DEPARTMENT OF CIVIL ENGINEERING
S.V.U. COLLEGE OF ENGINEERING
SRI VENKATESWARA UNIVERSITY: TIRUPATI

CURRICULUM FOR B.TECH CIVIL ENGINEERING (REGULAR) PROGRAMME TO BE IMPLEMENTED WITH EFFECT FROM THE ACADEMIC YEAR 2018-2019

SYLLABUS
Choice Based Credit System (CBCS)

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 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 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 modernengineering 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.

I SEMESTER

Course Code	Course Title	Instruction Hours per Week				Course Type	Credits
		Theory	Tutorial	Lab.	Total		
MABST 101	Mathematics – I	3	1	-	4	BASIC	4
CYBST 102	Engineering Chemistry	3	1	-	4	BASIC	4
ENHST 103	English	2	-	-	2	BASIC	4
EEEST 104	Basic Electrical & Electronics Engineering	3	1	-	4	BASIC	4
MEEST 105	Engineering Graphics & Design	2	-	3	3.5	BASIC	4
ENHSP 106	English Communication Lab	-	-	3	1.5	BASIC	3
	TOTAL	13	3	6	19		26

MABST 101 MATHEMATICS - I

Instruction Hours/Week: 3(L) +1(T) Credits:4
Sessional Marks : 40 End Semester Examinations Marks: 60

UNIT I

Differential Equations: Linear differential equations of second and higher order with constant coefficients-particularintegrals-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. applydifferential equations to engineering problems.
3. usetransformationto 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 etc using curve tracingmethodto 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											
CO2		2			2							
CO3			3	1								
CO4			1									
CO5					3	2						
CO6												
CO7												
CO8												
CO9												

CYBST 102 ENGINEERING CHEMISTRY

Instruction Hours/week :3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

UNIT I

Atomic and molecular structure (12 lectures)
Postulates of quantum chemistry.Schrodinger equation.Particle in a box solutions Molecular orbitals of diatomic molecules and plots of the multicentreorbitals.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.Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation 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.Cell potentials, 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/Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
3.Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.
7. Principles of physical chemistry, Puri, Sharma and Pattania

Course Outcomes:

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

1. analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. rationalise 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. rationalise 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					

ENHST 103 ENGLISH

Instruction Hours/week :2(L) Credits : 2
Sessional Marks : 40 End Semester Examinations Marks : 60

UNIT I

Vocabulary Building

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

UNIT II

Basic Writing Skills

SentenceStructures – Useof phrases andclauses in sentences –Importanceofproperpunctuation - Creating coherence – Organizingprinciplesof paragraphs in documents -Techniques for writingprecisely

UNIT III

Identifying CommonErrorsinWriting

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

UNIT IV

NatureandStyleofsensible Writing

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

UNIT V

Writing Practices

Comprehension - Précis Writing –EssayWriting

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 ResourceBook. 2001
4. Study Writing. LizHamp- Lyonsand Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay KumarandPushplata. 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. Learnliterary 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. makeuse 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												

EEEST 104 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Instruction Hours/Week : 3 (L) +1(T) Credits: 4 Sessional Marks : 40 End Semester Examination Marks: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).

Text Books :

1. Electrical Technogy by Edward Hughes
2. Basic Electrical Engineering byNagrath 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
5. 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	

MEEST 105 ENGINEERING GRAPHICS AND DESIGN

Instruction Hours/week :2(L) +3(P) Credits : 3.5

Sessional Marks : 40 Semester End Examination Marks : 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;

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)thoseinclined to both the Planes-Auxiliary Views;

Unit IV

Isometric Projections& Orthographic projections
Principles of Orthographic Projections-Conventions Draw simple objects, dimensioning and scale.Principlesof 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, CharotarPublishing House
2. Shah,M.B.&RanaB.C.(2008),EngineeringDrawingandComputerGraphics,PearsonEducation
3. AgrawalB.&AgrawalC.M.(2012),Engineering Graphics, TMH Publication
4. Narayana, K.L. &P Kannaiah(2008),Text book on Engineering Drawing,

ScitechPublishers

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						

ENHSP 106 ENGLISH COMMUNICATION LAB

Instruction Hours/week :3 Credits :1.5
Sessional Marks : 40 End Semester Examinations Marks : 60

ListeningComprehension -Pronunciation,Intonation, Stress and Rhythm -Common EverydaySituations: Conversations andDialogues -Communication at Workplace -Interviews -Formal Presentations

Reference/Text Books:

1. Practical English Usage. Michael Swan. OUP. 1995.
2. RemedialEnglish Grammar.F.T. Wood. Macmillan.2007
3. OnWritingWell.William Zinsser. Harper ResourceBook. 2001
4. StudyWriting.LizHamp– Lyonsand Ben Heasly.CambridgeUniversity Press. 2006.
5. Communication Skills. SanjayKumarandPushpalata. Oxford University Press. 2011.
6.Exercises in Spoken English.PartsI-III.CIEFL, Hyderabad. Oxford University Press

Course Outcomes:

The student will acquire basic proficiency in English including reading and listening comprehension, writingand speakingskills.

CO-PO Mapping

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

II SEMESTER

Course Code	Course Title	Instruction Hours per Week				Course Type	Credits
		Theory	Tutorial	Lab.	Total		
MABST 201	Mathematics – II	3	1	-	4	BASIC	4
PYBST 202	Engineering Physics	3	1	-	4	BASIC	4
CSEST 203	Programming for Problem solving	2	1	-	3	Core	4
CEEST 204	Engineering Mechanics	3	1	-	4	Core	4
MEESP 205	Workshop/Manufacturing Practices	-	-	3	3	Core	4
CSESP 206	Computer Programming Lab	-	-	3	3	Core	3
CEMCT 207	Environmental Science	4	-	-	4		
	TOTAL	13	3	6	19		26

MABST 201 MATHEMATICS II

Instruction Hours/Week : 3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 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.
   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												

PYBST 202 ENGINEERING PHYSICS

Instruction: Hours/Week: 3 (L) +1(T) Credits: 4
Sessional Marks: 40 End Semester Examinations Marks :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" Tata MCGraw Hill Education PVt.Ltd., New Delhi
4. M.N.Avadhanulu and P.G.Kshirsagar ``A Text Book 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. developappropriate competence and working knowledge of laws of modern Physics in understanding advanced technical engineering courses
2. understand the quantum mechanics and ultimately the quantum behaviour 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
5. understand the principles in electrostatics and electromagnetics and magnetic properties of materials.
6. understand size depended properties of nanodimensional materials and their effective utilization in making nano- and micro-devices for further microminiaturization of electronic devices.
7. think and participate deeply, creatively, and analytically in emerging areas of engineering technology.

8. learnthe basics of instrumentation, design of laboratory techniques, measurement, data acquisition, interpretation, and analysis.
9. 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												
CO9												

CSEST 203 PROGRAMMING FOR PROBLEM SOLVING

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

UNIT-I

Introduction to Programming -Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) -
Idea of Algorithm: steps to solve logical and numerical problems. Representation ofAlgorithm: Flowchart/Pseudocode with examples -From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code -Arithmetic expressions and precedence**.**

UNIT-II

Conditional Branching and Loops - Writing and evaluation of conditionals and consequent branching - Iteration and loops -Arrays (1-D, 2-D), Character arrays and Strings.

UNIT-III

Basic Algorithms -Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection) - Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

UNIT-IV

Functions -Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference - Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc - Quick sort or Merge sort.

UNIT-V

Structure -Structures, Defining structures and Array of Structures- Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation) File handling.

Text Books / Reference Books :

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

COURSE OUTCOMES:

1. Learn about fundamentals of computer and programming language, draw flow chart to solve given problem logically and develop algorithm to solve given program

2. Able to use the concept of branching and looping to design efficient C program and be able to apply the concepts of user defined function and recursion to support reusability

3. Able to discuss basic algorithmic analysis for simple algorithms; determine appropriate algorithmic approaches to a real world problems.

4. Apply fundamental programming concepts, using a functional programming language, to solve problems.

5. Design and develop a modular program in C for commercial billing activities using an array of structures and pointers.

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									

CEEST 204 ENGINEERING MECHANICS

Instruction Hours/Week: 3(L) + 1(T) Credits :4

Sessional Marks: 40 End Semester Examination : 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.

TEXT BOOKS :

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		2			2		1		1	
CO3	2	2		2			2		1		1	
CO4	2	2		2			2		1		1	
CO5	2	2		2			2		1		1	

MEESP 205 WORKSHOP/MANUFACTURING PRACTICES

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

Sessional Marks : 40 End Semester Examinations Marks : 60

WorkshopPractice:

1.Machineshop
2.Fittingshop
3.Carpentry
4.Electrical wiring
5.Weldingshop
6.Casting
7.Smithy
8.Plasticmoulding&GlassCutting

choose any of the above Five for practice

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

Detailedcontents

1.ManufacturingMethods-casting,forming,machining,joining, advancedmanufacturing methods
2. CNCmachining, Additivemanufacturing
3. Fittingoperations&powertools
4. Electrical&Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metalcasting
8. Welding(arc welding&gas welding), brazing

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

Text/ReferenceBooks:

1. HajraChoudhuryS.K.,HajraChoudhuryA.K.andNirjharRoyS.K.,"Elementsof Workshop Technology", Vol. I 2008and Vol. II 2010, Media promoters and publishersprivatelimited,Mumbai.
2. KalpakjianS.AndStevenS.Schmid,"ManufacturingEngineeringandTechnology", 4th edition,PearsonEducationIndiaEdition,2002.
3. GowriP.HariharanandA.SureshBabu,"ManufacturingTechnology–I" Pearson Education,2008.
4. RoyA.Lindberg,"ProcessesandMaterialsof Manufacture",4th edition,PrenticeHall India,1998.
5. RaoP.N., "ManufacturingTechnology",Vol.IandVol.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 fabricate components 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

CSESP 206 COMPUTER PROGRAMMING LAB

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

Assignments in C

Variable types and type conversions:
Simple computational problems using arithmetic expressions
Branching and logical expressions:
Problems involving if-then-else structures
Loops, while and for loops:
Iterative problems e.g., sum of series
1D Arrays: searching, sorting:
1D Array manipulation
2D arrays and Strings
Matrix problems, String operations
Functions, call by value
Simple functions
Numerical methods (Root finding, numerical differentiation, numericalintegration):
Programming for solving Numerical methods problems
Recursion, structure of recursive calls
Recursive functions
Pointers, structures and dynamic memory allocation
Pointers and structures

Assignments in C and JAVA
File handling
File operations

Course Outcomes:

At the end of the course, students will be able to develop Programming concepts to

1. formulate simple algorithms for arithmetic and logical problems.
2. translate the algorithms to programs (in C language).
3. test and execute the programs and correct syntax and logical errors.
4. implement conditional branching, iteration and recursion.
5. decompose a problem into functions and synthesize a complete program using divide and conquer approach.
6. use arrays, pointers and structures to formulate algorithms and programs.
7. apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

and

to apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

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
CO3	3	3		2	2	1			1		3	
CO4	3	3		3		2		2		3		
CO5	3	2			3		3		3		1	
CO6												
CO7												

CEMCT 207 ENVIRONMENTAL SCIENCE

Instruction Hours/week**:** 4(L) Credits :--
Sessional Marks : 100 End Semester Examinations Marks : --

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, dams 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.

CO-PO Mapping

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

III SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits
		Lecture	Tutorial	Practical	Total	
MABST 301	Mathematics – III	3	-	-	3	3
CEPCT 302	Strength of Materials	3	1	-	4	4
CEPCT 303	Surveying	3	1	-	4	4
CEPCT 304	Building Materials and Construction Technology	3	-	-	3	3
MEEST 305	Basic Mechanical Engineering	2	-	-	2	2
CEPCT 306	Engineering Geology	2	1	-	3	3
CEPCP 307	Surveying Lab	-	-	3	3	1.5
CEPCP 308	Engineering Geology Lab	-	-	2	2	1
Total		16	3	5	24	21.5

MABST 301 Mathematics – III

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

Sessional Marks : 40 **Semester-end Examination: 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. They can also formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.

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	

CEEST 302 STRENGTH OF MATERIALS

Instruction Hours/week : 3(L) +1(T) **Credits :4**

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

Course Educational Objective (CEOs)

To acquire the knowledge about behavior of members subjected to various types of forces on the members.

1) To impart procedure for drawing shear force and bending moment diagrams for beams.
2) To make the student able to analyze flexural stresses in beams due to different loads.
3) 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 contraflexure - 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 – Theories of failure.

UNIT III

BENDING STRESSES AND SHEAR 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 have:

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

CEPCT 303 SURVEYING

Instruction Hours/week : 3(L) +1(T) **Credits :4**

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

Course Educational Objective (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.

The first step in engineering practice is surveying and the soundness of any civil engineering work is dependent on the reliability and accuracy of surveying. Therefore, it is imperative that a student of engineering should have good knowledge of surveying. To impart the knowledge of surveying and latest technologies in surveying it is necessary to introduce this subject in the curriculum.

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:

- Measure and layout elevations and relative position of points, understand plans and field notes.
- Perform computations using information gathered from differential levelling, traversing, area calculations, and volume/ earthwork.
- Ability to design and set out curves
- Ability to use modern surveying equipment
- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- 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	1	2	1		1					1	
CO4	2	2	1	1		2		1			1	
CO5	2	2	1	1		2		1			1	
CO6	2	2	1	1		2		1			1	
CO7	2	2	1	1		2		1			1	
CO8	2	2	1	1		2		1			1	
CO9	2	2	1	1		2		1			1	
	2	2	1	1		2		1			1	

CEPCT 304 BUILDING MATERIALS AND CONSTRUCTION TECHNOLOGY

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

Course Educational Objective (CEOs)

- To understand the suitability of masonry materials for construction.

- To learn the characteristics of different types of mortar tests
- To know about aggregates.
- To learn about high grade cements,
- To learn about Non-distractive testing methods.
- To understand different types construction practices
- To Learn Causes of damage and deterioration of concrete structures and their repairs
- To learn the application of civil engineering Construction equipment

UNIT-I

STONES-BRICKS

Stone as building material-criteria for selection-Tests on stones-Deterioration and preservation of stone work
Bricks-Classification-Manufacture of clay bricks-Tests on bricks-Compressive strength-Water absorption-Efflorescence-Bricks for special use-Refractory bricks

UNIT-II

CEMENT-AGGREGATES - CONCRETE

Cement ingredients-Manufacturing process-Types and grades-properties of cement -Hydration-Compressive strength-Tensile strength- Soundness and consistency-Setting time-Aggregates-Natural stone aggregates- Crushing strength-Impact strength-Flakiness-Abrasion Resistance-Grading-Sand-Bulking.
Concrete- Manufacture-Batching plants-RMC-Properties of fresh concrete-Slump-Flow and compaction-Principles of Hardened concrete-Compressive, Tensile and shear strength-Modulus of Rupture-Tests

UNIT-III

TIMBER AND OTHER MATERIALS

Timber- Market forms-Industrial timber-Plywood-Veneer- Thermocole-Panels of laminates-Steel -Aluminium and other metallic materials-composition-Uses-Market forms-Mechanical treatment-Paints-Varnishes-Distempers- Bitu mens

UNIT-IV

CONSTRUCTION PRACTICES

Types of foundations-Stone Masonry-Brick Masonry- Composite Masonry-Cavity walls-Flooring-Formwork-Centering and shuttering sheet piles-Slip and Moving forms-Roofs and roof covering- Joints in Concrete-Plastering and Pointing-Shoring-Scaffolding-Under pinning-Submerged structures.

UNIT-V

CONSTRUCTION EQUIPMENT

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

TEXTS BOOKS

1. R.K. Rajput, Engineering Materials, S.Chand and company Ltd., 2000.
2. M.S.Shetty, Concrete Technology (Theory and Practice), S.Chand and company Ltd., 2003
3. Gambir, M.L, Concrete Technology, Tata Mc graw hill Publishing Company,1995.
4. Shetty, M.S., Concrete Technology, Theory and Practice, S.Chand and Company, 2003.

REFERENCE BOOKS

1. Arora, S.P. and Bindra, S.P., Building Construction, Dhanpat Rai and Sons, 1997.

2. Punmia, B.C., Building Construction, Lakshmi Publications (P) Ltd., 1993.
3. Peurifoy, R.L., Formwork for Concrete Structures, Mc graw hill book Co., 1999.

Course Outcomes (COs)

After completion of the course the student will have:

- To find the suitability various building materials at a particular location in the building construction.
- To know the preparation of concrete and tests to be performed
- Ability to utilize various modern building materials like timber products, protective coatings, and fibre textiles
- Able to know the different types of concretes their application, mix design and tests.
- To develop acquaintance over service requirements like protectives, damp and termite proofing.
- Able to repair and rehabilitation of distressed structures and use of construction equipment in the field.

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
CO4	2	2	2	1		1	2	2	2	1	2	1
CO5	1	1	1	1	2	2	1			1	2	1
CO6	2	1	1	1	2	1	1	1		1	2	1

MEEST 305 BASIC MECHANICAL ENGINEERING

Instruction Hours/Week : 2(L) Credits : 2
Sessional Marks : 40 End Semester Examinations Marks : 60

COURSE OBJECTIVES:

1. To give overall picture of mechanical engineering from the point of view of basic concepts.
2. To learn about basic laws of thermodynamics.
3. To give insight into IC engines, steam engines, and steam turbines, gas turbines.
4. To make known the basic manufacturing processes and machine tools.
5. To learn about power transmission devices.

UNIT – I

Introduction to Thermodynamics – Concept of a system – Types of Systems, Thermodynamic Equilibrium – Properties, State, Process and Cycle, Zeroth Law, Energy Interactions – Heat and work, Types of work.

First and Second Laws of Thermodynamics: First law, Cycle and process, Specific heats, Heat interactions in a closed system for various processes, Limitations of First law, Concept of Heat Engine (H.E.) and reversed heat engine (Heat pump and refrigerator) , Efficiency/COP, Second Law: Kelvin – Plank and Clausius Statements , Carnot Cycle, Carnot Efficiency, Property of Entropy – T- S and P – V diagrams

UNIT – II

Thermal Power Plant: Thermal power plant layout – Four circuits – Rankine cycle, Boilers: Fire tube Vs Water Tube; BobCock and Wilcox, Cochran Boilers, Steam Turbines, Impulse Vs. Reaction Turbines, Compounding of Turbines.

UNIT – III

Internal Combustion Engines (IC): I.C. 2 – Stroke and 4 – Stroke engines – S.I. engines and C.I. engines – Differences Heat transfer – Modes – Thermal resistance concept, Conduction, Composite walls and Cylinders. Combined Conduction and Convection – Overall Heat transfer Coefficient, Simple Numerical Problems in Heat transfer

UNIT – IV

Manufacturing Processes : Engineering Materials ; Classification , Properties of materials, Metal Casting, Moulding, Patterns, Hot working and Cold working , Extrusion, Forging, Rolling and Drawing.

Machine Tools and Machining Processes – Lathe Machines and Lathe operations, Milling machines, Types – Milling operations , Shaper, Planer, Drilling and Grinding machines.
Welding – Gas welding, Arc Welding, Soldering and Brazing

UNIT – V

Power Transmission – Transmission of Mechanical Power, Belt drives, Simple Numerical Problems, Gear Drives – Simple Numerical Problems

Basics of Automotive vehicle – Brakes – Types - Clutch and Differential

TEXT BOOKS:

1. Mathur, M.L., Mehta F.S. and Tiwari R.P., Elements of Mechanical Engineering, Jain Brothers, New Delhi, 2011.

2. Roy K.P. and HazraChowdary, S.K., Elements of Mechanical Engineering, Media Promoters and Publishers Pvt., Ltd, 2002.
3. Rudramoorthy R., Thermal Engineering, Tata McGrawHill Book Company, New Delhi, 2003.
4. HazraChowdary, S.K., and Bose, Workshop Technology ,Vol. I and II, Media Promoters and Publishers Pvt. Ltd., 2002.

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

1. Understand basics of thermodynamics and components of thermal plant
2. Identify engineering materials and their properties, manufacturing methods encountered in engineering practice.
3. Understand basics of heat transfer, refrigeration and internal combustion engines.
4. Understand mechanism of power transfer through belt, chain, rope and gear drives.
5. Understand functions and operations of machine tools including milling, grinding, and shaping machines.

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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								
CO2	2	2	2	1								
CO3	2	2	2	1								
CO4	2	2	2	1								
CO5	2	2	2	1								

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

Course Educational Objective (CEOs)

1. To learn various geological parameters.
2. Identification of minerals
3. Identification of rocks.
4. Identification of geologic structures

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.
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.

4. A Text Book of Engineering Geology - N.Chennakesavulu.
5. Engineering and general Geology by Parbin Singh
6. Engineering Geology by R.E.Goodman

Course Outcomes (COs)

After completion of the course the student will have:

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	2	1	1	1		1			1		2
CO2	1	2	1	2	1		1			1		2
CO3	1				1		1		1		2	1

CEPCP 307 SURVEYING LAB

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

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

Course Educational Objective (CEOs)

- To apply the possess knowledge about survey field techniques
- To apply the possess knowledge about traverse survey
- To determine distances, areas of polygons
- 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. Applying mathematics concepts in the field of surveying.
3. 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	2	2	1	1		1		1	1	2	
CO2	1	2	2	2	1		1		1		2	
CO3	1	2	2	2	1		1		2	2	2	

CEPCP 308 ENGINEERING GEOLOGY LAB

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

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

Course Educational Objective (CEOs)

1. To enable the student to learn various geological structures
2. To find the properties of minerals,
3. Identification of rocks
4. Field applications
5. To study geological maps

List of Experiments:

1. Description of the geological models.
2. Study of the Physical properties of Minerals.

   Mega-scopic identification of
   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
3. Study and Identification of the Rocks.

   Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc…

   Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotite schist, Marble, Khondalite, etc…
4. Structural Geology Problems
   a) Thickness Problems.
   b) Strike and Dip Problems
   c) Bore Hole or Three point problems.
5. Study of the Geological Maps.
6. Description of the geological modals.
7. Study of the Physical properties of Minerals.
8. Study and Identification of the Rocks.
9. Structural Geology Problems
   a) Thickness Problems.

b) Strike and Dip Problems
c) Bore Hole or Three point problems.

Course Outcomes (COs)

After completion of the course the student will :

1. The study and identification of minerals, rocks and structures with their utilization in civil engineering 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	2	1	1			1	2	1	

IV SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits
		Lecture	Tutorial	Practical	Total	
PAMCT 401	Constitution of India	3	-	-	3	-
MABST 402	Mathematics – IV	3	-	-	3	3
CEPCT 403	Fluid Mechanics and Hydraulic Machines	3	1	-	4	4
CEPCT 404	Structural Analysis	3	1	-	4	4
CEPCT 405	Environmental Engineering	3	-	-	3	3
CEPCT 406	Soil Mechanics	3	1	-	4	4
CEPCD 407	Computer aided Building Drawing	-	-	4	4	2
CEPCP 408	Fluid Mechanics and Hydraulic Machines Lab	-	-	2	2	1
CEESP 409	Materials Testing Lab	-	-	2	2	1
Total		18	3	8	29	22

PAMCT 401 CONSTITUTION OF INDIA

Instruction Hours/Week : 3(L) **Credits : -**
Sessional Marks : 100 **End Semester Examinations Marks : -**

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: 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 of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics

4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

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

Course Outcomes: At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

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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			
CO5						2			2			

MABST 402 Mathematics - IV

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 1: 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 2: 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 3: 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 4: 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 5: 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			2			
CO2						2			2			
CO3						2			2			
CO4						2			2			

CEPCT 403 FLUID MECHANICS AND HYDRAULIC MACHINES

Instruction Hours/Week : 3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks: 60

Course Educational Objective (CEOs)

1. To understand the significance of fluid properties
2. To understand the principles of pressure measuring devices and computation of Hydrostatic forces.
3. To understand the basic principles of fluid flow
4. To learn the measurement of flow through pipes, channels and from tanks
5. To learn laminar and turbulent characteristics of pipe flows
6. To study the characteristics of pumps and turbines

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.

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 – Euler's equation of motion along a streamline – Bernoulli's equation – Applications of Bernoulli's Equation – Free jets and vortex flows - Linear momentum equation - Impacts of jets on free and fixed moving vanes – Moment of momentum equation – Torque on Sprinklers.

UNIT III

DIMENSIONAL ANALYSIS AND SIMILITUDE

Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Buckingham's Pi method. Dimensionless groups, Similitude, Types of models, model studies.

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 – Work done – 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 have:

1. Able to solve fluid flow problems using fundamental principles
2. Able to compute hydrostatic forces on plane and curved surfaces
3. Able to measure pressure, velocity and discharge
4. Able to perform model analysis
5. Able to analyze the flow problems in laminar and turbulent flow conditions
6. Able to analyze the characteristics of pumps and turbines

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
CO6	2	2	2	2	2		1			2	2	2

CEPCT 404 STRUCTURAL ANALYSIS

Instruction Hours/Week : 3(L)+1(T) Credits : 4
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	1	2				1	1	1	2
CO4	2	1	1	1	2				1	1	1	2
CO5	2	1	1	1	2				1	1	1	2
CO6	2	1	1	1	2				1	1	1	2

CEPCT 405 ENVIRONMENTAL ENGINEERING

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

Course Educational Objective (CEOs)

1.To estimate the water demand and learn about various sources of water.
2. To study the water quality characteristics and types of conduits used for carrying of water
3. To design the water treatment plant units
4.To estimate the wastewater quantity and study the various types of sewers
5.To design the wastewater treatment plant units

UNIT – I

INTRODUCTION TO WATER SUPPLY ENGINEERING

Need for protected water supplies; objectives of water supply systems; Role of Environmental Engineers.

QUANTITY OF WATER

Design period; Prediction of population; Types of water demand; Per capita consumption; Factors affecting per capita consumption; Fire demand; Fluctuations in demand.

SOURCES & INTAKE WORKS:

Classification of sources of water supply; choice of source; Suitability with regard to quality and quantity; Lake, river, reservoir and Canal intakes

UNIT – II

TRANSPORTATION AND PUMPING OF WATER:

Types of conduits; Capacity and design; Materials for pipes; Leakages; Types of pumps; Efficiency and choice of pumps.

QUALITY OF WATER:

Physical, Chemical and Bacteriological characteristics of water; Standards for drinking water; Water borne diseases.

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.

FILTRATION AND DISINFECTION

Theory of Filtration ; Different types of filters and their design. Disinfection; Types of Disinfectants; Mechanism of disinfection; Types of Chlorination-Break point chlorination

UNIT – III

WASTEWATER COLLECTION:

Sanitation ; systems of sanitation, water carriage system, sewerage; systems of sewerage; sources of wastewater ; Estimation of quantity of municipal wastewater ; Estimation of quantity of storm water ; Different types of sewers; design flows through sanitary sewers, storm sewers and combined sewers. Hydraulic design of sewers ; Sewer appurtenances , House drainage and Plumbing systems.

UNIT –IV

CHARACTERISTICS OF DOMESTIC WASTEWATER:

Characteristics of sewage - Physical, chemical and biological. BOD equation and factors affecting the BOD rate of reaction, population equivalent.

PRELIMINARY AND PRIMARY SEWAGE TREATMENT:

Concept of wastewater treatment; primary, secondary and tertiary treatment; Conventional treatment process flow diagrams of municipal wastewater treatment plants; Functions of each unit and design of screens, grit chamber, and primary settling tanks.

UNIT-V

SECONDARY TREATMENT OF SEWAGE:

Principles of biological treatment; nutritional requirement of biological treatment system; factors affecting biological treatment systems Design, construction, operation and maintenance of activated sludge process, oxidation ditch trickling filters and waste stabilization ponds.

Course Outcomes

1. Able to estimate the water demand and classify the various sources of water.

2. Able to explain the water quality characteristics and types of conduits used for carrying of water

3. Able to design the water treatment plant units

4. Able to estimate the wastewater quantity and classify the various types of sewers

5. Able to design the wastewater treatment plant units

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.
5. Sewage Disposal and Air Pollution Engineering, by S.K.Garg

REFERENCE BOOKS :

1. Wastewater Engineering, Treatment, Disposal, and Reuse by Metcalf and Eddy.

CO-PO Mapping

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

CEPCT 406 SOIL MECHANICS

Instruction Hours/Week : 3(L)+1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives:

The objective 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:

Introduction:

Types of soils - formation and deposition - moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity. *Soil as 3−Phase system* **,** Relationship between various soil parameters. Determination of Moisture content, Specific gravity and Unit weight using various methods ,Dry Sieve Analysis , Sedimentation Analysis and Density Index.

UNIT II

Identification and Classification of Soils: Tests for field identification of soils, Consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow

& toughness indices. Determination of liquid limit, plastic limit and shrinkage limit. soil classification based on particle size , texture , Unified and Indian standard method.

UNIT III

Permeability and Seepage

Soil Water: Mode, Occurrence and types of soil water

Permeability: Darcy's law- coefficient of permeability: determination by constant-head and falling-head methods. Permeability of stratified soils - factors affecting Permeability

Seepage Analysis- stream and potential functions - flow nets, graphical method to plot flow nets.

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 Triaxial compression tests - Shear strength parameters - Shear strength of cohesive and cohesionless soils - Test conditions - Stress Paths

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 various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine compaction characteristics of soils.
- Calculate consolidation time and settlement of soils.
- 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

CEPCD 407 COMPUTER AIDED BUILDING DRAWING

Instruction Hours/Week : 4(D) Credits : 2
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 & 3D drawings
3) Communicate a design idea/concept graphically/ visually
4) Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.
5) Get a Detailed study of an engineering artifact

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 DRAWING: Terms, 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. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity

UNIT- V

PICTORIAL VIEW: Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modelling (BIM)

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

List of Drawing Experiments:

1. Buildings with load bearing walls including details of doors and windows.
2. Taking standard drawings of a typical two storeyed building including all MEP, joinery, rebars, finishing and other details and writing out a description of the Facility in about 500 -700 words.
3. RCC framed structures
4. Reinforcement drawings for typical slabs, beams, columns and spread footings.
5. Industrial buildings – North light roof structures – Trusses
6. Perspective view of one and two storey buildings.

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 software's.
- Develop engineering project drawings incorporating details and design parameters in 2D & 3D.
- Examine efficacy of CAD design.

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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

CEPCP 408 FLUID MECHANICS AND HYDRAULIC MACHINES LAB

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

Course Educational Objective (CEOs)

1. To conduct experiments on measuring devices
2. To conduct experiments on Turbines and Pumps

LIST OF EXPERIMENTS

1. Calibration of Small Orifice
2. Calibration of Venturimeter
3. Calibration of Orifice meter
4. Calibration of Bend meter
5. Calibration of Triangular Notch
6. Measurement of Viscosity
7. Verification of Bernoulli's Theorem
8. Flow visualization
9. Characteristic curves of pumps
10. Characteristic curves of turbines

Course Outcomes (COs)

After completion of the course the student will have:

- Able to determine types of flow
- Able to calibrate the flow measuring devices
- Able to draw performance characteristic curves

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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

CEESP 409 MATERIAL TESTING LAB

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

Course Educational Objective (CEOs)

The experimental work involved in the laboratory should make the student understand the fundamental modes of loading of the structures and to determine mechanical properties of materials.

Course objectives:

1) Impart on experimental determination and evaluation of mechanical characteristics and advanced behavior of metallic and non-metallic structural materials.
2) Demonstrate the deformation and fracture behavior of structural materials.
3) Teach experimental procedures and common measurement instruments, equipment, devices.
4) Handling and testing the structural components behaviour by adopting Non destructive techniques
5) Throw light on variety of established material testing procedures and techniques

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. acquire the knowledge and behavior in finding the properties of different materials.

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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	2	

V SEMESTER

CEPCT 501	Hydraulic Engineering	3	1	-	4	4
CEPET 502	Advanced Environmental Engineering	3	-	-	4	4
CEPCT 503	Foundation Engineering	3	-	-	3	3
CEPET 504	Remote Sensing and GIS	3	-	-	3	3
CEPCT 505	Reinforced Concrete Design	3	1	-	3	3
CEPCT 506	Design of Steel Structures	3	-	-	3	3
CEPCP 507	Hydraulic Engineering Lab	-	-	2	2	1
CEPCP 508	Soil Mechanics Lab	-	-	3	3	1.5
	Open Elective - MOOCS	Period of Study during V Semester. Performance reflected in VII Semester				
	TOTAL	18	2	5	25	22.5

CEPCT 501 HYDRAULIC ENGINEERING

Instruction Hours/Week : 3(L) +1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

COURSE EDUCATIONAL OBJECTIVES (CEOs)

.1. To understand boundary layer concept, its separation and control
2. To learn the characteristics of flow through pipes
3. To understand the basic concepts of open channel flows
4. To learn uniform flow characteristic in channels
5. To understand the principles of gradually varied flows and rapidly varied flows.

UNIT I

BOUNDARY LAYER THEORY: Boundary layer concepts- Thickness of Boundary Layer – Boundary Layer Along a Long Thin flat Plate and its Characteristics –Laminar Boundary Layer – Turbulent Boundary Layer – Laminar Sublayer – Separation of Boundary Layer – Methods of Controlling the Boundary Layer

FLOW AROUND SUBMERGED BODIES
Types of Drag –Drag on a Sphere, Cylinder and Airfoil – Development of Lift on Immersed Bodies.

UNIT II

FLOW THROUGH PIPES: Loss- Major loss, Darcy-Weisbach equation, minor losses, total energy line, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, siphon, branching of pipes – Pipe networks – Hardy- cross method.

UNIT III

INTRODUCTION TO OPEN CHANNEL FLOW-Section between open channel flow and pipe flow, geometric parameters of a channel, classification of open channels, classification of open channel flow, Velocity and pressure distribution of a channel section.

UNIFORM FLOW- Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient. Most economical section of a channel. Computation of Uniform flow, Normal depth.

UNIT IV
SPECIFIC ENERGY AND SPECIFIC FORCE CONCEPTS
Specific energy, Specific energy curve, critical flow, discharge curve Specific force , Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats.

UNIT V
GRADUALLY VARIED FLOWS Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profiles, Characteristics of surface profiles. Computation of water surface profile by graphical, Direct and standard step methods.

RAPIDLY VARIED FLOWS- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

Text/Reference Books:

1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House
2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
3. Open channel Flow, K. Subramanya, Tata McGraw Hill.
4. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.
5. Burnside, C.D., "Electromagnetic Distance Measurement," Beekman Publishers, 1971.

COURSE OUTCOMES (COs)
After completing the course, the student will be able to,

1. Able to find out drag and lift forces on submerged bodies
2. Able to analyze flow through pipes
3. Able to determine the economical sections
4. Able to classify the GVF profiles, RVF profiles and their characteristics

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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					2	2	2
CO2	2	2	2	2	1					2	2	2
CO3	2	2	2	2	1					2	2	2
CO4	2	2	2	2	1					2	2	2

CEPET 502 ADVANCED ENVIRONMENTAL ENGINEERING

Course Educational Objective (CEOs)

1.To study the characteristics of sludge and different methods of tertiary treatment of wastewater.

2. To understand the different methods of disposal of wastewater.

3. To study the different types of air pollutants, its effects and controlling measures.

4.To know the causes, effects and controlling measures of noise pollution

5.To study the concept of Municipal Solid Waste Management.

UNIT I

SLUDGE MANAGEMENT IN WASTEWATER TREAMENT: Quantity and characteristics; and types of sludges; sludge conditioning and dewatering; handling, treatment, sludge utilization and disposal.

TERITIARY TREATMENT FOR WASTEWATER: Tertiary treatment ; Removal of nitrogen, phosphorus, heavy metals, suspended solids and pathogenic bacteria.

UNIT II

EFFLUENT DISPOSAL Standards for disposal ; disposal into surface water bodies ; Self purification, zones of pollution. Dissolved oxygen sag curve; Streeter - Phelps equation; Marine disposal ; On land disposal and treatment systems - overflow, flooding and irrigation.

ONSITE DISPOSAL SYSTEM: Septic tank and effluent disposal system.

UNIT III

AIR POLLUTION :

Types of pollutants; their sources and impacts; air pollution meteorology; air pollution control; air quality standards and limits.

UNIT - IV

NOISE POLLUTION Impacts of noise; permissible limits of noise pollution; Measurement of noise and control of noise pollution.

UNIT-V

MUNICIPAL SOLIDWASTES: Characteristics; generation; collection and transportation of solid waste; Engineered systems for solid waste management (reuse/recycle ,energy recovery, treatment and disposal).

Course Outcomes (COs)

1. Able to characterize sludge and explain about different types of tertiary treatment of wastewater.

2. Able to explain about different methods of disposal of wastewater.

3. Able to explain about different types of air pollutants, its effects and controlling measures.

4. Able to apply measures for noise pollution

5. Able to manage Municipal Solid Waste.

TEXT BOOKS :

1. Sewage Disposal and Air Pollution Engineering, by S.K.Garg.

2. Environmental Engineering by H.S.Peavy et al.

3. Water Supply and Sewerage, by E.W.Steel and Mc.Ghee.

4. Air pollution and its Control by C.S.Rao

REFERENCE BOOKS :

1. Wastewater Engineering, Treatment, Disposal, and Reuse by Metcalf and Eddy.

2. Techobanglous, G.Theisen, H. and Ehasin, R.(1996). Solid waste engineering principlesandManagement Issues – McGraw Hill, Tokyo.

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												
CO3	2	2	2					2	1		1	1
CO4												1
CO5	2	2	2					2	1		1	1

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

ONE COURSE FROM AMONG THE PROGRAMME ELECTIVE COURSES TO BE STUDIED.

CEPCT 503 FOUNDATION ENGINEERING

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

Course Objectives:

The objective of this course is:

1) To explain Shear strength of soils and determination methods
2) To teach slope stability analysis and assessment of earth pressures.
3) To impart knowledge on bearing capacity and settlement of shallow foundations.
4) To throw light on soil exploration and. methods of soil improvement.

UNIT – I

Stability of Slopes: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.

UNIT – II

Earth Pressure Theories: Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

Earth Retaining Structures: Types of Retaining Structures - Stability Considerations of Gravity and Cantilever Retaining Walls

UNIT – III

Compaction of Soils: Compaction of Soil - theory of compaction - compaction of cohesive and Cohesionless soils, Determination of optimum moisture content - maximum dry density.

Effective Stress in Soils: Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table. Surcharge, Capillary action, seepage pressure, quick sand condition. Stresses in soils - due to point load, line load, strip load, uniformly loaded circular, rectangular loaded area. Influence factors, Isobars, Boussinesq's equation, Newmark's Influence Chart, Pressure bulb concept.

UNIT-IV

Bearing Capacity and Shallow Foundations – Determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory – settlements - IS Methods.

UNIT -V

Deep Foundations: **Pile Foundations**– Types of piles – Load carrying capacity based on static and dynamic formulae- Pile load tests - pile groups in sands and clays- Negative skin friction.

Well Foundations: Types – Different shapes – Components of well foundation – forces acting on well foundations - Design Criteria – Determination of staining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. C. Venkataramiah, Geotechnical Engineering, New age International Pvt . Ltd, (2002).
2. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics".

REFERENCES:

1. Braja M. Das Principles of Geotechnical Engineering, Cengage Learning
2. Purushtoma Raj, Soil Mechanics and Foundation Engineering, Pearson Publications
3. Bowles, J.E., Foundation Analysis and Design (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.

Course Outcomes:

Upon the successful completion of this course:

The student will be able to:

- Assess stability of slopes and Earth Pressures.
- Determine safe bearing capacity and settlement of shallow foundations.
- Calculate load carrying capacity of piles.
- Determine the well staining thickness
- 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	2	1	1	1	2	1	2	2	1
CO3	2	1	2	2	2	1	2	1	1	1	2	1
CO4	2	2	2	2	2	1	1	2	1	1	2	1

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CEPET 504 REMOTE SENSING AND GIS

Course Objectives:

1) Introduce the basic principles of Remote Sensing and GIS techniques.
2) teach various types of satellite sensors and platforms
3) impart concepts of visual and digital image analyses
4) teach concepts of principles of spatial analysis
5) teach application of RS and GIS to Civil engineering

UNIT – I

Introduction to photogrammetry:

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

Remote sensing:

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

UNIT – III

Geographic information system:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS spatial analysis:

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

UNIT – V

Water resources applications:

Land use/Land cover in water resources, Surface water mapping and inventory –Watershed management for sustainable development and Watershed characteristics – Reservoir sedimentation, Fluvial Geomorphology – Ground Water Targeting, Identification of sites for

artificial Recharge structures – Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1. B. Bhatta, Remote Sensing and GIS by Oxford University Press, New Delhi.
2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication.

REFERENCES:

1. George Joseph, Fundamentals of remote sensing, Universities press, Hyderabad.
2. C. P. Lo Albert, K.W. Yonng, Concepts & Techniques of GIS, Prentice Hall (India) Publications.
3. M. Anji Reddy Remote sensing and GIS, B. S. Publications, New Delhi.
4. L. R. A. Narayana, Remote Sensing and its applications, University Press 1999.

Course outcomes

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

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

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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
CO2	2	2		1	1						1	2
CO3	2	1		2	1							1
CO4	2	2		1	1						1	2
CO5	2	1		2	1							1

ONE COURSE FROM AMONG THE PROGRAMME ELECTIVE COURSES TO BE STUDIED.

CEPCT 505 REINFORCED CONCRETE DESIGN

Instruction Hours/Week : 3(L)+1 (T) Credits : 4

Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To understand the general mechanical behavior of reinforced concrete members.
2. Ability to analyze and design reinforced concrete flexural members and compression members.
3. To help the student develop an intuitive feeling about structural & material vise behavior and design of RC systems & elements.

4. To teach concepts of working stress and limit state methods.
5. To impart design procedure of RC elements in flexure, shear and torsion.
6. To teach design procedure for short and long RC columns.
7. To explain design procedure of RC footings
8. To demonstrate design of RC slab

UNIT – I

INTRODUCTION

Introduction:

Concepts of Reinforced concrete Design – Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456 – 2000. **Beams:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

DESIGN FOR FLEXURE – WORKING STRESS METHOD

Assumptions, permissible stresses in concrete and steel, balanced design, transformed area method, analysis and design for flexure of singly and doubly reinforced and flanged sections.

LIMIT STATE METHOD

UNIT – II

DESIGN PRINCIPLES: Basic Design Principles - Stress strain curves for concrete and steel - Characteristic strengths and loads - Partial safety factors - Stress block - Various limit states.
DESIGN FOR FLEXURE: Limit state of collapse in flexure - Ultimate flexural strength - Balanced, under-reinforced and over-reinforced sections - Design of singly and doubly reinforced rectangular beams - Design of flanged beams.

UNIT - III

DESIGN FOR SHEAR, TORSION AND BOND: Shear-Truss analogy - Design of beams for shear and torsion - Anchorage and development length.

LIMIT STATES OF SERVICEABILITY: Deflection (short and long term) - Cracking.

UNIT – IV

DESIGN OF SLABS, STAIR CASES AND BEAMS:
Design of one way and two way slabs - Design of stair cases - Design of continuous beams and slabs.

UNIT – V

DESIGN OF COMPRESSION MEMBERS: Columns - Reduction factors - Axially loaded - Eccentrically loaded columns - Uniaxial moment - Biaxial moment (for practice only and not for University Examination).

DESIGN OF FOUNDATIONS: Types of footings - Design of wall footings and isolated, pad stepped and sloped footings - Square, rectangular subjected to axial load.

TEXT BOOKS:

1) Reinforced Concrete by Limit State Design by AK Jain.

2) Reinforced Concrete Design by SN Sinha.
3) LSD of Reinforced Concrete Structures by Ramachandra.
4) Reinforced Concrete Design by Unni Krishna Pillai and Devdas Menon.
5) Reinforced Concrete Design by P.C. Varghese.

I S CODE OF PRACTICE

IS 456- 2000 Code of practice for Reinforced Concrete Structures.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.

2. Reinforcement detailing of continuous beams.

3. Reinforcement particulars of columns and footings.

4. Detailing of One way, Two way and continuous slabs

Course Outcome:

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

1. Understand the basic concepts of working stress and limit state design methods
2. Design various RC elements like beams, columns, footings and slabs.
3. Apply design concepts to complex structural systems in advanced courses.

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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	
CO2	2	2		1	1				1	1	1	1
CO3	2	2					1		1	1	1	

CEPCT 506 DESIGN OF STEEL STRUCTURES

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

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

Course Objectives

1) To teach different types of Connections and relevant IS code provision.
2) To impart with design procedures of beams and columns.
3) To enable Design of truss elements
4) To enable design of column bases
5) To teach design and Plate and Gantry Girders with curtailment of flanges.

UNIT -I:

Connections:

Bolted connections – Bolt value, Welded connections: Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Design stresses – IS Code requirements. Design of fillet weld subjected to in plane and out of plane.

UNIT -II:

Beams:

Design of simple and compound beams-Curtailment of flange plates - IS Code-provision - Beam - to - beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

UNIT -III:

Tension Members and Compression members:

Design of members in direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members.

UNIT -IV:

Design of built-up columns and column bases:

Built-up columns with lacing and/or battening system. Design of Eccentrically loaded columns, Splicing of columns.

Design of Column bases: slab base and gusseted base under axial load and moment.

UNIT -V:

Plate Girders:

Design of plate girder – IS code Provisions – Welded – Curtailment of flange plates, stiffeners – splicing and connections.

The students should prepare the following plates.

- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flanges
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing

TEXT BOOKS

1. N. Subramanian, Steel Structures Design and Practice, Oxford University Press.
2. S. K. Duggal, Design of steel structures, Tata Mc Graw Hill, New Delhi.

REFERENCES

1. Sarwar Alam Raz, Structural Design in Steel, New Age International Publishers, New Delhi
2. M. Raghupathi, Design of Steel Structures, Tata Mc. Graw-Hill.
3. N. Krishna Raju; Structural Design and Drawing, University Press.

I S Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.

2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.

3) Steel Tables.

Course Outcomes:

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

a. Explain relevant IS codes
b. Analysis and design of flexural members and detailing
c. Design compression members of different types with connection detailing
d. Design Plate Girder and Gantry Girder with connection detailing

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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
CO2	2	2	1			1		1		1		1
CO3	1	1	2		1	1		2		1		
CO4	1	1	2		1	1		2		1		

CEPCP 507 HYDRAULIC ENGINEERING LAB

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

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

Course Educational Objective (CEOs)

1. To conduct experiments on pipe and open channel flows

LIST OF EXPERIMENTS

1 Determination of Friction factor of the pipe material

2 Determination of Head Loss coefficient due to Sudden contraction

3 Determination of Head loss coefficient due to Gate valve in a pipe line

4 Determination of Head Loss coefficient due to Bend in a pipe line

5 Velocity Distribution coefficients in Open channel flows

6 Gradually Varied Flow profile computations on a horizontal and rectangular channels

7 Characteristics of Hydraulic Jump.

Course Outcomes (COs)

After completion of the course the student will

1 Able to compute losses in pipe flow

2 Able to determine characteristics of gradually varied flow and hydraulic jump

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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	1	2
CO2	2	2	2	2		2				1	1	2

CEPCP 508 SOIL MECHANICS LABORATORY

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

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

Course Educational Objective (CEOs)

The objective 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.

LIST OF EXPERIMENTS

1. Specific gravity
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests

7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

Course Outcomes:

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

- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various 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		
CO2	2	2	1		1			1		1		
CO3	2	1	1							1		

AN OPEN ELECTIVE – MOOCS COURSE IS TO BE STUDIED.

VI SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits
		Lecture	Tutorial	Practical	Total	
CEPCT 601	Hydrology and Water Resources Engineering	2	1	-	3	3
CEPCT 602	Transportation Engineering	3	-	-	3	3
CEOET 603	Open Elective – I	3	-	-	3	3
CEPET 604	Programme Elective – III	3	-	-	3	3
CEPCP 606	Environmental Engineering Lab	-	-	2	2	1
CEPCP 607	Transportation Engineering Lab	-	-	2	2	1
MGHST	Management(Organizational	2	1	-	3	3

608	Behaviour)					
Total		13	2	4	19	17

CEPCT 601 HYDROLOGY & WATER RESOURCES ENGINEERING

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

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

Course Educational Objective (CEOs)

1. To understand the phases of hydrologic cycle
2. To learn the measurement of evaporation and infiltrations
3. To understand the concept of unit hydrograph
4. To learn determination of flood and methods of flood routing
5. To learn irrigation requirements of crops and design of canals

UNIT I

Introduction - hydrologic cycle, water-budget equation, applications in engineering, sources of data.
Precipitation - forms of precipitation, types of precipitation, measurement of precipitation, rain gauge network, mean precipitation over an area, classification of rainfall- estimation of missing rainfall data- depth-area-duration relationships, maximum intensity-duration-frequency relationship, Probable Maximum Precipitation (PMP).

UNIT II
Abstractions From Precipitation - evaporation process, evaporimeters, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, potential evapotranspiration equations, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, infiltration indices.

UNIT III
Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph- Derivation of unit hydrograph of different durations - Distribution graph
Ground Water - saturated formations, aquifer properties, geologic formations, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests. Open wells – yield – recuperation test.

UNIT IV
FLOODS:

Importance of flood studies - Methods of estimating flood peak - Empirical formulae - Rational method - Components of a Hydrograph - Base flow separation - Unit hydrograph - Derivation of unit hydrograph of different durations - Distribution graph - Gumbles method of flood frequency analysis.

FLOOD ROUTING: Basic equation - Types - Routing by Puls and Muskingum methods

UNIT V

IRRIGATION- Water requirement of crops-Crops and crop seasons, cropping pattern, duty and delta; Quality of irrigation water; Soil-water relationships, root zone soil water, consumptive use, irrigation requirement, frequency of irrigation; Methods of irrigation: surface, sub-surface, sprinkler and trickle / drip irrigation.

CANALS: Design of non-erodible channels- methods of economic section and permissible velocity- design of erodible channels-Regime approach-Kennedy's silt theory and Lacey's regime theory.

Course outcomes (Cos)

1. Able to calculate to mean precipitation
2. Able to prepare DAD and IDF curves
3. Able to develop flood hydrograph
4. able to compute flood magnitude and route of floods through reservoir and strems
5. Able to compute yield of well
6. To determine the irrigation water requirement and design of irrigation canals

Text/Reference Books:

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc-Graw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.

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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		2	1	2
CO2	2	2	2	2	1			1		2	1	2
CO3	2	2	2	2	1			1		2	1	2
CO4	2	2	2	2	1			1		2	1	2
CO5	2	2	2	2	1			1		2	1	2
CO6	2	2	2	2	1			1		2	1	2

CEPCT 602 TRANSPORTATION ENGINEERING

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

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

COURSE EDUCATIONAL OBJECTIVES (CEOs)

1. Identify the requirements of highways and apply the knowledge for planning highway alignment.
2. Estimate the geometrics for highways
3. Select appropriate highway materials and design the various highway pavements.
4. Estimate the traffic requirements from traffic studies.
5. Understand the various components of Railways, Airports and Docks and Harbors.

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway Development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys

UNIT – II

HIGHWAY GEOMETIC DESIGN:

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

UNIT - III

PAVEMENT DESIGN: Aggregates and bitumen - desirable properties, tests - Aggregate bitumen mixes - Design by Marshall method., Pavement Types, components and their functions, design factors, flexible pavement design - IRC methods based on CBR only. Rigid pavement design - Calculation of stresses, design of joints, dowel bars, tie bars, thickness of pavement by IRC procedure.

UNIT – IV

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams--Road Traffic Signs – Types and Specifications – Road markings- -Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method-Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections and Grade Separated Intersections - Channelization: Objectives –Traffic Islands and Design criteria- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

INTRODUCTION TO RAILWAY, AIRPORT AND HARBOUR ENGINEERING:

Site selection – Engineering Surveys- Permanent way components – Cross Section of Permanent Way - Points &Crossings -Turn outs- Stations and Yards.

Factors affecting selection of site for Airport – Airport layout and terminal area -Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram – Runway Lighting system.

Harbours - Types of harbours, site selection- ports, classification of ports – docks - break water, types of breakwaters, quays, jetties, wharves, dolphins, fender systems, aprons, transit sheds and ware houses, dredging.

COURSE OUTCOMES (COs)

1. Estimate the requirements and design highway pavements.
2. Apprehend different components of Railways, Airports and Harbours.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
3. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.
4. Docks and Harbour Engineering - S.P.Bindra.

REFERENCES:

1. Highway Engineering – S.P.Bindra , Dhanpat Rai & Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Railway Engineering – August – Prabha & Co., 15th Edition – 1994.
4. Docks and Harbour Engineering - R.Srinivasan.

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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			1	
CO2	1	1				2					2	2

CEOET 603 CONCRETE TECHNOLOGY

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

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

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.

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.

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
CO5	2		2	1					1		1	2

CEPET 604 ADVANCED FOUNDATION ENGINEERING

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

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

ONE COURSE FROM AMONG THE PROGRAMME ELECTIVE COURSES TO BE STUDIED.

Course Objectives:

The objective of this course is:

5) To throw light on Soil exploration methods.
6) To teach. methods of soil improvement for Shallow Foundation.
7) To impart knowledge on braced cuts and components design.
8) To explain the concept of Sheet Pile Walls.
9) To enable students to design suitable foundations in expansive soils.

UNIT I

Soil Exploration: Methods of soil exploration – Boring and Sampling methods – Penetration Tests – Pressure meter – Programme planning and preparation of soil investigation report.

UNIT II

Isolated Footings − Classification and purpose, Contact pressure under footings, proportioning of Isolated footings.

Strap & Combined Footings: Need of Strap & Combined Footings-Types of Combined Footings-Proportioning of Rectangular & Trapezoidal Combined Footings -Strap Footing

UNIT III

Braced Excavations: Braced cut **-** Apparent pressure diagrams for cuts in both sands and clays - Types of bracing systems - Design of various components of bracing - Bottom heave of cuts in soft clays - Piping failure of cuts in sands

UNIT IV

Sheet Pile Walls: Types of sheet pile walls – Free cantilever sheet pile – Cantilever sheet pile in Cohesionless soils – Cantilever sheet pile in cohesive soils. Anchored sheet pile wall with free earth support method – Rowe's moment reduction curves – Anchored sheet pile with fixed earth support method – Design of Anchors.

UNIT V

Foundations on Expansive Soils: Expansive soils, parameters of expansive soils, classification of expansive soils, preventive measures for expansive soil, design of foundation in swelling soils−drilled piers, belled drilled pier, undreamed piles, construction of under reamed piles,

TEXT BOOKS:

3. V.N.S.Murthy, " Advanced Foundation Engineering", CBS Publishers.
4. Gopal Ranjan & A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age Publishers

REFERENCES:

4. Braja M. Das, "Principles of Geotechnical Engineering", Cengage Learning.
5. Purushtoma Raj, " Ground Improvement Techniques " .Pearson Publications
6. Bowles, J.E., Foundation Analysis and Design (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.

Course Outcomes (Cos) Upon the successful completion of this course:

The student will be able to:

- Choose appropriate soil exploration method
- Suggest suitable ground improvement methods.
- Design bracing systems and Sheet pile walls
- Design suitable foundations on expansive 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	2			1		1	1	
CO2	2	2	2	1	2			1		1		
CO3	2	2	2	1	1			2		1		
CO4	2	2	1	1	2			1		1	1	

CEPCP 606 ENVIRONMENTAL ENGINEERING LAB

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

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

Course Educational Objective (CEOs)

1 To be aware of water quality analysis
2 To be aware of wastewater analysis
3 To be aware of how to interpret the results

Water Analysis

1. (a) Determination of Color.
   (b) Determination of Taste and Temperature
2. Determination of (a) Total Suspended and Dissolved Solids.
   (b) Organic and Inorganic Solids.
3. (a) Determination of pH and Electrical Conductivity.
   (b) Determination of Turbidity.
4. (a) Determination of Acidity.
   (b) Determination of Alkalinity.
5. Determination of Hardness and sulphates
6. Determination of Chlorides.
7. (a) Determination of Dissolved Oxygen.
   (b) Determination of Residual Chlorine.

8. (a) Determination of Optimum Coagulant Dose.
   (b) Demonstration of determination of MPN Index of water.

Waste water Analysis

9. Determination of Settle able Solids.
10. Determination of Nitrates
11. Determination of Phosphates
12. Determination of BOD of sewage water
13. Determination of COD of sewage water

Course Outcomes (COs)

After completion of the course the student will :

1. Able to Perform common environmental experiments relating to water quality and wastewater characteristics
2. Able to Statistically analyze and interpret laboratory results
3. Demonstrate good written and oral communication skills

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CO-PO Mapping

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

CEPCP 607 TRANSPORTATION ENGINEERING LAB

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

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

Course Educational Objective (CEOs)

1. To enable to study different highway construction materials.
2. To facilitate students to perform different tests on highway construction materials.

CYCLE – I

1. Specific Gravity and Water Absorption Test.
2. Aggregate Impact Test
3. Elongation Index Test
4. Flakiness Index Test
5. Angularity Test

6. Los Angles Abrasion Test
7. Aggregate Crushing Test
8. Stripping Value of Aggregate

CYCLE – II

1. Flash & Fire Point Test
2. Softening point Test
3. Specific Gravity of Bitumen
4. Penetration Test on Bitumen
5. Ductility Test

Course Outcomes (COs)

After completion of the course the student will have:

1. Able to perform various tests for selection of various materials used in highway construction

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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		

MGHST 608 MANAGEMENT (ORGANIZATIONAL BEHAVOIUR)

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

Course Educational Objective (CEOs)

1. Understand the Nature of Management;

2. Identify and Describe the Functions of Management;

3. Understand the Social Responsibilities of Business; and

4. Appreciate the Interests of Various Stakeholders in the Business.

Unit – I

Role of Management – Concept – Significance – Functions – principles of Management - Patterns of Management: Scientific – Behavioral – Systems – Contingency. Decision Making & Controlling – Process – Techniques. Planning – Process – Problems –– Making It Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective. Nature of Management - Social Responsibili Ties of Business -

Manager and Environment Levels in Management - Managerial Skills - Planning - Steps in Planning Process - Scope and Limitations - Short Range and Long Range Planning - Flexibility in Planning ¬Characteristics of asound Plan - Management by Objectives (MBO) - Policies and Strategies - Scope and Formulation - Decision Making - Techniques and Processes.

Unit-II

Organising - Organisation Structure and Design – Authority and Responsibility Relationships - Delegation of Authority and Decentralisation - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organisation-al design - Mechanistic vs Adoptive Structures - Formal and Informal Organisation.

Organizational Behavior – Introduction to OB – Organizing Process – Departmentation Types – Making Organizing Effective - Understanding Individual Behavior – Perception – Learning – Personality Types – Johor window- Transactional Analysis.

Unit – III

Perception and Learning - Personality and Individual Differences - Motivation and Job Performance - Values, Attitudes and Beliefs – Stress Management - Communication Types-Process - Barriers – Making Communication Effective.

Unit – IV

Group Dynamics - Leadership - Styles - Approaches - Power and Politics - Organisational Structure - Organisational Climate and Culture - Organisational Change and Development.

Group Dynamics & Motivation – Benefits of Groups – Types of Groups – Group Formation and Development, Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David Mc Clelland, and Porter and Lawler.

Unit – V

Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of good Leader, Change Management – Conflict Management Comparative Management Styles and approaches – Japanese Management Practices Organisational Creativity and Innovation - Management of Innovation - Entrepreneurial Management – Benchmarking - Best Management Practices across the world - Select cases of Domestic & International Corporations - Management of Diversity.

Reference Books:

1. Organizational Behavior, Stephen P. Robbins, Pearson Education.
2. Organizational Behaviour, S.S.Khanka, S.Chand
3. Organizational Behavior , Mishra .M.N ,Vikas
4. Management and Organizational behavior, Pierce Gardner, Cengage.
5. Principles of Management, Koonz, Weihrich and Aryasri, Tata McGraw Hill.
6. Management and Organizational Behaviour, Subbarao P, Himalaya Publishing House.
7. Organizational Behaviour, Sarma, Jaico Publications.
8. Principles of Management, Murugesan, Laxmi Publications.

Course Outcomes (COs)

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

1. Understand the Nature of Management;
2. Identify and Describe the Functions of Management;
3. Understand the Social Responsibilities of Business; and
4. Appreciate the Interests of Various Stakeholders in the Business.

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CO-PO Mapping

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

VII SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits
		Lecture	Tutorial	Practical	Total	
CEPCT 701	Estimation & Costing	3	-	-	3	3
CEOET 702(a)	Watershed Management	3	-	-	3	3
CEOET 702(b)	Environment Impact Assessment					
CEHST 704	Professional Practice, Law & Ethics	3	1	-	4	4
CEPCI 705	Industry Internship	-	-	6	6	3
CEPCX 706	Project Work - Phase I	-	-	6	6	3
CEOET 707	Open Elective - MOOCS	-	-	-	-	3
Total		9	1	12	22	19

CEPCT701 ESTIMATION & COSTING

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

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

Course Educational Objective (CEOs)

1) To impart basic knowledge on different types of estimation
2) To enrich with specifications and tender procedures.
3) To give insights on various types of contract agreements.
4) To inculcate data preparation for abstract estimation
5) To teach procedure for valuation of buildings.

UNIT - I

General items of work in building - Standard units - Principles of working out quantities for detailed and abstract estimates, approximate and detailed estimates of simple buildings.

Methods of estimation-advantages-types of estimates-detailed estimates of residential buildings-single storied and multi-storeyed buildings-earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-paintings.

UNIT - II

Specifications-Detailed and general specifications-construction specifications-sources- types of specifications-Tender notices-types-corrigendum notice-tender procedures Drafting model tenders.

UNIT - III

Data-Rate analysis-abstract estimate-report to accompany estimate-measurement book –bills-types. Rate analysis for the following items:

Earth work for foundations and basement of buildings
Mortars: Cement mortar (1:4)
Foundation Concrete: Cement Concrete (1:5:10)
Reinforced Concrete: Lintels, slabs, beams, columns (1:2:4)
Brick work: Constructed with first class bricks with L.M. (1:1.5) and C.M (1:6
Stone masonry: C.R.S - Ist sort constructed with C.M. (1:2) and R.R.Masonry C.M (1:2).
Flooring: (a) with Cuddapah or Shahbad slabs. (b) Ellis pattern flooring with 10 cm. Concrete and 20mm cement concrete surface - Mosaic flooring.
Roofing: (a) R.C.C roof 10cm thick, 2 courses of flat tiles to top.
(b) A.C. corrugated sheet roofing on steel purlins.
Plastering: C.M. (1:4) 12 mm thick.
Pointing : a) with C.M (1:3) flush pointing to R.R.masonry.
b) C.M (1:3) for brick masonry.
Painting: a) White washing and colour washing of walls: 2 coats.
b) Painting iron and wood work: 3 coats.
Wood work: Panelled doors and windows.

UNIT - IV

Contracts, Types of contracts, contract document, conditions of contracts, contract procedure, termination of contracts, specification important condition of contract, arbitration and legal requirements.

UNIT - V

Valuation:

Introduction, technique of valuation, elements of valuation and factors affecting valuation, methods of valuation of land property and building property, rate of interest for sale, purchase, mortgage, Fixation of rent.

Valuation – Gross income, Net income, Outgoings, Scrap value, Salvage value, Obsolescence, Annuity, Capitalized value, Year's purchase, Sinking fund, Depreciation; Determination of depreciation.

TEXT BOOKS:

1. Text book of estimating and costing - B.N.Dutta.
2. Estimating Costing by G.S.Biride.
3. Valuation by Rangwala.
4. A.P.D.S.S. Standard data book Vol.II.
5. A.P.Department standard specifications.
6. Professional practice - by Roshan Namvati

Course Outcomes (COs)

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

- Understand basics on methods and types of estimation.
- Formulate specifications and tender documents.
- Prepare contract agreements
- Determine rate analysis of different items.
- Valuation of buildings.

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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	2				1	2	2
CO2	1	1	1	2	1	1				1	2	2
CO3	2	1	2	2	1	1				2	2	2
CO4	2	1	1	1	2	2				2	2	2
CO5	2	1	1	2	1	2				1	2	2

CEOET 702(a) WATERSHED MANAGEMENT

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

Course Educational Objectives (CEOs)

1. To learn about Rainfall-Runoff analysis and estimation and design of storm
2. To known about effective watershed management methods and optimization
3. To understand about different soil conservation equation and principles
4. To understand about water harvesting techniques and artificial recharge techniques

UNIT I

WATERSHED HYDROLOGY:

Basic characteristics – Rainfall analysis – Runoff analysis – Estimation of design storm and the design flood – Flood routing – Flood mitigation through planning of reservoir capacities and operation of reservoirs.

UNIT II

WATERSHED MANAGEMENT:

Classification of effective watershed management methods – Factors affecting integrated watershed management – Watershed inventory – Problem definition and scope – Consultation process – Developing workable management options – Evaluation of constraints and criteria – Simple assessment methods.

UNIT III

SOIL CONSERVATION:

Soil loss estimation – Universal soil loss equation – Soil erosion principles – Gully erosion – Design of permanent gully control structures – Stream bank erosion – Erosivity and erodability – Engineering measures and control practices.

UNIT IV

WATER HARVESTING TECHNIQUES: Farm ponds – percolation tanks – Drop spillway chutes and flumes – Pipe spillways.

UNIT V

ARTIFICIAL GROUNDWATER RECHARGE TECHNIQUES:

Artificial recharge – Considerations – Methods – Induced infiltration – Water spreading – Flooding – Artificial recharge basins and ditches – Natural channel modifications – Recharge pits and shafts – Recharge wells.

REFERENCE BOOKS:

1. Prof. R. Suresh, "Watershed Hydrology " Standard Publishers.
2. Isobel W. Heathiote. "Integrated Watershed Management – Principles and Practices".
3. Schwab, G.O. & others, "Soil and water Conservation Engineering".
4. Prof. R. Suresh, "Soil and water Conservation Engineering".(Standard Publishers).
5. Wayne A. Pettyjohu, "Introduction to Artificial Ground Water Recharge" Scientific Publishers, Jodhpur.
6. Murthy J. V. S., "Watershed Management".

Course Outcomes (COs)

- Able to explain about Rainfall-Runoff analysis and estimation and design of storm
- Able to do the effective watershed management methods and optimization
- Able to understand about different soil conservation equations and principles
- Able to apply the knowledge of water harvesting techniques and artificial recharge techniques
- 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	
CO2	2	2	2	1	1		2		1	1	1	
CO3	2	2	2	1	1		2		1	1	1	

CO4	2	2	2	1	1		2		1	1	1	

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEOET 702(b) ENVIRONMENT IMPACT ASSESSMENT

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

Course Objectives:

1) To impart knowledge on different concepts of Environmental Impact Assessment
2) To teach procedures of risk assessment
3) To teach the EIA methodologies and the criterion for selection of EIA methods
4) To teach the procedures for environmental clearances and audit

UNIT –I:

Concepts and methodologies of EIA

Impacts of Development on Environment – Rio Principles of Sustainable Development-Environmental Impact Assessment (EIA) – Objectives – Historical development Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters-Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT – II

Impact of Developmental Activities and Land Use

Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise and energy, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction – Analysis of alternatives. Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT –III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation - Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment. Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Review of EIA Reports – Environmental Clearance. Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis.

UNIT – IV

Environmental audit:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT – V

Environmental Acts and Notifications:

The Environmental protection Act, The water preservation Act, The Air (Prevention & Control of pollution Act), Wild life Act - Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000. EIA Notification and Legal Framework–Stakeholders and their Role in EIA– Selection & Registration Criteria for EIA Consultants – Screening and Scoping in EIA – Drafting of Terms of Reference.

TEXT BOOKS:

1. Canter Larry W., Environmental Impact Assessment, McGraw-Hill education Edi (1996)
2. Y. Anjaneyulu,Environmental Impact Assessment Methodologies, B. S. Publication, Hyderabad.

REFERENCES:

1. Peavy, H. S, Rowe, D. R, Tchobanoglous, Environmental Engineering, G.Mc-Graw Hill International Editions, New York 1985
2. J. Glynn and Gary W. Hein Ke, Environmental Science and Engineering, Prentice Hall Publishers
3. Suresh K. Dhaneja, Environmental Science and Engineering, S.K., Katania & Sons Publication, New Delhi.

4. H. S. Bhatia Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi

Course Outcomes

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

- Prepare EMP, EIS, and EIA report**.**
- Identify the risks and impacts of a project**.**
- Choose an appropriate EIA methodology**.**
- Evaluation the EIA report**.**
- Estimate the cost benefit ratio of a project**.**
  Know the role of stakeholder and public hearing in the preparation of EIA**.**

CO-PO Mapping

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

ONE COURSE FROM AMONG THE PROGRAMME ELECTIVE COURSES TO BE STUDIED.

CEHST 704 PROFESSIONAL PRACTICE, LAW & ETHICS

Instruction Hours/Week : 3 (L)+1(T) Credits : 4
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objective (CEOs)

1. To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession

2. To develop some ideas of the legal and practical aspects of their profession

UNIT I

Professional Practice – Respective roles of various stakeholders: Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards)

UNIT II

Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.

UNIT III

General Principles of Contracts Management: *Indian Contract Act, 1972 and amendments* covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /"Red Flag" conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public-Private Partnerships; International Commercial Terms;

UNIT IV

Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece
rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

UNIT V

Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition,

Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies;

Text/Reference Books:

B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
The National Building Code, BIS, 2017
RERA Act, 2017
Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
Avtarsingh (2002), Law of Contract, Eastern Book Co.
Dutt (1994), Indian Contract Act, Eastern Law House
Anson W.R. (1979), Law of Contract, Oxford University Press
Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration

Course Outcomes:

At the end of the course, student is able to:

1. To develop some ideas of the legal and practical aspects of their profession
2. To understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession.

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CO-PO Mapping

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

CEPCI 705 INDUSTRY INTERNSHIP

Instruction Hours/Week : 6 (P) Credits : 3
Sessional Marks : 100 End Semester Examinations Marks : -

Course Educational Objectives (CEOs)

- To enable the students to have practical work knowledge in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Exposing the students to practical know-how in the chosen area of Civil Engineering
- Preparations of Detailed Project Report.

Course Outcomes (Cos)

1. To enable the students to acquire practical knowledge.
2. Capable of carrying out Civil Engineering works in the field.

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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

CEPCX 706 PROJECT WORK – PHASE I

Instruction Hours/Week : 6 (P) Credits :3
Sessional Marks : 100 End Semester Examinations Marks : -

Course Educational Objectives (CEOs)

- To enable the students to work in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Carrying out project work in the chosen area of Civil Engineering

- Preparations of Detailed Project Report

Course Outcomes (Cos)

1. To enable the students to work in convenient group
2. Capable of doing a project involving theoretical and experimental studies.
3. Modern trend and technology in civil engineering

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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		
CO2	2	2	2		1					1		
CO3	2	2	2		1					1		

VIII SEMESTER

Course Code	Course Title	Scheme of Instruction(Hours/Week)				No. of Credits
		Lecture	Tutorial	Practical	Total	
CEOET 801	Finite Element Methods	3	-	-	3	3
CEPET 802	Water Resources System Analysis	3	-	-	3	3
CEPCX 803	Project Work - Phase II	-	-	18	18	9
Total		6	-	18	24	15

CEOET 801 FINITE ELEMENT METHODS

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

Sessional Marks : 40 End Semester Examinations Marks : 60

Course Objectives

1) Introduce fundamentals of elasticity and steps involved in FEM.
2) To describe element stiffness matrix formulation for 1D and 2D cases.
3) To impart isoparametric formulation concepts.
4) To teach formulation of stiffness matrix for axi-symmetric problems.
5) To demonstrate numerical solution techniques used in FEM.

UNIT-I

Introduction:

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

UNIT-II

One Dimensional & Two Dimensional Elements: Stiffness matrix for bar element – shape functions – 1D and 2D elements – types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT-III

Element stiffness matrix:

Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT-IV

Isoparametric Formulation:

isoparametric elements for 2D analysis –formulation of CST element, 4 – noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements. AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded isoparametric axi-symmetric element

UNIT-V

Solution techniques:

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

TEXT BOOK:

1. Tirupathi R Chandraputla, Finite Element Analysis for Engineering and Technology, Universities Press Pvt Ltd, Hyderabad. 2003.
2. C. S. Krishna Murthy Finite Element analysis-Theory & Programming, Tata Mc.Graw Hill Publishers.

REFERENCES:

1. H.V. Lakshminaryana, Finite element analysis and procedures in engineering, 3rd edition, Universities press, Hyderabad.
2. Robert D. Cook, Michael E Plesha, Concepts and applications of Finite Element Analysis, John Wiley & sons Publications
3. S. Rajasekharan, Finite element analysis in Engineering Design, S. Chand Publications, New Delhi.

Course Outcomes

Upon completion of the course, the student will be able to

- Develop finite element formulations of 1D & 2D problems.
- Solve complex problems using FEM.
- Formulate isoparametric elements with different irregular boundaries.
- Implement solution techniques for higher order problems in practice.
- Apply concepts for carrying out research.
- Apply concepts for modelling of non-linear materials and geometry.

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CO-PO Mapping

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

ONE COURSE FROM AMONG THE OPEN ELECTIVE COURSES TO BE STUDIED.

CEPET 802 WATER RESOURCES SYSTEM ANALYSIS

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

Course Objectives:

1) Teach Concepts of systems techniques in water resources engineering
2) Teach Linear Optimization concepts
3) Demonstrate the Development system approach to reservoir operation
4) Planning water allocation to different crops
5) Expertise on River operation policies

UNIT 1

Concept of System and System Analysis - Definition and Types of Systems - Basic Principles of Systems Approach and Analysis. Systems Techniques in Water Resources.

UNIT II

Introduction to Optimization - Linear and Dynamic Programming - Simulation - Combined Simulation and Optimization. Economics of Water Resources Projects - Cost Benefit Analysis - Cost Allocation among various projects in a Multi-purpose Project.

UNIT III

Systems Approach to Reservoir - Deterministic Flows - Reservoir Sizing and Reservoir Operations. Basic Concepts of Random Flows Reliability.

UNIT IV

Application of Linear Programming to Water Resources Systems - Irrigation Water Allocation for Single and Multiple Crops. Reservoir Operation for Irrigation and Hydropower Generation.

UNIT V

Applications of Dynamic Programming to Water Resources Systems - Optimal Crop Water Application - Steady State Reservoir Operating Policy for Irrigation. Real Time Reservoir Operation for Irrigation.

TEXT BOOKS:

1. Loucks, D. P. and Eelco Van Beek, Water Resources systems planning and management: An Introduction to methods, models and applications. (2005), UNESCO.
2. Vedula, S. and Mujumdar, P. P., Water resources Systems: Modeling techniques and analysis, (2005), Tata McGraw Hill, New Delhi.

REFERENCES:

1. Mays, L.W. and Tung, Y.K., Hydro systems Engineering and Management, (1992). McGraw Hill, USA.

2. Simonovic, S.P., Managing water resources: Methods and tools for a systems approach, (2009). UNESCO Publishing, France.
3. R. K. Sharma & T. K. Sharma, A Textbook Of Irrigation Engineering, S. Chand and Company Limited, New Delhi

Course Outcomes:

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

- Apply basic principles of system approach.
- Judging Economics of water resources of multipurpose projects.
- Apply optimization principles to single and multi crop applications.
- Designing reservoir operation leading to optimum crop water application.

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

ONE COURSE FROM AMONG THE PROGRAMME ELECTIVE COURSES TO BE STUDIED.

CEPCX 803 PROJECT WORK- PHASE II

Instruction Hours/Week : 18 (P) Credits : 9
Sessional Marks : 40 End Semester Examinations Marks : 60

Course Educational Objectives (CEOs)

- To enable the students to work in convenient group on a project involving theoretical and experimental studies related to Civil Engineering
- Carrying out project work in the chosen area of Civil Engineering
- Preparations of Detailed Project Report

Course Outcomes (Cos)

1. To enable the students to work in convenient group
2. Capable of doing a project involving theoretical and experimental studies.
3. Modern trend and technology in civil engineering

CO-PO Mapping

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

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