etc., Seismographs, Seismic zoning, Response of Simple Structural Systems

Module-V: [8L+4T]

Principles of earthquake resistant design: Terminology, General principles and Design criteria, Methods of Analysis, Equivalent lateral force method of Analysis for multistoried building as per Indian Standard Code of Practice, Introduction to Response Spectrum Method, Fundamental concepts of Ductile detailing

Text Books:

Structural Dynamics (Theory and Computation) Mario Paz. CBS Publishers and Distributor

Reference Books:

Dynamics of Structure (Theory and Application to Earthquake Engineering) A.K.Chopra Pearson Education
Elements of Earthquake Engineering Jai Krishna, A. R. Chandrashekhar and Brijesh Chandra South Asian Publishers

Earthquake Resistant Design D. J. Dowrick John Willey & Sons

IS 1893 (Part 1): 2002, IS 3920, IS 4326 - Bureau of Indian Standard

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 704C.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 704C.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 704C.3	-	-	-	-	-	-	-	-	-	-	-	-
CE 704C.4	3	3	3	3	2	2	1	1	3	2	2	2
CE704.5	3	3	3	3	3	1	1	1	3	3	2	
CE 704C	3	3	3	2.5	2.5	1.5	1	1	3	2.5	2.5	2.5

PAPER NAME: CONSTRUCTION PLANNING & MANAGEMENT

PAPER CODE: CE703
TOTAL: 42 HRS

CONTACTS: 2L +2T =4HRS

CREDITS: 3

Prerequisites:

Basic course in construction material and methodology with understanding of structural elements and their uses and sequence of construction, erection. Basic knowledge of quantity Estimation and valuation.

Course Objective:

Students will gain knowledge on planning, Regulation and by laws for construction. students will be familiar with fire protection, construction plant and equipments. students will be able to plan and schedule construction project by CPM and CEAT. some knowledge on management and departmental procedures of PWD, EMD and SD and familiarity Cost Analysis, project cost, cost slopes and time optimization.

Course Outcome:

CE703.1 Students will be able to successfully apply business and Management skills in positions within the construction industry.
CE703.2 Use industry resources including associations and organizations,
CE703.3 Practice informed decision- making in personal and professional endovers.
CE703.4 Manage a quality construction project from start to completion while maintaining budget, schedule, and safety requirements.

Course contents:

Module-I: [2L+2T]

Planning: General consideration, Definition of aspect, prospect, roominess, grouping, circulation
Privacy, acclusion

Module-II: [2L+2T]

Regulation and Bye laws: Bye Laws in respect of side space, Back and front space, Covered areas, height of building etc., Lavatory blocks, ventilation, Requirements for stairs, lifts in public assembly building, offices

Module-III: [2L+2T]

Fire Protection: Fire fighting arrangements in public assembly buildings, planning, offices, auditorium

Module-IV: [4L+4T]

Construction plants & Equipment: Plants & equipment for earth moving, road constructions, excavators, dozers, scrapers, spreaders, rollers, their uses.

Plants & Equipment for concrete construction: Batching plants, Ready Mix Concrete, concrete mixers, Vibrators etc., quality control

Module-V: [4L+4T]

Planning & scheduling of constructions Projects:

Planning by CPM & PERT, Preparation of network, Determination of slacks or floats. Critical activities. Critical path, project duration .expected mean time, probability of completion of project, Estimation of critical path, problems

Module-VI: [3L+3T]

Management: Professional practice, Definition, Rights and responsibilities of owner, engineer, Contractors, types of contract

Module-VII: [4L+4T]

Departmental Procedures: Administration, Technical and financial sanction, operation of PWD, EMD and SD, Acceptance of tenders, Arbitration, cost Analysis, Direct and Indirect project costs, Total costs- cost slopes. Crushing cost and time optimization

Text Books:

Construction Planning, Equipments and methods Puerifoy, R.L. McGraw Hill.

Reference Books:

Management in construction industry P.P.Dharwadkar Oxford and IBH Publishing company New Delhi 3

Construction Management, Critical path Methods in Construction, J.O.Brien Wiley Interscience

PERT and CPM L.S. Srinath

Project planning and control with PERT and CPM' Construction equipments and its management

B.C.Punmia and K.K.Kandelwal S.C.Sharma

National Building code BIS

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE603.1	2	2	2	2	2	2	-	-	-	-	-	-
CE603.2	2	2	2	2	1	2	2	-	2	2	2	-
CE603.3	2	2	1	2	3	2	2	-	2	1	1	-
CE603.4	-	-	1	1	1	-	-	-	2	1	3	-
CE603	2	2	1.5	1.75	1.75	2	2	-	2	1.33	2	-

PAPER NAME: TRANSPORTATION ENGINEERING**PAPER CODE: CE704A CONTACTS: 3L +1T =4HRS CREDITS: 3****TOTAL: 42 HRS****Pre Requisites:**

Knowledge on IRC codes, Loading pattern base on IRC, Traffic features etc.

Course Objectives:

Introduction of IRC loading

Introduction of Traffic Engineering.

Utility of study of traffic management.

Basic concept of Railway track, railway governing body and engineering fundamentals.

Course Outcome:

CE 704A.1 Understanding of traffic loading pattern

CE 704A.2 Understanding of traffic engineering and traffic management

CE 704A.3 Basic concept of railway engineering

Course contents:**Module-I: [6L+2T]****INTRODUCTION OF DIFFERENT TYPES OF LOADING FOR BRIDGE DESIGN BASED ON IRC GUIDELINES:**

Definition and Basic Forms, Component of bridge, classification of bridge, short history of bridge development. I.R.C Loads. Analysis of IRC Loads, Impact factors, other loads to be considered, Importance of Hydraulic factors in Bridge Design.

Module- II:[9L+3T]**TRAFFIC ENGINEERING:**

Traffic Engineering : Road user and vehicle characteristics; Traffic flow characteristics – Traffic Volume, Speed, Headway, Concentration and Delay; Traffic surveys & studies; Traffic estimation; Statistical applications in traffic engineering analysis; Parking; Road intersections – Basic traffic conflicts, classification of at-grade intersections, channelization, rotaries, traffic signals, signs and marking; Road Safety; Traffic System Management...

Module–III: [6L+2T]**TRANSPORTATION MANAGEMENT:**

Functions of IRC, Central Road Research Institute. Motor Vehicle Act, Jayakar committee Recommendations, Saturation system, Population unit and productivity units. Highway cost analysis, Transportation Demand Analysis, Preparation of Project Report.

Module- IV: [11L +3T]**INTRODUCTION OF RAILWAY ENGINEERING:**

Basic Terminologies of Railway Engineering, Different types of Railway planning, Classification of Indian

Railways, Classification of Indian Railways based on speed criteria, Undertakings Under Ministry Of Railways, Initiatives By Indian Railways For Development Of Tourism Sector, Global Trains Of Tomorrow, Construction And Renewal Of Track, Development of High And Super High Speeds, Modernization Of Track For High Speeds, Administration Of Indian Railways, Railway Expenses, Rates and Fares.

Text Books:

High Way Engineering Khanna& Justo Nemchand& Brothers, Roorkee

Reference Books:

Principles of Transportation Engineering P. Chakraborty& A. Das PHI

Transportation Engineering- C.J Khisty& B.K Lall.

I.S Specifications on Concrete , Aggregate & Bitumen Bureau of Indian Standard

Relevant latest IRC Codes (IRC-37 – 2001, IRC 58 – 2002, IRC 73 - 1980, IRC 86 - - 1983, IRC 106 – 1990, IRC 64 – 1990, IRC 15- 2002 Indian Road Congress

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7		PO8	PO9	PO10	PO11	PO12
CE 704A.1	3	3	3	2	3	1	1		1	3	3	3	3
CE 704A.2	3	3	3	2	2	2	1		1	3	2	3	2
CE 704A.3	3	1	2	1	2	3	2		2	1	3	3	3
CE 704A.4	3	3	3	3	2	2	1		1	3	2	2	2

PAPER NAME: TRAFFIC ENGINEERING & PLANNING**PAPER CODE: CE704B****CONTACTS: 3L +1T =4HRS****CREDITS: 3****TOTAL: 36 HRS****Prerequisites:**

Basic course on transportation engineering with preliminary knowledge of pavement design, alignment, and statutory regulations preliminary knowledge of statistics and probability.

Course Objective:

Students will acquire knowledge on traffic engineering administration and function, traffic survey, parking survey. students will be familiar with statistical method of traffic engineering, geometric design, traffic signals and transport planning. some knowledge on economic evaluation of transportation, benefit cost ratio method, growth of town -present difficulties in urban traffic condition.

Course Outcome:

704B.1	Learn about basic Traffic Engineering administration.
704B.2	Students would be aware of the basic principles of speed, journey time and delay time.
704B.3	Students will be able to understand volume counts and parking surveys.
704B.4	Students would be aware of the basic principles of design, planning and management of traffic system.
704B.5	Design a pretimed signalized intersection and determine the signal splits and design an actuated signalized intersection.

Course contents:**Module-I: [3L+1T]**

Traffic engineering administration & function: Definition organization of state Traffic engineering & District traffic engineering. Traffic engineering administration of transportation organizational structure for the traffic engineering department in city. Importance of traffic engineering under Indian conditions. Road user & the vehicle system of exhibiting reaction to external stimuli & power performance of vehicle

Module-II: [1L+1T]

Traffic surveys – speed, journey time and delay surveys, spot speed—journey speed & delays – Direct timing Procedure for spot speed determination –Enoscope.

Module-III: [1L+1T]

Vehicles volume counts, classification and occupancy –necessity, types of vehicles volume counts and their uses. Combination of manual & mechanical method.

Module-IV: [1L+1T]

Parking surveys—Needs of parking surveys , types of parking survey

Module-V: [5L+1T]

Statistical methods for traffic engineering—Introduction, Concept of probability—mean, standard deviation & variance Poissons and binomial Distributions—Normal distributions.

Module-VI: [3L+1T]

Geometric Design—Introduction, traffic, Horizontal & Vertical alignment & combination of both alignment, sight distance Inter section –Design for pedestrian facilities.

Module-VII: [3L+1T]

Traffic signals – Introduction, signal indications, Amber Period, Red Amber period and intergreen period, Fixed time signals & vehicle Actuated signals.

Module-VIII: [3L+1T]

Transport planning—scope of the subject systems approach to transport planning and stages in transport planning—computer application in transport planning

Module-IX: [3L+1T]

Transport planning for small and medium size cities. Introduction-, Difficulties in transport planning for small and medium cities.

Module-X: [3L+1T]

Economic evaluation of transportation—Need for economic evaluation, costs & benefits of transport projects- Benefit cost ratio method. Nature of traffic problems in cities - Growth of town- Growth of Traffic — presents difficulties in urban traffic conditions.

Text Books:

Traffic Engineering & transport planning - Kadiali L.R.

Reference Books:

Highway Engineering - Justo, Khanna

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	2	3	-	-	2	-	-	-	-	-	-	1
CO3	1	2	3	-	-	2	-	-	-	-	2	-
CO4	1	1	3	-	-	2	-	-	-	-	-	1
CO5	-	-	3	2	-	2	-	-	-	-	-	1

PAPER NAME: URBAN PLANNING**PAPER CODE: CE704C****CONTACTS: 3L +1T =4HRS****CREDITS: 3****TOTAL: 42 HRS****Pre requisites:** Student should knowledge about the procedure of urban planning**Course Objective:** Student should be able to deal with The urban planning methods properly.**CourseOutcome:**

CE704C.1	Student will be able know the introduction of the man and Environment ,Biological and behavioral responses to human settlements,Role
CE704C.2	Student will be able to know about planning thought behind Jaipur and Delhi Studies of selected examples to include concentric city, , CIAM, linear industrial city and contemporary India Cities
CE704C.3	Student will be able to know about definitions of town planning, levels of planning and steps for preparation of a town plan
CE704C.4	Student will able to know about design of regional hubs like shopping malls, sub divisional hospitals , etc.

Course contents:**Module 1 -[6L+2T]**

Man and Environment ,Biological and behavioral responses to human settlements,Role of River Banks in growth of human settlement. Western world: River valley settlements, Greek, Roman, Medieval, Renaissance and modern.

Module 2 -[6L+2T]

Indus valley civilization - Mohenjodaro, Harappa, Extracts from Chanakya's Arthasastra, Manasara's Vastushastra, planning thought behind Jaipur and Delhi Studies of selected examples to include concentric city, , CIAM, linear industrial city and contemporary India Cities

Module 3 -[9L+4T]

Definitions of town planning, levels of planning and steps for preparation of a town plan, survey techniques in planning, concepts, functions, components and preparation of a development plan. Planning concepts related to garden city, neighbourhood planning, satellite towns and ribbon development. Concepts in Regional and Metropolitan planning, land subdivision regulations and zoning, nature of regulations and control, the comprehensive role of urban design in town planning process.

Module 4 -[9L+4T]

Design of regional hubs like shopping malls, sub divisional hospitals , etc.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 704C.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 704C.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 704C.3	-	-	-	-	-	-	-	-	-	-	-	-
CE 704C.4	3	3	3	3	2	2	1	1	3	2	2	2
CE 704C	3	3	3	2.33	2.33	1.66	1	1	3	2.33	2.66	2.33

PRACTICAL SUBJECT NAME: ENVIRONMENTAL ENGINEERING LAB**PAPER CODE: CE791****CONTACTS: 3P=3HRS****CREDITS: 2****Prerequisites:**

Basic course of environmental engineering with preliminary knowledge of chemistry. Knowledge of different impurities and different dissolved solids with chemical behavior of that element.

Course Objective:

Students will gain hands on knowledge on different test of water like total solids, turbidity, chloride, carbonate, hardness, fluoride, Iron, residual chlorine demand, BOD, COD, DO, organic matter, nitrate, phosphate and bacteriological quantity of water.

Course Outcome:

CE791.1 Perform common environmental experiments relating to water and wastewater quality
CE791.2 Identify appropriate test for environmental problems.
CE791.3 Statistically analyze and interpret laboratorial results
CE791.4 Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.
CE791.5 Understand and use of water and wastewater sampling procedures and sample preservations.

Course contents:

EXPERIMENT NO.	EXPERIMENT NAME	TYPE OF TEST
1.	Determination of turbidity for a given sample of water	PHYSICAL
2.	Determination of solids in a given sample of water: Total Solids, Suspended Solids and Dissolved Solids	
3.	Determination of pH for a given sample of water	
4.	Determination of concentration of Chlorides in a given sample of water	CHEMICAL
5.	Determination of carbonate, bi-carbonate and hydroxide alkalinity for a given sample of water	
6.	Determination of hardness for a given sample of water	
7.	Determination of concentration of Fluorides in a given sample of water	
8.	Determination of concentration of Iron in a given sample of water	
9.	Determination of the Optimum Alum Dose for a given sample of water through Jar Test	
10.	Determination of the Residual Chlorine in a given sample of water	
11.	Determination of the Chlorine Demand for a given sample of water	
12.	Determination of the Available Chlorine Percentage in a given sample of bleaching powder	

13.	Determination of amount of Dissolved Oxygen (DO) in a given sample of water	
14.	Determination of the Biochemical Oxygen Demand (BOD) for a given sample of wastewater	
15.	Determination of the Chemical Oxygen Demand (COD) for a given sample of wastewater	
16.	Determination of Organic matter / Organic Carbon for a given sample of water	
17.	Determination of Phosphate for a given sample of water	
18.	Determination of Nitrate for a given sample of water	
19.	Determination of Sulphate for a given sample of water	
20.	Determination of bacteriological quality of water: presumptive test, confirmative test and Determination of MPN	BACTERIOLOGICAL

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 791.1	2	2	-	1	-	-	2	-	-	-	-	-
CE 791.2	1	1	3	1	-	-	-	-	-	-	-	-
CE 791.3	1	2	3	1	-	-	-	-	-	-	-	-
CE 791.4	3	3	1	-	-	-	-	-	-	-	-	-
CE791.5	1	2	3	-	-	-	-	-	-	-	-	-
CE 791	1.6	2	3	1	-	-	-	-	-	-	-	-

PRACTICAL SUBJECT NAME: CIVIL ENGINEERING PRACTICE SESSIONAL

PAPER CODE: CE782

CONTACTS: 3P=3HRS

CREDITS: 3

Prerequisites:

Basic course on foundation/soil engineering with knowledge of soil parameters or behavior, structural design of foundation and hydrology and irrigation engineering knowledge on environmental engineering with water and water treatment knowledge on transportation Engineering with emphasis on designed and pavement signal.

Course Objective:

Students will gain hands on knowledge on Foundation Engineering, environmental engineering, transportation engineering, serving by preparing typical soil report, bearing capacity and settlement from typical field data with estimation of runoff, hydrograph, S curve, design of lined canal can perform population forecast, hydraulic design of sewer. Familiar in determination of Highway capacity, Geometric design, Design of rigid and flexible pavement traffic signal design.

Course Outcome:

CE 792.1	Demonstrate capability in RCC structural details
CE 792.2	Ability to know the steel structural details
CE 792.3	Ability to know the sewer design
CE 792.4	Ability to know the hydraulic structure design

Course contents:

Foundation Engineering

Stability Analysis of Slopes, Preparation of typical soil test report, Estimation of bearing capacity and settlement of foundation from typical field data, Structural design and detailing of isolated rectangular footing and combined footing. Water Resource Engineering
Estimation of runoff, Field capacity and permanent wilting point Construction of hydrograph& S curve, efficient section of canal, Design of lined canals, Determination of yield of wells, flood routing

Environmental Engineering

Population forecasting, Analysis and design of water distribution network, Hydraulic design of sewer

Transportation Engineering

Determination of highway capacity, Highway geometric design, Design of flexible and rigid pavement, Traffic Signal Design

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 792.1	2	1	2	-	-	-	-	-	-	-	-	-
CE 792.2	2	2	2	-	-	-	-	-	-	-	-	-
CE 792.3	2	2	3	1	-	-	-	-	-	-	-	-
CE 792.4	2	2	3	1	-	-	-	-	-	-	-	-
CE 792	2	1.75	2.5	1	-	-	-	-	-	-	-	-

DEPARTMENT OF CIVIL ENGINEERING

Syllabus of 8th Semester

**Autonomy Curriculum and Syllabus of B.Tech Programme
Implemented from the Academic Year 2016**

Fourth Year Eighth Semester

CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours			Contact Hours/ Week	Credits
THEORY:			L	T	P	Total	
PE-IV	CE 801A	Dynamics of Soil & Foundation	3	1	0	4	4
	CE 801B	Finite Element Analysis					
	CE 801C	Advanced Structural Analysis					
PE-V	CE 802A	Advanced Foundation Engineering	3	1	0	4	4
	CE 802B	Ground Improvement & Technique					
	CE 802C	Advanced Transportation Engineering					
	CE 802D	Pavement Design					
OE-III	CE 803A	Hydraulic Structure	3	0	0	3	3
	CE 803B	Water Resource Management And Planning					
	CE 803C	Air & Noise Pollution And Control					
	CE 803D	Remote Sensing And GIS					
HS	HU 806	Project Management	2	1	0	3	2
SESSIONAL:							
PW	CE881	Project II	0	0	12	12	6
PW	CE882	Grand Viva	0	0	0	0	4
HS	HU891	Technical Report Writing & Group Discussion	0	0	3	3	1
		TOTAL: SEVEN	11	3	15	29	24

PAPER NAME: DYNAMICS OF SOIL AND FOUNDATION**PAPER CODE: CE801A CONTACTS: 3L +1T=4HRS CREDITS: 4 TOTAL: 42 HRS****Pre requisites:** Knowledge of Basic Soil Mechanics / Fundamental Geotechnical Engineering

Course Objective: The aim of the course to train the students, with the background of basic degree in civil engineering, in the field of soil dynamics. The emphasis is given for (i) the design of foundations and isolation systems subjected to different kinds of vibrations, (ii) determination of dynamic properties of soils by using laboratory and non-destructive field tests, and (iii) liquefaction assessment.

Course Outcome:

CE801.1	Understand the dynamic behaviour of foundations.
CE801.2	Design foundations and isolation systems subjected to different kinds of vibrations,
CE801.3	Determine dynamic properties of soils by using laboratory and non-destructive field tests,
CE801.4	Design machine foundations.
CE801.5	Assess the liquefaction potential of a given site

Course contents:**Module-I: [3L+1T]**

Introduction: Principles of design of reinforced concrete members - Working stress and Limit State method of design. Introduction: Types of Machine Foundations, General requirement of Machine foundations, Dimensional criteria, Design data, Permissible amplitude, Permissible Bearing pressure

Module-II: [6L+2T]

Fundamental of vibrations: Degrees of freedom, Natural frequency, Undamped single degree freedom system, Damped single degree freedom system, Transmissibility, Response to ground motion, Introduction to multiple degree freedom system

Module-III: [6L+2T]

Dynamic properties of Soil, Laboratory and field evaluation of soil properties as per IS codes;

Module-IV: [9L+3T]

Analysis and design of Block type Machine Foundation: Modes of Vibrations, Methods of Dynamic Analysis, Design considerations for dynamically loaded foundations and constructional features; Design procedures for foundations for hammers, reciprocating engines, Vibration Isolation and damping

Module-V: [4L+2T]

Liquefaction of soils: Definition, Causes and effects of Liquefaction, Evaluation of Liquefaction potential, Mitigation of Liquefaction Hazards

Module-VI: [3L+1T]

Propagation of elastic waves in soils: Mechanism of wave propagation, Body waves, Surface waves, Rayleigh waves

Text Books:

Foundation Analysis & Design J.E. Bowels McGraw Hill

Reference Books:

Principles of Foundation Engineering B.M. Das Thomson Book

Foundation Design Manual N. V. Nayak Dhanpat Rai Publication Pvt. Ltd

Foundations for Machines: Analysis and design ShamsheerPrakash, Vijay K Puri Wiley Series in Geotechnical Engineering

Advance Foundation Engineering N. Som& S. C. Das

Hand Book of Machine Foundation P. Sirinivashalu& C.V.Vaiddyanathan Tata McGraw Hill

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE801.1	3	3	2	2	2	1	2	2	3	3	2	3
CE801.2	3	3	1	2	2	3	2	2	3	3	1	3
CE801.3	3	3	2	2	3	3	2	2	1	3	1	3
CE801.4	3	3	1	3	1	2	2	2	2	2	1	3
CE801.5	3	3	1	1	2	1	2	2	3	2	2	3

PAPER NAME: FINITE ELEMENT ANALYSIS**PAPER CODE: CE801B CONTACTS: 3L +1T =4HRS CREDITS: 4TOTAL: 42 HRS****Prerequisites:**

Basic knowledge of structural analysis for determinate and indeterminate structures, trusses and behavior of plates and preliminary knowledge of standard structural software and computer uses knowledge of matrices algebra.

Course Objective:

Students will gain knowledge on finite element analysis, finite element formulation techniques, element properties and numerical integration. Students will be able to formulate stiffness matrices and analysis of continuous beam and simple plane frame. To acquire knowledge on FEM for two dimensional analysis, FEM for plates and introduction of standard FEM in civil engineering.

Course Outcome:

Students will be able to:

CE801B .1 Obtain an understanding of the fundamental theory of the FEA method.

CE801B .2 Developed the ability to generate the governing FE equations for systems governed by partial differential equations.

CE801B .3 Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements.

Course contents:**Module-I: [3L+1T]**

Introduction to Finite Element Analysis: Introduction, Basic Concepts of Finite Element Analysis, Steps in Finite Element Analysis, Fundamental concepts of Elasticity

Module-II: [3L+1T]

Finite Element Formulation Techniques: Virtual Work and Variational Principle, Galerkin Approach, Displacement Approach, Stiffness Matrix and Boundary Conditions

Module-III: [6L+2T]

Element properties: Concepts of shape functions: Natural Coordinates, one dimensional, Triangular, Rectangular Elements

Isoparametric Formulation: Isoparametric Elements, Stiffness Matrix of Isoparametric Elements,

Numerical Integration: One Dimensional, Two Dimensional

Module-IV: [9L+3T]

Formation of stiffness matrices and analysis of Truss, Continuous Beam and Simple Plane Frame.

Module-V: [4L+2T]

FEM for two dimensional analyses: Constant Strain Triangle, Linear Strain Triangle, Rectangular

Elements

Module-VI: [3L+1T]

FEM for Plates: Introduction to Plate Bending Problems, Finite Element Analysis of Thin Plate

Module-VII: [3L+1T]

Introduction to application of standard FEM software in civil Engineering

Text Books:

Finite Element Method with Applications in Engineering Y. Desai et. al Pearson

Reference Books:

Introduction to Finite Element in Engineering Chandrapatla&Belegundu Pearson Education

A First Course in Finite Element Method D. L. Logan Thomson

Surveying: Bannister, Raymond & Baker Pearson Education

Concepts and Applications of Finite Element Analysis R. D. Cook et. al Wiley India

Finite Element Analysis – Theory and Programming C. S. Krishnamoorthy Tata Mcgraw Hill

Matrix, Finite Element, Computer and Structural Analysis M. Mukhopadhyay Oxford and IBH Publishing Co. Pvt.

Ltd., New Delhi, India

Finite Element Procedures K. J. Bathe PHI, New Delhi, India

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 801B.1	3	-	-	2	-	-	-	-	-	-	-	2
CE 801B.2	3	3	3	3	-	-	-	-	-	-	-	2
CE 801B.3	3	-	-	3	-	-	-	-	-	-	-	2
CE 801B	3	3	-	3	-	-	-	-	-	-	-	2

PAPER NAME: ADVANCED STRUCTURAL ANALYSIS

PAPER CODE: CE801C CONTACTS: 3L +1T =4HRS CREDITS: 4 TOTAL: 42 HRS

Prerequisites: Students should have knowledge about the subjects Strength of Materials and Structural Analysis-I & II.

Course Objective:

1. Learning the concept of Matrix method of analysis
2. Learning dynamic analysis of structural frames for wind loads.
3. Learning the theories of special structures like Plates & Shells.
4. Introduction to the advanced theories of elasticity.

Course Outcome:

CE801C.1 Students will understand matrix method of analysis.
CE801C.2 Students will learn to evaluate wind loads on structures.
CE801C.3 Students will learn to analyse plates and shell structures.
CE801C.4 Students will be able to apply knowledge of elasticity in different coordinate systems.

Course content:

Module-I: [9L+3T]

Matrix methods of analysis: Matrix formulation of redundant beam analysis (Clapeyron's three moment theorem. Stiffness and flexibility approaches for beams, simple portal frame, trusses by matrix formulation.

Module-II: [3L+1T]

Dynamic analysis of structural frames: Wind analysis of structures by using I.S. Code provisions. IS 875-III to be followed for the Wind Load calculations.

Module-III: [9L+3T]

Theory of plates and shells: Thin plate analysis. Differential equation of bending under point and uniformly distributed load, various support systems. Rectangular and circular plates. Membrane analysis of thin shell, meridional & hoop stress, shell of revolution, cylindrical shell, applications.

Module-IV: [10L+4T]

Theory of Elasticity : Three dimensional stress and strain analysis, stress - strain transformation, stress invariants; equilibrium and compatibility equations, boundary conditions; Two dimensional problems in Cartesian and Polar coordinates. Beam bending problems; Energy principles, variational methods and numerical methods.

Text Books:

Structural analysis (A Matrix approach)- Pandit Gupta

Reference Books:

Advanced structural analysis- Debdas Menon

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 801C.1	3	3	2	2	-	-	-	-	-	-	-	1
CE 801C.2	3	2	2	2	-	-	-	-	-	-	-	1
CE 801C.3	3	2	1	2	-	1	-	-	-	-	-	1
CE 801C	3	2	2	2	-	1	-	-	-	-	-	1

PAPER NAME: ADVANCED FOUNDATION ENGINEERING**PAPER CODE: CE802A CONTACTS: 3L +1T =4HRS CREDITS: 4 TOTAL: 42 HRS****Prerequisites:**

Basic knowledge of soil mechanics with emphasis on soil behavior, parameters, test procedure.
Knowledge on foundation and bearing capacity and settlement analysis. Preliminary knowledge on vibration and dynamics of structures.

Course Objective:

Students will gain knowledge on soil exploration and site investigation, with bearing capacity from SPT and SCPT and plate load test data. Students will be able to design beams on elastic foundation and raft Foundation as per IS:2950 .

Familiarity with deep Foundation-pile, laterally loaded piles by as per codal provisions and load carrying capacity and settlement analysis.

Students will acquire knowledge on retaining wall and sheet pile structures.

Familiarity with design of foundation for vibration control and foundation on expansive soils.

Course Outcome:

CE802A .1 Determine suitable soil parameters
CE802A .2 Design and analyze foundation systems using conventional methods
CE802A .3 Design a budget and proposal for a Geotechnical investigation
CE802A .4 Design appropriate foundation systems based on ground-investigation data and be able to select correct soil parameters for the designs
CE802A .5 Understand limitations and uncertainties in geotechnical design

Course contents:**Module-I: [3L+1T]****Soil Exploration and Site Investigation**

Planning of soil exploration programme, Field testing, Preparation of bore-log and soil investigation report

Geo-physical exploration: Seismic refraction survey electrical resistivity method

Module-II: [9L+3T]**Shallow Foundations**

Bearing Capacity from SPT and SCPT and Plate load Test data, Proportioning of footing based on settlement criteria.

Beams on elastic foundation: Infinite beam, Finite beam, Modulus of sub-grade reaction and effecting parameters.

Raft Foundation: Settlement and Bearing Capacity analysis, Analysis of flexible and rigid raft as per IS 2950.

Module-III: [6L+2T]**Deep Foundations**

Pile: Tension piles, Laterally loaded piles: Elastic continuum approach, Ultimate load Analysis, Deflection and maximum moment as per IS 2911, Pile load test

Drilled Shaft: Construction procedures, Design Considerations, Load Carrying Capacity and settlement analysis

Caissons: Types, Sinking and control.

Module-IV: [6L+2T]**Retaining walls and sheet pile structures**

Gravity, cantilever and counter fort retaining walls: Stability checks and design Sheet Pile Structures: Cantilever sheet piling, Anchored sheet piling: Free and fixed earth support methods of Analysis, Braced Excavation

Module-V: [3L+1T]**Design of foundation for vibration control**

Elements of vibration theory, Soil- springs and damping constants, dynamic soil parameters, Types of Machine foundations, General consideration in designing dynamic bases.

Module-VI: [5L+1T]**Foundations on expansive soils: Problems and Remedies****Text Books:**

Foundation Analysis & Design J.E. Bowels McGraw Hill

Reference Books:

Principles of Foundation Engineering B.M. Das Thomson Book

Foundation Design Manual N. V. Nayak Dhanpat Rai Publication Pvt. Ltd

Foundations for Machines: Analysis and design ShamsheerPrakash, Vijay K Puri Wiley Series in GeotechnicalEngineering

Advance Foundation Engineering N. Som& S. C. Das

Hand Book of Machine Foundation P. Sirinivashalu& C.V.Vaidyanathan Tata McGraw Hill

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE802A.1	3	3	2	2	2	-	-	-	-	2	-	2
CE802A.2	3	3	2	3	-	-	-	-	-	1	-	2
CE802A.3	3	3	3	3	3	-	-	-	-	2	-	2
CE802A.4	3	3	3	3	3	2	-	-	-	2	-	2
CE802A.5	3	3	3	2	-	-	-	-	-	-	-	2
CE802A	3	3	2.6	2.6	2.67	2	-	-	-	1.75	-	2

PAPER NAME: GROUND IMPROVEMENT& TECHNIQUE**PAPER CODE: CE802B CONTACTS: 3L +1T =4HRS CREDITS: 4 TOTAL: 42 HRS****Pre requisites:** Knowledge of Basic Soil Mechanics / Fundamental Geotechnical Engineering

Course Objective: To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques. • To bring out concepts of reinforced earth. • Applications of geotextiles in various civil engineering projects.

Course Outcome:

CE802.1	Understand the different ground improvement techniques
CE802.2	Understand the methods of stabilisation
CE802.3	Understand the methods and properties of reinforced soil
CE802.4	Understand the basic concepts of geosynthetics
CE802.5	Understand the basic concept of consolidation of soil
CE802.6	Understand the concept of shear strength in soil

Course contents:**Module-I: [3L+1T]**

Introduction: Definition, Need for Ground Improvement, Different types of problematic soils, Emerging trends in ground Improvement.

Module-II: [6L+2T]

Mechanical stabilization: Shallow and deep compaction requirements, Principles and methods of soil compaction, Shallow compaction and methods. Properties of compacted soil and compaction control, Deep compaction and Vibratory methods Dynamic compaction.

Module-III: [6L+2T]

Hydraulic modification: Ground Improvement by drainage, Dewatering methods. Design of dewatering systems, Preloading, Vertical drains, vacuum consolidation, Electro-kinetic dewatering, design and construction methods.

Module-IV: [6L+2T]

Modification by admixtures: Cement stabilization and cement columns, Lime stabilization and lime columns. Stabilization using bitumen and emulsions, Stabilization using industrial wastes Construction techniques and applications.

Module-V: [3L+1T]

Grouting: Permeation grouting, compaction grouting, jet grouting, different varieties of grout materials, grouting under difficult conditions.

Module-VI: [3L+1T]

In situ soil treatment methods: f Soil nailing, rock anchoring, micro-piles, design methods, construction techniques.

Module-VII: [4L+2T]

Case studies: Case studies of ground improvement projects.

CO-PO mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE802.1	3	3	1	2	3	2	1	2	2	3	2	3
CE802.2	3	3	1	2	3	2	1	1	2	3	1	3
CE802.3	3	3	2	2	3	3	3	3	1	1	2	3
CE802.4	3	3	1	3	1	2	2	1	2	1	1	3
CE802.5	3	3	1	1	2	1	2	2	3	2	2	3
CE802.6	3	2	3	1	2	2	2	1	2	2	1	1

PAPER NAME: ADVANCED TRANSPORTATION ENGINEERING**PAPER CODE: CE802C CONTACTS: 3L +1T =4HRS CREDITS: 4 TOTAL: 42 HRS****Prerequisites:**

Basic knowledge of on transportation engineering with fundamentals of pavement design alignment survey and testing procedure of road material understanding basic methodology of transportation models and uses.

Course Objective:

Students will gain knowledge on traffic Engineering and transportation planning. Familiarity with railway engineering location survey, Geometric design ,signaling and track maintenance.

To acquire knowledge on Airport engineering- runways, taxiways, aprons, wind rose diagram, design and taxiway and terminal building.

Course Outcome:

CE 802C.1	Learn about highway engineering and traffic engineering.
CE 802C.2	Learnn about airport engineering
CE 802C.3	Learn about Railway engineering.

Course contents:**Module-I: [6L+2T]**

Traffic Engineering : Road user and vehicle characteristics; Traffic flow characteristics – Traffic Volume, Speed, Headway, Concentration and Delay; Traffic surveys & studies; Traffic estimation; Statistical applications in traffic engineering analysis; Parking; Road intersections – Basic traffic conflicts, classification of at-grade intersections, channelization, traffic signals, signs and marking; Road Safety

Module-II: [9L+3T]

Transportation planning: Transportation planning at different levels; Transport Project planning – Planning studies and investigation; Elements of Urban Transportation Planning; Transport Demand Analysis; Preparation of Project Report

Module-III: [9L+3T]

Railway Engineering : Location surveys & alignment, Permanent way components, Gauges, Geometric Design, Points & crossings, Stations & Yards, Signaling, Track Maintenance

Module-IV: [8L+2T]

Airport Engineering : Functional areas of airports: Runways, Taxiways, , Aprons, Terminal buildings; Classification of Airports; Airport site selection; Design of Runway, Runway orientation, Wind Rose diagram; Design of Taxiway and Terminal Building

Text Books:

Transportation Engineering Vazirani&Chandola

Reference Books:

Transportation Engineering Khisty and Lal PHI

A Text Book of Railway Engineering S.P. Arora& S.C. Saxena

Railway Engineering Satish Chandra Oxford University press

Transportation Engineering Vazirani&Chandola

Airport planning and Design S.K.Khanna&M.G.Arora

Airport Transportation Planning & Design-. Virendra Kumar &Satish Chandra Galgotia Publication Pvt. Ltd.
New Delhi

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE802C.1	2	2	2	1	-	-	-	-	-	-	-	2
CE802C.2	2	2	3	-	-	-	-	-	-	-	-	-
CE802C.3	2	2	3	-	-	-	-	-	-	-	-	-
CE802C	2	2	2.6	1	-	-	-	-	-	-	-	2

PAPER NAME: PAVEMENT DESIGN**PAPER CODE: CE802D**
42 HRS**CONTACTS: 3L +1T =4HRS****CREDITS: 4****TOTAL:****Pre Requisites:**

Concept of different types of pavement and its features based on IRC.

Course Objective:

- i) Introduction of different types pavements and its performance
- ii) Introduction of traffic loading in pavement design.
- iii) Description of characteristics of pavement materials.
- iv) Design of different types of pavement.

Course Outcome:

CE 802.1	Understanding the pavement performance under different circumstances
CE 802.2	Concept of pavement design.

Course contents:**MODULE – I: [6L+2T]**

Principles of Pavement Design: Types of Pavements, Concept of pavement performance, Structural and functional failure of pavement, Different types of pavement performance, Different pavement design approaches.

Module- II: [6L+2T]

Traffic Consideration in Pavement Design: Vehicle types, Axle configurations, Contact shapes and contact stress distribution, Concept of standard axle load, Vehicle damage factor, Axle load surveys, Estimation of design traffic.

Module- III : [6L+2T]

Pavement Material Characterization: Identification of different type of materials Field and laboratory methods for characterization of pavement materials.

Module- IV: [6L+2T]

Analysis and Design of Flexible Pavements: Selection of appropriate theoretical model for flexible pavements, Analysis of different layers of flexible pavements based on linear elastic theory, Different methods of design of flexible pavements, IRC guidelines (IRC-37).

Module –V: [3L+2T]

Analysis and Design of Rigid Pavements: Selection of appropriate theoretical models for rigid pavements, Analysis of wheel load stresses, curling, temperature differential, Critical stress combinations, Different methods of design of rigid pavements, IRC guidelines (IRC-58)

Module- VI: [3L+2T]

Pavement Overlay Designs : Overlay design as per Indian Roads Congress guidelines (IRC-81) Overlay design as per AASHTO-1993 guidelines.

Text Books:

Principles of Pavement Design E.J.Yoder and M.W. Witczak , Wiley publisher.

Reference Books:

Pavement Analysis and Design Y. H. Huang Prentice-Hall

Highway Engineering Khanna and Justo Nem Chand

IRC-37, IRC-58, IRC-73, IRC-81, IRC-106 and other relevant IRC codes

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 802D.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 802D.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 802D.3	1	1	3	2	1	-	-	3	1	2	2	2
CE 802D.4	3	3	3	3	2	2	1	1	3	2	2	2

PAPER NAME: HYDRAULIC STRUCTURE**PAPER CODE: CE803A****CONTACTS: 3L +0T =3HRS****CREDITS: 3 TOTAL: 36 HRS****Prerequisites:**

Basic course on hydraulics with emphasis on fluid behavior pressure losses and application of theories in real scenario knowledge of seepage and groundwater calculation.

Course Objective:

Students will acquire knowledge on different elements of Hydraulic structure, diversion headwork, weirs, barrages.

Familiarity with hydraulic design of canals, Ogee fall and cross drainage works.

Aqua knowledge on dams, earthen dams, method of construction, type, failure causes, seepage control in earthen Dam, gravity dam.

Familiarity with spillways and its requirement capacity.

Course Outcome:

CE803A.1	Students will able to analyze and design hydraulic structures using relevant code of practice.
CE803A.2	Students will able to Apply the basic design principles to engineering design practice
CE 803A.3	To define basic theories of hydraulic structure design concepts- cross drainage works, canal falls etc.
CE803A.4	To define basic theories of hydraulic structure design concepts- dams, culverts, siphons etc
CE803A.5	To identify seepage under hydraulic structures and protection methods.

Course contents:**Module-I: [4L]**

Diversion Head works: Necessity, Difference between weir and Barrage, Type of Weirs, Selection of site, layout and description of each part, Effects of construction of a weir on the river regime, causes of failure of weirs on permeable foundation and their remedies

Module-II: [8L]

Theories of seepage and Design of weirs and Barrages: Failure of Hydraulic Structures Founded on Pervious foundations: i) By piping ii) By Direct uplift, Bligh's creep theory of seepage flow, Khosla's theory & concept of flow-nets, concept of exit gradient and critical exit gradient, Khosla's method of independent variable for determination of pressures and exit gradient for seepage below a weir or a barrage, necessary corrections, examples.

Module-III: [2L]

Hydraulic structures for canals: Canal falls, Description of ogee fall, Trapezoidal-notch fall, Syphon well drop. Examples

Module-IV: [2L]

Cross-Drainage Works: Necessity, types, selection of a suitable type (Introduction only)

Module-V: [8L]

Dam (General): Definition, classification of Dams, factors governing selection of type of dam, selection of suitable site for a dam.

Earthen Dams: Introduction, Types of Earthen Dams, Methods of Construction, Causes of failure, Design Criteria, Determination of line of seepage or phreatic line in Earthen Dam, seepage control in Earthen Dam, Examples.

Module-VI: [6L]

Gravity Dam: Definition, Typical cross- section, Forces acting on Gravity Dam, Combination of forces for design, Mode of failure and criteria for structural stability of Gravity Dams, Principal and shear stresses. Elementary profile of a Gravity Dam, Concept of High and low Gravity Dam, Examples

Module-VII: [6L]

Spillways: Types, Location, Essential requirements, spillway capacity. Components of spillway, Energy Dissipators, Stilling basins (Indian standard)

Text Books:

Hydrology & Water resources Engineering - S.K. Garg (Khanna Publication)

Reference Books:

- i) Water resource Engineering - M.C. Chaturvedi
- ii) Irrigation and Hydraulic Structure - S.K Garg

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 803A.1	2	2	3	-	-	-	-	-	-	-	-	-
CE 803A.2	2	2	3	-	-	-	-	-	-	-	-	-
CE 803A.3	2	1	2	1	-	-	-	-	-	-	-	1
CE 803A.4	2	2	3	1	-	-	-	-	-	-	-	2
CE 803A.5	1	2	3	-	-	-	-	-	-	-	-	-
CE 803A	1.8	1.8	2.8	1	-	-	-	-	-	-	-	1.5

PAPER NAME: WATER RESOURCES MANAGEMENT AND PLANNING**PAPER CODE: CE 803B CONTACTS: 3L +0T =3HRS CREDITS: 3 TOTAL: 36 HRS**

Prerequisites: Students will at preliminary knowledge of hydraulics and water resource acquainted with statistical methods.

Course Objective:

Students will acquire knowledge of the resources needed for each stage, tools and materials.
Understanding requirement of internal stakeholders with information regarding project costs

Estimate the time needed to successfully complete a project and implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

Course Outcome:

HU803B.1	Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
HU803B.2	Students will be able to provide internal stakeholders with information regarding project costs by considering factors such as estimated cost, variances and profits
HU803B.3	Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
HU803B.4	Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

Course contents:**MODULE I [12L]**

Planning and analysis of Water Resource Systems: Introduction, System Analysis, Engineers and Policymakers Methods of Analysis: Introduction, Evaluation of Time streams of Benefits and Costs. Plan formulation, Planning models and solution procedures, Lagranges Multipliers, Dynamic Programming, Recursive equations, Bellmans' principle of optimality. Curse of dimensionality of discrete dynamic programming. Examples

MODULE -II [9L]

Reservoir Operation: Sequential process, single Reservoir problem - with release as decision variable, with storage as decision variable (deterministic approach). Examples, Related Computer Programming. Multi-reservoir problems (Deterministic approach)

MODULE -III [9L]

Water Resources Planning under Uncertainty: Introduction, probability concepts and Methods – Random variable and Distributions, Univariate probability Distributions ,properties of Random variable – Moment and Expectation (Univariate Distributions) , Moment Generating Functions, Measures of Central tendency, Measures of Dispersion, Measures of symmetry (Skewness), measures of peakedness (kurtosis), examples

MODULE -IV [6L]

Stochastic River Basin Planning Model: Introduction, Reservoir operation, Stochastic, Dynamic programming, Operating Model, Probability Distribution of Storage volumes and Releases, examples.quality Management: Prediction and Simulation, Water quality Management Modeling

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU803B.1	-	-	-	-	3	2	2	-	-	-	-	-
HU803B.2	-	-	-	-	-	3	2	2	-	-	1	-
HU803B.3	-	-	-	-	-	-	-	-	3	2	2	-
HU803B.4	-	-	-	-	3	2	2	-	-	-	1	-
HU803B	-	-	-	-	3	2.33	2	2	3	2	1.33	-

PAPER NAME: AIR & NOISE POLLUTION & CONTROL**PAPER CODE: CE803C CONTACTS: 3L +0T =3HRS CREDITS: 3 TOTAL: 36 HRS****Prerequisites:**

Basic knowledge of environment pollution and its causes with preliminary knowledge of chemistry knowledge on different impurities are pollutants of air.

Course Objective:

Students will acquire knowledge on air pollution, sources and control of particulates, gaseous pollutant and self cleansing properties of the environment. Familiarity with noise pollution, measurement, sources and control. Acquire knowledge on global environmental issues like ozone depletion, acid rain, greenhouse effect. Familiarity with administrative control on environment with function of State and Central Pollution Control Boards and clearance process for industries and infrastructural projects. Some knowledge on environmental laws and Environmental Impact Assessment.

Course Outcome:

CE 803C.1	To learn about the air pollutants, sources and its effects.
CE 803C.2	To have a clear understanding on the air quality standards and its techniques.
CE 803C.3	To determine the fluid resistance for organic materials.
CE 803C.4	To find the Properties of air pollution and its control measures.
CE 803C.5	To learn about the effects and the sources of noise pollution.

Course contents:**Module-I: [6L]**

Introduction: Environment. Pollution, Pollution control

Module-II: [6L]

Air Pollution: Air Pollutants: Types, Sources, Effects; Air Pollution Meteorology: Lapse Rate, Inversion, Plume Pattern; Air Pollution Dispersion Model: Point Source Gaussian Plume Model, Stability Classes, Stability Charts, Design of Stack Height.

Module-III: [6L]

Air pollution Control: Self cleansing properties of the environment; Dilution method; Engineered Control of Air Pollutants: Control of the particulates, Control of Gaseous Pollutants, Control of Air pollution from Automobiles.

Module-IV: [5L]

Noise Pollution: Definition; Sound Pressure, Power and Intensity; Noise Measurement: Relationships among Pressure, Power and Intensity, Levels, Frequency Band, Decibel Addition, Measures of community Noise i.e. L_N , L_{eq} , L_{dn} , L_{NP} ; Sources, ; Effects; Control.

Module-V: [4L]

Global Environmental Issues: Ozone Depletion, Acid Rain, Global Warming-Green House Effects

Module-VI: [5L]

Administrative Control on Environment: Functions of Central and State Pollution Control Boards; Environmental Clearance Process for Industries and Infrastructural Projects

Module-VII: [4L]

Environmental Laws: Water Act, Air Act, Motor Vehicle Act

Text Books:

Environmental Engineering by S.K. Garg

Reference Books:

Environmental Engineering by P.V.Rowe

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 801A.1	2	2	2	3	1	2	2	-	2	-	-	2
CE 801A.2	2	2	2	3	1	-	-	-	-	-	-	-
CE 801A.3	-	3	2	3	1	-	-	-	-	-	-	-
CE 801A.4	-	1	2	2	1	-	3	-	1	-	-	2
CE 801A.5	-	1	-	2	1	2	3	-	-	-	-	2
CE 801A	1.6	2.33	2.67	2.6	1	2	2.67	-	1	-	-	2

PAPER NAME: REMOTE SENSING AND GIS**PAPER CODE: CE 803D****CONTACTS: 3L +0T =3HRS****CREDITS: 3****TOTAL: 36 HRS****Pre requisites:** Student should knowledge about remote sensing and GIS.**Course Objective:** Student should be able to make technology choice to deal with the technology behind remote sensing and know about GIS.**CourseOutcome:**

CE803D.1	Student will be able know the introduction of the remote sensing and Geodetics, Triangulation, Trilateration, Tachometry etc.
CE803D.2	Student will be able to know and apply the photogrammetric survey and analyze the problems.
CE803D.3	Student will be able to know and apply the satellite survey. Also analyze and evaluate the problems.
CE803D.4	Student will able to know about the astronomy and GPS system.
CE803D.5	Student will able to know about GIS concept.

Course contents:**Module-I: [5L]**

INTRODUCTION: Definition and types of remote sensing, Tachometry (Planimetry/ altimetry), Triangulation (Frame work / adjustment), Trilateration (EDM/ Total Station), Geodetics (physical/ geometrical geodesy), Error Analysis (causes / law of weights), Numerical example

Module-II: [7L]

PHOTOGRAMMETRIC: Camera System (phototheodolite/ aircraft), Ground photograph (oblique/orthogonal streophoto), Aerial photograph (perspective scale/ flight planning), distortion (relief / tilt), Geometrix (parallax / mapping), application (topographics / interpretation), Numerical examples

Module-III: [7L]

SATELLITE SURVEY: Satellite Sensing (Sensors / platforms), energy sources (electromagnetic / atmospheric interaction), visual interpretation (Band width), digital processing (imageries / enhancement), data integration (multi-approach / GIS), microwave imaging (active system / radars), applications

Module-IV: [10L]

ASTRONOMY: Celestial sphere (star-coordinates / transformation), field astronomy (azimuth, solar and polar method), 3D computation (local vs global), spherical trigonometry, Multilateration, Observation, Corrections in astronomy, Correlation of low, medium, remote objects, Global Positioning Systems

Module-V: [7L]

GEO INFORMATICS: GIS concept (Introduction/ definition), planning and management, spatial data model, database and DBMS, linking of attributes, geospatial analysis, modern trends

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CE 803D.1	3	3	3	2	3	1	1	1	3	3	3	3
CE 803D.2	3	3	3	2	2	2	1	1	3	2	3	2
CE 803D.3	-	-	-	-	-	-	-	-	-	-	-	-
CE 803D.4	3	3	3	3	2	2	1	1	3	2	2	2
CE 803D.5	3	3	3	3	2	1	1	1	3	2	1	2
CE 803D	3	3	3	2.5	2.25	1.5	1	1	3	2.25	2.25	2.25

PAPER NAME:PROJECT MANAGEMENT**PAPER CODE: HU 806****CONTACTS: 2L +1T =3HRS****CREDITS: 2****TOTAL: 30 HRS****Prerequisites:** Knowledge about Building Material , Construction**Course Objective:**

Classify various forms of organizations

- Understand the concept Project management planning and apply it on construction projects
- Focus on Cost management of a construction project
- Demonstrate Time management of a construction project by proper scheduling using PERT, CPM,
- Resource allocation, Updating, etc. Summarize Quality management systems required for construction projects
- Manage the project team, defining roles and responsibilities and fixing scope of the project
- Perform Time-motion studies on construction activities and interpret the results

Course Outcome:

HU806.1	Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
HU806.2	Students will be able to provide internal stakeholders with information regarding project costs by considering factors such as estimated cost, variances and profits
HU806.3	Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
HU806.4	Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

Course contents:**Module-I: [4L]**

Basics of Management 1.1 Modern scientific management, Management Functions, Management Styles with special focus on the contributions of Henry Fayol, Frederick Taylor, Abraham Maslow, Elton Mayo and Douglas McGregor

Module-II: [10L]

Project Management 2.1 Basic forms of organization with emphasis on Project and matrix structures 2.2 Project Life Cycle, concept of s-curve between time and cost of project 2.3 Planning for achieving time, cost, quality, project feasibility reports based on socio-techno-economic-environmental impact analysis 2.4 Project clearance procedures and necessary documentation for major works like dams, multistoried structures, ports, tunnels, etc. 2.5 Qualities, role and responsibilities of project Manager 2.6 Role of Project Management Consultants 2.7 Web based project management.

Module-III: [6L]

Project Scheduling: Importance of Project Scheduling, Work Breakdown Structure and Organization Breakdown Structure, Scheduling Techniques – Gantt Chart and LOB, Network Analysis – CPM/PERT. software in Construction scheduling (MSP, primavera,

Module-IV: [4L]

Work Study 6.1 Definition, Objectives, basic procedure of work study 6.2 work study applications in Civil Engineering. 6.3 Method study – Definition, Objective, Procedure for selecting the work, recording facts, symbols, flow process charts, multiple activity charts, string diagrams. 6.4 Work measurement – Time and motion studies, Concept of standard time and various allowances, time study, equipment performance rating. Activity sampling, time-lapse photography technique, Analytical production studies

Module-V: [2L]

Human Resource Management The processes that organize, staff, manage, and lead the project team.

Module-VI: [2L]

Project Quality Management: Concept of Project Quality, TQM in Projects, Project Audit.

Module-VII: [2L]**Cost Management**

The processes involved in estimating, budgeting, and controlling costs so that the project can be completed within the approved budget. Identify resources required to complete tasks

Text Books:

PERT & CPM principle and applications” L.S. Srinath , E.W.P. Ltd. New Delhi. 3.“ Network Analysis Techniques “ S.K. Bhatnagar, Willey Eastern Ltd.

Reference Books:

Project Management – K Nagrajan – New age International Ltd.

Professional Construction Management Barrie-Paulson-McGraw Hill Institute Edition.

Project Management – Ahuja H.N. – John Wiely, New York.

Project Management-Planning and Control---Rory Burkey 4th ed.—Wiley, Ind

Text Book of Project Management, Macmillan- Gopalkrishnan P. and Rama Mmoorthy

Project Management for Business and Technology – Principles and Practice- Nicholas John M, Prentice Hall India, 2nd Edn.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HU806.1						3	2		3			3
HU806.2								1		3		3
HU806.3							3		3			1
HU806.4						3	2		3	3		2

PAPER NAME: TECHNICAL REPORT WRITING & GROUP DISCUSSION

PAPER CODE: HU891 CONTACTS: 3P =3HRS CREDITS: 1 TOTAL: 24 HRS

Prerequisite: Knowledge of English

Objectives of this Course:

This course has been designed:

1. To inculcate a sense of confidence in the students.
2. To help them become good communicators both socially and professionally.
3. To assist them to enhance their power of Technical Communication.

Course Outcome:

HU891.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU891.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU891.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU891.4: Able to analyze communication behaviours.

HU891.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

Detailed Course Outlines:

A. Technical Report Writing : [2L+6P]

1. Report Types (Organizational / Commercial / Business / Project)
2. Report Format & Organization of Writing Materials
3. Report Writing (Practice Sessions & Workshops)

B. Language Laboratory Practice

I. Introductory Lecture to help the students get a clear idea of Technical Communication & the need of Language Laboratory Practice Sessions [2L]

2. Conversation Practice Sessions: (To be done as real life interactions) [2L+4P]

a) Training the students by using Language Lab Device/Recommended Texts/cassettes /cd's to get their Listening Skill & Speaking Skill honed

b) Introducing Role Play & honing over all Communicative Competence

3. Technical Presentation and Report writing: [2L+6P]

a) Teaching Technical Presentation as a skill

b) Strategies and Standard Practices of Individual /Group Presentation and Report writing

c) Media & Means of Presentation: OHP/POWER POINT/ Other Audio-Visual Aids

d) Report Writing and Oral Reports

4. Interview Sessions : [2L+6P]

a) Training students to face Job Interviews confidently and successfully

b) Arranging Mock Interviews and Practice Sessions for integrating Listening Skill with Speaking Skill in a formal situation for effective communication

5. Competitive Examination: [2L+2P]

a) Making the students aware of Provincial /National/International Competitive Examinations

b) Strategies/Tactics for success in Competitive Examinations

c) SWOT Analysis and its Application in fixing Target

Text Books: 1) Nira Konar: English Language Laboratory: A Comprehensive Manual PHI Learning, 2011 2) D. Sudharani: Advanced Manual for Communication Laboratories & Technical Report Writing Pearson Education (W.B. edition), 2011 References:

Reference Books: 1) Adrian Duff et. al. (ed.): Cambridge Skills for Fluency A) Speaking (Levels 1-4 Audio Cassettes/HandbB) Listening (Levels 1-4 Audio Cassettes/Handbooks) Cambridge University Press 1998 2) Mark Hancock: English Pronunciation in Use 4 Audio Cassettes/CD'S, OUP 2004

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO.1	2	-	-	3	-	3	2	2	3	3	-	3
CO.2	2	3	3	3	-	3	3	3	2	3	-	3
CO.3	1	3	3	3	-	2	2	2	2	3	-	2
CO.4	1	2	3	3	-	2	1	1	2	3	-	2
CO.5	3	3	2	3	-	2	3	2	2	3	-	2