MAHATMA GANDHI INSTITUTE OF TECHNOLOGY (Autonomous)

B.Tech in Civil Engineering

Scheme of Instruction and Examination

(Choice Based Credit System)

Applicable from AY 2022-23 Batch

I SEMESTER

S. No	Course Code	Course Title	Instruction Hours per week			Examination Max. Marks		Duration of SEE in hours	Credits
			L	T	P	CIE	SEE		
1.	MA101BS	Matrices and Calculus	3	1	0	40	60	3	4
2.	PH101BS	Applied Physics	3	1	0	40	60	3	4
3.	CS102ES	C Programming and Data Structures	3	0	0	40	60	3	3
4.	EN101HS	English for Skill Enhancement	2	0	0	40	60	3	2
5.	PH151BS	Applied Physics Laboratory	0	0	3	40	60	3	1.5
6.	CS152ES	C Programming and Data Structures Laboratory	0	0	2	40	60	3	1
7.	EN151HS	English Language and Communication Skills Laboratory	0	0	2	40	60	3	1
8.	CE151PC	Elements of Civil Engineering	0	0	2	50	--	--	1
9.	ME151ES	Engineering Workshop	0	1	3	40	60	3	2.5
10.		Induction Programme							
		Total	**11**	**3**	**12**	**370**	**480**		**20**

II SEMESTER

S. No	Course Code	Course Title	Instruction Hours per week			Examination Max. Marks		Duration of SEE in hours	Credits
			L	T	P	CIE	SEE		
1.	MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	40	60	3	4
2.	CH201BS	Engineering Chemistry	3	1	0	40	60	3	4
3.	ME201ES	Engineering Graphics	1	0	4	40	60	3	3
4.	ME202ES	Engineering Mechanics	3	0	0	40	60	3	3
5.	CE201PC	Surveying	2	0	0	40	60	3	2
6.	CH251BS	Engineering Chemistry Laboratory	0	0	2	40	60	3	1
7.	CS251ES	Python Programming Laboratory	0	1	2	40	60	3	2
8.	CE251PC	Surveying Laboratory - I	0	0	2	40	60	3	1
9.	MC201BS	Environmental Science	3	0	0	40	60	3	0
		Total	**15**	**3**	**10**	**360**	**540**		**20**

III SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours per week			Max. Marks		Duration of SEE in hours	
			L	T	P	CIE	SEE		
1.	CE301PC	Building Materials, Construction and Planning	3	0	0	40	60	3	3
2.	CE302PC	Concrete Technology	3	0	0	40	60	3	3
3.	CE303PC	Strength of Materials – I	3	0	0	40	60	3	3
4.	CE304PC	Fluid Mechanics	3	0	0	40	60	3	3
5.	EE331ES	Basic Electrical and Electronics Engineering	3	0	0	40	60	3	3
6.	CE351PC	Surveying Laboratory - II	0	1	2	40	60	3	2
7.	CE352PC	Strength of Materials Laboratory	0	0	2	40	60	3	1
8.	CE353PC	Concrete Technology Laboratory	0	0	2	40	60	3	1
9.	EE361ES	Basic Electrical and Electronics Engineering Laboratory	0	0	2	40	60	3	1
10.	MC301HS	Constitution of India	3	0	0	40	60	3	0
		Total	**18**	**1**	**8**	**400**	**600**		**20**

IV SEMESTER

S. No	Course Code	Course Title	Instruction			Examination			Credits
			Hours per week			Max. Marks		Duration of SEE in hours	
			L	T	P	CIE	SEE		
1.	MA401BS	Probability and Statistics	3	1	0	40	60	3	4
2.	CE401PC	Strength of Materials – II	3	0	0	40	60	3	3
3.	CE402PC	Structural Analysis - I	3	0	0	40	60	3	3
4.	CE403PC	Engineering Geology	3	0	0	40	60	3	3
5.	CE404PC	Hydraulics and Hydraulic Machinery	3	0	0	40	60	3	3
6.	CE451PC	Fluid Mechanics and Hydraulic Machinery Laboratory	0	0	2	40	60	3	1
7.	CE452PC	Computer Aided Drafting Laboratory	0	0	2	40	60	3	1
8.	CE453PC	Real-time Research Project/ Field-Based Project	0	0	4	50	--	--	2
9.	MC451HS	Gender Sensitization Laboratory	0	0	2	50	50	3	0
		Total	**15**	**1**	**10**	**380**	**470**		**20**

L	T	P	C
3	1	0	4

B.Tech in Civil Engineering
I Semester Syllabus
MA101BS: MATRICES AND CALCULUS
(Common to all Branches)

Course Objectives

- Types of matrices and their properties, concept of a rank of the matrix and applying thisconcept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
- Geometrical approach to the mean value theorems and their application to the mathematical problems, evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative, finding maxima and minima of function of two andthree variables.
- Evaluation of multiple integrals and their applications.

Course Outcomes

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations.
- Find the Eigen values and Eigen vectors, reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems, evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with and without constraints.
- Evaluate the multiple integrals and apply the concept to find areas, volumes.

UNIT-I: Matrices

Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss- Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations, LU Decomposition method, Gauss elimination method and Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: Eigen values, Eigen vectors, properties of Symmetric, Skew Symmetric, Orthogonal, Unitary, Hermitian and Skew Hermitian matrices with reference to Eigen values and Eigen vectors Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Calculus

Mean value theorems: Rolle‟s theorem, Lagrange‟s Mean value theorem with their Geometrical Interpretation and applications, Cauchy‟s Mean value Theorem, Taylor‟s Series. Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-IV: Multivariable Calculus (Partial Differentiation and applications)

Definitions of Limit and continuity, Partial Differentiation: Euler‟s Theorem, Total derivative, Jacobian, Functional dependence and independence. Applications: Maxima and minima of functions

of two variables and three variables using method of Lagrange multipliers.

UNIT-V: Multivariable Calculus (Integration)

Evaluation of Double Integrals (Cartesian and polar coordinates), change of order of integration (only Cartesian form), Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) triple integrals.

Applications: Areas (by double integrals) and volumes (by double integrals and triple integrals).

Suggested Readings:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications,5th Editon, 2016.

Reference Books:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition,Pearson, Reprint,2002.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications,Reprint, 2008.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.

L	T	P	C
3	1	0	4

B.Tech in Civil Engineering
I Semester Syllabus
PH101BS: APPLIED PHYSICS
(Common to all branches)

Course Objectives: The objectives of this course for the student are to:

- Understand the basic principles of quantum physics.
- Understand the underlying mechanism involved in construction and working principles ofvarious semiconductor devices.
- Study the fundamental concepts related to the dielectric and magnetic materials.
- Identify the importance of nanoscale, quantum confinement and various fabrication techniques.
- Study the characteristics of lasers and optical fibres.

Course Outcomes: At the end of the course the student will be able to:

- Understand physical world from fundamental point of view by the concepts of Quantum mechanicsand visualize the difference between conductor, semiconductor and an insulator by classification ofsolids.
- Identify the role of semiconductor devices in science and engineering Applications.
- Explore the fundamental properties of dielectric and magnetic materials for their applications.
- Appreciate the features and applications of Nanomaterials.
- Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.

UNIT - I: QUANTUM PHYSICS

Blackbody radiation — Planck‟s radiation law - Wein‟s law, Rayleigh-Jean‟s law - Photoelectric effect — de Broglie‟s Hypothesis, Davisson and Germer‟s experiment — Heisenberg uncertainty principle with an illustration - Non-existence of electrons in nucleus - Time independent Schrodinger wave equation - Born interpretation of the wave function - Particle in one dimensional potential box.

UNIT - II: SEMICONDUCTORS AND DEVICES

Intrinsic and extrinsic semiconductors — Hall effect - Direct and indirect band gap semiconductors - Construction, principle of operation and characteristics of P-N Junction diode, Zener diode and Bipolar Junction Transistor (BJT) — LED, PIN diode, Avalanche Photo Diode (APD) and Solar cells: structure, materials, working principle and characteristics.

UNIT - III: DIELECTRIC AND MAGNETIC MATERIALS

Dielectric Materials: T ypes of polarizations – Electronic & Ionic polarizabilities - Internal f ield in Diele ct r i c s and Cl a us i us - Mo s so tt i R el at i on – Ferroelectric - Piezoelectric and Pyroelectric materials –Applications: liquid crystal displays (LCD) and crystal oscillators.Magnetic Materials: Origin of magnetic moment - Classification of Magnetic materials - Weiss theory of ferromagnetism — Hysteresis curve
— Soft and Hard magnetic materials — Applications: Bubble memory devices, magnetic field sensors.

UNIT - IV: NANOTECHNOLOGY

Nanoscale — Properties of Nanomaterials - Surface to volume ratio - Quantum confinement — Top-down fabrication: ball milling - Bottom-up fabrication: sol-gel, Physical Vapor Deposition (PVD) and Chemical Vapor Deposition (CVD) - Characterization techniques: XRD, SEM & TEM - Applications of nanomaterials.

UNIT - V: LASERS AND FIBER OPTICS

Lasers: Characteristics - Spontaneous and Stimulated emissions – Einstein coefficients - Population Inversion - Pumping mechanisms - Ruby laser, Nd:YAG laser, He-Ne laser, CO_2 laser, Semiconductor laser - Applications of lasers.

Fiber Optics: Introduction to optical fibers - Advantages of optical Fibers over conventional communications — Principle of light transmission through optical fiber - Structure of optical fiber - Acceptance angle and Numerical aperture - Classification of optical fibers: Step index and Graded index fibers — Attenuation mechanism in optical fibers — Block diagram of optical fiber communication system - applications.

TEXT BOOKS:

1. M. N. Avadhanulu, P.G. Kshirsagar & T. V. S. Arun Murthy "A Text book of Engineering Physics"- S Chand Publications, 11th Edition 2019.
2. Engineering Physics by Shatendra Sharma and Jyotsna Sharma, Pearson Publication,2019
3. Semiconductor Physics and Devices- Basic Principle – Donald A, Neamen, Mc Graw Hill, 4th Edition,2021.
4. B.K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Learning, 2nd Edition
5. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.

REFERENCE BOOKS:

1. Quantum Physics, H.C. Verma, TBS Publication,2nd Edition 2012
2. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley & Sons, 11th Edition, 2018.
3. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.
4. Elementary Solid State Physics, S.L. Gupta and V. Kumar, Pragathi Prakashan, 2019.
5. A.K. Bhandhopadhya – Nano Materials, New Age International, 1st Edition, 2007.

L	T	P	C
3	0	0	3

B.Tech in Civil Engineering
I Semester Syllabus
CS102ES: C PROGRAMMING AND DATA STRUCTURES
(CIVIL, ECE, EEE, MCT, MECH, MME)

Course Objectives:

- Introduce the importance of programming
- C language constructs
- program development
- data structures
- searching and sorting.

Course Outcomes:

- Understand the various steps in Program development.
- Explore the basic concepts in C Programming Language.
- Develop modular and readable C Programs
- Understand the basic concepts such as Abstract Data Types, Linear and Non-LinearData structures.
- Apply data structures such as stacks, queues in problem solving
- To understand and analyze various searching and sorting algorithms.

UNIT - I

Introduction to Computers – Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development

Introduction to C Language – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output

Structure of a C Program – Operators, Bit-wise operators, Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Statements.

UNIT - II

Statements – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Recursion.

Designing Structured Programs- Functions, basics, user defined functions, inter function communication, standard functions.

Arrays – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays.

UNIT - III

Pointers – Introduction, Pointers for inter function communication, pointers to pointers, compatibility, **Pointer Applications** – Passing an array to a function, Memory allocation functions, array of pointers **Strings** — Concepts, C Strings, String Input/Output functions, arrays of strings, string manipulation functions, string / data conversion.

UNIT - IV

Derived types – The Typedef, enumerated types, Structures – Declaration, definition and initialization of structures, accessing structures, operations on structures, complex structures. Unions – Referencing unions, initializers, unions and structures.

Input and Output – Text vs Binary streams, standard library functions for files, converting file types, File programs — copy, merge files.

UNIT – V

Sorting- selection sort, bubble sort, insertion sort,

Searching-linear and binary search methods.

Data Structures — Introduction to Data Structures, abstract data types, Linear list — singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations.

TEXT BOOKS:

1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition,Cengage Learning.
2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Fifth Edition, Pearson Education.
3. The C Programming Language, B.W. Kernighan and DennisM.Ritchie,PHI/Pearson Education

REFERENCE BOOKS:

1. C & Data structures – P. Padmanabham, 3rd Edition, B.S. Publications.
2. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
3 Programming in C – Stephen G. Kochan, III Edition, Pearson Education.
4. C for Engineers and Scientists, H. Cheng, McGraw-Hill International Edition
5. Data Structures using C – A. M. Tanenbaum, Y. Langsam, and M.J. Augenstein,Pearson Education / PHI
6. C Programming & Data Structures, E. Balagurusamy, TMH.
7. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
8. C & Data structures – E V Prasad and N B Venkateswarlu, S. Chand & Co.

L	T	P	C
2	0	0	2

B.Tech in Civil Engineering
I Semester Syllabus
EN101HS: ENGLISH FOR SKILL ENHANCEMENT
(Common to CSE, CSE (DS), CSE (AI&ML), IT, CSBS & EEE)

Course Objectives: This course will enable the students to:

- Improve the language proficiency in English with an emphasis on Vocabulary and improvetheir functional grammar.
- Enhance their Reading and Writing skills.
- Develop study skills and communication skills in various professional situations.
- Train in effective reading techniques for better comprehension of texts of various domains.
- Equip them to study Engineering subjects more effectively and critically using thetheoretical and practical components of the syllabus.

Course Outcomes: Students will be able to:

- Choose appropriate vocabulary and sentence structures for their oral and written Communication.
- Demonstrate their understanding of the rules of functional grammar.
- Develop comprehension skills from the known and unknown passages.
- Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts.
- Acquire basic proficiency in reading and writing modules of English.

UNIT-I- ***Toasted English*** **by R. K. Narayan** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary : The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms

Grammar **:** Identifying Common Errors in Writing with Reference to Articles and Prepositions.

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

Writing **:** Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for Writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT-II- ***Appro JRD*** **by Sudha Murthy** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary **:** Words Often Misspelt - Homophones, Homonyms and Homographs.

Grammar **:** Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading **:** Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice.

Writing **:** Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

UNIT-III- ***Lessons from Online Learning*** **by F. Haider Alvi, Deborah Hurst et al** from **"English: LanguageContext and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary : Words Often Confused - Words from Foreign Languages and their Use in English.

Grammar **:**Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.

Reading **:** Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice – Barriers to Effective Reading.

Writing **:**Format of a Formal Letter-Writing Formal Letters E.g., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

UNIT-IV - ***Art and Literature*** **by Abdul Kalam** from **"English: Language, Context and Culture"** published by Orient BlackSwan, Hyderabad.

Vocabulary **:** Standard Abbreviations in English – Idioms and Phrases

Grammar **:** Redundancies and Clichés in Oral and Written Communication.

Reading **:** Effective Steps to Reading - Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing **:**Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

UNIT-V - ***Go, Kiss the World*** **by Subroto Bagchi** from **"English: Language, Context andCulture"** published by Orient BlackSwan, Hyderabad.

Vocabulary : Technical Vocabulary and their Usage

Grammar **:** Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading **:** Reading Comprehension-Exercises for Practice

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

Note: Listening and Speaking Skills given under Unit-6 in the AICTE Model Curriculum are covered in the syllabus of ELCS Lab Course.

Note-1 **:**As the syllabus of English given in AICTE Model Curriculum-2018 for B.Tech First Year is **Open-ende** , besides following the prescribed textbook, it is required to prepare teaching/learning materials **by the teachers collectively** in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning in the class.

Note: **2** **:** Based on the recommendations of NEP2020, teachers are requested to be flexible to adopt Blended Learning in dealing with the course contents .They are advised to teach 40 percent of each topic from the syllabus in blended mode.

Textbook:

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books:

1. Liss and Davis (2010) Effective Academic Writing, Oxford University Press.
2. Richards, Jack C. (2022) Interchange Series. Introduction, 1, 2, 3. Cambridge University Press
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Chaudhuri, Santanu Sinha. (2018). Learn English: A Fun Book of Functional Language, Grammar and Vocabulary. (2nd ed.,). Sage Publications India Pvt. Ltd.
5. Wiley (2019). Technical Communication. Wiley India Pvt. Ltd, Rupa Publications.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students.Mc Graw-Hill Education India Pvt. Ltd.

7. Swan, Michael. (2016). Practical English Usage. Oxford University Press. Fourth Edition
8. Green, David (2015). Contemporary English Grammar Structure And Composition, Trinity Press (Imprint of Laxmi Publication Pvt Ltd).

L	T	P	C
0	0	3	1.5

B.Tech in Civil Engineering
I Semester Syllabus
PH151BS: APPLIED PHYSICS LABORATORY
(Common to all branches)

Course Objectives: The objectives of this course for the student to

- Capable of handling instruments related to the Hall effect and photoelectric effect experiments and their measurements.
- Understand the characteristics of various devices such as PN junction diode, Zener diode, LED, solar cell, lasers and optical fiber and measurement of energy gap and resistivity of semiconductor materials.
- Able to measure the time constant of RC circuits.
- Study the variation of magnetic field along the axis of current carrying coil.
- Understanding the method of least squares fitting.

Course Outcomes: The students will be able to:

- Know the determination of the Planck‟s constant using Photo electric effect andidentify the material whether it is n-type or p-type by Hall experiment.
- Appreciate quantum physics in semiconductor devices and optoelectronics.
- Gain the knowledge of applications of RC circuits.
- Understand the effect of magnetic field in different current carrying coils.
- Carried out data analysis.

LIST OF EXPERIMENTS:

1. Determination of work function and Planck‟s constant using photoelectric effect.
2. Determination of Hall co-efficient and carrier concentration of a given semiconductor.
3. Characteristics of series and parallel LCR circuits.
4. V-I characteristics of a p-n junction diode and Zener diode
5. V-I and P-I characteristics of light emitting diode (LED)
6. V-I Characteristics of solar cell
7. Determination of Energy gap of a semiconductor.
8. Determination of Acceptance Angle and Numerical Aperture of an optical fiber.
9. V-I characteristics of Laser diode.
10. Understanding the method of least squares – torsional pendulum as an example.
11. Determination of time constant using RC circuits
12. Determination of magnetic field of induction using Steewart-Gee‟s apparatus

Note: *Any 8 experiments are to be performed.*

REFERENCE BOOK:

1. S. Balasubramanian, M.N. Srinivasan “A Text book of Practical Physics”- S ChandPublishers, 2017.

L	T	P	C
0	0	2	1

B.Tech in Civil Engineering
I Semester Syllabus
CS152ES: C PROGRAMMING AND DATA STRUCTURES LABORATORY
(CIVIL, ECE, EEE, MCT, MECH, MME)

Course Objectives:

- Introduce the importance of programming
- C language constructs
- Program development
- Data structures
- Searching and sorting.

Course Outcomes:

- Develop modular and readable C Programs
- Solve problems using strings, functions
- Handle data in files
- Implement stacks, queues using arrays, linked lists.
- To understand and analyze various searching and sorting algorithms.

List of Experiments:

1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is avalue supplied by the user.
4. Write a C program to find the roots of a quadratic equation.
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user,performs the operation and then prints the result. (Consider the operators +,-
   ,*, /, % and use Switch Statement)
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
    i) Addition of Two Matrices
    ii) Multiplication of Two Matrices
11. Write a C program that uses functions to perform the following operations:
    i) To insert a sub-string in to a given main string from a given position.
    ii) To delete n Characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the stringT begins, or – 1 if S doesn‟t contain T.
14. Write a C program to count the lines, words and characters in a given text.

15. Write a C program to generate Pascal‟s triangle.
16. Write a C program to construct a pyramid of numbers.
17. Write a C program that uses functions to perform the following operations:
    i) Reading a complex number
    ii) Writing a complex number
    iii) Addition of two complex numbers
    iv) Multiplication of two complex numbers
    (Note: represent complex number using a structure.)
18.
    i. Write a C program which copies one file to another.
    ii. Write a C program to reverse the first n characters in a file. (Note: The file name and n are specified on the command line.)
19.
    i. Write a C program to display the contents of a file.
    ii. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file)
20. Write a C program that uses functions to perform the following operations on singlylinked list.:
    i) Creation ii) Insertion iii) Deletion iv) Traversal
21. Write C programs that implement stack (its operations) using
    i) Arrays ii) Pointers
22. Write C programs that implement Queue (its operations) using
    i) Arrays ii) Pointers
23. Write a C program that implements the following sorting methods to sort a givenlist of integers in ascending order
    i) Bubble sort ii) Selection sort iii)Insertion sort
24. Write C programs that use both recursive and non recursive functions to perform thefollowing searching operations for a Key value in a given list of integers:
    i) Linear search ii) Binary search

TEXT BOOKS:

1. C Programming & Data Structures, B.A. Forouzan and R. F. Gilberg, Third Edition, CengageLearning.
2. Let us C, Yeswanth Kanitkar
3. C Programming, Balaguruswamy.

L	T	P	C
0	0	2	1

B.Tech in Civil Engineering
I Semester Syllabus
EN151HS: ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY
(Common to CSE, CSE (DS), CSE (AI&ML), IT, CSBS & EEE)

The **English Language and Communication Skills (ELCS) Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives: This course will enable the students to:

- Facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- Sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
- Bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
- Improve the fluency of students in spoken English and neutralize mother tongue interference
- Train students to use language appropriately for public speaking, group discussions and interviews.

Course Outcomes: Students will be able to:

- Understand the nuances of English language through audio- visual experience and group Activities.
- Demonstrate their understanding of exact pronunciation of speech sounds.
- Acquire fluency in their language and neutralize their accent for intelligibility without Mother Tongue Interference (MTI).
- Speak with clarity and confidence which in turn enhances their employability skills.
- Develop their ability in presenting, arguing, summarizing and leading various communicative activities.

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

Listening Skills:

Objectives

1. To enable students develop their listening skills so that they may appreciate the role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening, so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.

• Listening for general content
• Listening to fill up information
• Intensive listening
• Listening for specific information

Speaking Skills:

Objectives:

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional Contexts

- Oral practice
- Describing objects/situations/people
- Role play – Individual/Group activities
- Just A Minute (JAM) Sessions

The following course content is prescribed for the **English Language and Communication Skills Lab**.

Exercise – I

CALL Lab:

Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers- Effective Listening. Practice: Introduction to Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and
Plural Marker- Testing Exercises.

ICS Lab:

Understand: Spoken vs. Written language- Formal and Informal English.

Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing
Oneself and Others.

Exercise – II

CALL Lab:

Understand: Structure of Syllables – Word Stress– Weak Forms and Strong Forms – Stress pattern in sentences –
Intonation.

Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms- Stress pattern in sentences –
Intonation - Testing Exercises.

ICS Lab:

Understand: Features of Good Conversation – Strategies for Effective Communication.

Practice: Situational Dialogues – Role Play- Expressions in Various Situations –Making Requests and Seeking
Permissions - Telephone Etiquette.

Exercise - III

CALL Lab:

Understand: Errors in Pronunciation-Neutralising Mother Tongue Interference (MTI).

Practice: Common Indian Variants in Pronunciation – Differences between British and American Pronunciation -Testing
Exercises

ICS Lab:

Understand: Descriptions- Narrations- Giving Directions and Guidelines – Blog Writing

Practice: Giving Instructions – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding –
Agreeing and Disagreeing – Seeking and Giving Advice – Making Suggestions

Exercise – IV

CALL Lab:

Understand: Listening for General Details.

Practice: Listening Comprehension Tests - Testing Exercises

ICS Lab:

Understand: Public Speaking – Exposure to Structured Talks - Non-verbal Communication-Presentation Skills.

Practice: Making a Short Speech – Extempore- Making a Presentation.

Exercise – V

CALL Lab:

Understand: Listening for Specific Details.

Practice: Listening Comprehension Tests -Testing Exercises

ICS Lab:

Understand: Group Discussion – Introduction to Interview Skills

Practice: Group Discussion – Mock Interviews

Minimum Requirement of infrastructural facilities for ELCS Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):

Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:

i) Computers with Suitable Configuration

ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

The Interactive Communication Skills Lab: A Spacious room with movable chairs and audiovisual

aids with a Public Address System, a T. V. or LCD, a digital stereo –audio & video system and camcorder etc.

Source of Material (Master Copy): Exercises in Spoken English. Part 1, 2, 3. CIEFL and Oxford University Press

Note: Teachers are requested to make use of the master copy and get it tailor-made to suit the contents of the syllabus.

Suggested Software:

1. Cambridge Advanced Learners' English Dictionary with CD.
2. Grammar Made Easy by Darling Kindersley.
3. Punctuation Made Easy by Darling Kindersley.
4. Oxford Advanced Learner's Compass, 10th Edition.
5. English in Mind (Series 1-4), Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge.
6. English Pronunciation in Use (Elementary, Intermediate, Advanced) Cambridge University Press.
7. English Vocabulary in Use (Elementary, Intermediate, Advanced) Cambridge University Press.

8. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS). Digital All Orell Digital Language Lab (Licensed Version).

REFERENCE BOOKS:

1. Kumar, Rajesh (2022). English Language Communication Skills – Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
2. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English – A workbook. Cambridge University Press
3. Kumar, Sanjay & Lata, Pushp. (2019). Communication Skills: A Workbook. Oxford University Press
4. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient Black Swan Pvt. Ltd.
5. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press.
6. Central Institute of English (2005). Exercises in Spoken English Vol. 1, 2 & 3, Oxford India, Hyderabad

L	T	P	C
0	0	2	1

B.Tech in Civil Engineering
I Semester Syllabus
CE 151 PC: ELEMENTS OF CIVIL ENGINEERING

Course Objectives

- To provide practical knowledge about physical properties of minerals and rocks.
- To determine the characteristics of cement, coarse & fine aggregates.

Course Outcomes

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

1. Understands the method and ways of investigations required for Civil Engineeringprojects
2. Identify the various rocks, minerals depending on geological classifications
3. Evaluate the properties of cement, fine and coarse aggregates and determine its suitability for construction.

List of Experiments:

1. **Identification of Minerals**
   Silica Group, Feldspar Group, Crystalline Group, Carbonate Group, Pyroxene Group, Mica Group, Amphibole Group.
2. **Identification of Rocks**
   Igneous Petrology, Sedimentary Petrology, Metamorphic Petrology.
3. **Geological Maps and Structural Geology**
   a. Study of topographical features from Geological maps. Identification of symbols in maps.
   b. Simple structural Geology Problems (Folds, Faults & Unconformities)
4. **Tests on Cement**
   a. Fineness test & Normal Consistency test.
   b. Specific gravity test, Initial and Final setting time of cement.
5. **Tests on Fine Aggregates**
   a. Specific Gravity test.
   b. Bulking of sand & Fineness modulus of Fine aggregate.
6. **Tests on Coarse Aggregate**
   a. Specific Gravity test.
   b. Fineness modulus of Coarse aggregate

Text Books:

1. IS 383 :1993 “Specification for Coarse and Fine Aggregates from Natural Sources forConcrete”
2. Engineering Geology Laboratory Record/Manual by Dr N.Chennakesavulu

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B.Tech in Civil Engineering
I Semester Syllabus
ME151ES: ENGINEERING WORKSHOP

Pre-requisites: Practical skill

Course Objectives: At the end of this course students are expected to

- Study of different hand operated power tools, uses and their demonstration.
- Gain a good basic working knowledge required for the production of various engineeringproducts.
- Provide hands on experience about use of different engineering materials, tools, equipment and processes those are common in the engineering field.
- Study commonly used Engineering trades like carpentry, fitting, tin smithy, foundry, housewiring, plumbing & black smithy and practical exposure to these trades.
- Study of various machining operations.

Course Outcomes: At the end of the course, the student will be able to

- Practice on various workshop trades including plumbing, fitting, carpentry, foundry, house wiring, tin smithy, black smithy and welding by using different tools.
- Identify and apply suitable tools for different trades of Engineering processes including drilling,material removing, measuring and chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.
- Implement the knowledge of basic workshop processes under safety norms.
- Understand different metal joining techniques using arc welding process.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

I. Carpentry – (Bridle Joint, Half - Lap Joint, Mortise & Tenon Joint)
II. Fitting – (L- fit, V-Fit & Dovetail Fit)
III. Tin-Smithy – (Square Tin, Rectangular scoop & Rectangular tray)
IV. Foundry – (Preparation of Green Sand Mould using Single Piece and Split Pattern)
V. Welding Practice – (Arc Welding- Lap Joint, Butt Joint & T Joint)
VI. House-wiring – (Parallel & Series, Two-way Switch and Tube Light)
VII. Black Smithy – (Oval shape, S – Hook & Fan Hook)

2. TRADES FOR DEMONSTRATION & EXPOSURE:

Plumbing, Machine Shop, Metal Cutting (Water Plasma), Power tools used in construction and WoodWorking operations.

Text Books:

1. Workshop Practice /B. L. Juneja / Cengage
2. Workshop Manual / K. Venugopal / Anuradha.

Reference Books:

1. Work shop Manual - P. Kannaiah/ K. L. Narayana/ SciTech
2. Workshop Manual / Venkat Reddy/ BSP

L	T	P	C
3	1	0	4

B.Tech in Civil Engineering
II Semester Syllabus
MA201BS: ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to all Branches)

Course Objectives

- Methods of solving the differential equations of first order.
- Methods of solving the differential equations of higher order.
- Concept, properties of Laplace transforms, solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface andvolume integrals.

Course Outcomes

- Identify whether the given differential equation of first order is exact or not.
- Solve higher differential equation and apply the concept of differential equation to real worldproblems.
- Use the Laplace transforms techniques for solving ordinary differential equations.
- To analyse the physical quantities involved in engineering field related to vector valued functions.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: First Order Ordinary Differential Equations

Exact differential equations, Equations reducible to exact differential equations, linear and Bernoulli's equations, Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Ordinary Differential Equations of Higher Order

Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax}V(x)$ and $x\ V(x)$, method of variation of parameters, Equations reducible to linear ordinary differential equations with constant coefficients: Legendre's equation, Cauchy-Euler equation. Applications: Electric Circuits.

UNIT-III: Laplace transforms

Laplace Transforms: Laplace Transform of standard functions, First shifting theorem, Second shifting theorem, Unit step function, Dirac delta function, Laplace transforms of functions when they are multiplied and divided by 't', Laplace transforms of derivatives and integrals of function, Evaluation of integrals by Laplace transforms, Laplace transform of periodic functions, Inverse Laplace transform by different methods, Convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation

Vector point functions and scalar point functions, Gradient, Divergence and Curl, Directional derivatives, Tangent plane and normal line, Vector Identities, Scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration

Line, Surface and Volume Integrals, Theorems of Green, Gauss and Stokes (without proofs) and their applications.

SUGGESTED READINGS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications,5th Edition, 2016.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and CompanyLimited, New Delhi.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications,Reprint, 2008

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3	1	0	4

B.Tech in Civil Engineering
II Semester Syllabus
CH201BS: ENGINEERING CHEMISTRY
(Common to all branches)

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfectengineer:
- To understand water quality for industrial and domestic usage, softening methods and related problems.
- To acquire the knowledge of Battery technology, corrosion and corrosion controlling techniques which are essential for the Engineers and applications in industries.
- To understand the preparation, properties and applications of polymeric materials.
- To get exposed to qualitative and quantitative parameters of fuels and to develop understanding of the combustion process.
- To understand the application of smart materials, lubricants, refractories and cement'

Course Outcomes:

After completing the course , the student will be able to acquire:

- Knowledge on the disadvantages of hard water for domestic and industrial purposes. The techniques of softening of hard water and treatment of potable water.
- Knowledge on storage of electrical energy in batteries, construction of batteries and fuel cells. Mechanism of corrosion of metals and alloys and corrosion control methods.
- Knowledge on the Preparation, properties and application of polymeric materials.
- Knowledge about the fuels, techniques of analysis for quality parameters of fuels, their combustionprocess and applications.
- Knowledge pertaining to the applications of smart materials, lubricants, refractories and cement.

UNIT - I: Water and its treatment:

Introduction to hardness of water — Expression of hardness, Units and related numerical problems. Potable water and its specifications - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination.

Boiler troubles: Sludge, Scale, Boiler corrosion and Caustic embrittlement. Internal treatment of Boiler feed water - Calgon conditioning - Phosphate conditioning - Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of water — Reverse osmosis.

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UNIT – II Battery Chemistry & Corrosion

Introduction - Classification of batteries - primary, secondary and reserve batteries with examples.Basic requirements for commercial batteries. Construction, working and applications of Zn-air and Lithium ion battery, Applications of Li-ion battery. Fuel Cells - Differences between battery and a fuel cell, Construction and applications of Methanol Oxygen fuel cell and Solid oxide fuel cell. Solar cells - Introduction and applications of Solar cells.

Corrosion: Causes and effects of corrosion – Theories of chemical and electrochemical corrosion –mechanism of electrochemical corrosion. Types of corrosion: Galvanic, Water-

line and Pitting corrosion. Factors affecting rate of corrosion. Corrosion control methods: Cathodic protection — Sacrificial anode and impressed current methods. Application of Metallic coatings — Electroplating

UNIT - III: Polymeric materials:

Definition – Classification of polymers with examples – Types of polymerization – Addition andcondensation polymerization with examples.

Plastics: Definition and characteristics - Thermoplastic and thermosetting plastics, PreparationProperties and Engineering applications of PVC, Teflon and Bakelite.

Fibers: Preparation, Properties and Engineering applications of Nylon 6:6, and Terylene

Elastomers: Characteristics – Preparation – Properties and Applications of Buna-S, Butyl and Thiokolrubber.

Conducting polymers: Characteristics and Classification with examples - Mechanism of conduction in trans-polyacetylene and Applications of conducting polymers.

Biodegradable polymers: Concept and advantages - Polylactic acid and Polyvinyl alcohol and their applications.

UNIT - IV: Energy Sources:

Introduction, Calorific value of fuel – HCV, LCV- Dulong‟s formula. Classification - solid fuels: Coal –Analysis of coal – Proximate and ultimate analysis and their significance. Liquid fuels – Petroleum and its refining, Cracking types – Moving bed catalytic cracking. Knocking – Octane and Cetane rating. Synthetic petrol - Fischer-Tropsch‟s process. Gaseous fuels – Composition and uses of Natural gas, LPG and CNG. Biodiesel – Transesterification, advantages.

UNIT - V: Engineering Materials:

Smart materials and their engineering applications

Shape memory materials - Poly L- Lactic acid. Thermoresponse materials - Polyacryl amides, Polyvinylamides

Lubricants: Classification of lubricants with examples - Characteristics of a good lubricant. Properties of lubricants: Viscosity, Cloud point,Pour point, Flash point and Fire point.

Refractories: Definition, Classification, Characteristics of a good refractory. Application of refractories.

Cement: Portland cement - its composition, Setting and hardening

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010
2. Engineering Chemistry by Rama Devi, Venkata Ramana Reddy and Rath, Cengagelearning,2016
3. A textbook of Engineering Chemistry by M. Thirumala Chary, E. Laxminarayana andK.Shashikala, Pearson Publications, 2021.
4. Textbook of Engineering Chemistry by Jaya Shree Anireddy, Wiley Publications.

REFERENCE BOOKS:

1. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi (2015)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi (2011)

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1	0	4	3

B.Tech in Civil Engineering
II Semester Syllabus
ME201ES: ENGINEERING GRAPHICS

Course Objective:

- Recognize the standards of engineering graphics, learn to generate Geometric Constructions, Conic Sections and construct Engineering Scales.
- Understand the procedure to develop Orthographic projections of points, lines and planes.
- Learn the procedure to develop projection of solids and objects.
- Understand the procedure to generate the Sections and developments of Solids.
- Learn the procedure to develop Isometric projections, convert Orthographic views to Isometric views and vice versa using Graphics Instruments and AutoCAD.

Course Outcomes:

- Apply the fundamental principles of Engineering Graphics to create engineering drawings of various geometric constructions, conic sections and engineering scalesadhering to BIS Standards.
- Generate Orthographic projections; Front View, top view and side views of points and lines.
- Draw the Orthographic projections of planes and solids
- Understand the Sections of solids and developments of surfaces.
- Develop Isometric projection convert Orthographic views to Isometric views and viceversa for practical engineering problems using AutoCAD.

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance, Scales – Plain & Diagonal, Conic Sections-ellipse, parabola, hyperbola and Rectangular Hyperbola — General method only. Cycloid, Epicycloid and Hypocycloid. Introduction to Auto CAD software – Commands.

UNIT- II:

Orthographic Projections: Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.

UNIT – III:

Projections of Regular Solids inclined to one plane, Sections and Sectional views of Right Regular Solids –Prism, Cylinder, Pyramid, and Cone

UNIT – IV:

Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone. Intersection ofsolids — cylinder vs cylinder.

UNIT – V:

Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions –Isometric Projection of solids. Conversion of Isometric Views to Orthographic Viewsand Vice-versa –Conventions.

Free hands Sketches of 2D, creation of 2D sketches. conversion of Isometric views to orthographic views using Auto CAD.

TEXT BOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing, Basant Agrawal and C M Agrawal, Third Edition McGraw Hill
3. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas:S.Chand and company Ltd.

REFERENCE BOOKS:

1. Engineering Graphics and Design, WILEY, Edition 2020
2. Engineering Drawing, M. B. Shah, B.C. Rane / Pearson.
3. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford
4. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

Note: - Internal and External examinations are conducted in conventional mode.

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3	0	0	3

B.Tech in Civil Engineering
II Semester Syllabus
ME202ES: ENGINEERING MECHANICS

Course Objectives: The objectives of this course are to

- Explain the resolution of forces, compute the resultant of system of forces and solve problems using equations of equilibrium.
- Perform analysis of forces acting on bodies lying on rough surfaces.
- Locate the centroid and compute the area moment of inertia of standard and composite sections
- Locate centre of gravity and compute the mass moment of inertia of standard and composite bodies.
- Explain kinematics and kinetics of particles, curvilinear motion and rotation of rigid bodies.

Course Outcomes: At the end of the course, students will be able to

- Determine resultant of forces acting on a body and analyze equilibrium of a body subjected to system of forces.
- Solve problem of bodies subjected to friction.
- Find the location of centroid and calculate area moment of inertia of a given section.
- Find the centre of gravity and calculate the mass moment of inertia of given body.
- Solve problems using kinematic equations and also solve problems using principles of kinetics such as work-energy principle, Impulse-momentum principle

UNIT-I

Introduction to Engineering Mechanics - Basic concepts, System of Forces, Moment of Forces and its Application; Resultant of Force System, Free body diagrams, Equilibrium of System of Forces, Equations of Equilibrium of Coplanar Concurrent Force System; Spatial Systems - Components in Space, Resultant; Static Indeterminacy.

UNIT-II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion ofBodies, Wedge Friction, Screw jack;

UNIT-III

Centroid of Lines and Areas from first principles; Centroid of composite sections;
Centre of Gravity of simple bodies and composite bodies; Theorems of Pappus.

UNIT-IV

Moment of Inertia – Definition; Theorems of moment of inertia; Area Moment of inertia of plane sectionsfrom first principles, Area Moment of inertia of composite sections;
Mass Moment of Inertia - Transfer Formula, Mass moment of inertia of simple bodies and composite bodies.

UNIT-V

Kinematics - Rectilinear motion; Plane curvilinear motion;

Kinetics - D"Alembert"s principle - its applications in translation and motion of connected bodies; Work Energy principle - its application in motion of connected bodies; Impulse-momentum principle.

TEXT BOOKS:

1. K. Vijay Kumar Reddy and J.Suresh Kumar, Singer"s Engineering Mechanics – Statics andDynamics, BS Publications, 2011.
2. Irving H. Shames and G. Krishna Mohan Rao, Engineering Mechanics, Pearson Education, 2005.

REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., Engineering Mechanics, McGraw Hill InternationalEdition, 1983.
2. Beer F.P & Johnston E.R Jr. Vector, Mechanics for Engineers, Tata McGraw Hill, 2004.
3. Hibbeler R.C & Ashok Gupta, Engineering Mechanics, Pearson Education, 2010.
4. Tayal A.K., Engineering Mechanics – Statics & Dynamics, Umesh Publications, 2011.
5. Basudeb Bhattacharyya, Engineering Mechanics, Oxford University Press, 2008.
6. Nelson A, Engineering Mechanics - Statics and Dynamics, McGraw Hill Education, 2017.

L	T	P	C
2	0	0	2

B.Tech in Civil Engineering
II Semester Syllabus
CE201PC: SURVEYING

Course Objectives

- The importance and fundamentals of surveying for measuring field parameters usingtraditional and modern instruments involved in civil construction.
- To know the basics of levelling and theodolite survey in elevation and angular measurements.
- Develop skills to conduct traverse survey & to find the area.
- To provide knowledge of Total Station & advanced surveying instruments.

Course Outcomes

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

1. Calculate angles, distances and levels.
2. Identify data collection methods and prepare field notes.
3. Understand the working principles of survey instruments.
4. Estimate the measurement errors and apply corrections.
5. Interpret survey data and compute areas and volumes.

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances, Approximate methods, Direct Methods, Chains, Tapes, ranging, Tape corrections, indirect methods, optical methods, E.D.M. method.
Prismatic Compass: Introduction, Bearings, included angles, Local Attraction, Magnetic Declination and dip.

UNIT - II

Levelling and Contouring: Leveling- Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, HI Method, Rise and Fall method, Effect of Curvature of Earth and Refraction. Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.
Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary (coordinates, MDM, DMD methods), Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible. **Traversing:** Methods of traversing, traverse computations and adjustments, Gale‟s traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry. **Curves**: Types of curves and their necessity, elements of simple curve, setting out of simple curves

UNIT - V

Modern Surveying Methods: Total Station and Global Positioning System: Basic principles, classifications, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments, Components **GPS** : Space segment, control segment and user segment, reference systems, satellite orbits, GPS observations, Applications of GPS.

TEXT BOOKS:

1. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi.
2. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
3. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System - Theory and Practice, Springer- Verlag Publishers, 2001.

REFERENCE BOOKS:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill — 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. Surveying (Vol — 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Surveying by Bhavikatti, Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. NewDelhi, 2004.
7. Surveying and leveling by R. Agor, Khanna Publishers 2015.

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0	0	2	1

B.Tech in Civil Engineering
II Semester Syllabus
CH251BS: Engineering Chemistry Laboratory
(Common to all branches)

Course Objectives:

The course consists of experiments related to the principles of chemistry required for an Engineering student and the student will learn the following:

- Estimation of hardness of water to check its suitability for industrial and drinking purpose andestimation procedures through volumetric analysis.
- Estimation procedures using conductometry and potentiometry.
- Preparation of polymers such as Bakelite and Polystyrene in the laboratory.
- Understand the lubricant properties such as saponification value and viscosity of oils.
- Understand the corrosion of metals in a corrosive medium.

Course Outcomes:

After completing the course, the student will gain practical knowledge on:

- Determination of parameters like hardness of water and estimations through volumetric analysis.
- Performance of experiments of conductometry and potentiometry and estimation procedures using them.
- Preparation of polymers like Bakelite and Polystyrene.
- Performing experiments related to estimation of saponification value and viscosity oflubricating oils.
- Performing experiments to know rate of corrosion of mild steel in various conditions.

List of Experiments:

I. **Volumetric Analysis:** Estimation of hardness of water by EDTA - Complexometry method.
II. **Volumetric Analysis:** Estimation of Fe^{+2} by Dichrometry.
III. **Conductometry:** Estimation of the concentration of an acid by Conductometry.
IV. **Potentiometry:** Estimation of the amount of Fe^{+2} by Potentiometry.
V. **Potentiometry:** Determination of an acid concentration using Potentiometer.
VI. **Preparations:**
    1. Preparation of Bakelite.
    2. Preparation Polystyrene
VII. **Lubricants:**
    1. Estimation of acid value of given lubricating oil.
    2. Estimation of viscosity of lubricating oil using Ostwald‟s Viscometer.
VIII. **Corrosion:** Determination of rate of corrosion of mild steel in the presence and absence ofInhibitor
IX. **Virtual lab experiments**
    a. Construction of Fuel cell and its working.

b. Smart materials for Biomedical applications
c. Batteries for Electrical vehicles.
d. Functioning of Solar cell and its applications.

REFERENCE BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna - S ChandPublications,New Delhi (2022)
2. Vogel‟s text book of practical organic chemistry - 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel - ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia - Narosa Publications Ltd., New Delhi (2007).

L	T	P	C
0	1	2	2

B.Tech in Civil Engineering
II Semester Syllabus
CS251ES: PYTHON PROGRAMMING LABORATORY

Course Objectives:

- To install and run the Python interpreter
- To learn control structures.
- To Understand Lists, Dictionaries in python
- To Handle Strings and Files in Python

Course Outcomes: After completion of the course, the student should be able to

- Develop the application specific codes using python.
- Understand Strings, Lists, Tuples and Dictionaries in Python
- Verify programs using modular approach, file I/O, Python standard library
- Implement Digital Systems using Python

Note: The lab experiments will be like the following experiment examples

Week -1:

1. i) Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   ii) Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.3.
   i) Write a program to calculate compound interest when principal, rate and number of periods are given.
   ii) Given coordinates (x1, y1), (x2, y2) find the distance between two points
4. Read name, address, email and phone number of a person through keyboard and print the details.

Week - 2:

1. Print the below triangle using for loop.5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
2. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character (use 'if-else-if' ladder)
3. Python Program to Print the Fibonacci sequence using while loop
4. Python program to print all prime numbers in a given interval (use break)

Week - 3:

1. i) Write a program to convert a list and tuple into arrays.
   ii) Write a program to find common values between two arrays.
2. Write a function called gcd that takes parameters a and b and returns their greatest common divisor.

3. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.

Week - 4:

1. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sortedin ascending order and False otherwise.
2. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.

   i). Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don‟t have to be in the same order.
   ii). The wordlist I provided, words.txt, doesn‟t contain single letter words. So you might want to add
   "I", "a", and the emptystring.
   iii). Write a python code to read dictionary values from the user. Construct a function to invertits content. i.e., keys should be values and values should be keys.
3. i) Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e' ii) Remove the given word in all the places in a string?
   iii) Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
4. Writes a recursive function that generates all binary strings of n-bit length

Week - 5:

1. i) Write a python program that defines a matrix and prints
   ii) Write a python program to perform addition of two squarematrices
   iii) Write a python program to perform multiplication of two square matrices
2. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
3. Use the structure of exception handling all general purpose exceptions.

Week-6:

1. a. Write a function called draw_rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.
   b. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
   c. Write a function called draw_point that takes a Canvas and a Point as arguments and drawsa representation of the Point on the Canvas.
   d. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
2. Write a Python program to demonstrate the usage of Method Resolution Order (MRO) in multiple levels of Inheritances.

3. Write a python code to read a phone number and email-id from the user and validate it for correctness.

Week- 7

1. Write a Python code to merge two given file contents into a third file.
2. Write a Python code to open a given file and construct a function to check for given words presentin it and display on found.
3. Write a Python code to Read text from a text file, find the word with most number of occurrences
4. Write a function that reads a file *file1* and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.

Week - 8:

1. Import numpy, Plotpy and Scipy and explore their functionalities.
2. a) Install NumPy package with pip and explore it.
3. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
4. Write a program to implement Half Adder, Full Adder, and Parallel Adder
5. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

TEXT BOOKS:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly

REFERENCE BOOKS:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and W eb Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Programming with Python, A User‟s Book, Michael Dawson, Cengage Learning, India Edition
4. Think Python, Allen Downey, Green Tea Press
5. Core Python Programming, W. Chun, Pearson
6. Introduction to Python, Kenneth A. Lambert, Cengage

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B.Tech in Civil Engineering
II Semester Syllabus
CE 251PC: SURVEYING LABORATORY - I

Course Objectives

- Learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- Learn and understand how to calculate Area of plot and Ground.
- Learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

Course Outcomes

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

1. Prepare Map and Plan for required site with suitable scale by using various surveying instruments.
2. Prepare contour Map and Estimate the Quantity of earthwork required for formation level forRoad and Railway Alignment.
3. Judge suitability of instrument to be used to carry out survey for a given field to estimateareas and volumes.

CYCLE - I

1. Chaining of a line using chain, measurements of area by cross staff survey.
2. Measurement of distance between two points when there is an obstacle for both chaining and ranging. Compass survey
3. Traversing by compass and adjustments in included angles and measurement of area -graphical adjustments.
4. Distance between two inaccessible points by compass. Plane Table Surveying
5. Measurement & Plotting of the area by Radiation method.
6. Determination of Positions objects by Intersection Method – Plane Table Survey.
7. Traverse by Plane table Survey.

CYCLE – II

Leveling

8. Measurement of elevation of various given points.
9. Elevation difference between two given points by reciprocal leveling.
10. Longitudinal Leveling
11. Cross sectional Leveling
12. Plotting of Contours by Indirect Method

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B. Tech in Civil Engineering
II Semester Syllabus
MC201BS : ENVIRONMENTAL SCIENCE
(Common to all branches**)**

Course Objectives:

- To understand the importance of ecosystem and ecological balance.
- To understand the natural resources and their conservation.
- To understand the importance of biodiversity and its values.
- To gain knowledge about environmental pollution, effects and controlling measures. To study about global environmental problems and global issues.
- To understand the environmental policies, regulations and sustainable development.

Course Outcomes:

After completing the course, the student will be able to:

- Get the information about ecosystem and their usage and conservation.
- Learn different types of natural resources and take up the measures to protect the resources.
- Get the information about biodiversity and their usage and conservation.
- Get the information about the types of pollution, understand their effects and controlling measures.
- Gain the knowledge about current global environmental issues and initiations to be taken to protect the environment.
- Gain the knowledge about environmental acts, EIA, sustainable development and follow the rulesand regulations.

UNIT - I

Ecosystems: Definition, scope, and importance of ecosystem. Classification, structure, and function of an ecosystem, food chains, food webs, and ecological pyramids. Flow of energy,biogeochemical cycles, bioaccumulation, biomagnification, ecosystem value, services and carrying capacity. Field visits.

UNIT - II

Natural Resources: Classification of resources: Living and non-living resources. **Water resources:** Use and over utilization of surface and ground water, floods and droughts. Dams: Benefits and problems. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. **Land resources** and **Forest resources**. **Energy resources:** Growing energy needs, renewable and non-renewable energy resources, use of alternate energy resources. Case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, definition, genetic, species and ecosystem diversity. Values of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and

optional values. India as a mega diversity nation, hot spots of biodiversity. Field visit. Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In - Situ and Ex -situ conservation. National biodiversity act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution:

Classification of pollution. **Air pollution:** Primary and secondary pollutants, automobile and industrial pollution. Ambient air quality standards. **Soil pollution:** Sources and types, impacts of modern agriculture, degradation of soil. **Solid waste:** Municipal solid waste management, composition and characteristics of e-waste and its management.

Pollution control technologies: Wastewater treatment methods: Primary, secondary and tertiary. Overview of air pollution control technologies, concepts of bioremediation.

Global Environmental issues and Global efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions /Protocols: Earth summit, Kyoto protocol and Montréal protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection Act, legal aspects Air Act-1981, Water Act, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Concepts of environmental management plan (EMP).

Towards Sustainable Future: Concept of sustainable development goals, population and its explosion. Crazy consumerism, Environmental education, Human health, Environmental ethics. Concept of green building, Principles of green chemistry, Ecological footprint, Life cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: Towards a sustainable future by Richard T. Wright. 2008 PHLLearning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008,PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New Age International publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.

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B.Tech in Civil Engineering
III Semester Syllabus
CE301PC: BUILDING MATERIALS, CONSTRUCTION AND PLANNING

Course Objectives: The objectives of the course are

- List the construction material.
- Explain different construction techniques
- Understand the building bye-laws
- Highlight the smart building materials

Course Outcomes: After the completion of the course student should be able to

1. **Identify** different building materials and their structural requirements.
2. **Understand** the different types of cement and admixtures.
3. **Appraise** the different alternative materials used for construction.
4. **Extrapolate** importance of building components.
5. **Plan** a Building using appropriate building by laws and **Understand** building Services.

UNIT-I

Stones, Bricks and Aggregates: Properties of building stones -relation to their structural requirements - Classification of stones - stone quarrying - precautions in blasting - dressing of stone -composition of good brick earth - various methods of manufacture of bricks - Comparison between clamp burning and kiln burning - Fine aggregate - Natural and manufactured - Sieve analysis - specify gravity – bulking - moisture content - deleterious materials - Coarse aggregate - Natural and manufactured - Importance of size, shape and texture.

UNIT-II

Cement & Admixtures: Ingredients of cement–manufacture–Chemical composition–Hydration-field & laboratory tests - Types of cement, Properties and applications – introduction to admixtures– Classification - mineral & chemical admixtures–Applications.

UNIT-III

Alternative Materials and Masonry: Wood – structure – properties - seasoning of timber - Classification of wood - defects in timber - Alternative materials for wood - galvanized iron, fiber reinforced plastics, steel, aluminum and glass - Ceramic Tiles- Manufacturing-specifications of Tiles

Masonry - types of masonry- English and Flemish bonds - Stone masonry - rubble and ashlars masonry - Composite masonry –Brick-stone composite; Concrete - Reinforced brick masonry.

UNIT-IV

Building Components and Finishing: Lintels – arches - different types of floors-concrete, mosaic and terrazzo floors - Roofs - pitched, flat and curved roofs - lean to-roof - coupled roofs, RCC roofs, madras terrace and shell roofs. Trussed roofs- king and queen post trusses - Foundations: Shallow foundations, spread, combined, strap and mat footings. Stair case- Definitions - technical terms and types of stairs - requirements of good stairs - introduction to geometrical design of stairs – lifts, ramps, elevators and

escalators – types and purpose - Finishers **-** Plastering, Pointing, Painting, Claddings – Formwork –Types - Requirements–Standards–Scaffolding – Shoring - Underpinning.

UNIT–V

Building Planning and Building Services:

Building planning – significance – scope - principles of building planning - classification of buildings and building by laws - Introduction to National Building Codes (NBC) – guidelines and regulations - Building Services - Plumbing Services - Water Distribution, Sanitary Lines & Fittings; Ventilation - Functional requirements systems of ventilations - Air-conditioning - Essentials and Types; Acoustics –characteristic – absorption – Acoustic design - Fire protection – Fire Hazards – Classification of fire-resistant materials and constructions

TEXT BOOKS

1. Building Materials by S. K. Duggal, New Age International (P) Limited, 4th Edition, 2016, National Building Code (NBC) of India.
2. Building Construction by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications (P) ltd., New Delhi. Twelfth Edition, 2023.
3. Engineering Materials by Rangawala S. C. Charter Publishing House, Anand, India. 43rd Edition, 2019.

REFERENCE BOOKS

1. Building Materials and construction by Sushil Kumar, Standard Publishers, 20th Edition, reprint, 2015.
2. Building Materials by P C Vergese, PHI Learning Pvt. Ltd, 2nd Edition, 2015.
3. Building Materials and Components, CBRI, India, 1990.
4. Alternative Building Materials Technology by Jagadish. K.S,, New Age International, 2007.
5. Concrete Technology by M. S. Shetty, S. Chand & Co. New Delhi, 2005

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B.Tech in Civil Engineering
III Semester Syllabus
CE302PC: CONCRETE TECHNOLOGY

Course Objectives:

The objectives of the course are to

- **Understand** the mechanism of hydration of cement and learn the properties of aggregates to produce quality concrete
- **Understand** the properties of concrete in plastic and hardened stage.
- **Design** economic concrete mix proportion and know understand its importance in estimation of composition of materials.
- **Know** various types of special concretes & its application.

Course Outcomes:

After the completion of the course student should be able to

1. **Explain** the properties of concrete ingredients i.e., cement, sand, coarse aggregate
2. **Summarize** the effects of the rheology of the behavior of fresh concrete and testing ethods adopted.
3. **Understand** the behavior of hardened concrete and destructive, non-destructive testing on hardened concrete
4. **Design** the concrete mix by BIS method of mix design and understand the factors Influencing concrete mix
5. **Define** special concretes, their application for practical purpose.

UNIT-I

Cement: Grades of cement – Hydration of cement – Structure of Hydrated cement

Aggregate: Classification of aggregate – Bond, strength & other mechanical properties of aggregates – Soundness of aggregate – Alkali aggregate reaction – Thermal properties– Fineness modulus – Grading curves – Grading of fine, Manufactured sand and coarse Aggregates – Gap graded aggregate – Maximum aggregate size – Properties of Recycled aggregate.

UNIT-II

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

UNIT–III

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel/space ratio – Gain of strength of concrete – Maturity concept – Strength in tension and compression – Factors affecting strength –Relation between compression and tensile strength-Curing.

Testing of Hardened Concrete: Compression tests– Tension tests – Factors affecting strength –Flexure

tests – Splitting tests – Pull-out test, Non-destructive testing methods – codal provisions for NDT.

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

UNIT–IV

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

UNIT–V

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

TEXTBOOKS:

1. Concrete Technology by M.S.Shetty - S.Chand & Co.;2004
2. Concrete Technology by A.R.Santhakumar, 2nd Edition, Oxford university Press, New Delhi
3. Concrete Technology by M.L.Gambhir.–Tata Mc.Graw Hill Publishers, 5th Edition, New Delhi

REFERENCEBOOKS:

1. Properties of Concrete by A.M.Neville – Low priced Edition– 4th edition
2. Concrete: Micro structure, Properties and Materials – P.K. Mehta and J.M.Monteiro, Tata Mc.Graw Hill Publishers

IS Codes:

IS 383 :2016
IS 516 :2018 (Part-1-4)
IS 10262-2019

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B.Tech in Civil Engineering
III Semester Syllabus
CE303PC: STRENGTH OF MATERIALS – I

Course Objectives:

The objective of this Course is

- To understand the nature of stresses developed in simple geometries such as bars and beams for various types of simple loads.
- To calculate the elastic deformation occurring in simple members for different types of loading.
- To show the plane stress transformation with a particular coordinate system for different orientation of the plane.
- To know different failure theories adopted in designing of structural members.

Course Outcome:

After completion of the course, the student will be able to:

1. **Describe** the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, related to the strength of structured and mechanical components.
2. **Analyse** the beams for various types of loads to calculate the variation of Shear force and Bending Moment across the span
3. **Recognize** various types of loads applied on structural components of simple framing geometries and understand the nature of internal stresses that will develop within the components.
4. **Evaluate** the strains and deformation that will result due to the elastic stresses developed within the materials for simple types of loading.
5. **Analyze** various situations involving structural members subjected to plane stresses and applications of Mohr's circle of stress.

UNIT – I

Simple Stresses and Strains: Concept of stress and strain - St. Venant's Principle-Stress and Strain Diagram - Elasticity and plasticity – Types of stresses and strains- Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain - Pure shear and Complementary shear - Elastic modulii, Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, and impact loadings – simple applications.

UNIT – II

Shear Force and Bending Moment: Types of beams – Concept of shear force and bending moment - S.F and B.M diagrams for cantilever, simply supported including overhanging beams subjected to point loads, uniformly distributed load, uniformly varying load, couple and combination of these loads –Point of contra-flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses and Shear Stresses: Theory of simple bending – Assumptions – Derivation of simple bending equation- Section Modulus - Determination of flexural/bending stresses of rectangular and circular sections (Solid and Hollow), I ,T, Angle and Channel sections - Introduction to shear stress, Derivation of formula for shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections– Design of simple beam sections .

UNIT – IV

Deflection of Beams: Slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L, Uniformly varying load and couple -Mohr's theorems – Moment area method – Conjugate Beam Method -Application to simple cases.

UNIT – V

Principal Stresses and Theories of failures: Introduction – Stresses on an oblique plane of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear –Principal stresses – Mohr's circle of stresses – ellipse of stress - Analytical and graphical solutions – Introduction to Theories of Failures – Analysis of beams for various theories of failures

TEXT BOOKS:

1. Strength of Materials by R. K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B.C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press

REFERENCE BOOKS:

1. Mechanics of material by R.C. Hibbeler, Prentice Hall publications
2. Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall publications
3. Strength of Materials by T.D.Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R.K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Strength of Materials by B.S.Basavarajaiah and P. Mahadevappa, 3rd Edition, Universities Press.

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B.Tech in Civil Engineering
III Semester Syllabus
CE304PC: FLUID MECHANICS

Course Objectives:

The objectives of the course are to:

- Introduce the concepts of fluid mechanics useful in Civil Engineering applications
- Provide a first level exposure to the students to fluid statics, kinematics and dynamics.
- Learn about the application of mass, energy and momentum conservation laws for fluid flows
- Train and analyze engineering problems involving fluids with a mechanistic perspective.
- To obtain the velocity and pressure variations in various types of simple flows
- To prepare a student to build a good fundamental background useful in the application of intensive courses covering hydraulics, hydraulic machinery and hydrology.

Course Outcomes:

After completion of this course, students should be able to:

1. **Identify** fluid properties and to **determine** the forces on plane and curved surfaces.
2. **Classify** the fluid flow and A**nalyze** the continuity principles
3. **Apply** the momentum and energy principles in order to **solve** problems related to pipes, notches and weirs
4. **Estimate** the losses in pipes, design and analyze pipe networks.
5. **Solve** laminar and turbulent boundary layers and **analyze** the lift and drag forces on objects.

UNIT–I

Properties of Fluid: Distinction between a fluid and a solid - basic Properties of fluids–Viscosity - Newton law of viscosity - vapor pressure - surface tension – capillarity - Bulk modulus of elasticity - compressibility.

Fluid Pressure: Pressure at a point - Pascal's law - Hydrostatic law – Piezometer - U-Tube Manometer - Single Column Manometer - U-Tube Differential Manometer - Micro-manometers.

Fluid Statics: Hydrostatic pressure force for horizontal, vertical, inclined plane surfaces and curved surfaces.

UNIT-II

Fluid Kinematics:

Classification of fluid flow - steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and in-compressible flow - ideal and real fluid flow - One, two-and three-dimensional flows; Streamline, path line, streak line and stream tube - stream function - velocity potential function - flow net - three-dimensional continuity equations in Cartesian co-ordinates and its applications - Acceleration and its types.

Fluid Dynamics:

Surface and Body forces - Euler's equation - Bernoulli's equation - Bernoulli's equation to real fluid flows - Kinetic energy correction factor.

UNIT-III

Applications of Bernoulli's equation: Introduction to Orifice – types of orifices -Venturi meter - Orifice meter and Pitot tube - flow through rectangular, triangular and trapezoidal & stepped notches and weirs - Concept of end contractions and velocity of approach and discharge through Broad crested weir

Momentum equation : Momentum equation and Its application on pipe bend - momentum correction factor.

UNIT–IV

Flow through Pipes:

Reynolds number and Reynolds experiment - Characteristics of laminar and turbulent flow - Laminar flow through circular pipes, and fixed parallel plates - Loss of head through pipes in turbulent flow- Darcy-Wiesbach equation - minor losses - total energy line - hydraulic gradient line - Pipes in series, equivalent pipe, pipes in parallel - power transmission through pipes - Water hammer in pipes and control measures.

UNIT-V

Boundary Layer Concepts:

Concept of boundary layer theory - characteristics of boundary layer over a flat plate - Boundary layer thickness - displacement, momentum and energy thickness - Momentum integral equation of boundary layer - concepts of laminar and turbulent boundary layers on a flat plate - Local and average friction coefficients - Laminar sub-layer – Boundary layer separation and Control methods - Drag and Lift forces and types of drag - Magnus effect.

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TEXTBOOKS:

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Modi .P.N. and. Seth. S.M, , Standard Book House, 2009.
2. Fluid Mechanics and Hydraulic machines by Rajput. R.K., S.Chand & Company, 2010.
3. Fluid Mechanics including Hydraulic Machines by Jain. A. K., , Khanna Publishers (rs),2004

REFERENCEBOOKS:

1. Fluid Mechanics and Hydraulic Machines by Bansal. R. K, , Laxmi Publications Pvt. Ltd, 2010
2. Fluid Mechanics and Hydraulic Machines problems and solutions by Subramanya. K, , McGraw Hill Education Pvt. Ltd, 2014 .
3. Introduction to Fluid Mechanics and Fluid Machines by S.K.Som, Gautam Biswas, Suman
4. Chakraborthy, , McGraw Hill Education,PrivateLimited,2014 .

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B.Tech in Civil Engineering
III Semester Syllabus
EE331ES: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(CE)

Prerequisite: **Mathematics and Physics**

Course Objectives:

- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To impart the knowledge of various electrical installations
- To study and understand the different types of DC/AC machines and Transformers.
- To introduce the concepts of diodes & filters
- To impart the knowledge of various configurations, characteristics and applications in transistors and field effect transistors.

Course Outcomes:

After completion of the course, students will be able to:

- To analyze and solve electrical circuits using network laws and theorems.
- To introduce components of Low Voltage Electrical Installations
- To study the working principles of Electrical Machines
- To understand and analyze basic diode and rectifier configurations
- To identify and characterize various types of transistors.

UNIT-I: Electrical Circuits

DC Circuits: Electrical circuit elements (Resistor, Inductor & Capacitor), Ohm's Law, voltage and current sources (Independent and Dependent), Kirchhoff's Laws, Mesh Analysis, Nodal Analysis, Delta-Star & Star Delta Conversion

AC Circuits: Representation of sinusoidal waveforms, peak value and rms values, phasor representation, Analysis of single-phase ac circuits with phasor diagrams, Three-phase balanced circuits, voltage and current relations in star and delta connections

UNIT-II: Electrical Installation

Miniature Circuit Breaker (MCB), Types of Wires and Cables, Earthing,Types of earthing, Batteries, Elementary calculations for energy consumption.

UNIT-III: Electrical Machines

Working principle of Single-phase transformer, equivalent circuit, phasor diagram of transformer at no load and load, losses in transformers, efficiency & regulation calculation. Construction and working principle of DC generators, Types of DC generators: Separately excited, Self-Excited (Shunt, Series, Compound), EMF equation. Working principle of DC motors, Types of DC motors,

Torque equations Construction and working principle of Three-phase Induction motor, Slip, Torque equations, Construction and working principle of synchronous generators.

UNIT-IV: Electronic Devices

Diodes: Principle of Operation, Forward bias, Reverse bias, Static Volt-Ampere characteristics, Static and dynamic resistances, Operation of Zener diode, Characteristics of zener diode and applications.

Rectifiers and Filters: P-N junction as a rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Filters – Inductor Filters, Capacitor Filters

UNIT-V: Transistors

Bipolar Junction Transistor (BJT) - Construction, Principle of Operation, Common Emitter, configurations, Input and Output Characteristics. Transistor Application: Transistor as Amplifier & Transistor as Switch.

Field Effect Transistor (FET): Construction, Principle of Operation of JFET, Output Characteristics, Transfer Characteristics, JFET applications: JFET as Amplifier & JFET as a Switch, Comparison of Bipolar Junction Transistor and Field Effect Transistor, Biasing of FET.

Suggested Readings:

1. Sukija, TK Nagasarkar Basic Electrical and Electronics Engineering – Oxford University.
2. D.P. Kothari, I J Nagrath, Basic Electrical and Electronics Engineering - McGraw Hill Education.

Reference Books:

1. R. L. Boylestad and Louis Nashelsky, Electronic Devices and Circuits, PEI/PHI, 9th Ed, 2006.
2. Millman and C. C. Halkias, Satyabrata Jit, Millman's Electronic Devices and Circuits, TMH, 2/e, 1998.
3. William Hayt and Jack E. Kemmerly, Engineering circuit analysis, McGraw Hill Company, 6th edition.

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B.Tech in Civil Engineering
III Semester Syllabus
CE351PC: SURVEYING LABORATORY–II

Course Objectives:

- Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying and Levelling .
- Student will be able to learn and understand about theodolite and total station in surveying.
- Student will learn and understand how to calculate Area of plot and Ground.
- Student will learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile using total station.

Course Outcomes:

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

1. **Apply** the principle of surveying for measuring angles, distance, area and constants using theodolite.
2. **Determination** of distance (inaccessible), heights and elevation using theodolite and total station.
3. **Developing** of contour maps, drawing profiles and curve setting using total station.

CYCLE-I

Theodolite Surveying:

1. Measurement of horizontal angles and vertical angles.
2. Distance between two inaccessible points.
3. Measurement of area by theodolite traversing (Gales traverse table).
4. Determination of tachometer constants.
5. Distance between two inaccessible points using the principles of tachometer surveying.
6. Distance between two inaccessible points using the principles of trigonometric surveying

CYCLE -II

Total Station:

7. Area Measurement
8. Stake Out
9. Remote Elevation Measurement
10. Missing Line Measurement
11. Longitudinal & Cross Section Profile
12. Contouring
13. Providing a Simple Circular Curve
14. Demonstration of applications of GPS

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B.Tech in Civil Engineering
III Semester Syllabus
CE352PC: STRENGTH OF MATERIALS LABORATORY

Course Objectives:

- To conduct the Tension test, Compression test on various materials
- To conduct the Shear test, Bending test on determinate beams
- To conduct the Compression test on spring and Hardness test using various machines
- To conduct the Torsion test, Impact test on various materials

Course Outcomes:

After the completion of the course, students should be able to

1. **Determine** the ultimate tensile stress, shear stress of steel and compressive strength of brick and concrete
2. **Determine** modulus of elasticity of beam using bending test.
3. **Determine** the mechanical properties of various materials.

LIST OF EXPERIMENTS:

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

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B.Tech in Civil Engineering
III Semester Syllabus
CE353PC: CONCRETE TECHNOLOGY LABORATORY

Course Objectives:

- To know the various procedures to determine the characteristics of cement
- To know the test procedures to find the properties of fresh concrete
- To understand the test procedures to find mechanical properties of hardened concrete

Course Outcomes:

After completion of the course, the student should be able to

1. **Perform** various tests required to assess the characteristics of cement
2. **Design** the concrete mix for required strength and evaluate the fresh concrete
3. **Evaluate** the destructive and non-destructive hardened properties of concrete

LISTOF EXPERIMENTS:

1. **Tests on Cement:**
   a) Soundness.
   b) Compressive strength.
2. IS method of mix design of normal concrete as per IS:10262
3. **Tests on Fresh Concrete:**
   a) Slump cone test.
   b) Compacting factor test.
   c) Vee-Bee consistometer test.
   d) Flow Table test.
4. **Tests on Hardened Concrete:**
   a) Compression test
   b) Flexure test
   c) Split Tension Test
   d) Modulus of Elasticity of concrete
5. **Non-destructive Tests on Hardened Concrete:**
   a) Rebound Hammer
6. **Demonstration:**
   a) UPV
   b) Profometer

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B.Tech in Civil Engineering
III Semester Syllabus
EE361ES: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY (CE)

Prerequisite: **Basics of Electrical and Electronics Engineering**

Course Objectives:

- To study a given network by applying various electrical laws
- To understand the performance characteristics of DC and AC machines
- To understand the characteristics of PN junction and Zener Diode
- To understand the applications of diode as rectifiers
- To understand the characteristics of BJT and FET

Course Outcomes:

After completion of the course, students will be able to:

- Analyze network by applying various electrical laws
- Analyze performance characteristics of DC and AC machines
- Analyze the characteristics of PN junction and Zener Diode
- Acquire the knowledge of various rectifier configurations
- Analyze the characteristics of BJT and FET

LIST OF EXPERIMENTS/ DEMONSTRATIONS:

PART A: ELECTRICAL

1. Verification of KVL and KCL
2. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Performance Characteristics of a DC Shunt Motor
5. Performance Characteristics of a Three-phase Induction Motor
6. No-Load Characteristics of a Three-phase Alternator

PART B: ELECTRONICS

1. Study and operation of
   (i) Multi-meter (ii) Function Generator (iii) Regulated Power Supply (iv) Cathode Ray Oscilloscope.
2. PN Junction diode characteristics
3. Zener diode characteristics and Zener as voltage Regulator
4. Input & Output characteristics of Transistor in CE configuration
5. Full Wave Rectifier with & without filters
6. Input and Output characteristics of FET in CS configuration

Any 5 experiments from PART-A and 5 experiments from PART-B are to be conducted.

Suggested Readings:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education

Reference Books:

1. Electronic Devices and Circuits – R. L. Boylestead and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6th edition.
3. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
4. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.
5. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
6. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

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B.Tech in Civil Engineering
III Semester Syllabus
MC301HS: CONSTITUTION OF INDIA
(CE, ME, ECE, CSM, MCT & MME)

Course Objectives:

- To understand the history of making of Indian Constitution and the role of drafting committee.
- To list the salient features of the Preamble to the Constitution of India
- To identify the importance of fundamental rights as well as fundamental duties
- To understand the powers and functions of parliament, President, Council of Ministers, Governor Judges, etc and their qualifications.
- To have a thorough understanding of Local self-government and its associated agencies.
- To learn and realise the role and functioning of election commission and Institute and Bodies for the welfare of SC/ST/OBC and women.

Course Outcomes: At the end of the course, students will be able to:

- Describe the history of making of Indian Constitution and the role of drafting committee
- Explain the purpose of Preamble to the Constitution of India
- Outline the Fundamental Rights and Fundamental Duties of a citizen.
- Acquire knowledge on functioning of Parliament, Executive and judiciary systems.
- Comprehend and evaluate the role of Local self government and its associated agencies.
- Assess and analyze the role and functioning of the Election Commission.

Unit - 1 History of Making of the Indian Constitution- History of Drafting Committee.
Unit - 2 Philosophy of the Indian Constitution- Preamble Salient Features
Unit - 3 Contours of Constitutional Rights & Duties - Fundamental Rights

- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

Unit - 4 Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit - 5 Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Panchayat raj: Introduction, PRI: Zila Panchayat. Elected officials and their roles, CEO ZilaPanchayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root

democracy

Unit - 6 Election Commission: Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners. State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.

SUGGESTED READING:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

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B.Tech in Civil Engineering
IV Semester Syllabus
MA401BS: PROBABILITY AND STATISTICS
(CE)

Course Objectives:

- The theory of random variables and probability distributions and their properties
- The concept of theoretical distributions
- The concept of sampling and sampling distributions
- The testing of hypothesis and making statistical inferences
- The basic ideas of statistics including measures of central tendency, curve fitting, correlation and regression

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

- Formulate and solve problems involving random variables
- Understand the theoretical distributions
- Understand the concept of sampling distributions
- Apply concept of testing of hypothesis to case studies
- Apply statistical methods for analyzing experimental data

UNIT-I: Random Variables and Probability Distributions:

Concept of a Random variables - Discrete and Continuous random variables and their distribution functions – Expectation, Variance and standard deviation of random variables.

UNIT-II: Theoretical Distributions:

Binomial, Poisson distributions and its properties, Poisson approximation to the Binomial distribution; Normal distributions and its properties. Normal approximation to Binomial distribution

UNIT-III: Fundamental Sampling Distributions:

Random Sampling, Sampling Distributions, Sampling Distribution of Means and the Central Limit Theorem, theory of estimation.

UNIT-IV: Tests of Hypotheses:

Test of significance- Basics of testing of hypothesis, Null and Alternate hypothesis, types of errors, level of significance, Critical region, Large sample test - single mean, single proportion, difference of means, difference of proportions; Small sample tests: Student's t-distribution, single mean, difference of means.

UNIT-V: Applied Statistics:

Curve fitting by the method of least squares, fitting of straight lines, second degree parabolas and more general curves – Correlation and regression, Rank correlation.

TEXTBOOKS:

1. Ronald E. Walpole, Raymond H.Myers, Sharon L. Myers, KeyingYe, Probability & Statistics for Engineers & Scientists, 9thEd.PearsonPublishers.
2. SC Gupta and VK Kapoor, Fundamentals of Mathematical statistics, Khanna publications.

REFERENCEBOOKS:

1. T.T.Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, Ltd, 2004.
2. Sheldon MRoss, Probability and statistics for Engineers and scientists academic press

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B.Tech in Civil Engineering
IV Semester Syllabus
CE401PC: STRENGTH OF MATERIALS – II

Course Objectives:

The objective of this Course is
- To understand the nature of stresses developed in simple geometries shafts, springs, columns and cylindrical and spherical shells for various types of simple loads.
- To calculate the stability and elastic deformation occurring in various simple geometries for different types of loading.
- To understand the unsymmetrical bending and shear center importance for equilibrium conditions in a structural member of having different axis of symmetry.

Course Outcomes:

On completion of the course, the student will be able to:
1. **Describe** the concepts and principles, understand the theory of elasticity, and perform calculations, relative to the strength of structures and mechanical components in particular to torsion and direct compression.
2. **Analyze** strength and stability of structural members subjected to Direct and combined bending stresses.
3. **Evaluate** the combined bending stresses on the columns and struts subjected to axial and eccentrically loading.
4. **Analyse** the cylindrical shells for hoop and radial stresses and understand the changes in dimensions.
5. **Understand** and evaluate the shear center and unsymmetrical bending

UNIT – I

Torsion of Shafts and Springs: Introduction to Torsion for circular shafts-Theory of pure torsion – Derivation of Torsion equation -Assumptions made in the theory of pure torsion – Polar section modulus – Power transmitted by shafts – Combined bending and torsion – Design of shafts according to theories of failure-

Introduction to springs– Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel.

UNIT - II

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

UNIT – III

Columns and Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column –slenderness ratio – Euler's critical stress – Limitations of Euler's theory– Long columns subjected to eccentric loading –

Secant formula – Empirical formulae — Rankine – Gordon formula- Straight line formula – Prof. Perry's formula.

UNIT – IV

Thin and Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – concept of Thin spherical shells. Thick cylindrical shells - Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage.

UNIT – V

Unsymmetrical Bending and Shear Centre: Introduction – Centroidal principal axes of section –Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bendingmoment into two rectangular axes through the centroid – Location of neutral axis- Introduction to shear centre - Shear center for symmetrical and unsymmetrical (channel, I, T and L) sections.

TEXT BOOKS:

1. Strength of Materials by R.K Rajput, S. Chand & Company Ltd.
2. Mechanics of Materials by Dr. B. C Punmia, Dr. Ashok Kumar Jain and Dr. Arun Kumar Jain
3. Strength of Materials by R. Subramanian, Oxford University Press.

REFERENCE BOOKS:

1. Mechanics of Materials by R.C. Hibbeler, Pearson Education
2. Engineering Mechanics of Solids by Popov E.P. Prentice-Hall Ltd
3. Strength of Materials by T.D. Gunneswara Rao and M.Andal, Cambridge Publishers
4. Strength of Materials by R. K. Bansal, Lakshmi Publications House Pvt. Ltd.
5. Fundamentals of Solid Mechanics by M. L. Gambhir, PHI Learning Pvt. Ltd.

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B.Tech in Civil Engineering
IV Semester Syllabus
CE402PC: STRUCTURAL ANALYSIS – I

Course Objectives:

The objective of the course is to
- Differentiate the statically determinate and indeterminate structures.
- To understand the nature of stresses developed in perfect frames and three hinged arches for various types of simple loads
- Analyse the statically indeterminate members such as fixed beams, continuous beams and forvarious types of loading.
- Understand the energy methods used to derive the equations to solve engineering problems
- Evaluate the Influence on a beam for different static & moving loading positions

Course Outcomes:

At the end of the course the student will able to
1. **Analyz**e pin jointed frames by different methods.
2. **Apply** energy theorems for the analysis of determinate structural elements and toAnalyze determinate arches.
3. **Analyze** Propped cantilever and fixed beams.
4. **Analyze** continuous beams and simple frames by classical methods.
5. **Determine** shear force, bending moment and absolute maximum values from Influence line diagrams for moving loads.

UNIT – I

Analysis of Perfect Frames: Types of frames- Perfect, Imperfect and Redundant pin jointed plane frames - Analysis of determinate pin jointed plane frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

UNIT – II

Energy Theorems: Introduction-Strain energy in linear elastic system - expression of strain energy dueto axial load, bending moment and shear forces - Castigliano's theorem-Unit Load Method – Deflections of simple beams and pin- jointed plane frames - Deflections of statically determinate bent frames.

Three Hinged Arches – Introduction – Types of Arches – Comparison between Three hinged and Two hinged Arches - Linear Arch - Eddy's theorem - Analysis of Three hinged arches - Normal Thrust and radial shear and bending moment - Geometrical properties of parabolic and circular arches - Three hinged parabolic circular arches having supports at different levels.

UNIT - III

Propped Cantilever and Fixed Beams: Determination of static and kinematic indeterminacies for beams - Analysis of Propped cantilever and fixed beams, including the beams with different moments of inertia - subjected to point loads , uniformly distributed load , uniformly varying load, couple and combination of

loads - Shear force, Bending moment diagrams and elastic curve for Propped Cantilever and Fixed Beams - Deflection of Propped cantilever and fixed beams - effect of sinking of support – effect of rotation of a support.

UNIT – IV

Continuous Beams: Introduction - Continuous beams - Clapeyron's theorem of three moments- Analysis of continuous beams with constant and variable moments of inertia with one or both ends -fixed-continuous beams with overhang - effect of sinking of supports.

Slope Deflection Method: Derivation of slope-deflection equation - application to continuous beams with and without sinking of supports - Determination of static and kinematic indeterminacies for frames - Analysis of Single Bay, Single storey Portal Frames by Slope Deflection Method including Side Sway - Shear force and bending moment diagrams and Elastic curve.

UNIT – V

Moving Loads and Influence Lines: Introduction - maximum SF and BM at a given section and absolute maximum shear force and bending moment due to single concentrated load ,uniformly distributed load longer than the span, uniformly distributed load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length - Definition of influence line for shear force and bending moment - load position for maximum shear force and maximum bending moment at a section - Point loads, uniformly distributed load longer than the span, uniformly distributed load shorter than the span.

TEXT BOOKS:

1. Structural Analysis Vol –I & II by V.N. Vazirani and M.M. Ratwani, Khanna Publishers.
2. Structural Analysis Vol I & II by G. S. Pandit and S.P. Gupta, Tata McGraw Hill Education Pvt. Ltd.
3. Structural analysis by T. S Thandavamoorthy, Oxford University Press

REFERENCE BOOKS:

1. Mechanics of Structures Vol – I and II by H.J. Shah and S.B. Junnarkar, Charotar Publishing House Pvt. Ltd.
2. Theory of structures by S.Ramamrutham and R.Narayan,9th edition. Dhanpat Rai publishing company.
3. Basic Structural Analysis by C. S. Reddy, Tata McGraw Hill Education Pvt. Ltd.
4. Basic Structural Analysis by K.U. Muthu et al., I.K. International Publishing House Pvt. Ltd
5. Fundamentals of Structural Analysis by M.L. Gamhir, PHI Learning Pvt. Ltd.

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B.Tech in Civil Engineering
IV Semester Syllabus
CE403PC: ENGINEERING GEOLOGY

Course Objectives:

The objective of this Course is

- To give the basics knowledge of Geology that is required for constructing various Civil Engineering Structures, basic Geology, Geological Hazardous and Environmental Geology.
- To focus on the core activities of engineering geologists – site characterization and geologic hazard identification and mitigation. Planning and construction of major Civil Engineering projects.

Course Outcomes:

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

1. **Understand** the weathering process and mass movement Geology.
2. **Identify** the types of rocks and their significant importance in Civil Engineering structures.
3. **Distinguish** types of geological structures and their suitability.
4. **Apply** the knowledge of Geophysical investigation in the exploration of subsurface information and ground water potential.
5. **Analyze** geological principles for mitigation of natural hazards and site characterization for dams and tunnels.

UNIT - I

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

Weathering of Rocks: Its effect over the properties of rocks importance of weathering with reference to dams - reservoirs and tunnels weathering of common rock like “Granite”

UNIT - II

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

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of igneous. Sedimentary and metamorphic rocks. Their distinguishing features, Megascopic studyof Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss,Schist, Quartzite, Marble and Slate.

UNIT - III

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

UNIT - IV

Earth Quakes: Causes and effects, shield areas and seismic belts - Seismic waves - Richter scale - precautions to be taken for building construction in seismic areas - Landslides, their causes and effect - measures to be taken to prevent their occurrence.

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

UNIT - V

Geology of Dams, Reservoirs, and Tunnels: Types of dams and bearing of Geology of site in their selection - Geological Considerations in the selection of a dam site - Analysis of dam failures of the past - Factors contributing to the success of a reservoir - Geological factors influencing water Lightness and life of reservoirs - Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005
2. Engineering Methods by D. Venkat Reddy; Vikas Publishers 2015.
3. Engineering Geology by S K Duggal, H K Pandey Mc Graw Hill Education Pvt Ltd 2014
4. Principles of Engineering Geology by K.V.G.K. Gokhale – B.S publications

REFERENCE BOOKS:

1. Fundamental of Engineering Geology by F.G. Bell, B.S. Publications, 2005.
2. Principles of Engineering Geology & Geotechnics by Krynine & Judd, , CBS Publishers & Distribution
3. Engineering Geology by Subinoy Gangopadhyay, Oxford university press.
4. Engineering Geology for Civil Engineers by P.C. Varghese, PHI

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B.Tech in Civil Engineering
IV Semester Syllabus
CE404PC: HYDRAULICS AND HYDRAULIC MACHINERY

Course Objectives:

The objectives of the course is
- Define the fundamental principles of water conveyance in open channels.
- Discuss and analyze the open channels in uniform and Non-uniform flow conditions.
- Study the characteristics of hydroelectric power plant and its components.
- Study of models and Analyze the impact of jet on vanes and their applications
- Analyze and design of hydraulic machinery and its modeling

Course Outcomes:

At the end of the course the student will able to
1. **Apply** fundamentals in design of open channels for uniform flow
2. **Solve** problems in Non-uniform flow conditions in open channels.
3. **Analyze** the fundamentals of dimensional analysis and the basics of turbo machinery.
4. **Evaluate** the working proportions and performance of turbines.
5. **Predict** characteristics and performance of centrifugal pumps and **interpret** the study of hydro electric power plants.

UNIT-I

Open Channel Flow – I:

Uniform Flow: Introduction to Open channel flow-Comparison between open channel flow and pipe flow - Classification of open channel flows - Velocity distribution - Uniform flow–Characteristics of uniform flow - Chezy's,Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient - Most economical sections - Computation of Uniform flow - Normal depth.

Critical Flow: Specific energy – critical depth - computation of critical depth – critical, sub critical and Super critical flows - Applications of specific energy to channel transitions.

UNIT-II

Open Channel Flow – II:

Non-uniform flow – Gradually Varied Flow: Dynamic equation for G.V.F - Classification of channel bottom slopes – Classification and characteristics of Surface profiles - various methods of integration of varied flow equation - computation of water surface profiles using Direct step method.

Rapidly varied flow: Elements and characteristics i.e Length and Height of Hydraulic jump in rectangular Channel – Types of jump - applications and location of hydraulic jump - Energy dissipation.

UNIT-III

Dimensional Analysis and Hydraulic Similitude: Introduction to Dimensional analysis - dimensional homogeneity–Rayleigh's method and Buckingham -π- methods - Model studies –Similitude - dimension less numbers- types of models - Application of model studies to fluid flow problems - Distorted models

concept.

Basics of Turbo Machinery: Hydro dynamic force of jets on stationary and moving flat , inclined and curved vanes / plates - Jet striking centrally and at tip - Velocity triangles at inlet and outlet - expressions for work done and efficiency - angular momentum principle and its applications.

UNIT-IV

Hydraulic Turbines: Elements of a typical Hydropower installation – Heads and efficiencies – Classification of turbines – working of Pelton wheel, Francis turbine, Kaplan turbine - working proportions - velocity triangles diagrams - work done and efficiency - hydraulic design - Draft tube – Classification, functions and efficiency.

Unit quantities such as Unit speed, Unit discharge and Unit power - Specific speed - Selection of turbines - Performance characteristics - geometric similarity – cavitation - governing of turbines -surge tanks and its types.

UNIT-V

Centrifugal Pumps: Centrifugal pump definition and classification – components - work done - manometric head - various losses and efficiencies - minimum starting speed - specific speed - Multistage pumps - pumps in series and parallel - geometric similarity - performance of pumps - characteristic curves - NPSH - cavitation.

Hydropower Engineering: Definition of hydro power - comparison between hydro power and thermal power - estimation of hydropower potential – storage and pondage - Classification of Hydropower plant under various considerations - definition of terms- firm power - secondary power - load factor - utilization factor - capacity factor - various components of hydro power development.

TEXTBOOKS:

. 1. Hydraulics and Fluid Mechanics including Hydraulic Machines by Modi P.N. and Seth S.M., , Standard Book House, 2009.
2. Fluid Mechanics and Hydraulic machines by Rajput R.K., S.Chand & Company, 2010.
3. Fluid Mechanics including Hydraulic Machines by Jain A. K., , Khanna Publishers (rs), 2004.

REFERENCEBOOKS:

1. Fluid Mechanics and Hydraulic Machines by Bansal R. K, , Laxmi Publication Pvt. Ltd, 2010
2. Fluid Mechanics and Hydraulic Machines problems and solutions by Subramanya K, McGraw Hill Education Pvt.Ltd,2014
3. Fluid Mechanics & Fluid Power Engineering by D.S.Kumar, , Kataria & Sons Publications Pvt. Ltd.

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B.Tech in Civil Engineering
IV Semester Syllabus
CE451PC: FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY

Course Objectives:

- To **identify** the behavior of analytical models introduced to the actual behavior of real fluid flows.
- To **explain** the standard measurement techniques of fluid mechanics and their applications.
- To **illustrate** the students with the components and working principles of the various flow related experiments
- To **illustrate** the students with the components and working principles of the hydraulic machines such as different types of turbines and pumps.
- To **analyze** the laboratory measurements and to document the results in an appropriate format

Course Outcomes:

1. **Analyze** the coefficient of discharge measurements and **Illustrate** the Bernoulli's equation and Water hammer phenomenon.
2. **Identify** various losses for real fluid and **interpret** the various coefficients
3. **Test** the performance characteristics of various hydraulic machines.

LIST OF EXPERIMENTS:

1. Verification of Bernoulli's equation
2. Determination of Coefficient of discharge for a small orifice by constant head method
3. Calibration of Venturi meter / Orifice Meter
4. Calibration of Triangular/Rectangular/Trapezoidal Notch
5. Calibration of Water hammer Apparatus
6. Determination of Minor losses in pipe flow- Contraction loss
7. Determination of Friction factor of a pipeline
8. Determination of Energy loss in Hydraulic jump
9. Determination of Manning's and Chezy's constants for Open channel flow.
10. Impact of jet on vanes
11. Performance Characteristics of Pelton wheel turbine
12. Performance Characteristics of Francis turbine
13. Performance characteristics of Kaplan Turbine
14. Performance Characteristics of a single stage Centrifugal Pump
15. Performance Characteristics of a multistage Centrifugal Pump

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B.Tech in Civil Engineering
IV Semester Syllabus
CE452PC: COMPUTER AIDED DRAFTING LABORATORY

Course Objectives:

- To be able to plan buildings as per NBC**.**
- To understand various types of conventional signs and brick bonds.
- To draw the plan section and elevation for doors, trusses and staircases.
- To use AutoCAD tools to draw building plans, sections and elevations from a given line diagramand specifications.
- To develop working drawings of residential buildings.

Course Outcomes:

After completing the course, the student will be able to:

1. **Use** various commands of the chosen software to draw plan, section, and elevations of Brick bonds and staircases.
2. **Draw** plan, section, and elevations of Residential and Public buildings in accordance with building by-laws and the National Building Code.
3. **Draw** building Electrical and Plumbing layouts.

LIST OF EXPERIMENTS:

1. Planning Aspects of Building systems as per National Building Code (NBC).
2. Brick bonds: English bond & Flemish bond – Odd and Even courses.
3. Developing plan and section of dog-legged staircase.
4. Developing plan of single storied residential building.
5. Developing section and elevation of single storied residential building.
6. Developing plan of single /two storied Residential building as per Building by-laws.
7. Developing plan of public building as per building by-laws.
8. Developing section and elevation of public building.
9. Development of working drawing of building –Electrical Layout.
10. Development of working drawing of building – Plumbing Layout.

TEXT BOOKS:

1. Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh –Laxmi Publications.
2. Engineering Graphics by P. J. Sha – S. Chand & Co.
3. Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao – Radiant Publishing House.
4. Civil Engineering Drawing-II by N. Sreenivasulu – Radiant Publishing House.

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B.Tech in Civil Engineering
IV Semester Syllabus
MC451HS: GENDER SENSITIZATION LABORATORY
(CE, ME, ECE, MCT & MME)

Course objectives:

This course aims:

- To develop students' sensibility with regard to issues of gender in contemporary India.
- To provide a critical perspective on the socialization of men and women.
- To introduce students to information about some key biological aspects of genders.
- To expose the students to debates on the politics and economics of work.
- To help students reflect critically on gender violence.
- To expose students to more egalitarian interactions between men and women.

Course Outcomes:

- Students will have developed a better understanding of important issues related to gender in contemporary India.
- Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
- Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.
- Students will acquire insight into the gendered division of labour and its relation to politics and economics.
- Men and women students and professionals will be better equipped to work and live together as equals.
- Students will develop a sense of appreciation of women in all walks of life.
- Through providing accounts of studies and movements as well as the new laws that provide protection andrelief to women, the textbook will empower students to understand and respond to gender violence.

Course Description

This course offers an introduction to Gender Studies, an interdisciplinary field that asks critical questions about the meanings of sex and gender in society. The primary goal of this course is to familiarize students with key issues, questions and debates in Gender Studies, both historical and contemporary. It draws on multiple disciplines – such as literature, history, economics, psychology, sociology, philosophy, political science, anthropology and media studies – to examine cultural assumptions about sex, gender, and sexuality. This course integrates analysis of current events through student presentations, aiming to increase awareness of contemporary and historical experiences of women, and of the multiple ways that sex and gender interact with race, class, caste, nationality and other social identities. This course also seeks to build an understanding and initiate and strengthen programmes combating gender-based violence and discrimination. The course also features several exercises and reflective activities designed to examine the concepts of gender, gender-based violence, sexuality, and rights. It will further explore the impact of gender- based violence on education, health and development.

Unit-I: Understanding Gender

Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender- Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male.

Unit-II: Gender Roles and Relations

Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles-Gender Roles and Relationships Matrix-Missing Women-Sex Selection and Its Consequences-Declining Sex Ratio. Demographic Consequences-Gender Spectrum: Beyond the Binary

Unit-III: Gender and Labour

Division and Valuation of Labour-Housework: The Invisible Labor- "My Mother doesn't Work." "Share the Load."- Work: Its Politics and Economics -Fact and Fiction. Unrecognized and Unaccounted work. -Gender Development Issues-Gender, Governance and Sustainable Development-Gender and Human Rights-Gender and Mainstreaming

Unit–IV: Gender - Based Violence

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment: Say No! -Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "Chupulu".

Domestic Violence: Speaking Out -Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life…."

Unit – V: Gender and Culture

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature- Gender Development Issues-Gender Issues-Gender Sensitive Language-Gender and Popular Literature - Just Relationships: Being Together as Equals Mary Kom and Onler. Love and Acid just do not Mix. Love Letters. Mothers and Fathers. Rosa Parks-The Brave Heart.

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

- Classes will consist of a combination of activities: dialogue-based lectures, discussions, collaborative learning activities, group work and in-class assignments. Apart from the above prescribed book, Teachers can make use of any authentic materials related to the topics given in the syllabus on "Gender".

Suggested Readings:

- The Textbook, "Towards a World of Equals: A Bilingual Text Book on Gender" written by A. Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu published by Telugu Akademi, Telangana Government in 2015.

Assessment and Grading:

- Discussion & Classroom Participation: 20%
- Project/Assignment: 30%
- End Term Exam: 50%.