SRI VENKATESWARA UNIVERSITY: TIRUPATI

SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Course

B. Tech CIVIL ENGINEERING

Choice Based Credit System (CBCS)

Academic Year 2021-2022

Amended as per NEP-2020

About the Department:

- Established in the year 1959.
- Largest department in the University.
- Well Qualified & Experienced Faculty.
- Meritorious students, Regular conduct of student's activities, Field visits, Internships participation of students in various activities in other Institutions.
- Good Alumni Support
- Faculty actively involved in teaching, research, consultancy and extension programmes and also interaction with outside world.

Vision:

Vision of the Civil Engineering Department is to produce globally competitive and committed Civil Engineers with ethical values to cater to the needs of the society and strive for sustainable development through research and innovation.

Mission:

- To impart quality education with the support of state-of-art Infrastructure and Faculty.
- To inculcate inquisitiveness, infuse training and research for the societal development.
- To address growing needs of sustainable infrastructure development.
- To provide technical advice and support to the industry.
- To provide awareness of global economic problems and contribute to Nation building.
- To provide entrepreneurial skills for the upliftment of the country.

PROGRAMME OUTCOMES

POs describe what students are expected to know or be able to do by the time of graduation from the program. Program Outcomes are established as per the process described below.

Program Outcomes of B.Tech in Civil Engineering are:

1. To apply knowledge of mathematics, Science, Engineering fundamentals, and engineering specialization for the solution of complex engineering problems.
2. To identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. To design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.
4. To use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid

conclusions.

5. To create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.
6. To apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. To communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. To demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. To recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

a. To provide students with the fundamental, technical knowledge and skills in mathematics, sciences and engineering to recognize, analyze and solve complex problems in the areas of Structural, Geotechnical, Hydraulics and Water Resources, Transportation and Environmental engineering.
b. To provide students with individual working skills and practical experience and to fulfill their professional duties and communicate effectively in teamwork, ethical thinking, technical leadership, and lifelong learning.
c. To make the students responsible professionals to work in various positions in industry or government and/or succeed in graduate or other professional organizations.

d. To train the students to become engineers, managers, scientists, researchers and innovators and make substantial contributions to the society.
e. To guide the students to use modern tools to solve complex engineering problems
f. To make the students to strive for the improvement of the quality of life and improve the standard of living by providing environmental sustainability.

PROGRAMME SPECIFIC OUTCOMES (PSO'S)

PSO1: Specify, Design, test and evaluate foundations and super structure for residences, public buildings, industries, irrigation structures, transportation amenities and environmental Engineering systems.

PSO2: Development of state of art skills for using modern tools, as entrepreneur in the domain field or in multidisciplinary environment.

I Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA 101	Basic Sci.	Mathematics – I	3	1	-	4	**4**
CY 101	Basic Sci	Engg. Chemistry	3	1	-	4	**4**
EN103	Humanities	English	2	-	-	2	**2**
EE104	Basic Engg	Basic Electrical & Electronics Engineering	3	1	-	4	**4**
ME105	Basic Engg	Engineering Graphics and Design	2	-	3	5	**3.5**
EN 106	Humanities Lab	English Communication Lab	-	-	3	3	**1.5**
		TOTAL	13	3	6	22	**19**

MA 101 MATHEMATICS –I

(I Semester - Common for all branches)

Instruction: 3(L) +1(T) /week Credits:4 Assessment: 40 + 60

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particular integrals-homogeneous differential equations with variable coefficients-method of parameters-simulation equations.

UNIT II

Laplace Transforms I: Laplace transforms of standard functions-inverse transforms-transforms of

derivatives and integrals-derivatives of transforms-integrals of transforms.

UNIT III

Laplace Transforms II: Transforms of periodic functions-convolution theorem-applications to solution of ordinary differential equations.

UNIT IV

Calculus: Roll's and Mean value theorems - Taylor's and Maclaurins's series-maxima and minima for functions of two variables - Infinite series - Convergence Tests series of positive terms - comparison, Ratio tests - Alternating series - Leibnitz's rule - Absolute and conditional convergence.

UNIT V

Multiple Integrals: Curve tracing (both Cartesian and polar coordinate) - Evaluations of double and Triple integrals-change of order of integrations-change of variables of integrations-simple applications to areas and volumes.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. analyze differential equations and solve them
2. apply differential equations to engineering problems.
3. Use transformation to convert one type into another type presumably easier to solve.
4. use shift theorems to compute the Laplace transform, inverse Laplace transform and the solutions of second order, linear equations with constant coefficients.
5. solve an initial value problem for an n^{th} order ordinary differential equation using the Laplace transform.
6. expand functions as power series using Maclaurin's and Talor's series
7. optimize the problems related to OR, Computer science, Probability and Statistics
8. draw an approximate shape by the study of some of its important characteristics such as symmetry, tangents, regions enclosing curve tracing method to find length, area, volume.
9. use multiple integral in evaluating area and volume of any region bounded by the given curves.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					
CO6												
CO7												
CO8												
CO9												

CY 101 ENGINEERING CHEMISTRY

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60 UNIT I

Atomic and molecular structure (12 lectures)

UNIT I

Postulates of quantum chemistry. Schrodinger equation. Particle in a box solutions, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals, Equations for atomic and molecular orbitals, Energy level diagrams of diatomics, Pi-molecular orbitals of butadiene and benzene. Band structure of solids and the role of doping on band structures

UNIT II

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclearmagnetic resonance and magnetic resonance imaging, surface characterization techniques.

UNIT III

Chemical equilibria, Intermolecular forces and potential energy surfaces

Use of free energy in Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies.Free energy and emf.Cellpotentials, the Nernst equation and applications.

Use of free energy considerations in metallurgy through Ellingham diagram. Equations of state of real gases and critical phenomena.

UNIT IV

Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular

geometries, Born- Haber cycle, The use of reduction potentials, Properties of ionic and covalent compounds.

UNIT V

Stereochemistry, Organic reactions and synthesis of a drug molecule

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings Synthesis of a commonly used drug molecule.

Reference/Textbooks

University chemistry, by B. H. Mahan

Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane 3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell

Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

Physical Chemistryby P. W. Atkins

Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Ed.

Principles of physical chemistry, Puri, Sharma and Pattania

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

1. analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. rationalize bulk properties and processes using thermodynamic considerations.
3. distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. list major chemical reactions that are used in the synthesis of molecules.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1				2	2					1
CO2		1		2		1	1					
CO3		2			1		2					2
CO4				1	1		2					
CO5	1			1	2		1					

EN 103 ENGLISH

Instruction: 2(L) **Credits: 2** **Assessment: 40 + 60**

UNIT I Vocabulary Building

The concept of Word Formation- Root words from foreign languages and their use in English- Acquaintance with prefixes and suffixes from foreign languages in English form derivatives- Synonyms, antonyms, and standard abbreviations.

UNIT II Basic Writing Skills

Sentence Structures – Use of phrases and clauses in sentences –Importance of proper punctuation - Creating coherence – Organizing principles of paragraphs in documents -Techniques for writing precisely

UNIT III Identifying Common Errors in Writing

Subject-verb agreement -Noun-pronoun agreement -Misplaced modifiers -Article -Prepositions - Redundancies -Clichés

UNIT IV Nature and Style of sensible Writing

Describing - Defining - Classifying –Providingexamples or evidence –Writingintroductionand conclusion

UNIT V Writing Practices

Comprehension - Précis Writing –EssayWriting

Reference/Textbooks:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper ResourceBook. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay KumarandPushpalata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts.I-III. CIEFL, Hyderabad. Oxford University Press

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

1. learn the elements of grammar and composition of English Language.
2. Learn literary texts such as Short stories and prose passages.
3. maintain linguistic competence through training in vocabulary, sentence structures and pronunciation.
4. develop communication skills by cultivating the habit of reading comprehension passages.
5. develop the language skills like listening, speaking, reading and writing.
6. Make use of self-instructed learner friendly modes of language learning through competence.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							
CO5		1	1	2								
CO6												

EE104BASIC ELECTRICAL AND ELECTRONICS ENGG.

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit-I

Electric DC Circuits: Kirchhoff's Voltage & Current laws, Superposition Theorem, Star – Delta Transformations.

AC Circuits: Complex representation of Impedance, Phasor diagrams, Power & Power Factor, Solution of Single Phase Series & Parallel Circuits. Solution of Three Phase circuits and Measurement of Power in Three Phase circuits.

Unit-II

Single Phase Transformers: Principle of Operation of a Single phase Transformer, EMF equation, regulation and Efficiency of a single phase transformer.

DC Machines: Principle of Operation, Classification, EMF and Torque equations, Characteristics of Generators and Motors

UNIT-III

Three Phase Induction Motor: Principle of Rotating Magnetic Field, Principle of Operation of 3- ϕ I.M., Torque-Speed Characteristics of 3-ϕ I.M.

UNIT-IV

p-n junction operation, diode applications, Zener diode as regulator.

Transistor and applications: Introduction to transistors, BJT Characteristics, biasing and applications

UNIT-V

Integrated Circuits: Operational amplifiers, Applications: adder, subtractor, Integrator and Differentiator.

Digital Circuits: logic gates, Combinational Logic circuits, Flip-Flops, counters and shift registers, Laboratory measuring instruments: digital multi-meters and Cathode Ray Oscilloscopes (CRO's).

Textbooks:

1. Electrical Technology by Edward Hughes
2. Basic Electrical Engineering by Nagrath and Kothari

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

1. understand the basic concepts of D.C. single phase and 3- phase supply and circuits and solve basic electrical circuit problems
2. understand the basic concepts of transformers and motors used as various industrial drives
3. understand the concept of power factor improvement for industrial installations and concepts of most economical power factor
4. understand the operation and characteristics of diodes, transistors, integrated circuits and digital circuits.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1		1		1			1	
CO2	2	2	2	1		1		1			1	
CO3	2	2	2	1		1		1			1	
CO4	2	2	2	1		1		1			1	

ME 105 ENGINEERING GRAPHICS AND DESIGN

Instruction: 2(L) +3 (Drg) /week Credits: 3.5 **Assessment: 40 + 60**

Unit I Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments,lettering, Conic sections including the Rectangular Hyperbola (General method only);Cycloid,Epi-cycloid, Hypo- cycloid and Involutes.

Unit II

Scales- Scales– construction of Plain & Diagonal Scales.

Projections of points, lines - Projections of Points and lines inclined to both planes, including traces;

Question Paper Modular – 4 questions from Units I t0 IV, 15 marks each

Unit III

Projections of planes

Projections of planes (Regular surfaces only) inclined Planes-Auxiliary Planes

Projections of Regular Solids (Simple solids – cylinder, cone, prism & pyramid) those inclined to both the Planes-Auxiliary Views

Unit IV

Isometric Projections& Orthographic projections

Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale. Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Unit V Introduction to CAD

CAD workstation and peripherals, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars Standard, Object Properties, Draw, Modify and Dimension, Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom used in CAD, Select and erase objects.;

Text/Reference Books:

1. Bhatt N.D., Panchal V.M. &Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. Agrawal B. & Agrawal C.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing, Scitech Publishers
5. Corresponding set of) CAD Software Theory and User Manuals

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

1. make a distinction between first angle projection and third angle projection of drawing.
2. draw hyperbola, parabola, Involutes and Cycloidal curves.
3. draw sections of solids including cylinders, cones, prisms and pyramids.
4. draw projections of lines, planes, solids and sections of solids.
5. draw orthographic projections of lines, planes, and solids.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1			1	1					
CO2	2	1				1	1					
CO3		2		2		2						1
CO4			1	2			1					
CO5		1		2		3						

EN 106 / EN 206 ENGLISH COMMUNICATION LAB

Instruction: 0(L) +3(Lab) /week Credits: 1.5 Assessment: 40 + 60

Listening Comprehension -Pronunciation, Intonation, Stress and Rhythm -Common Everyday Situations: Conversations and Dialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. LizHamp– Lyons and Ben Heasly. Cambridge Univ. Press. 2006
5. Communication Skills. Sanjay Kumar and Pushpalata. Oxford Univ. Press.2011
6.Exercises in Spoken English. PartsI-III.CIEFL, Hyderabad. Oxford Univ. Press

Course Outcomes:
The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									

II Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA201	Basic Sci.	Mathematics – II	3	1	-	4	**4**
PY 202	Basic Sci	Engineering Physics	3	1	-	4	**4**
CS 203	Basic Engg	Programming for Problem Solving	2	1	-	3	**3**
CE 204	Basic Engg	Engineering Mechanics	3	1	-	4	**4**
ME 205	Basic Engg. Lab	Workshop / Manufacturing Practices	-	-	3	3	**1.5**
CS 206	Basic Engg Lab	Programming for Problem Solving Lab	-	-	3	3	**1.5**
CE 207	Audit	Environmental Science	4	-	-	4	**0**
		TOTAL	13	3	6	22	**18**

MA 201MATHEMATICS II

(II Semester - for all branches)

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Unit I

Matrices: rank of a matrix-solution of system of linear equations-Eigen values, vectors –Canley- Hamilton theorem-quadratic forms-diagonalization.

Unit II

Vector Calculus: Gradient, Divergence, Curl of a vector and related properties-line, surface, volume integrals-Green's, Stokes's and Gauss Divergence theorems and its applications.

Unit III

Fourier Series: Fourier series-even and odd functions, periodic functions-half range sine and cosine series-harmonic analysis.

Unit IV

Special Functions I: Gamma and Beta functions-series solutions of differential equations-ordinary points.

Unit V

Special Functions II: Bessel function-recurrence formulae-generating function for $J_n(X)$-Lengender polynomials-recurrence formulae-generating function for $P_n(X)$ - Rodriguez's formula - orthogonality of Lengender polynomials.

Text/Reference Books

1. B S Grewal, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. M K Venkataraman, Engineering Mathematics, National Publishing Company, Chennai.
3. B V Ramana, Higher Engineering Mathematics, 6th Reprint, Tata McGraw-Hill, 2008.
4. Bali and Iyengar, Engineering Mathematics, 6th Edition, Laxmi Publications, 2006.

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

1. use ranks of matrices to decide whether the system of linear equations is consistent or not
2. use Cayley-Hamilton theorem to find inverses or powers of matrices.
3. use Eigen values and vectors to reduce Quadratic forms to normal form.
4. to analyze motion problems from real lines to curves and surfaces in 3-D and use tools such as divergence and curl of vector and gradient, directional derivatives that play significant roles in many applications.
5. use Green's theorem to evaluate line integrals along simple closed contours on the plane
6. use Stokes' theorem to give a physical interpretation of the curl of a vector field
7. use the divergence theorem to give a physical interpretation of the divergence of a vector field.
8. find the Fourier Series to represent a function as a series of constants times sine and cosine functions of different frequencies in order to observe periodic phenomenon.
9. Evaluate certain improper integrals to make them simple with introduction of Gamma and Beta functions.
10. study certain special functions that arise in solving certain ordinary differential equations to model many physical phenomena.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	3		1			2		3	
CO2	2	3	3		3		1					2
CO3		1				2		2				
CO4	1	3		3				1				
CO5	3		3		2			2				
CO6												
CO7												
CO8												
CO9												

CO10												

PY 202ENGINEERING PHYSICS

Instruction: 3(L) +1(T) /week Credits: 4 Assessment: 40 + 60

UNIT I Wave Optics

Interference: Huygen`s Principle-Principle of Superposition-Interference of Light-Young`s double slit experiment- -Newton's Rings.

Diffraction: Fraunhofer Diffraction at a Single Slit and a Circular Aperture-Plane Diffraction grating –Resolving Power-Rayleigh`s Criterion-Resolving power of Grating and Microscope.

Lasers : Introduction – Spontaneous and Stimulated Emission of Radiation – Population Inversion – Types of Lasers – Ruby Laser – He-Ne Laser – Semiconductor Laser – Applications of Lasers.

UNIT II Mechanics of Rigid Body

Rigid Body-Rotational Motion and Kinematics Relations-Kinetic Energy and Angular Momentum of a Rotating Body-Equation of Motion of a Rigid body (Torque of a Rigid Body)-Combined Translation and Rotational Motion of a Rigid Body- Body Rolling on an inclined Plane.

Mechanics of Continuous Media

Elasticity, Stress and Strain- Hook`s Law and Behaviour of Wire Under Load- Elastic Constants- Relation Between Elastic Modulii-Types of Supports, Beams and Loads-Different types of Bending- Cantilever with an End Load. Ultrasonic Waves - Sound Absorption and Reverberation -Sabine Formula - Acoustics of Buildings.

UNIT III Electromagnetism and magnetic properties of Materials

Laws of Electrostatistics- Electric Current- Laws of Magnetism- Ampere`s, Faraday`s laws- Maxwells Equations – Polarization - Permeability and dielectric constant- Polar and non-polar Dielectrics, Clausius-Mossotti equation, Applications of Dielectrics.

Magnetization - Permeability and Susceptibility- Classification of Magnetic Materials, Ferromagnetism-Magnetic Domains and Hesteresis, Applications of ferromagnetic materials.

UNIT IV Quantum Mechanics

Wave – Particle duality – de Broglie Concept of Matter Waves – Properties of Matter Waves – Davison and Germer Experiment – G.P.Thomson Experiment – Heisenberg's Uncertainty Principle – Schrödinger's Time Independent and Time Dependent Wave equation – Significance of Wave

Function – Electron in an Infinite Square Potential Well – Probability Densities and Energy Levels.

UNIT V NanoPhysics and Nanotechnology

Introduction to Nanomaterials –Properties: Optical Properties – Quantum Confinement – Electrical properties. Synthesis of Nanomaterials: Ball milling, Arc deposition method – Chemical Vapour Deposition-

Pulsed laser deposition. Characteristics of C^{60} (Zero dimensional), Carbon Nanotubes (One Dimensional) and Graphene(Two Dimensional). Applications of Nanomaterials.

Text Books / Reference Books:

1. R.K.Gaur and S.L.Gupta ``Engineering Physics" Sultan and Chand Pub., New Delhi
2. S.L.Gupta and SanjeevGupta`UnifiedPhysics`Vol.I Jai PrakashNath& Co., Meerut.
3. HitendraK.Malik and A.K.Singh ``Engineering Physics" TataMCGraw Hill Education Pvt.Ltd., New Delhi
4. M.N.Avadhanulu and P.G.Kshirsagar ``A Textbook of Engineering Physics`` S.Chand and Company Pvt.Ltd., New Delhi
5. B.L Theraja, "Modern physics", S.Chand& Company.
6. V. Raghavan "Material Science", Tata McGraw Hill Publications.
7. M.S.RamachandraRao and Shubra Singh, ``Nanoscience and Nanotechnology`` Wiley India Pvt.Ltd, New Delhi

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

1. Develop appropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behavior of charged particles when they are in motion.
3. identify and apply appropriate analytical and mathematical tools of Physics in solving Engineering problems
4. apply the basic principles of Mechanics of rigid body and continuous media and their applications understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
5. understand size depended properties of nano-dimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
6. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.
7. Learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
8. provide multidisciplinary experiences throughout the curriculum.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	2									
CO2	2		2	2								
CO3		1		2	2							
CO4			2	2	3							

CO5		1	1	2								
CO6												
CO7												
CO8												

CS203 PROGRAMMING FOR PROBLEM SOLVING

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

Course Objectives:

1. To acquire problem solving skills
2. To be able to develop flowcharts and algorithms for the given problem
3. To learn how to write modular programs in C
4. To enable to use arrays, pointers, strings and structures in solving problems.
5. To explain the difference between object-oriented programming and procedural programming.
6. To understand principles of object-oriented programming.

UNIT-I

Problem Solving : Problem solving techniques, Computer as a problem solving tool, Programming Languages – Machine Language, Assembly Language, Low and High-Level Languages, Procedural and Object-Oriented Languages. Algorithm definition, Features, Criteria, Flowchart definition, Basic symbols, Sample flowcharts, Problem solving aspects, Efficiency of algorithms.

Basics of C: Structure of a C program, C tokens, Keywords, Identifiers, Basic data types and sizes, Constants, Variables, Operators in C, Operator Precedence and Associativity, Expressions, Type conversions, Basic input/output statement, Sample programs.

UNIT-II

Conditional Statements: Selection statements, Decision making within a program, Simple if statement, if-else statement, Nested if-else, if-else ladder and switch-case. Iterative statements: while-loop, do-while loop, for loop, Nested loops, Infinite loops, goto, break and continue statements, Sample programs.

Functions: Introduction to modular programming and functions, Basics, Standard Library of C functions, Prototype of a function, Parameter passing, User defined functions, Recursive functions, Passing arguments to a function: Call by reference, Call by value, Storage Classes in a single source file, Scope rules, Header files, C Pre-processor.

UNIT-III

Arrays: Introduction to arrays, Definition, Declaration, Storing elements, Accessing elements, One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array, Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix, Passing array to functions, String fundamentals, String manipulations, Standard library string functions.

Pointers: Definition of pointer, pointer type declaration, pointer assignment, pointer initialization, Pointer arithmetic, Functions and Pointers, Dangling memory, Character pointers and functions, Pointers to pointers, Arrays and Pointers, Pointer arrays, Pointers and structures, Dynamic memory management functions.

UNIT-IV

Structures: Structures declaration, Structure variables, Initialization of structures, Accessing structures, Nested structures, Arrays of structures, Structures containing arrays, Structures and functions, Pointers to structures, Self-referential structures, Unions, Typedef, Bit-fields.

File Processing: Concept of Files, Text files and binary files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file.

UNIT V

Introduction to Object-Oriented Programming (OOP): Need for OOP, Principles of OOP, Basics of C++ Programming, Operator Overloading, Function Overloading, Inheritance: Derived classes, Protected access specifier, Derived class constructors, Overriding member functions, Class hierarchies, Public and Private inheritance, Multiple inheritance.

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

1. Develop and test programs in C and correct syntax and logical errors.
2. Implement conditional branching, iteration and recursion.
3. Decompose a problem into functions and synthesize a complete program.
4. Use arrays, pointers, strings and structures to formulate algorithms and programs
5. Use files to perform read and write operations.
6. Handle programming assignments based on class,abstraction, encapsulation, overloading and inheritance.

Text Books

1. Ashok N Kamthane, Amit Ashok Kamthane, Programming in C, 3rd Edition, Pearson Education, 2019.
2. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
5. Herbert Schildt,The Complete Reference C++, 4th Edition, Tata McGraw-Hill.

Reference Books

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.
5. The C++ Programming Language, Bjarne Stroustrup, 3rd Edition, Pearson Education.
6. Problem solving with C++: The Object of Programming, 9th Edition, Walter Savitch, Pearson Education.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		3			2			2		2
CO2	2	3	2		3					2		
CO3		2	1								3	
CO4		3										
CO5			3									
CO6												

CE 204 ENGINEERING MECHANICS

Instruction: 3(L) +1(T) /week **Credits: 4** **Assessment: 40 + 60**

UNIT I

STATICS : Basic concepts – System of force, Concurrent and non-concurrent coplanar and non- coplanar forces – Resultant – Moment of force and its application – Couples and resultant of force systems – Equilibrium of systems of forces – Free body diagrams, Equations of equilibrium of coplanar systems and spatial systems.

UNIT II

Analysis of plane trusses: Types of supports – Types of trusses – Analysis of trusses using method of joints and method of sections.

UNIT III

CENTRE OF GRAVITY AND MOMENTS OF INERTIA: Theory of Pappus – Centroids of composite figures – Areas of gravity of bodies – Moment of inertia – Parallel and perpendicular axis theorems – Moments of inertia of composite areas (rolled and built up sections) – Radius of gyration of areas.

UNIT IV

SIMPLE STRESES AND STRAINS : Elasticity and plasticity – Types of stresses and strains – Hooke's law – Stress-strain diagram for mild steel – Working stress – Factor of safety.

Lateral strain – Poisson's ratio and volumetric strain – Elastic moduli and relationship between elastic constants – Bars of varying section – Composite bars – Temperature stresses.

UNIT V

STRAIN ENERGY: Gradual, sudden and impact loading – Endurance limit principles of virtual work and its applications.

TEXTBOOKS:

1. Ghose D.N. – Applied Mechanics and Strength of Materials.
2. Timoshenko & Young – Engineering Mechanics.
3. Junarkar SB – Mechanics of Structures – Vol. I.
4. Junarkar SB – Elements of Applied Mechanics.

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

1. apply the basic knowledge of force system.
2. know the types of supports occur in civil engineering structures
3. know the geometrical properties of different cross sections.
4. understand different types of stresses and strains, elastic constants.
5. understand the behavior of different internal forces under different types of loading.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2		2			2		1		1	
CO2	2	2		1			1		1		1	
CO3	2	2		1					2		1	
CO4	1	2		2							1	
CO5		2			1		2					

ME 205 WORKSHOP/MANUFACTURING PRACTICE

(ME 105 for EEE, ECE & CSE) (ME 205 for ChE,CE & ME)

Instruction: 0(L) +3 (lab)/week Credits: 1.5 Assessment: 40 + 60

Workshop Practice: Five practices among

1. Machine shop 2.Fittingshop 3.Carpentry 4.Electrical wiring

5. Welding shop 6.Casting 7.Smithy 8.Plasticmoulding&GlassCutting

Examinations could involve the actual fabrication of simple components, utilizing one or More of the techniques covered above.

Detailed Contents

1. ManufacturingMethods-casting,forming,machining,joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools.
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding. Glass cutting

7. Metal casting.
8. Welding(arc welding & gas welding), brazing

The above course content is learnt by online videos/ppt presentations.

Text/ReferenceBooks:

1. HajraChoudhury S.K., HajraChoudhury A.K.andNirjharRoy S. K., Elements of Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and Publishers private limited, Mumbai.
2. Kalpakjian S. and Steven S. Schmid ManufacturingFngineeringand Technology", 4th edition, PearsonEducationIndiaEdition,2002.
3. GowriP.Hariharanand A. SureshBabu, Manufacturing Technology–I" Pearson Education,2008.
4. Roy A. Lindberg, Processes and Materials of Manufacture",4th edition, Prentice Hall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol. I & II,TataMcGrawHillHouse, 2017

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.

- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Course Outcomes : Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry to fabricatecomponents using different materials.

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		1		1	1						1

CS206 PROGRAMMING FOR PROBLEM SOLVING LAB

Instruction: 0(L) +3 (Lab)) /week Credits: 1.5 Assessment: 40 + 60

Course Objectives:

1. To provide exposure to problem-solving through programming
2. To train the student on the concepts of the C- Programming language

The following programs shall be developed and executed in Programming Language C.

1. Programs on conditional control constructs.
2. Programs on iterative statements (while, do-while, for).
3. Programs on recursive procedures
4. Programs on arrays, matrices (single and multi-dimensional arrays).
5. Programs using user defined functions, demonstrating parameter passing methods viz. call by value and call by reference.
6. Programs using different library functions viz. ctype.h, math.h, stdio.h, stdlib.h, string.h, conio.h and pre-processor directives.
7. Programs using pointers (int pointers, char pointers) and pointer arrays.
8. Programs on structures and unions
9. Programs on File Processing.
10. Programs on Pointers to structures and Self-referential structures

Course Outcomes: After Completion of this course the student would be able to

1. Develop the C code for the given algorithm.
2. Understand, debug and trace the execution of programs written in C language.

Reference Books:

1. Scheldt H, C: The Complete Reference, 4th Edition, Tata McGraw-Hill, 2002.
2. Hanly J R &Koffman E.B, "Problem Solving and Program design in C", Pearson Education, 2019.
3. R.G. Dromey, How to solve it by Computer, Pearson Education, 2019.
4. Behrouz A. Forouzan& Richard F. Gilberg, Computer Science: A Structured Programming Approach Using C, Third Edition, Cengage Learning

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3		2		1		2	1	
CO2	3	3			2			3		2		3

ENVIRONMENTAL SCIENCE

Instruction: 4(L) Credits: 0(Zero) Assessment: 40 + 60

UNIT I

Environmental Studies and Natural Resources

Definition, Scope and importance of Environment, Environmental studies, Need for public awareness

Components of Environment- Atmosphere, Hydrosphere, Lithosphere.

Renewable and **Non-Renewable Resources and associated problems**

Water resources: Use and over utilization of surface and ground water, floods, drought, conflicts over water, dam benefits and problems.

Forest resources: Use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

Land resources: Land as a resource, land degradation, Man induced landslides, soil erosion and desertification.

Mineral resources: Use and overexploitation, Environmental effects of extracting and using mineral resources, case studies.

Food resources: World food problems, changes caused agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, water logging, salinity, Case studies.

Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.

Role of an individual in conservation of natural resources.

UNIT II

Ecosystem and Biodiversity

Ecosystem - Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem.

(a) Forest ecosystem. (b) Grassland ecosystem

(c) Desert ecosystem. (d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its conservation:

Definition, genetic species and ecosystem diversity, Biogeographically classification of India.

Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, National and local levels, India as a mega-diversity nation.

Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts, Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

UNIT – III

Environmental pollution and Global Effects

Definition, Causes, Effects, and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution.

Pollution case studies.

Disaster management: Floods, earthquakes, cyclone, landslides, Tsunami. Climate change-Global warming, Acid rain, Ozone depletion.

UNIT – IV

Environment Issues and Management

- Environment and Human health – Epidemic diseases, HIV/AIDS, Aviation Flue, Water Borne Diseases.
- Environmental Impact Assessment, Sustainable Development, Clean Production and Clean Development Mechanisms
- Environment Legislation: Environmental Protection Act, Water Act, Air Act, Wild Life Protection Act, Forest Conservation Act, Public Liability & Insurance Act, Issues involved in Enforcement of Environmental legislation.

UNIT – V

Social Issues and the Environment

- Population growth, Population Explosion, Population Control, Women and Child welfare.
- Urbanization, Industrialization, Development projects, Resettlement and Rehabilitation of people – Problems concerned, Case studies.
- Consumerism and Waste Products Conservation, Public Awareness, Water Conservation, Rain water harvesting, watershed management, Wasteland reclamation, Human Rights, Value education, Environmental ethics- Issues and possible solution.
- Role of information Technology in Environment and Human Health.

Text Books / Reference Books :

1. AnubhaKaushik& C P Kaushik, Environmental studies, New age International Publishers,

2008
2. Benny Joseph, Environmental studies, Tata McGraw-Hill Publishers, 2005
3. M Chandra Sekhar, Environmental Science, Hi-Tech Publishers, 2004
4. Keerthinarayana and Daniel Yesudian, Principles of Environmental Sciences and Engineering , Hi-Tech Publishers, 2005
5. AmalK.Datta, Introduction to Environmental Science and Engineering, Oxford & IBH Publishing Co.Pvt.Ltd, 2000
6. SanthoshkumarGarg,RajeshawriGarg and RajniGarg, Ecological and Environmental studies, Khanna publishers, 2006
7. Gilbert M, Introduction to Environmental Engineering and Science, Masters Publication by Prentice –Hall of India Private Ltd., 1991
8. William P Cunningham and Mary Ann Cunningham, Principles of Environmental Science, Tata McGraw Hill Publishing Co.Ltd, 2002

Course Outcomes:

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

1. acquire knowledge in
    - diverse components of environment and natural resources
    - ecosystem and biodiversity & its conservation methods
    - population growth and human health
    - green technology
2. identify and resolve the issues related to sources of different types of pollutions
3. provide solutions to individuals, industries and government for sustainable development of natural resources
4. apply environmental ethics in protection of diversified ecosystems.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	2	1	2	1	1	1		
CO2	2	2	2	1		1	1	1	2	1		
CO3	2	2	2	2	1	1	1	2	2	1		
CO4	2	2	2	1	2	1	1	1	1	1		

III Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA301B	Basic Sci. Course	Mathematics – III*(Common to all branches)*	3	-	-	3	3
CE302C	Professional Core Course	Strength of Materials	3	-	-	3	3
HS303C	Humanities and Social Science	Managerial Economics and Accountancy *(Common to all branches)*	3		-	3	3
CE304C	Professional Core Course	Surveying	3	-	-	3	3
CE305C	Professional Core Course	Building Materials and Construction Technology	3		-	3	3
CE306C	Professional Core Course	Engineering Geology	3	-	-	3	3
CE 307P	Professional Core Course Lab	Surveying Lab	-	-	3	3	1.5
CE 308P	Professional Core Course Lab	Materials Testing Lab	-	-	2	2	1
CE309S	Skill Oriented Course	Computer Skills	1	-	2	3	2
MC310A	Mandatory Course	Constitution of India*(Common to all branches)*	2	-	-	2	-
		TOTAL	***21***	**-**	***7***	***28***	**22.5**

MA 301B Mathematics – III

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objective (CEOs):

1. To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
2. To provide an overview of probability and statistics to engineers

UNIT I

Complex analysis - I: Analytical functions - Cauchy-Riemann equations – Construction of Analytic functions - Complex integration - Cauchy's theorem - Integral formula - Evaluation of integrals.

UNIT II

Complex analysis - II: Taylor's and Laurent's' series- Transformations- Conformal mapping - Bilinear transformations - Transformation of 1/z, z^2, sin z and cos z.

UNIT III

Complex analysis –III: Singularities - Poles - Residues - Residue theorem – Contour integration- Evaluation of real integrals

UNIT IV

Partial differential equations - I : Formation of differential equations - Classification - First order linear partial differential equations – Lagrange's' linear equation - Method of multipliers - first order non-linear partial differential equations - Charpits method.

UNIT V

Partial differential equations - II: Method of separation of variables - One dimensional wave equation - Heat equation – Laplace's equation.

Text Books:

1. Grewal B S, Higher Engineering Mathematics, 40th Edition, Khanna Publications, 2007.
2. Venkataraman M K, Engineering Mathematics, Vol. I & II, National Publishing Company, 1993.
3. Venkataraman M K, Engineering Mathematics, National Publishing Company, 1995.
4. Grewal B S, Engineering Mathematics, 13th Edition, Khanna Publications.
5. Kreyszig E, Advanced Engineering Mathematics, 8th edition, Wiley, 1998.

Course Outcomes (COs):

At the end of the course students will be able to

1. Solve field problems in engineering involving PDEs.
2. Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1		1	1					1	1	
CO2	2	2		1	1					1	1	

CE 302C STRENGTH OF MATERIALS

Instruction Hours/week : 3(L) **Credits : 3**
Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objective (CEOs):

1. To acquire the knowledge about behavior of members subjected to various types of forces on the members.
2. To impart procedure for drawing shear force and bending moment diagrams for beams.
3. To make the student able to analyze flexural stresses in beams due to.
4. To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

UNIT I

SHEAR FORCE AND BENDING MOMENT:

Definition of beam - Types of beams - Concept of shear force and bending moment - S.F and B.M diagrams for

cantilever, simply supported and overhanging beams subjected to point loads, u.d.l, uniformly varying loads and combination of these loads - Point of contra flexure - Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT II

FLEXURAL STRESSES AND SHEAR STRESSES:

Theory of simple bending - Distribution of flexural stresses and shear stresses - Resilience due to flexure and shear. Principal stresses and principal strains - Mohr's circle of stresses.

UNIT III

COMBINED DIRECT AND BENDING STRESSES:

Stresses under the combined action of direct loading and B.M - Core of a section - Circular, rectangular and triangular (solid and hollow) - Determination of stresses in the case of chimneys, retaining walls and dams.

UNIT IV

COLUMNS AND STRUTS:

Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – eccentric loading and Secant formula – Prof. Perry's formula.

UNIT V

CYLINDERS:

Thin cylinders subjected to internal fluid pressure - Thick cylinders under internal and external pressure - Compound cylinders.

TEXT BOOKS:

1) Mechanics of Structures Vol.I & Vol.II by S.B.Junnarkar.
2) Analysis of Structures by Vazirani & Ratwani.
3) Strength of Materials Vol.I & Vol.II by Timoshenko.
4) Strength of Materials by Andrew Pytal and Ferdinand L.Singer (Longman).

REFERENCES:

1) Engineering Mechanics by Egor. P. Popov.

Course Outcomes (COs):

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

1) Develop shear force and bending moment diagrams for different load cases.

2) Compute the flexural stresses for different load cases and different cross-sections.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2		1				2	2	2	1
CO2	2	1	2	1	1				2	2	2	1

HS 303C MANAGERIAL ECONOMICS AND ACCOUNTANCY

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks :60**

Course Educational Objective (CEOs):

1. To learn the fundamental concepts of economics and analysis methods.
2. To study depreciation methods and inflation process and trade policies.
3. To acquire knowledge in basic concepts of accounting, principles.

4. To learn the techniques for preparing cost sheet.

Unit -I

Introduction to Engineering Economics, Fundamental concepts, Time value of money, Cash flow and Time Diagrams, choosing between alternative investment proposals, Methods of Economic analysis (pay back, ARR, NPV, IRR and B/C ratio), The effect of borrowing on investment, Equity vs Debt Financing, concept of leverage, Income tax leverage.

Unit -II

Depreciation and methods of calculating depreciation (straight line, sum of the years digit method, Declining balance method, Annuity method, Sinking fund method), National income accounting Methods of estimation, Various concepts of National Income, Significance of National income Estimation and its limitations.

Unit -III

Inflation: Definition, Process and Theories of inflation and Measure of control. New Economic Policy 1991(Industrial Policy, Trade Policy, Fiscal Policy), Impact on Industry.

Unit -IV

Accounting Principles, procedure, Double entry system, Journal, ledger, Trial balance, Cashbook, preparation of Trading and Profit and Loss account, Balance sheet.

Unit -V

Cost Accounting: Introduction, Classification of costs, Methods of costing, Techniques of costing, Cost sheet and preparation of cost sheet, Break-even Analysis, Meaning and its application, Limitation.

TEXT BOOKS:

1. Henry Malcom Steiner, Engineering Economics Principles, 2nd Edition, McGraw Hill Education, 1996.
2. Dewett. K.K., Modern Economic Theory, Sultan Chand and Co., 2006.
3. A.N. Agarwal, Indian Economy, Wiley Eastern Limited, New Delhi.
4. Jain and Narang, Accounting Part-I, Kalyani Publishers, 2011.
5. Arora, M.N. Cost Accounting: Principles and Practice, 12th Edition,Vikas Publication, 2012.

Course Outcomes (COs): After the completion of the course the student will be able to:

1. Understand Macro Economic environment of the business and its impact on enterprise.
2. Identify various cost elements of the product and its effect on decision making.
3. Understand the concepts of financial management and smart investment.
4. Prepare the Accounting records and interpret the data for Managerial Decisions.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			1			2					1	
CO2			1			2					1	
CO3			1			2					1	
CO4			1			2					1	

CE 304C SURVEYING

Instruction Hours/week : 3(L) **Credits :3**

Sessional Marks : 40 **Semester-end Examination Marks :60**

Course Educational Objectives (CEOs):

1. Highlight the purpose of surveying in civil engineering construction,
2. Explain different types of curves, their requirement and curve setting.
3. Formulate survey observations and perform calculations
4. Train on utilization of surveying instruments like EDM, Total station and GPS.

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- 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, Introduction to compound curves. Elements of Reverse curve - Transition curve – length of curve – Elements of transition curve - Vertical curves.

UNIT - V
MODERN SURVEYING INSTRUMENTS:

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems - Segments, GPS measurements, 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.

REFERENCES:

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. New Delhi, 2004.
7. Surveying and leveling by R. Agor Khanna Publishers 2015.

Course Outcomes (COs):

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

- Identify data collection methods and prepare field notes.
- Measure and layout elevations and relative position of points, understand plans and field notes.
- Ability to design, set out curves and use modern equipment.
- Calculate angles, distances, levels, estimate measurement errors and apply corrections.
- Interpret survey data and compute areas and volumes.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	1		1					1	
CO2	2	1	2	1		1		1			1	
CO3	2	2	1	1		2		1			1	
CO4	2	2	1	1		2		1			1	
CO5	2	2	1	1		2		1			1	

CE 305C BUILDING MATERIALS AND CONSTRUCTION

Instruction Hours/Week: 3(L) Credits : 3
Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

- To learn and understand the manufacturing, physical and mechanical properties of various construction materials and their testing procedures.
- To study the basic building components.
- To learn the methods to be followed in constructing various components of a building.

UNIT-I
STONES-BRICKS
Stone as building material-Selection of stones for construction-Tests on stones-Qualities of a good building stone-Deterioration of stones-Preservation of stones.

Bricks-composition of good brick earth-Manufacture of bricks-Classification of bricks-Tests for bricks-Absorption, Crushing strength, Hardness, presence of soluble salts, shape and size, soundness, structure-Uses of bricks-Refractories.

UNIT-II
CEMENT-AGGREGATES
Cement ingredients-Setting action of cement-Manufacturing process of ordinary cement
-Types of cement – Field and laboratory tests for cement-storage and uses of cement.

Aggregates-Qualities-classification of aggregates-Testing of Aggregates—Grading of aggregates-classification of sand-Bulking of sand- properties of good sand.

UNIT-III
TIMBER AND OTHER MATERIALS
Timber-Qualities of good timber- Market forms-Industrial timber, Plywood, Veneer-.
Steel -Market forms of steel. Aluminum -properties , alloys of aluminium.

UNIT-IV
CONSTRUCTION ELEMENTS
Types of foundations, Stone Masonry-joints in stone masonry, classification of stone masonry. Brick Masonry-Bonds in brick masonry, types of brick masonry. Lintels- Types of lintels. Roofs and its types. Flooring -types of flooring, timber floors, composite floors. Damp proofing- meaning, causes, effects, materials used for damp proofing, methods of damp proofing.

UNIT-V
OTHER ELEMENTS
Pointing-objects, mortar for pointing, method of pointing, types of pointing. Plastering-requirements of good plaster, methods of plastering. Painting-types of paints, painting on different surfaces failure of paint, defects in

painting. Varnishing- characteristics of ideal varnish, ingredients, types, process of varnishing. Distempering- properties, ingredients of a distemper, process of distempering.

Thermal Insulation - insulating materials, thermal insulation of exposed doors, windows, exposed roofs and exposed walls. Acoustics-definition, types of absorbent materials, conditions for good acoustics, methods of sound insulation.

TEXTBOOKS:

1. Sushil Kumar "Building Materials and construction", 20th edition, reprint 2015,StandardPublishers
2. Dr. B. C. Punmia, Ashok kumar Jain, Arun Kumar Jain, "Building Construction, Laxmi Publications (P) ltd., New Delhi.
3. Rangwala S. C. "Engineering Materials", Charotar Publishing House, India.

REFERENCES:

1. S. K. Duggal, "Building Materials", (Fourth Edition)New Age International (P) Limited, 2016 National Building Code(NBC) of India
2. P C Vergese, "Building Materials", PHI Learning Pvt.Ltd
3. Building Materials and Components, CBRI, 1990,India
4. Jagadish. K.S, "Alternative Building Materials Technology", New Age International,2007.
5. M. S. Shetty, "Concrete Technology", S. Chand & Co. New Delhi.

Course Outcomes (COs):

After completion of the course the student will able to:

- Explain the manufacturing, physical and mechanical properties of various construction materials and their testing procedures.
- Describe the basic building components.
- Apply the methods to be followed in constructing various components of a building.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1		1	1		1	2	1	2	1	1	1
CO2	1		1	1		1	2		2	1	1	1
CO3	2	1	1	1		1	2	1	2	1	2	1

CE 306C ENGINEERING GEOLOGY

Instruction Hours/Week : 3(L) Credits : 2

Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

1. To learn various geological parameters.
2. To study characteristics of various minerals and their Identification.
3. To study the formation and features of rocks and their Identification .
4. To learn elements of geological structures.
5. To acquire knowledge in preliminary causes for landslides and earth quakes.

UNIT – I

Introduction to geology and its various branches -Role of Earth Sciences in Civil Engineering Operations, Processes acting at the surface of the earth - Volcanism, Geological action of wind, glaciers, rivers and oceans - Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers.

UNIT – II

Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite. Study of minerals like Garnet, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay minerals.

UNIT – III

Petrology: Origin and formation of rocks - Classification of rocks - Igneous, Sedimentary and Metamorphic rocks - Their textures and structures -Study of rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomorate, Sand stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate. Definition of rock - Rock forming processes - Geological classification of rocks - Megascopic study, Chemical and Mineralogical Composition of rock.

UNIT – IV

Structural Geology: Elements of structural geology like strike, dip, outcrop. Study of folds, joints, faults and their importance in civil engineering works. Dykes and sills, common structures and textures - Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India.

UNIT – V

Geology of dams, reservoirs, tunnels landslides and rock falls. Earthquakes. Groundwater exploration. Rock as construction materials. Site selection for dams and tunnels – analysis of failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

TEXT BOOKS:

1. A text book of geology By Mukharjee.P.K.
2. A Text Book of Engineering Geology - N.Chennakesavulu.
3. Engineering and general Geology by Parbin Singh
4. Engineering Geology by R.E.Goodman

REFERENCES:

1. Principles of Engineering geology and Geotechnics By Krynine & Judd
2. Geology for Engineers by Blyth & de freitaus
3. Fundamental of Engineering Geology by F.H.Bell.

Course Outcomes (COs):

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

1. To apply the geological knowledge to Civil Engineering Constructions, at different stages. The kind of study exposes the geological draw backs, if any.
2. To help the site engineers to take suitable precautionary measures to overcome the drawbacks but also to take advantage of the site geology findings wherever possible.
3. To take precautionary measures in civil engineering constructions based on geological parameters.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			1	1		1			1		
CO2	1				1		1					
CO3	1				1		1					

CE 307P SURVEYING LAB

Instruction Hours/week : 3 (P) **Credits : 1.5**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objective (CEOs):

1. To apply the possess knowledge about survey field techniques
2. To apply the possess knowledge about traverse survey
3. To determine distances, areas of polygons
4. To gain knowledge of modern field measurement tools and techniques

EXERCISE – 1

Measurement of distance by chain, Tape and Area of a polygon by cross staff survey

EXERCISE – 2

Compass traversing and adjustment of closing error by Bowditch method (Graphical method)

EXERCISE – 3

Plane table survey; finding the area of a given boundary

EXERCISE – 4

Fly levelling: Height of the instrument method and rise and fall method.

EXERCISE – 5

Fly levelling; Longitudinal Section and Cross sections of a given road profile.

EXERCISE – 6

Theodolite Survey: Determining the Horizontal and Vertical Angles Finding the distance between two inaccessible points.

EXERCISE – 7

Tachometric survey: Heights and distance problems using tachometric principles.

EXERCISE – 8

Set out simple curve using Perpendicular offsets from long chord and Rankine's deflection angles method.

EXERCISE – 9

Total Station: Determination of area using total station.

EXERCISE – 10

Total Station: Determination of Remote height.

Course Outcomes (COs):

After completion of the course the student will have:

1. Ability to use the techniques, skill and surveying equipment for engineering practice.
2. Ability to apply mathematics concepts in the field of surveying.
3. Ability to develop an understanding of modern surveying equipment

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2			1	1		1			1		
CO2	1				1		1					
CO3	1				1		1					

CE 308P MATERIAL TESTING LAB

Instruction Hours/Week : 2(P) **Credits** : 1
Sessional Marks : 40 **Semester-end Examination Marks**: 60

Course Educational Objective (CEOs):

1. To make student understand the fundamental modes of loading of the structures
2. To train student in methods for determining mechanical properties of materials.

LIST OF EXPERIMENTS

1. Tension and Torsion Test on Mild Steel bar and HYSD bar
2. (a) Deflection Test on Simply Supported Beam
   (b) Charpy Impact Test
3. (a) Deflection Test on Fixed Beam
   (b) Izod Impact Test
4. (a) Compression Test on Wood
   (b) Shear Test on Wood
5. (a) Test on Closed coil Helical Spring
   (b) Bending Test on Carriage Spring
6. (a) Deflection Test on beam under Uniform Bending
   (b) Bending Test on R.S. Joist
7. Sieve Analysis of coarse and fine aggregates
8. Bulking of Sand by Volume and Weight methods
9. Normal consistency, Initial and Final Setting Times of Cement
10. Tests on concrete
    a) Slump Test
    b) Compressive Strength of Concrete Cubes
    c) Compaction Factor Test
    d) Compressive Strength of Concrete Cylinders
11. (a) Specific gravity & Water absorption of Coarse aggregate
    (b) Specific gravity of Cement
12. Water absorption and Compressive Strength of Bricks

Course Outcomes (COs):

After completion of the course the student will be able to

1. Determine the properties of different building construction materials.
2. Analyse the behaviour of different construction materials.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1								1		
CO2	2	1								1		

CE 309S COMPUTER SKILLS

Instruction Hours/week: 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination Marks: 60**

Course Educational Objectives (CEOs):

1. To learn and use MSWORD.
2. To learn and use MSEXCEL,MSPOWERPOINT
3. To learn and browse the INTERNET and EMAIL

EXERCISE – 1:
MS WORD: Text Basics, Text Formatting and saving file, working with Objects

EXERCISE – 2 :
MS WORD: Header & Footers, Working with bullets and numbered lists, Tables

EXERCISE –3:
MS WORD: Styles and Content, Merging Documents, Sharing and Maintaining Document

EXERCISE –4 :
MS WORD: Sharing and Maintaining Document, : Proofing the document, Printing

EXERCISE –5:
MS EXCEL: Introduction to Excel, Formatting excel workbook

EXERCISE –6
MS EXCEL: Perform Calculations with Functions, Sort and Filter Data with Excel

EXERCISE – 7:
MS EXCEL: Create Effective Charts to Present Data Visually, Analyze Data Using PivotTables and Pivot Charts, Protecting and Sharing the work book

EXERCISE – 8:
MS EXCEL: Use Macros to Automate Tasks, Proofing and Printing

EXERCISE – 9:
MS POWER POINT: Setting Up PowerPoint Environment, Creating slides and applying themes, Working with bullets and numbering, Working with Objects, Slide show option and print

EXERCISE – 10:
INTERNET AND EMAIL: What is Internet, Receiving Incoming Messages , Sending Outgoing Messages, Email addressing , Email attachments, Browsing, Search engines , Text chatting, Job Searching.

COURSE OUTCOMES (COs):

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

1. Use MS WORD, MS EXCEL AND POWER POINT in any civil engineering project works and for personal works.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2								1	1

MC310A CONSTITUTION OF INDIA

Instruction Hours/Week : 2(L) **Credits : -**
Sessional Marks : 100 **End Semester Examinations Marks : -**

Course Educational Objectives(CEOs): Students will learn:

1. To Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2. To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3. To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Unit-I
History of Making of the Indian Constitution:
History ,Drafting Committee, (Composition & Working)
Philosophy of the Indian Constitution: Preamble Salient Features

Unit-II
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-III
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-IV
Local Administration:

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

Unit-V
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.

TEXT BOOKS/REFERENCES:

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.

Course Outcomes(COs):
Students will be able to:

1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
4. Discuss the passage of the Hindu Code Bill of 1956.

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8

2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						2			2			
CO2						2			2			
CO3						2			2			
CO4						2			2			

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IV Semester

Code	Category	Course Title	Scheme of Instruction (hr/Week) Lecture	Tutorial	Practical	Total Instruction	Credits
MA401C	Engineering Sci. Courses	Probability &Statistics *(Common to all branches)*	3	-	-	3	3
CE402C	Professional Core Courses	Concrete Technology and Construction Equipment	3	-	-	3	3
CE403C	Professional Core Courses	Fluid Mechanics and Hydraulic Machines	2	1	-	3	3
CE404C	Professional Core Courses	Structural Analysis	2	1	-	3	3
CE405C	Professional Core Courses	Environmental Engineering -1	3	-	-	3	3
CE406C	Professional Core Courses	Soil Mechanics	2	1	-	3	3
CE407P	Professional Core Lab	Fluid Mechanics and Hydraulic Machines Lab	-	-	3	3	1.5
CE408P	Professional Core Lab	Soil Mechanics Lab	-	-	2	2	1

CE409S	Skill Oriented Course *	Python Programming	1	-	2	3	2
CE410P	Professional Core Lab	Computer Aided Building Drawing	-	-	3	3	1.5
		TOTAL	**17**	**5**	**10**	**37**	**24**

MA 401C PROBABILITY & STATISTICS

Instruction Hours/Week: 3(L) **Credits: 3**
Sessional Marks : 40 **End Semester Examinations Marks: 60**

Course Educational Objective (CEOs)

The objective of this course is

1. To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
2. To impart knowledge in basic concepts and few techniques in probability and statistics in relation to the engineering applications.

UNIT- I

SOLUTION TO ALGEBRAIC EQUATIONS: Solution of polynomial and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method. finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT- II

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical Differentiation, numerical integration- trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Ordinary differential equations-Taylor's series, Euler and modified Euler's methods. Runge-Kutta method of fourth order for solving first and second order equations.

UNIT -III

PROBABILITY : Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous)**,** probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties.

UNIT- IV

TESTING OF HYPOTHESIS: Formulation of null hypothesis, critical regions, level of significance. Large sample tests: test for single proportion, difference of proportions, test for single mean and difference of means.

UNIT -V

SMALL SAMPLE TESTS: Student t-distribution(single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2/e, Reprint 2012.

References

1. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Course Outcomes:

At the end of the course students will be able to

- evaluate approximating the roots of polynomial and transcendental equations by different algorithms
- Apply different algorithms for approximating the solutions of ordinary differential equations to its analytical computations
- apply discrete and continuous probability distributions
- design the components of a classical hypothesis test

infer the statistical inferential methods based on small and large sampling tests

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3										
CO2	2	3										
CO3	3	3	3									
CO4	2	3										

CE 402C CONCRETE TECHNOLOGY

Instruction Hours/Week : 3(L) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course objectives:

1) Explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
2) Develop fundamental knowledge in the fresh and hardened properties of concrete
3) Produce the testing methodology to evaluate the properties of concrete during fresh and hardened stage
4) Knowledge on the behaviour of concrete with response to stresses developed.
5) Knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

UNIT-I

CEMENTS AND AGGREGATES:

General, Manufacture of Portland cement by dry process, Approximate oxide composition limits of OPC, Bogue's compounds, heat liberation from a setting cement, structure of hydrated cement, water requirements for hydration.

TYPES OF CEMENTS: Ordinary Portland cement, Rapid hardening cement, Sulphate resisting cement, Slag cement, Quick setting cement, Super sulphated cement, Portland pozzolana cement, air entraining cement, coloured cement, expansive cement, High alumina cement.

AGGREGATES: Classification, source, size and shape texture and influence of texture on strength, specific gravity of aggregates, moisture in aggregates, bulking of fine aggregate, methods used for determination of moisture content of aggregates, grading of aggregates, sieve analysis, standard grading curve, grading limits of fine aggregates as per IS ; gap grading.

UNIT-II

WATER & ADMIXTURES: Quality of water for mixing concrete, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for mixing concrete.

ADMIXTURES AND CONSTRUCTION CHEMICALS: General, plasticizers and super plasticizers – Dosage, mixing procedure, equipment, effect of super plasticizes on the properties of hardened concrete, Retardors, accelerators. Air-entraining admixtures, factors affecting amount of air-entrainment, effect of air-entrainment on the properties of concrete, fly ash, effect of fly ash on fresh and hardened concrete, high volume fly ash concrete, silica fume, available forms, effect of silica fume on compressive strength of concrete, construction chemicals for curing, construction chemicals for water proofing.

UNIT-III

FRESH CONCRETE:

Workability, factors affecting workability, slump test, Kelly ball test, V-B test, compaction factor test, segregation, bleeding, volume batching and weigh batching, hand mixing, machine mixing, mixing time, compaction of concrete, hand compaction, compaction by vibration, internal vibrator, form work vibrator, table vibrator, platform vibrator, surface vibrator.

UNIT-IV

HARDENED CONCRETE: General, water-cement ratio; gel/space ratio; gain of strength with age; maturity concept of concrete, effect of maximum size of aggregate on strength.

TEST ON HARDENED CONCRETE: Compression test; moulds and compacting; curing; failure of compression specimen; effect of height/diameter ration strength; flexural strength of concrete; tensile strength of concrete; non-destructive testing methods

ELASTICITY, CREEP AND SHRINKAGE: Elastic properties of aggregate, Factor's affecting modulus of elasticity, poisson's ratio, creep and factors affecting creep, shrinkage and factors affecting shrinkage.

DURABILITY OF CONCRETE: Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

CONSTRUCTION EQUIPMENT: Selection of equipment for earth work, concreting, material handling and erection of structures-Dewatering and pumping equipments

UNIT-V

SPECIAL CONCRETES AND CONCRETING METHODS: Fibre reinforced concrete; Fibres used, factors effecting properties, aspect ratio of fibres, orientation of fibres, workability, mixing, applications, current development in FRC.

NO-FINES CONCRETE: mix proportion, drying shrinkage, Thermal conductivity, applications.

Ferrocement: Casting techniques, hand plastering, semi-mechanized process, Centrifuging, guniting, applications.

LIGHT-WEIGHT CONCRETE: Natural and artificial light-weight aggregates, properties of common light-weight concretes. High performance concrete.

PROPORTIONING OF CONCRETE MIXES: Concept of mix design, variables in proportioning ,different methods of mix design, nominal mix and design mix, Indian standard method of mix design.

TEXT BOOK

1. Concrete Technology by M.S.Shetty, S.Chand & Company Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Properties of concrete by A.M.Neville, Longman Publishers
2. Concrete technology by M.L.Gambhir, Tata McGraw-Hill Publishing company Ltd., New Delhi.

Course Outcomes:

At the end of the course student is able to

- Understand various ingredients of concrete and their role.
- Examine knowledge on the fresh and hardened properties of concrete.
- Design concrete mixes using various methods.
- Perceive special concretes for accomplishing performance levels.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				1		2			1	1		2
CO2	2	2	2	1					1	1	1	
CO3	2	2	2	1	2				1	1	1	
CO4	2		2	1					1		1	2

E403C FLUID MECHANICS AND HYDRAULIC MACHINES

Instruction Hours/Week : 2(L) +1(T) Credits : 3

Sessional Marks : 40 End Semester Examinations Marks: 60

Course Educational Objective (CEOs)

1. To understand the significance of fluid properties.
2. To apply the knowledge of fluid flow concepts and fundamental equations.
3. To solve the problems related to impacts of jets and flow measurements.
5. To apply the knowledge of laminar and turbulent flows.

6. To design the characteristics of turbines and pumps.

UNIT – I

FLUID PROPERTIES

Definition of a fluid –Density, Specific weight, Specific volume, Specific gravity – Viscosity – Bulk modulus of elasticity – Vapour pressure – Surface tension and capillarity- Pressure at a point – Absolute and gauge pressures

FLUID STATICS

Pascal's law – Pressure measurement – Manometers- Mechanical gauges – Hydrostatic pressure and force: horizontal, vertical and inclined planes, Curved surfaces.

UNIT – II

FLUID FLOW CONCEPTS

Flow characteristics – Velocity – Acceleration – Types of flow – Streamlines, Path lines, Streak lines – Stream function, Velocity potential, flow-net – Circulation and Vorticity.

FUNDAMENTAL EQUATIONS

Continuity equation – Energy Equation - Euler's equation of motion along a streamline – Bernoulli's equation – Applications of Bernoulli's Equation – Free jets and vortex flows.

UNIT III

IMPACTS OF JETS

Linear momentum equation - Impacts of jets on free and fixed moving vanes – Moment of momentum equation.

FLOW MEASUREMENT

Velocity measurement – Pitot tubes – Flow measurements: Flow through pipes - Venturi meter, Orifice meter and Nozzle meter- Flow through Channels: Weir and notches – Flow through tanks: Orifice and Mouth pieces.

UNIT IV

LAMINAR FLOW

Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

TURBULENT FLOW

Reynolds experiment, Transition from laminar to turbulent flow, Definition of turbulence, scale and intensity, Causes of turbulence, Turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes,

UNIT V

HYDRAULIC TURBINES

Classifications of turbines – Pelton Wheel, Francis Turbine and Kaplan Turbine velocity triangles at inlet and outlet – work done and efficiency– Draft Tube theory- Specific Speed – Characteristic Curves .

CENTRIFUGAL PUMPS

Components – Working – Types – Workdone – Heads – Losses and Efficiencies – Specific Speed – Multi Stage Pumps – Performance Characteristic Curves – Net positive Suction Head (NPSH).

Course Outcomes (COs)

After completion of the course the student will be

1. Able to solve fluid flow problems using fundamental principles
2. Able to apply the knowledge of fluid flow concepts and fundamental equations for solving problems

3. Able to measure pressure, velocity and discharge, and apply the knowledge of impacts of jets related to real life problems.
4. Able to analyze the flow problems in laminar and turbulent flow conditions.
5. Able to analyze the characteristics of turbines and pumps.

TEXT BOOKS

1. Hydraulics and Fluid Mechanics including Hydraulic Machines by P.N. Modi and S.M. Seth – Twentieth edition 2015, Standard Book House , New Delhi.
2. Fluid Mechanics and Hydraulic Machines by R.K.Rajput - 2002 Publication, S.Chand & Company Ltd., New Delhi.
3. Fluid Mechanics and Hydraulic Machines by R.K.Bansal -Revised Ninth edition 2010, Laxmi Publications (P) Ltd., New Delhi.

REFERENCE BOOKS

1. Fluid Mechanics by Victor L. Streeter and E.Benjamin Wylie, Keith W. Bedford – Edition 2010, Tata Mc Graw Hill Education Private Limited, New Delhi.
2. Fluid Mechanics and Turbo machines by Madan Mohan Das. – First Edition 2009, PHI Learning Pvt.Ltd., New Delhi.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	2	2	2					2	1	2
CO2	2	2	2	2	2		1			2	2	2
CO3	2	1	2	2	2					2	1	2
CO4	2	2	2	2	2		1			2	2	2
CO5	2	2	2	2	2		1			2	2	2

CE 404C STRUCTURAL ANALYSES

Instruction Hours/Week :2(L)+1(T) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Objectives

1) to teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2) to demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
3) to train the student compute shear stresses in different cross-sections and analyze failure mechanisms.

4) to make the student analyze circular shafts subjected to torsion
5) to make the student determine critical loads for columns with different end conditions.

UNIT- I

DEFLECTIONS: Relationship between curvature, slope and deflection - Differential equation for the elastic line of a beam - Slope and deflection of cantilevers and simply supported beams by integration method, moment area method and conjugate beam method. Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load - Mohr's theorems – Moment area method – application to simply supported and overhanging beams - analysis of propped cantilever beams under UDL and point loads.

UNIT-II

TORSION OF CIRCULAR SHAFTS: Theory of pure torsion in solid and hollow circular shafts - Transmission of power - Combined bending, torsion and end thrust.

SPRINGS: Types of springs - Close and open coiled helical springs under axial loads and axial couple - springs in series and parallel - Carriage or leaf springs.

UNIT- III

INFLUENCE LINES AND MOVING LOADS:

Influence lines for reactions, BM and SF; Curves of maximum BM and SF for single, two and multiple loads, udl longer and shorter than span, enveloping parabolic and EUDL – forces in truss members.

UNIT- IV

ENERGY THEOREMS: Virtual work and energy principles - Maxwell's, Betti's theorems, Castigliano's first theorem and unit load method - Deflection of simple beams and pin-jointed trusses. Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force. Introduction to finite element method for plane stress and plane strain.

UNIT- V

INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Analysis of plane trusses with two degrees of internal and external indeterminacy - Castigliano's theorem–II – Lack of fit.

TEXT BOOKS:

1) Analysis of Structures Vol.I & II by V.N.Vazirani & M.N.Ratwani.

2) Intermediate Structural Analysis by Wang.

3) Mechanics of Structures Vol.II by S.B.Junarkar.

4. Structural Analysis by L.S.Negi & R.S.Jangid.

5) Theory of Structures - Vol.I by S.P.Gupta, G.S.Pandit & R.Gupta.

6) Fundamentals of Structural Analysis by Sujit Kumar Roy & Subrata Chakrabarty.

Course Outcomes:

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

- Understand various engineering properties of materials
- Estimate magnitudes under combined loads in members and structures
- Determine shear stresses for different cross-sections.
- Determine deflection at any point on a beam under simple or combined loads
- Apply failure criteria to implement in design of structural members.
- Analyze members under torsion, combined torsion and bending moment for determination of energy absorption

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	1	1			1	1	1	1	1	
CO2	2	1		1	2				1	1	1	2
CO3	2	1		1	2				1	1	1	2
CO4	2	1		1	2				1	1	1	2
CO5	2	1		1	2				1	1	1	2
CO6	2	1		1	2				1	1	1	2

CE 405C WATER QUALITY AND TREATMENT

Instruction Hours/Week : 3(L) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

1. To know the water quality of different sources and water demand estimation.

2. To analyze the distribution network
3. To learn about the water quality parameters
4. To know the design concepts of water treatment plant
5. To study the advanced water treatment methods.

UNIT – I

SOURCES AND DEMAND OF WATER: Different sources of water, quantity and quality of different sources, Types and variation in water demand, factors affecting water demand, design period, population forecasting – Different methods and their suitability.

UNIT-II

WATER COLLECTION, CONVEYANCE AND DISTRIBUTION: Intake works for collection of surface water – Conveyance of water – Gravity and pumping – Their design – Different materials used for conveying conduits and their suitability, systems of distribution – Distribution reservoirs – Distribution networks, design of simple and complex pipe networks, pipe accessories – Valves and their location and suitability.

UNIT – III

WATER USES AND QUALITY REQUIREMENTS: Sources of water pollution, water borne diseases. Need for protected water supply, water quality – Physical, chemical and biological characteristics, water quality standards for different uses.

WATER TREATMENT: Conventional water treatment processes units and their functions. Theory and design of aeration, coagulation, flocculation and clarification, Determination of optimum dose of alum for coagulation of water.

UNIT – IV

FILTRATION AND DISINFECTION: Theory of Filtration – Different types of filters and their design. Disinfection – Disinfectant's mechanism of disinfection – Different methods of Disinfection. Types of Chlorination - Break point chlorination.

UNIT – V

ADVANCED TREATMENT METHODS: Treatment methods for removal of fluorides, arsenic, hardness, iron and manganese, salinity, colour.

TEXT BOOKS :

1. Water Treatment Principles and Design by James M. Montgomery.
2. Water Supply Engineering, by S.K.Garg.

3. Environmental Engineering by H.S.Peavy et al.
4. Water Supply and Sewerage, by E.W.Steel.

Course Outcomes (COs)

After completion of the course the student will be:

- Able to estimate the water demand of any area and understand the water sources and its quality
- Able to solve the distribution network problems
- Able to explain the water quality parameters
- Able to plan and design water treatment plant
- Able to understand advanced water treatment technologies

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2	1		1	1		1	1	1
CO2	2	2	2	2	1		1	1		1	1	1
CO3	2	2	2	2	1		1	1		1	1	1
CO4	2	2	2	2	1		1	1		1	1	1
CO5	2	2	2	2	1		1	1		1	1	1

CE 406C SOIL MECHANICS

Instruction Hours/Week : 2(L)+1(T) **Credits : 3**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Objectives:

The objectives of this course is:

1) To enable the student to find out the index properties of the soil and classify it.
2) To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
3) To enable the student to determine permeability of soils using various methods.
4) To impart the concept of seepage of water through soils and determine the seepage discharge.
5) To enable the students to determine Shear Strength of soils using various methods.

UNIT- I

SOIL COMPOSITION AND PHASE RELATIONSHIPS:

Types of soils - formation and deposition - Phase composition and Soil as 3–Phase system- Weight-Volume parameters : moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity - Relationship between various soil parameters - Determination of Moisture content, Specific gravity and Unit weights using various methods.

UNIT -II

IDENTIFICATION AND CLASSIFICATION OF SOILS:

Index properties - Determination of particle size-Dry Sieve Analysis &Sedimentation Analysis - Determination of Consistency limits-liquid limit, plastic limit, shrinkage limit - Indices from Index properties-Density Index, Plasticity, Liquidity and Consistency indices, Flow & Toughness indices - Soil classification based on particle size , texture - Unified and Indian standard soil classification systems – Engineering significance of classification and classification parameters- Tests for field identification of soils

UNIT -III

SOIL WATER & EFFECTIVE STRESS PRINCIPLE:

Mode, Occurrence and types of soil water – Geostatic stresses in soils - capillarity – Total Stress- Pore water pressure- Effective Stress Principle - nature of effective stress, effect of ground level, surcharge &water table on effective stress.

PERMEABILITY & SEEPAGE ANALYSIS:

Darcy's law-coefficient of permeability: determination by constant-head and falling-head methods-Permeability of stratified soils - factors affecting Permeability -Movement of water through soils- stream and potential functions - flow nets, graphical method to plot flow nets - seepage pressure - quick sand condition.

UNIT- IV

CONSOLIDATION OF SOILS:

comparison between compaction and consolidation, initial, primary & secondary consolidation - Terzaghi's theory of consolidation, final settlement of soil deposits, computation of consolidation settlement and secondary consolidation.

UNIT – V

SHEAR STRENGTH OF SOILS:

Shear strength of soils - Mohr'-Coulomb Failure Criteria - Measurement of shear strength - Direct shear, Unconfined compression and Tri-axial compression tests - Shear strength parameters - Shear strength of cohesive and cohesion less soils - Test conditions - Stress Paths under different stress conditions.

TEXT BOOKS:

1. C. Venkataramiah, Geotechnical Engineering, New age International Pvt. Ltd, (2002).
2. K. R. Arora, Soil Mechanics and Foundation Engg., Standard Publishers and Distributors, Delhi.

REFERENCES:

1. Gopal Ranjan & A. S. R. Rao, Basic and Applied Soil Mechanics, New age International Pvt . Ltd, New Delhi.
2. Braja M. Das Principles of Geotechnical Engineering, Cengage Learning

3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundation, Laxmi publications Pvt. Ltd., New Delhi

Course Outcomes:

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

- Identify and classify various soils based on their characteristics.
- Compute effective stress under different conditions
- Evaluate permeability and seepage of soils.
- Understand consolidation in soils and Calculate consolidation time and settlement of soils.
- Understand shear strength theories and Determine Shear Characteristics of soils

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	1	1	1					1	1
CO2	2	2	2	2	1	2	1		1		1	1
CO3	2	2	2	2	2	2	1		1	1	1	1
CO4	2	2	2	1	1	2	1		1	1	1	1
CO5	2	2	2	2	2	2	1		1	1	1	1

CE407P FLUID MECHANICS AND HYDRAULIC MACHINES LAB

Instruction Hours/Week : 3(P) Credits : 1.5

Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To determine the coefficient of discharge in flow measuring devices.
2. To determine the coefficients of different losses in pipe flow.
3. To draw the performance characteristic curves of pumps.

FLOW MEASUREMENT

1. Calibration of Small Orifice
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Calibration of Bend meter
5. Calibration of Triangular Notch

HEAD LOSSES IN PIPES

6. Determination of Friction factor of the pipe material
7. Determination of Head Loss coefficient due to Sudden Contraction
8. Determination of Head loss coefficient due to Gate Valve in a pipe line
9. Determination of Head Loss coefficient due to Bend in a pipe line

HYDRAULIC MACHINES

10. Characteristic curves of 0.8 kW two stage centrifugal pump
11. Characteristic curves of variable speed centrifugal pump

Course Outcomes (COs)

After completion of the course the student will be:

- Able to calibrate the flow measuring devices.
- Able to calculate loss coefficients for use in the pipe flow analysis.
- Able to prepare the characteristic curves of the pumps.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	1		2				1	1	2
CO2	2	2	2	1		2				1	1	2
CO3	2	2	2	1		2				1	1	2

CE408P SOIL MECHANICS LABORATORY

Instruction Hours/week : 2 (P) **Credits :1**

Sessional Marks : 40 **Semester-end Examination: 60**

Course Educational Objective (CEOs)

The course should enable the students to:

1. Develop laboratory skills in dealing with soil as a medium of water flow , for structural support and a primary building material.
2. Know the procedure to measure /determine engineering properties of soils in the laboratory.
3. To conduct following experiments on different types of soils to arrive the engineering properties.

List of Experiments

1. Grain Size Distribution by Dry Sieve Analysis.
2. Grain Size Distribution by Hydrometer Analysis
2. Specific Gravity of soils and Free Swell Index
3. Consistency limits by Liquid limit and by Plastic limit
4. In-situ density using Core Cutter method and Shrinkage Limit of given soil pat
5. Shrinkage Limit of given soil
6. In-situ density by Sand Replacement method.
7. I.S. Light Compaction test/ Standard Proctor Compaction test

Course Outcomes (COs)

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

1. Depict the procedures for measuring the engineering properties of soils.
2. Describe the procedure for measuring the basic properties and compaction characterstics of soils.
3. Assess the soil for engineering applications

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2			1			1		1		
CO2	2	1	1							1		
CO3	2	1	1							1		

CE409S PYTHON PROGRAMMING

Instruction Hours/Week: 1(T) +2(P) **Credits : 2.0**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

1. Computer programming skills are now becoming part of basic education as these skills are increasingly of vital importance for future job and career prospects.

2. The Python programming language which is one of the most popular programming languages worldwide.
3. The course shows you how to use the free open-source Python to write basic programs and high-level applications using concepts such as Class, BIF of Python, functions, variables, If Else statements, For loops, While loops, iterative and recursive programs and algorithms such as the Insertion Sort algorithm.
4. This course will be of great interest to all learners who would like to gain a thorough knowledge and understanding of the basic components of computer programming using the Python language – and might be a gentle introduction to programming for those who think they might have a longer-term interest in the subject area.

UNIT I

Introduction to Python Programming Language: Introduction to Python Language: What is Python? Why Python? Installing Python on Windows, Python IDLE, Python Literals, Python Data Types Basic Input-Output operations, Operators in Python, Decision making in Python, Conditional execution in Python, Logical and bit operations in Python, Naming Conventions, String Operations, String Slices, String Operators, Numeric Data Types, Conversions, Data type conversion, Built in Functions.

UNIT II

Python Built-in Data Structures: Introduction, List, Tuples, Dictionary, Sets, List Operations append, extend, insert, remove, pop, slice, and reverse, List Comprehension, Dictionary operations, Sorting Dictionaries, Copying Collections, Set operations. Standard python modules math, time, IO and time, Regular expressions, multi-threading.

UNIT III

Classes in Python, Principles of Object Oriented programming, Creating Classes, Instance Methods, File Organization, Special Methods, Class Variables, Inheritance, Polymorphism, Type Identification, Custom Exception Classes.

UNIT IV

Functions, I/O, Exception Handling in Python

Introduction:Defining your own functions, keyword and optional parameters, mapping functions, lambda functions, **Data Streams:** Creating Your Own Data Streams · Access Modes · Writing Data to a File · Reading Data From a File · Additional File Methods · Using Pipes as Data Streams · Handling IO Exceptions · Working with Directories · Metadata · Errors · Run Time Errors · The Exception Model · Exception Hierarchy · Handling Multiple Exceptions

Unit V

Python API development.

Introduction to API, Python API programming, Python web application frameworks, REST API, Python Flask, Flask Environment, Routing, Cookies, Sessions, Running Flask Application, Testing API with POSTMAN client

Course Outcomes (COs)

Upon completion of this course, students should be able to

1. Apply the OOP principles and best practices of python programming.
2. Write clear and effective pythonic code.
3. Create applications using python programming.
4. Implementing databases using SQLite and Access databases using python programming.
5. Understand and feel comfortable in working with web application frameworks.
6. Develop APIs required for the web applications using web frameworks like Flask and Fast API.

Reference Book:

1. Dive into Python, Mike

2. Learning Python, 4th Edition by Mark Lutz

3. Programming Python, 4th Edition by Mark L

Fundamentals of Python Programming, Richard L. Halterman Updated content of the book is maintained under the URL:http://python.cs.southern.edu/pythonbook/pythonbook.pdf

The official Python Tutorial. http://docs.python.org/tut/ How to think like a computer scientist (interactive) http://interactivepython.org/runestone/static/thinkcspy/index.html

How to think like a computer scientist http://openbookproject.net/thinkcs/python/english3e/

Code Academy Python http://www.codecademy.com/tracks/python A useful hands-on book: http://anh.cs.luc.edu/python/hands-on/3.1/Hands-onPythonTutorial.pdf

1. Introduction to Computation and Programming using Python, by John Guttag, PHI Publisher, Revised and Expanded version (Referred by MIT)
2. Python Programming using problem solving Approach by Reema Thareja, Oxford University, Higher Education Oxford University Press; First edition (10 June 2017), ISBN-10: 0199480173

3. Data Structures and Algorithms in Python by Michael T Goodrich and Robertto Thamassia, Micheal S Goldwasser, Wiley Publisher (2016) Fundamentals of Python first Programmes by Kenneth A Lambert, Copyrighted material Course Technology Inc. 1 st edition (6th February 2009

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	2					1		1	1
CO2	2	2	2	2					1		1	1
CO3	2	2	2	2					1		1	1
CO4	2	2	2	2					1		1	1
CO5	2	2	2	2					1		1	1
CO6	2	2	2	2					1		1	1

CE410P COMPUTER AIDED BUILDING DRAWING

Instruction Hours/Week : 3(P) **Credits : 1.5**
Sessional Marks : 40 **End Semester Examinations Marks : 60**

Course Educational Objective (CEOs)

1) Develop parametric design and the conventions of formal engineering drawing
2) Produce and interpret 2D drawings
3) Communicate a design idea/concept graphically/ visually
4) Examine a design critically and with understanding of AUTOCAD software.

UNIT- I

INTRODUCTION: Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

UNIT- II

SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards

UNIT- III

MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls – One brick wall and one and half brick wall

UNIT- IV

BUILDING COMPONENTS: Terms, Doors, Windows, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan.

UNIT- V

TYPICAL BUILDING DRAWINGS: A Building, An Office building, A Dwelling, A Residential House, Plan of a Secondary School, Bank, Primary Health Centre, Duplex House.

It may be advisable to conduct Drawing sessions along with Lab demonstrations.

Text book:

Building Planning and Drawing – Dr. N. Kumaraswamy and A. Kameshwara Rao – CHARATOR PUBLISHING HOUSE**.**

COURSE OUTCOMES:

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

- Develop drawing skills for effective demonstration of building details.
- Draw building plans using Computer Aided Design and Drafting soft wares.
- Develop engineering project drawings incorporating details and design parameters in 2D.
- Examine efficacy of AUTOCAD design and Drawing.

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CO-PO Mapping

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2		2		2	1	1	2	1	1	1	2
CO2	2		2		2	1	1	2	1	1	1	2
CO3	2		2		2	1	1	2	1	1	1	2
CO4	2		2		2	1	1	2	1	1	1	2