

DEPARTMENT OF CIVIL ENGINEERING

Program:

B. Tech (Civil Engineering)



Estd. : 1980
KITSW

**KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
WARANGAL-506015**

**CURRICULUM,
PROGRAM OUTCOMES
AND COURSE OUTCOMES**

(For Kakatiya University Syllabus)



Vision of the Department

The Vision of the department is to become a leading center of excellence in producing quality human resource in civil engineering by developing a sustainable technical education system to meet the changing technological needs of the Country. The Department will make significant contributions to the economic development of the state, region and nation.



Mission of the Department

- M1:** The Mission of Civil Engineering Department is to produce outstanding Civil Engineering graduates with highest ethics
- M2:** To impart quality education in civil engineering to raise satisfaction level of all stake holders.
- M3:** To serve society and the nation by providing professional civil engineering leadership to find solution to community, regional and global problems and accept new challenges in rapidly changing technology.

Program: B. Tech (Civil Engineering)

Program Educational Objectives (PEO's)

PEO 1	Apply fundamental technical knowledge and skills to find creative solutions to technological challenges and problems in various areas of basic sciences and engineering.
PEO 2	Able to analyze, design and use skills in order to formulate and solve civil engineering problems
PEO 3	Able to practice civil engineering in a responsible, professional and ethical manner to implement eco- friendly sustainable technologies for the benefit of industry and society.
PEO 4	Able to take up higher education, engage in research and development in civil engineering and allied areas of science and technology.

Program Outcomes (PO's)

PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	Engineering knowledge
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	Problem analysis
PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	Design/ development of solutions
PO4	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	Conduct investigations of complex problems
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	Modern tool usage
PO6	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.	The engineer and society:
PO7	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	Environment and sustainability
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	Ethics
PO9	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	Individual and team work
PO10	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	Communication
PO11	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	Project management and finance
PO12	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.	Life-long learning

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO 1	Apply fundamental computational methods and elementary analytical techniques in sub-disciplines related to civil engineering.
PSO 2	Design civil engineering structures, component or process to meet desired needs with appropriate consideration for the public health and safety, cultural, societal, sustainability and environmental considerations
PSO 3	Appreciate professional and ethical responsibility concerning legal, contemporary, environmental & cultural issues and consequent responsibilities relevant to the professional engineering practices and norms of civil engineering practice code.
PSO 4	Appreciate the role of research in civil engineering practice and recognize the need for and to engage in life-long learning in civil engineering and allied domains as relevant to rapidly changing technology.

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL - 15
(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : COMMON FOR ALL BRANCHES
SEMESTER : FIRST

S. No.	Course Code	Course Name	Periods			Credits (C)	Evaluation Scheme				
			L	T	P		CIE			ESE	Total Marks
							TA	MSE	Total		
1	U14MH101	Engineering Mathematics-I	3	1	-	4	15	25	40	60	100
2	U14CS102	Programming in C	3	1	-	4	15	25	40	60	100
3	U14PH103	Engg. Physics /	3	1	-	4	15	25	40	60	100
	U14CH103	Engg. Chemistry	3	1	-	4	15	25	40	60	100
4	U14MH104	English for Communication /	2	2	-	3	15	25	40	60	100
	U14ME104	Engineering Drawing	2	4	-	4	15	25	40	60	100
5	U14EI105	Basic Electronics Engg./	3	-	-	3	15	25	40	60	100
	U14EE105	Basic Electrical Engg.	3	-	-	3	15	25	40	60	100
6	U14ME106	Basic Mechanical Engg./	3	-	-	3	15	25	40	60	100
	U14CE106	Basic Engg. Mechanics	3	1	-	4	15	25	40	60	100
7	U14CS107	Programming in "C" Lab	-	-	3	2	40	-	40	60	100
8	U14PH108	Engg. Physics Lab /	-	-	3	2	40	-	40	60	100
	U14CH108	Engg. Chemistry Lab	-	-	3	2	40	-	40	60	100
9	U14ME109	Engg. Workshop Practice /	-	-	3	2	40	-	40	60	100
	U14CH109	Environmental Studies #	2	-	-	2	15	25	40	60	100
10	U14EA110	EAA: Physical Education & NSS #	-	-	2	1	100	-	100	-	100
		Total	17/ 19	5/ 8	11/ 8	28/ 30					1000

Note: L - Lectures; T- Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment; MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

indicates Mandatory Course

Student Contact Hours/Week : Stream - I = 33 (periods/week); Stream-II = 35 (periods/week)

Total Credits (C) : Stream - I = 28 Credits; Stream-II = 30 Credits

U14MH101 ENGINEERING MATHEMATICS- I

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:

LO1: To enable the student to acquire fundamental knowledge of mathematical concepts and mathematical methods and apply in engineering disciplines.

LO2: To introduce the basic concepts such as convergence and divergence of series, tests for convergence of series; limit, continuity, differentiability of a function, mean value theorems, expansion of a function in series

LO3: To introduce the concept of partial differentiation and total differentiation, and maxima & minima of functions of two/several variables

LO4: To introduce the concept of double integral and triple integral

UNIT-I (9+3)

Infinite Series: Sequences & Series, General properties of series, Series of positive terms, Comparison test, Limit comparison test, Integral test, D'Alembert's Ratio test, Cauchy's nth root test; Alternating series- absolute convergence.

Differential Calculus (Functions of One variable): Limits, Continuity, Differentiability, Rolle's theorem (Physical and algebraic interpretations), Lagrange's mean value theorem (Geometrical interpretation), Cauchy's mean value theorem. Taylor's theorem and Power series representation of functions, Maclaurin's series, Asymptotes and Tracing of Simple Curves.

UNIT-II (9+3)

Differential Calculus (Functions of Several variables): Partial differentiation, Total differentiation, Change of variables, Jacobians, Application to find Tangent plane and Normal to a surface. Taylor's theorem for function of two variables (without proof), Maximum and minimum values of functions of two variables. Lagrange's method of undetermined multipliers. Differentiation under integral sign.

UNIT-III (9+3)

Multiple Integrals and Applications: Double integral, Change of order of integration, Double integration in polar coordinates, Triple integrals, Applications: Area enclosed by plane curves, Volumes of solids, Calculation of mass, Center of gravity, Moment of Inertia of plane lamina. Beta and Gamma functions and their relations. Evaluation of improper integrals in terms of Beta and Gamma functions.

UNIT-IV (9+3)

Differential Equations of first order: Practical approach to differential equations. Formation and solution of differential equation. Solution of first order and first degree differential equation, variables separable form, homogeneous form, reducible to homogeneous form, First order linear equations, Equations reducible to linear equation (Bernoulli's equation), Exact differential equations, Equations reducible to exact form.

Applications of first order differential equations: Simple examples of Physical applications (Orthogonal trajectories, RL series circuit problem)

Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi
2. Shanti Narayan, "Differential Calculus", S. Chand & Co., New Delhi

Reference Books:

1. Jain R.K.& Iyengar SRK , “Advanced Engineering Mathematics”, Narosa Publishers
2. Kreyszig E., “Advanced Engineering Mathematics”, New Age International
3. Sastry S.S., “Engineering Mathematics - Vol. I & II”, Prentice Hall of India

Course Learning Outcomes:

CO1: test the convergence/divergence of a given series by Comparison test, Limit comparison test, Integral test, D’Alembert’s Ratio test, Cauchy’s nth root test

CO2: understand the basic concepts of limit, continuity, differentiability of a function, and will be able to expand a given function in series

CO3: trace a given curve

CO4: apply the technique of differentiation under integral sign to solve an integral

U14MH101 - Engineering Mathematics-I

U14MH101	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH101.1	3	3		2						1		2
U14MH101.2	3	2		2								2
U14MH101.3	3	2		2						1		2
U14MH101.4	2	3		3						1		3
	2.75	2.50	0.00	2.25	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.25

U14MH101 - Engineering Mathematics-I

U14MH101	PSO1	PSO2	PSO3	PSO4
U14MH101.1	3			3
U14MH101.2		2		2
U14MH101.3	3			2
U14MH101.4	2	1		
	2.67	1.50	0.00	2.33

U14CS102 PROGRAMMING IN C

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:

LO1: To expose the students to the concepts of problem solving using structured programming language

LO2: To improve students capability in applying logical skills in problem solving

LO3: To improve student's expertise in C Programming concepts.

LO4: To make students capable of using memory management techniques like pointers, files, dynamic memory allocation in c programming

UNIT-I (9+3)

Introduction: Definition of a computer, Types of computers, Operating system functions, Computer languages, Problem solving and Program development steps, Algorithm, Flowchart.

C Language Preliminaries: History, Character set, Identifiers, Keywords, Data types, Variable declarations, Expressions, Symbolic constants, Input-Output statements. **Operators:** Arithmetic, Relational, Increment, Decrement, Conditional, Logical, Bit-wise and Special operators.

UNIT-II: (9+3)

Flow Control Statements: Simple if, If-Else, Nested-if, Else-If ladder, Switch and Goto.

Iterative Statements: While, Do-While and For statements, Nested loops, Break, Continue.

Arrays: One dimensional, Two dimensional arrays. Linear search, Binary search, Bubble sort.

UNIT-III (9+3)

Functions: Definition, Function prototypes, Types of arguments, Parameter passing mechanisms, Recursion, Storage classes.

Strings: Operations on strings, String-Handling functions.

Structures and Unions: Definition, Declaration of structure and union variables, Memory allocation, Nested structures, Array of structures

UNIT-IV (9+3)

Pointers: Pointer declaration, pointers arithmetic, Pointer to arrays, Array of pointers, Pointer to strings, Pointer to function, and Pointer to Structures, Dynamic memory allocation.

Files: File operations, File handling functions, Random access files

Text Books:

1. E.Balagurusamy, "Programming in ANSIC", Tata McGraw Hill, 6th Edn, ISBN-13: 978-1-25- 90046-2, 2012
2. Herbert Schildt, "Complete Reference with C", Tata McGraw Hill, 4th Edn., ISBN-13: 9780070411838, 2000

Reference Books:

1. Kerningham and Ritchie, "The C Programming Language", Prentice Hall of India, 2nd Edn., ISBN-13:007-6092003106, 1988
2. Yaswanth Kkanetkar, "Let Us C", BPB Publications, 13th Edn., ISBN-13: 9788183331630, 2012

Course Learning Outcomes:*CO1: know the fundamentals of computers**CO2: understand applying logical skills for problem solving**CO3: learn C programming language concepts**CO4: apply C programming language concepts for problem solving***U14CS102 - Programming in C**

U14CS102	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CS102.1	2	1			1	1						2
U14CS102.2	3	3	2	1	2	1			1			3
U14CS102.3	2	1			1	1						2
U14CS102.4	2	1	1									2
	2.25	1.50	1.50	1.00	1.33	1.00	0.00	0.00	1.00	0.00	0.00	2.25

U14CS102 - Programming in C

U14CS102	PSO1	PSO2	PSO3	PSO4
U14CS102.1	2	2		3
U14CS102.2	3	1	1	
U14CS102.3	3	2		2
U14CS102.4	2	2	1	
	2.50	1.75	1.00	2.50

U14PH103 ENGINEERING PHYSICS

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To make the bridge between physics in intermediate level and its applications in engineering by giving proper inputs.

LO2: To introduce the basic concepts of all types of oscillations with illustrations by mechanical examples.

LO3: To introduce the basic concepts of coherence and polarized nature (interference, diffraction & polarization) of light waves and their applications.

LO4: To introduce and explore the knowledge of high frequency sound waves & their application in different fields.

UNIT-I (9+3)

Oscillations: Physical examples of simple harmonic motion –Torsional pendulum, Physical pendulum, Spring - Mass systems and Loaded beams - Two body oscillations – Qualitative treatment of Free, Damped & Forced Oscillations and Resonance.

Interference: The Superposition principle –Coherence –Phasor method of adding wave disturbances – Phase changes on reflection - Anti reflection coating –Interference of reflected light from uniform and wedge shaped film –Newton’s rings in reflected light-Determination of wavelength of monochromatic light using Newton’s rings experiment –Michelson’s Interferometer, Types of fringes, Determination of wavelength of monochromatic light, thickness and refractive index of a thin transparent sheet using Michelson’s Interferometer.

UNIT-II (9+3)

Diffraction: Fraunhofer diffraction at a single slit, measurement of slit width –Fraunhofer diffraction at a circular aperture –Rayleigh’s criterion for resolution - Diffraction grating (Qualitative) – Experimental determination of wavelength using a plane transmission grating-Dispersion and Resolving power of a grating.

Polarization: Polarized light-Double refraction, Geometry of calcite crystal, Construction and working of a Nicol prism – Theory of polarized light - Production and Detection of plane, circularly and elliptically polarized light – Quarter and Half-wave plates - Optical activity – Laurent’s half-shade Polarimeter – Application of polarization in LCDs.

Ultrasonics: Ultrasonic waves – Properties - Production of Ultrasonic waves - Magnetostriction method, Piezo-electric method – Detection of Ultrasonics - Determination of wavelength (Acoustic grating) - Application of ultrasonic waves.

UNIT-III (9+3)

Lasers (Qualitative): Absorption, Spontaneous and Stimulated emission – Relation among Einstein coefficients –Difference between conventional and laser light – Population inversion, Methods of achieving population inversion – Types of Lasers – Ruby Laser, Helium-Neon Laser, Carbon dioxide Laser and Nd-YAG Laser – Applications of lasers.

Holography: Introduction – Formation and Reconstruction of a Hologram – Applications of Holography.

Fiber Optics (Qualitative): Introduction – Total internal reflection – Fiber construction – Numerical aperture and Acceptance angle – Types of Optical fibers (Step and Graded index) – Power losses in Optical fibers –Attenuation, Dispersion, Bending – Light wave Communication using Optical fibers – Applications of Optical fibers - Fiber optic Sensors (Temperature and Displacement), Endoscope.

UNIT-IV (9+3)

Elements of Quantum Mechanics: De-Broglie concept of matter waves – De-Broglie wavelength, Properties of matter waves –Schrodinger’s wave equation – Time independent wave equation (one dimension), Particle in a box (one dimension), energy quantization, Wave functions.

Modern Materials (Qualitative): Magnetic materials: Introduction –Permeability - Magnetization –Classification of magnetic materials . Applications of magnetic materials – magnetic recording, magnetic memories. Superconducting materials: Superconductivity – Meissner effect –Transition temperature – Isotope effect. Types of Superconductors - Soft and Hard Superconductors – Applications of Superconductors.

Nanomaterials: Introduction – Classification of nanomaterials – Properties of nanomaterials – Physical, Chemical, Electrical, Optical, Magnetic and Mechanical properties (in brief) - Applications of nanomaterials (in brief).

Text Books:

1. Bhattacharya and Bhaskaran, “Engineering Physics”, Oxford University Press.
2. V.Rajendran, “Engineering Physics”, McGraw Hill Education.

Reference Books:

1. David Halliday and Robert Resnick, “Physics Part I & II”, Wiley Eastern Limited.
2. R.K. Gaur and S.L.Gupta, “Engineering Physics”, Dhanpath Rai and Sons.
3. P.K. Palanisamy, “Engineering Physics”, Scitech Publishers.

Course Learning Outcomes (COs):

CO1: understand the basic concepts of physics for its applications to Engineering.

CO2: understand the basic principles of oscillations that can be applied to all types of oscillatory phenomena like acoustic, mechanical, electromagnetic, atomic, nuclear etc.,.

CO3: appreciate the knowledge acquired in studying interference, diffraction and polarization in the application of thickness measurement of thin films, refractive indices and wavelength determinations using interferometric techniques, fringe pattern etc.,.

CO4: appreciate the knowledge gained in studying ultrasonics and their multi-dimensional applications in various fields like industrial, engineering (like NDT etc.,) and medical etc.,.

U14PH103 - Engineering Physics												
U14PH103	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14PH103.1	3					1						1
U14PH103.2	3					1						1
U14PH103.3	3					2	1					1
U14PH103.4	3					1						1
	3.00	0.00	0.00	0.00	0.00	1.25	1.00	0.00	0.00	0.00	0.00	1.00

U14PH103 - Engineering Physics				
U14PH103	PSO1	PSO2	PSO3	PSO4
U14PH103.1	3		2	2
U14PH103.2	3		1	1
U14PH103.3				1
U14PH103.4	3			1
	3.00	0.00	1.50	1.25

U14MH104 ENGLISH FOR COMMUNICATION

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
2	2	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To acquire writing skills with a focus on accuracy avoiding common errors in English.

LO2: To acquire word power enabling to use them in speaking and writing.

LO3: To develop reading comprehension skills with local and global comprehension.

LO4: To acquire listening and speaking skills using language laboratory.

UNIT-I (6)

Grammar

1. Clause Analysis
2. Tenses
3. Reported Speech

UNIT-II (6)

Vocabulary

1. Collocations
2. Idioms & Phrasal verbs

UNIT-III (6)

Reading Comprehension

1. "Stopping by Woods on a Snowy Evening" by Robert Frost
2. "Adivasis" by Kanchari Ilaiah

UNIT-IV (6)

Writing Devices

1. Application for jobs and preparing a curriculum vitae
2. Report writing
3. Project Writing

Text Books:

1. Damodar G., & Surender Kumar M., "English for Communication", KGA Publications, Warangal.
2. Purushotham K., "English for fluency", Orient Blackmen, Hyderabad.

Reference Book:

1. Krishna Swamy N., "Modern English Grammar", MacMillan India Ltd.

English Language Lab:

{Teacher Assessment (TA) is done through English Language Lab}

Listening Skills (6x2)

1. Listening to sounds, stress and intonation
2. Listening for information

Speaking Skills (6x2)

a. Presentation Techniques

- Group Discussions
- Interview Skills

b. Assignment

Students have to prepare and present an assignment on the following through PPT in the communication skills laboratory.

- Presentation of Oneself

Course Learning Outcomes (COs):

CO1: develop writing skills with a focus on accuracy to develop error free English.

CO2: develop word power to enable to use them in speaking and writing.

CO3: develop reading skills with a focus on developing reading comprehension skills .

CO4: enhance listening and speaking skills.

U14MH104 - English For Communication												
U14MH104	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH104.1						1		1	1	3	1	3
U14MH104.2						1		1	1	3	1	3
U14MH104.3						1		1	1	3	1	3
U14MH104.4						2	1	1	2	3	1	3
	0.00	0.00	0.00	0.00	0.00	1.25	1.00	1.00	1.25	3.00	1.00	3.00

U14MH104 - English For Communication				
U14MH104	PSO1	PSO2	PSO3	PSO4
U14MH104.1			1	3
U14MH104.2				
U14MH104.3			2	3
U14MH104.4			2	
	0.00	0.00	1.67	3.00

U14EI105 BASIC ELECTRONICS ENGINEERING

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

LO1: To introduce basic concepts of semi-conductors and conductivity in semiconductors

LO2: To introduce the operation and applications of semiconductor diodes

LO3: To introduce the basic concepts of BJT & its DC biasing concepts and FET

LO4: To introduce the fundamental concepts and basic principles of Electronic Measuring instruments.

UNIT-I (9)

Introduction to Electronics: Analog Signals (DC & AC), Sources (DC & AC), Digital Signals

Semiconductors: Energy bands in solids, Concept of forbidden gap, Insulator, Metals and Semiconductors, Transport phenomenon in semiconductors: Mobility and conductivity, Intrinsic semiconductor, Donor and Acceptor impurities, Fermi level, Recombination and Minority carrier Injection, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect

Semiconductor Diode: P-N Junction, Band diagram, Depletion layer, V-I characteristics of P-N Diode, Diode resistance and capacitance, Avalanche and Zener breakdown mechanisms

UNIT-II (9)

Diode Circuits: Rectifier circuits – Half wave, Full wave & Bridge rectifiers, Ripple voltage and Diode current with and without filters, Voltage regulation using Zener diode, Block diagram of DC adapter, Operation of LED & Photodiode

Bipolar Junction Transistor: Physical structure, Transistor current components, CE, CB & CC configurations and their Input & Output characteristics

UNIT-III (9)

DC Analysis of BJT Circuits: DC load line, Need for biasing, Transistor biasing methods for CE configuration, Basic transistor applications: Switch and Amplifier, Block diagram of a Public Address system

Field Effect Transistor: Physical structure, Operation and Characteristics of a Junction Field Effect Transistor (JFET)

UNIT-IV (9)

Measurement Systems: Block diagram of Measurement system, Ideal requirements of Measurement system, Performance characteristics of Measurement system, Errors in Measurement system

Electronic Instruments: PMMC Mechanism, Ammeter, Voltmeter & Ohmmeter, Loading effects of Ammeter & Voltmeter, Block diagram of Digital Multimeter (DMM), Block Diagram of Cathode Ray Oscilloscope (CRO), Expression for deflection sensitivity, CRT Screens, Measurement of time period and amplitude

Text Books:

1. David.A.Bell, "Electronic Devices and Circuits", Oxford University Press, New Delhi, India.
2. Neil storey, "Electronics: A systems Approach", 4/e-Pearson Education Publishing company Pvt. Ltd, India.
3. Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", PHI, India.

Reference Books:

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", 3/e, TMH, India.
2. Bhargava and Kulashresta, "Basic Electronics and Linear Circuits", TTTI, TMH, India.
3. Sawhney A.K, "Electrical and Electronic Measurements and Instrumentation", Dhanpat Rai & Sons, New Delhi, India.

Course Learning Outcomes (COs):

CO1: learn the concepts of conductivity in semi-conductors

CO2: learn the operation of basic semi-conductor devices and their V-I characteristics

CO3: get familiarized with the concepts of BJT& FET

CO4: use basic electronic measuring instruments like DMM and CRO

U14EI105 - Basic Electronics Engineering												
U14EI105	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14EI105.1	3	2	2	2		1						
U14EI105.2	3	2	1	1								
U14EI105.3	2	1	1	1								
U14EI105.4	2	1	1	1		1						
	2.50	1.50	1.25	1.25	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00

U14EI105 - Basic Electronics Engineering				
U14EI105	PSO1	PSO2	PSO3	PSO4
U14EI105.1	1	2	2	2
U14EI105.2		1	1	1
U14EI105.3	2	1		1
U14EI105.4	2	1	1	1
	1.67	1.25	1.33	1.25

U14ME106 BASIC MECHANICAL ENGINEERING

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To identify various engineering materials and applications.

LO2: To understand the basic elements of power transmission.

LO3: To know the basic manufacturing processes.

LO4: To understand fundamental principles and applications of thermodynamics.

UNIT- I (9)

Engineering Materials: Classification; properties and applications.

Power Transmission: Classification; Flat belt drives - open and cross belts; Introduction to Gears.

Bearings: Types - Sliding and rolling contact; Lubricants - Objectives, types, properties and applications.

UNIT- II (9)

Manufacturing Processes: Classification and their applications.

Sand Casting: Terminology; Mould cross section; Moulding sand-types and properties; Patterns-types, materials and allowances.

Welding: Principle and applications of gas and arc welding

Machining: Classification; Lathe machine-line diagram and functions of various parts.

UNIT- III (9)

Fundamental Concepts: Introduction to SI units, System, Thermodynamic state, Property, Process and Cycle; Energy, Work and Heat; Thermodynamic Equilibrium, Zeroth law of Thermodynamics, Laws of perfect gases.

First Law Of Thermodynamics: First law- Applications to Closed system, Internal energy, Enthalpy; Processes of Closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic.

UNIT- IV (9)

Second Law Of Thermodynamics: First law limitations, Second law Statements and their equivalence, Carnot Cycle, Carnot Theorem, Heat engine, Heat pump and Refrigerator.

IC Engines: Classification; Working principle of two and four stroke SI and CI engines.

Text Books:

1. Basant Agrawal and C M Agrawal, "Basic Mechanical Engineering", Wiley India Pvt. Ltd, New Delhi
2. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", Jain Brothers, New Delhi
3. Hazra Chowdary. S. K and Bose, "Basic Mechanical Engineering", Media Promoters and Publishers Pvt. Ltd, India.

Reference Books:

1. P. K. Nag, "Engineering Thermodynamics", Tata McGraw Hill, New Delhi.
2. Hazra Chowdary. S. K and Bose, "Workshop Technology, Vol. I & II", Media Promoters and publishers Pvt Ltd, India.

Course Learning Outcomes (COs):*CO1: know the properties and applications of various engineering materials**CO2: learn the basic concepts of power transmission**CO3: follow the principles and operations of manufacturing technology**CO4: understand the laws of thermodynamics and their applications***U14ME106 - Basic Mechanical Engineering**

U14ME106	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14ME106.1	3	2	1	2	1	1						1
U14ME106.2	3	2	1	1	1	1						
U14ME106.3	1	1				1						
U14ME106.4	2	1		1		2						1
	2.25	1.50	1.00	1.33	1.00	1.25	0.00	0.00	0.00	0.00	0.00	1.00

U14ME106 - Basic Mechanical Engineering

U14ME106	PSO1	PSO2	PSO3	PSO4
U14ME106.1	2	3	1	2
U14ME106.2	1	2	1	1
U14ME106.3	1	1		
U14ME106.4	2	1		1
	1.50	1.75	1.00	1.33

U14CS107 PROGRAMMING IN C LABORATORY

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (COs):

- LO1: To expose the undergraduate students to the practical implementation of C Programming concepts*
LO2: To improve student's capability in applying C Programming for problem solving.
LO3: To make students use effective memory management techniques in programming
LO4: To expose students to modular programming concepts in problem solving

LIST OF EXPERIMENTS

1. Programs using input output functions, operators (arithmetic, relational, conditional etc).
2. Programs using operators (bit-wise, logical, increment and decrement etc).
3. Programs using conditional control structures: if, if-else, nested if.
4. Programs using else if ladder, switch and goto.
5. Programs using loop control structures: while, do-while, for.
6. Programs on one dimensional array and two dimensional arrays.
7. Programs using functions: different types, parameter passing using call-by-value, call-by-reference, recursion and storage classes.
8. Programs using strings: one dimensional array, two dimensional array, string handling functions.
9. Programs using pointers, string pointers.
10. Programs using, structure pointers, functions pointers.
11. Programs using dynamic memory allocation.
12. Programs using file operations and file handling functions.

Course Learning Outcomes (COs):

- CO1: learn practical implementation of C programming language concepts.*
CO2: debug and document programs in C.
CO3: know usage of logical skills in developing C programs.
CO4: apply effective memory management techniques for problem solving

U14CS107 - Programming in C Laboratory

U14CS107	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CS107.1	3	3	3	3	3	2	3		3			3
U14CS107.2	3	3	3	1	3	3	3		3			3
U14CS107.3	2	2	2	2	3	1	3		2			2
U14CS107.4	2	1	3	2	2	1	3		2			2
	2.50	2.25	2.75	2.00	2.75	1.75	3.00	0.00	2.50	0.00	0.00	2.50

U14CS107 - Programming in C Laboratory

U14CS107	PSO1	PSO2	PSO3	PSO4
U14CS107.1	3	3	2	3
U14CS107.2		3	1	3
U14CS107.3	3	3		3
U14CS107.4	2	2		2
	2.67	2.75	1.50	2.75

U14PH108 ENGINEERING PHYSICS LABORATORY

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To understand the oscillatory phenomena in determining the various properties like rigidity modulus, moment of inertia, acceleration due to gravity and other elastic properties.

LO2: To determine the wavelengths, slit widths, diameters of thin wires etc., with high degree of accuracy using interference and diffraction techniques.

LO3: To study the optical activity of some substances.

LO4: To determine the optical fiber characteristics.

LIST OF EXPERIMENTS

- 1 Newton's Rings: Determination of wavelength of a monochromatic light.
- 2 Determination of slit width using He-Ne Laser.
- 3 To find dispersive power of a prism using Spectrometer
- 4 Torsional pendulum: Determination of rigidity modulus of given wire and moment of inertia of ring.
- 5 Diffraction Grating: Determination of wave lengths of white light using normal incidence method.
- 6 To determine resolving Power of a Telescope.
- 7 To find the acceleration due to gravity (g) by Compound pendulum.
- 8 Polarimeter (Saccharimeter): Determination of specific rotation of sugar solution.
- 9 Photo Cell: To study the characteristics of a photo cell.
- 10 Determination of wavelength of He-Ne Laser.
- 11 Spiral spring: Determination of force constant of spiral spring.
- 12 Determination of Numerical Aperture of an Optical fiber.
- 13 Determination of diameter of a thin wire using Interference method.

Course Learning Outcomes (COs):

CO1: handle and apply the powerful radiations like lasers and radioactive rays.

CO2: know the interference and diffraction patterns and apply them in precise measurements.

CO3: make preferential selection of Optical fibers.

CO4: determine the various optical, mechanical and magnetic properties

U14PH108 - Engineering Physics Laboratory

U14PH108	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14PH108.1	3		2			2	2					
U14PH108.2	2					1	1					1
U14PH108.3	2		1				1					1
U14PH108.4	2		3			2	2					2
	2.25	0.00	2.00	0.00	0.00	1.67	1.50	0.00	0.00	0.00	0.00	1.33

U14PH108 - Engineering Physics Laboratory

U14PH108	PSO1	PSO2	PSO3	PSO4
U14PH108.1	3		2	2
U14PH108.2	2	2		1
U14PH108.3	2		1	
U14PH108.4	2	2	2	1
	2.25	2.00	1.67	1.33

U14ME109 ENGINEERING WORKSHOP PRACTICE

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: To understand the importance of workshop practice in Engineering

LO2: To acquire proper understanding of various manufacturing processes

LO3: To identify the significance and application of various tools and equipment used in workshop

LIST OF EXPERIMENTS

Foundry:

1. Prepare a Sand Mould using bracket pattern
2. Prepare a Sand Mould using dumbbell pattern

Fitting:

3. Prepare a Square fit using Mild Steel Plates
4. Prepare a Half round fit using Mild Steel Plates

Welding:

5. Prepare a Lap joint on Mild Steel Plates using Arc Welding
6. Prepare a Single V - Butt Joint on Mild Steel Plates using Arc Welding

Carpentry:

7. Prepare a Half lap joint of a given Wooden pieces
8. Prepare a Bridle joint of a given Wooden pieces

Plumbing:

9. Prepare a Pipe joint with elbows & tee using PVC pipes
10. Prepare a Pipe joint with union & coupling using PVC pipes

Machine Shop:

11. Perform a Step turning operation on mild steel bar
12. Perform a Taper turning operation on mild steel bar

Text Books:

1. Hazra Chowdary. S.K and Bose, "Elements of Workshop Technology, Vol-I &II", Media Promoters and publishers Pvt. Ltd, India.
2. W.A.J.Chapman, "Workshop Technology, Vol-I", Edward Arnold

Course Learning Outcomes (COs):

CO1: know and understand the types of trades in engineering

CO2: improve their practical skills to develop new products

U14ME109 - Engineering Workshop Practice

U14ME108	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14ME108.1	1	2	2	3		1		2	3	3		2
U14ME108.2	1	2	3	3		1		2	3	3		2
	1.00	2.00	2.50	3.00	0.00	1.00	0.00	2.00	3.00	3.00	0.00	2.00

U14ME109 - Engineering Workshop Practice

U14ME108	PO1	PO2	PO3	PO4
U14ME108.1	1	2	2	3
U14ME108.2	1	2	2	2
	1.00	2.00	2.00	2.50

U14EA110 EAA PHYSICAL EDUCATION & NSS

Class: B.Tech. I Semester

Branch: Common to all branches

Teaching Scheme :

Examination Scheme :

L	T	P	C
-	-	2	1

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

I. PHYSICAL EDUCATION

Course Learning Objectives & Outcomes:

LO1: To perform and engage in a variety of physical activities

LO2: To develop and maintain physical health and fitness through regular participation in physical activities

LO3: To demonstrate positive self-esteem, mental health and physiological balance through body awareness and control

LO4: To exhibit the spirit of fair play, team work and sportsmanship

Activities related to :

1. Physical Fitness
2. Games & Sports

II. NATIONAL SERVICE SCHEME (NSS)

Course Learning Objectives:

LO1: arouse the social consciousness of the students

LO2: provide them with opportunity to work with people in villages and slums

LO3: expose them to the reality of life

LO4: bring about a change in their social perceptions

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical Camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on "Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes:

CO1: develop his / her personality through community service rendered

CO2: apply their education to find solutions to individual and community problems

CO3: acquire capacity to meet emergencies and natural disasters

CO4: acquire a democratic attitude, leadership qualities and practice national integration

U14EA110 - EAA: Physical Education & NSS

U14EA110	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14EA110.1				1	2	3	2	2	2	1	1	2
U14EA110.2				1	3	2	1	2	3	1	1	2
U14EA110.3				1	2	2	2	2	2	1	1	2
U14EA110.4						2	1	2	2	2	3	1
	0.00	0.00	0.00	1.00	2.33	2.25	1.50	2.00	2.25	1.25	1.50	1.75

U14EA110 - EAA: Physical Education & NSS

U14EA110	PO1	PO2	PO3	PO4
U14EA110.1	3	1		
U14EA110.2	3	1		
U14EA110.3				
U14EA110.4	3			
	3.00	1.00	0.00	0.00

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL - 15

(An Autonomous Institute under Kakatiya University, Warangal)

SCHEME OF INSTRUCTIONS & EVALUATION FOR B.TECH. 4-YEAR DEGREE PROGRAMME

BRANCH : COMMON FOR ALL BRANCHES

SEMESTER : SECOND

S. No.	Course code	Course Name	Periods			Credits (C)	Evaluation Scheme				
			L	T	P		CIE			ESE	Total Marks
							TA	MSE	Total		
1	U14MH201	Engineering Mathematics-II	3	1	-	4	15	25	40	60	100
2	U14CS202	Object Oriented Programming through C++	3	1	-	4	15	25	40	60	100
3	U14CH203	Engg. Chemistry /	3	1	-	4	15	25	40	60	100
	U14PH203	Engg. Physics	3	1	-	4	15	25	40	60	100
4	U14ME204	Engineering Drawing /	2	4	-	4	15	25	40	60	100
	U14MH204	English for Communication	2	2	-	3	15	25	40	60	100
5	U14EE205	Basic Electrical Engg. /	3	-	-	3	15	25	40	60	100
	U14EI205	Basic Electronics Engg.	3	-	-	3	15	25	40	60	100
6	U14CE206	Basic Engg. Mechanics /	3	1	-	4	15	25	40	60	100
	U14ME206	Basic Mechanical Engg.	3	-	-	3	15	25	40	60	100
7	U14CS207	Object Oriented Programming (OOP) Lab	-	-	3	2	40	-	40	60	100
8	U14CH208	Engg. Chemistry Lab /	-	-	3	2	40	-	40	60	100
	U14PH208	Engg. Physics Lab	-	-	3	2	40	-	40	60	100
9	U14CH209	Environmental Studies #	2	-	-	2	40	-	40	60	100
	U14ME209	Engg. Workshop Practice	-	-	3	2	15	25	40	60	100
10	U14EA210	EAA: Physical Education & NSS #	-	-	2	1	100	-	100	-	100
		Total	19/ 17	8/ 5	8/ 11	30/ 28					1000

Note: L - Lectures; T- Tutorials; P - Practicals; CIE - Continuous Internal Evaluation; TA - Teachers Assessment;

MSE - Mid Semester Examination; ESE - End Semester Examination; EAA - Extra Academic Activity;

indicates Mandatory Course

Student Contact Hours / Week : Stream - I = 35 (periods/week); Stream- II = 33 (periods /week)

Total Credits (C) : Stream - I = 30 Credits; Stream -II = 28 Credits

U14MH201 ENGINEERING MATHEMATICS- II

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: To enable the student to acquire fundamental knowledge of mathematical concepts and methods and apply in engineering disciplines

LO2: To introduce the methods of solving higher order linear differential equations with constant coefficients and introduce simple applications

LO3: To introduce the concept of vector function and vector differential calculus

LO4: To introduce integration of vector valued functions

UNIT-I (9+3)

Higher order linear differential equations with constant coefficients:

Liner differential Equations of higher order with constant coefficients, General solution, Complementary function, Particular Integral. Methods of evaluation of particular Integrals. Simple examples of Physical applications (Free oscillations of Spring - Mass system, RLC series circuit problem) Wronskian, Linear dependence of solutions, Method of Variation of parameters. Cauchy's homogenous linear equation.

UNIT-II (9+3)

Vector Differential Calculus: Vector functions - Derivative of a vector function of a scalar variable, Velocity and acceleration, Curves in Space, Tangent, Principal normal, Binormal, Curvature, Torsion of a given curve and Frenet -Serret Formulae. Scalar and vector point functions, Vector operators - Gradient of a scalar field, Divergence of a vector field, Curl of a vector field and their physical interpretations. Directional derivative, Application to find angle between two surfaces and to find scalar potential of a vector field, Irrotational fields & Solenoidal fields.

UNIT-III (9+3)

Vector integration: Integration of vector valued functions of a scalar variable, Application to find velocity and displacement of a particle; Line integral of scalar point and vector point functions, Applications: Work done by a force, Circulation; Surface Integral & Volume integral. Green's theorem in plane, and area of a plane region using Green's theorem, Stokes theorem & Gauss divergence theorems (without proof).

UNIT-IV (9+3)

Complex Variables: Functions of complex variables, Limit, Continuity, Differentiability, Analytic Functions, Cauchy-Riemann Equations in Cartesian and Polar coordinates. Elementary functions, Harmonic Functions, Construction of Analytic functions. Applications to find velocity potential and stream function of a fluid flow. Conformal mapping and bilinear transformation.

Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", Khanna Publishers, Delhi,

Reference Books:

1. Churchill R.V., "Complex Variable and its Applications", McGraw Hill
2. Kreyszig E., "Advanced Engineering Mathematics", New Age International
3. Spiegel M., "Vector Analysis -Schaum Series", McGraw Hill

Course Learning Outcomes(COs):

CO1: solve a given higher order linear differential equation with constant coefficients

CO2: understand few simple applications

CO3: understand the concept of a vector function and vector differentiation and will be able to find the characteristics of a space curve such as tangent, normal, binormal, curvature and torsion

CO4: understand the concept of gradient , divergence and curl of a vector point function and will be able to apply them to find angle between two surfaces, scalar potential

U14MH201 - Engineering Mathematics-II												
U14MH201	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH201.1	3	3		2						1		2
U14MH201.2	3	2		2								2
U14MH201.3	3	2		2						1		2
U14MH201.4	2	3		3						1		3
	2.75	2.50	0.00	2.25	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.25

U14MH201 - Engineering Mathematics-II				
U14MH201	PSO1	PSO2	PSO3	PSO4
U14MH201.1	3			3
U14MH201.2	3			2
U14MH201.3	2			2
U14MH201.4	3			3
	2.75	0.00	0.00	2.50

U14CS202 OBJECT ORIENTED PROGRAMMING THROUGH C++

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: to expose the students to the concepts of Object-Oriented Paradigm

LO2: to improve students capability in applying object oriented programming concepts in problem solving

LO3: to improve students expertise in implementing object oriented concepts using C++ Programming

LO4: to enable students to understand concepts of templates and exceptional handling

UNIT - I (9+3)

Programming Paradigms: Procedural Programming, Modular Programming, Object-Oriented Programming and Generic Programming.

Introduction to C++: Structure of C++ program, Basic I/O, Tokens, Data types, Reference variables, Operators, Manipulators, Expressions, Control Structures, Name Spaces.

Functions in C++: Inline function, Default arguments, Overloading, Parameter passing mechanisms, Name Spaces.

UNIT - II (9+3)

Classes and objects: Structures, Access Control, Specifying a Class, Defining member functions, Making an outside function inline, Nesting of member functions, Arrays within class, Arrays of objects, Static data members, Static member functions, Friend functions, Objects as arguments, Returning objects, Pointers to members, Constructors and Destructors.

Operator Overloading: Overloading of Unary and Binary operators, Overloading of Unary and Binary operators using friend functions, String operations, Type conversions.

UNIT - III (9+3)

Inheritance: Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Making private member inheritable, Virtual Base class, Abstract class, Constructors in derived classes.

Polymorphism: Pointers to objects, Pointers to derived classes, This pointer, Virtual Functions, Pure virtual functions.

Managing Console I/O operations: Introduction, C++ Streams, C++ Stream Classes, Un formatted I/O Operations, Formatted I/O Operations, Managing output with manipulators.

UNIT - IV (9+3)

Files: Classes for file stream operations, Opening and closing a file, Detecting EOF, File Modes, File pointers and their manipulators, Sequential input and output operations, Random access files, Command line arguments.

Templates: Class templates, Class templates with multiple parameters, Function templates, Function templates with multiple parameters, Overloading of template functions.

Exception Handling: Exception handling mechanism, Throwing mechanism, Catching mechanism, Rethrowing of exception, Specifying the exceptions.

Text Books:

1. E.Balagurusamy, "Object-Oriented Programming with C++", McGraw-Hill Education India Pvt. Ltd , Sixth Edition, ISBN-13:978-1-25-902993-6, 2012.
2. Bjarne Stroustrup, "The C++ Programming Language", Addison-Wesley Publications, Second Edition, ISBN No. 81-7808-126-1, 1991.

Reference Books:

1. K.R. Venugopal, Rajkumar, T.Ravishankar, "Mastering C++", McGraw-Hill Education India Pvt.Ltd, Second Edition, ISBN: 0-07-463454-2, 1997.
2. Timothy Bud, "An Introduction to Object Oriented Programming", Pearson Education, Second Edition, ISBN 81-7808-228-4, 2004.

Course Learning Outcomes(COs):

CO1: know the differences between procedural language and object-oriented languages

CO2: gain knowledge of Object-Oriented Paradigm for problem solving

CO3: will be able to gain practical knowledge of OOP concepts using C++

CO4: apply reusability concepts like inheritance, polymorphism in application development

U14CS202 - Object Oriented Programming Through C++												
U14CS202	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CS202.1	2	1			1	1						2
U14CS202.2	3	3	2	1	2	1			1			3
U14CS202.3	2	1			1	1						2
U14CS202.4	2	1	1									2
	2.25	1.50	1.50	1.00	1.33	1.00	0.00	0.00	1.00	0.00	0.00	2.25

U14CS202 - Object Oriented Programming Through C++				
U14CS202	PSO1	PSO2	PSO3	PSO4
U14CS202.1	2	2		3
U14CS202.2	3	1	1	
U14CS202.3	3	2		2
U14CS202.4	2	2	1	
	2.50	1.75	1.00	2.50

U14CH203 ENGINEERING CHEMISTRY

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: To understand the fundamental principles and applications of chemistry.

LO2: To identify the significance of electro chemistry.

LO3: To introduce and explore the knowledge of corrosion and its prevention

LO4: To impart and inculcate proper understandings of energy sources, phase rule, organic and polymer chemistry

UNIT-I (9+3)

Electrochemistry: Specific and equivalent conductance, Conductometric titrations, Electrode potential, Nernst equation, Electrochemical series, Reference electrodes : Calomel electrode, Ag/AgCl electrode, Ion-selective electrode : glass electrode, Determination of pH using Glass, Quinhydrone and Hydrogen electrodes, Potentiometric titrations, Commercial cells: Hydrogen-Oxygen fuel cell, Lead-acid storage cell.

UNIT-II (9+3)

Corrosion: Introduction: Corrosion by pure chemical reaction, Electrochemical theory of corrosion, Galvanic corrosion, Differential aeration corrosion, Factors influencing corrosion, Prevention of corrosion: Cathodic Protection, Hot Dipping, Cementation, Cladding, Electroplating, Corrosion inhibitors, Anodized coatings.

Phase Rule: Description of the terms: 'Phase', 'Component' and 'Degrees of freedom'. Gibbs Phase rule equation. Application of the phase rule to one-component system (Water system) and two-component system (silver-lead system).

Energy Sources: Characteristics of fuels for internal combustion (IC) engines, Knocking, Octane number. Unleaded petrol, Cetane number, Power alcohol, Compressed Natural gas (CNG), Liquefied petroleum gas (LPG).

UNIT-III (9+3)

Introduction to Methods of Chemical Analysis: Introduction to spectroscopy, Microwave spectra: Theory, Application of microwave spectra in the determination of bond length of a diatomic molecule. Infra-Red spectra: Theory, Applications: Calculation of force constant and identification of functional groups in organic compounds. UV-Visible spectra: Lambert-Beer's law and its applications, Types of electronic transitions.

Water Analysis and Treatment: Hardness of Water, determination of hardness of water by using EDTA, determination of Alkalinity, determination of Chloride by argentometry, determination of Fluoride by spectrophotometry, determination of Dissolved Oxygen, Biochemical Oxygen Demand and Chemical Oxygen Demand, Softening of water by Zeolite process and Ion-exchange process, Reverse Osmosis, Electrodialysis.

UNIT-IV (9+3)

Organic Chemistry: Fission of a covalent bond, Types of electron effects: Inductive effect, Mesomeric effect and Hyperconjugation, Reaction intermediates and their stabilities, Types of reagents: Electrophilic, Nucleophilic and Free radical reagents. Study of the mechanisms of substitution (SN^1 and SN^2) and Addition (Electrophilic, Nucleophilic and Free radical) reactions, Role of inductive effect, mesomeric effect and hybridization on the dissociation constant of carboxylic acids.

Polymers: Introduction : Types of Polymerization reactions (Addition and Condensations), Mechanism of free radical, cationic and anionic addition polymerization, Condensation polymerization, Thermo setting and thermo plastic resins, Silicone rubber, Conducting polymers, Laminated plastics.

Text Books:

1. Jain and Jain, "Engineering Chemistry", Dhanpat Rai Publishers.
2. Shashi Chawla, "Text book of Engineering Chemistry", Dhanpat Rai Publishers.

Reference Books:

1. J C Kuriacose and J.Rajaram, "Chemistry in Engineering and Technology (Vol .I&II)", Tata McGraw Hill Publishers.
2. Suba Ramesh, Vairam et. al "Engineering Chemistry", Wiley India.
3. O P Agarwal, "Engineering Chemistry", Khanna Publishers.
4. S.S.Dara, "A Text book of Engineering Chemistry", S.Chand & Company Ltd.

Course Learning Outcomes(COs):

- CO1: understand basic principles and role of chemistry in the field of engineering
 CO2: gain the knowledge of interrelationship between electrical and chemical energy
 CO3: make a judicious selection of materials in the field of engineering
 CO4: understand the phase rule and its application in the study of material science

U14CH203 - Engineering Chemistry												
U14CH203	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CH203.1	3	1	1	2								
U14CH203.2	3	2	1	2								
U14CH203.3	3	1	1	2								
U14CH203.4	3	1	1	2								
	3.00	1.25	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

U14CH203 - Engineering Chemistry				
U14CH203	PSO1	PSO2	PSO3	PSO4
U14CH203.1	3	1		
U14CH203.2	3			
U14CH203.3		1		
U14CH203.4	3			
	3.00	1.00	0.00	0.00

U14ME204 ENGINEERING DRAWING

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
2	4	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives (LOs):

LO1: To understand the importance of Engineering Drawing

LO2: To communicate effectively through Engineering Drawing

LO3: To impart and inculcate proper understanding of theory of projections

LO4: To identify the significance and application of the orthographic and isometric drawings.

UNIT - I (6+12)

Introduction: Importance of Engineering Drawing, instruments- uses; Conventions - ISO and BIS, Layout of drawing sheets, Types of Lines, Lettering and dimensioning.

Geometrical Constructions: Bisection of a line, arc and angle; division of a line, Construction of polygons- triangle, square, pentagon and hexagon.

Projection of Points: Introduction to orthographic projections-Vertical Plane, Horizontal plane; Views-Front view, Top view and Side view; Projection of Points.

Projection of Straight lines - I: Line parallel to both the planes, Line parallel to one plane and perpendicular to the other reference plane, Line parallel to one plane and inclined to the other reference plane.

UNIT - II (6+12)

Projection of Straight lines - II: Line- inclined to both the planes-Traces.

Projection of Planes: Planes - Perpendicular and Oblique planes; Projections of planes - parallel to one of the reference plane, inclined to one of the reference plane and perpendicular to the other; Projections of oblique planes.

UNIT - III (6+12)

Projection of Solids: Types-prisms, pyramids, cylinder and cone; Simple Positions-axis parallel to a reference plane and perpendicular to the other plane, axis parallel to one plane and inclined to other reference plane; axis inclined to both the reference planes.

Sections of Solids: Types-prisms and pyramids; Section planes, Sectional views and true shape of a section.

UNIT - IV (6+12)

Isometric Projections: Terminology; difference between isometric projection and view; Construction of isometric projection of different solids-box method and offset method.

Orthographic projections: Conversion of isometric views into orthographic views.

Text Books:

1. Bhatt N.D., "Elementary Engineering Drawing", Charotar Publishing House, Anand.

Reference Books:

1. Dhananjay A Jolhe, "Engineering Drawing", TMH, 2008.
2. Venugopal K. "Engineering Graphics with Auto CAD", New Age International Publishers Ltd., Hyderabad.
3. K. L. Narayana & P. Kannaiah, "Engineering Drawing", SciTech Publications, Chennai
4. W J Luzadder and J M Duff, "Fundamentals of Engineering Drawing", Prentice-Hall of India, 1995.

Course Learning Outcomes(COs):

CO1: After completion of the course, the student will be able to,

CO2: develop concepts on Engineering Drawing in order to become professionally efficient

CO3: understand the theory of projections

CO4: improve their spatial imagination skills to develop new products.

U14ME204 - Engineering Drawing												
U14ME204	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14ME204.1	3	2	3		2			3	2	2		3
U14ME204.2	2	3		2								
U14ME204.3	2	3	2	2	2	3		3	2	3		3
	2.33	2.67	2.50	2.00	2.00	3.00	0.00	3.00	2.00	2.50	0.00	3.00

U14ME204 - Engineering Drawing				
U14ME204	PSO1	PSO2	PSO3	PSO4
U14ME204.1	3	2	3	3
U14ME204.2	3	3	3	2
U14ME204.3	2	2		2
	2.67	2.33	3.00	2.33

U14EE205 BASIC ELECTRICAL ENGINEERING

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	:	40 marks
End Semester Exam	:	60 marks

Course Learning Objectives(LOs):

LO1: To impart basic knowledge about the Electrical & Magnetic Circuits.

LO2: To apply Kirchhoff's laws and Equivalent circuit models to analyze voltage & current relationship in passive circuit.

LO3: To inculcate the understanding about A.C. fundamentals and transformers.

LO4: To understand the working principles and applications of DC and AC Machines.

UNIT - I (9)

D.C. Circuits: Ohm's Law, Network Elements, Kirchhoff's Laws, Source Transformation, Mesh and Nodal Analysis, Power in D.C. Circuits, Series, Parallel and Series Parallel combination of Resistances, network reduction by Star - Delta Transformation.

Magnetic Circuits: Introduction, Magnetic Circuits, Magnetic Field Strength, Magnetomotive Force, Permeability, Relative Permeability, Analogy between Electric and Magnetic Circuits, Series Magnetic Circuit, Parallel Magnetic Circuit, Self-Inductance and Mutual Inductance.

UNIT - II (9)

D.C. Machines: Constructional features, Methods of Excitation, E.M.F. Equation, Torque development in D.C motor, Characteristics of Series, Shunt and Compound motors and Applications.

1- ϕ A.C. Circuits: Phasor representation of sinusoidal quantities, Average, R.M.S. values and Form factor, A.C. through Resistor, Inductor and Capacitor, Analysis of R-L-C series and Power factor, Power triangle, Series Resonance.

Measurements: Working principle of Moving coil, Moving Iron Ammeters and Voltmeters Dynamometer type Wattmeter.

UNIT - III (9)

3- ϕ A.C. Circuits: Production of 3 - ϕ Voltages, Voltage & Current relationships of Line and Phase values for Star and Delta connections, 3- ϕ Power Measurement by two-wattmeter method.

1- ϕ Transformers: Construction and operation principle, Development of No Load & On Load Phasor diagrams, Equivalent circuit, O.C. and S.C. tests, Losses and Efficiency, Voltage regulation.

UNIT - IV (9)

3- ϕ Induction Motor: Constructional features, Principle of Operation, Production of Rotating Magnetic Field, Torque - Slip Characteristics, Applications.

1- ϕ Induction Motors: Production of Rotating Field in various type of 1 - Phase Motors Split Phase, Capacitor Start, Capacitor run, Shaded Pole motors and Applications.

Text Books:

1. Edward Hughes, "Electrical & Electronics Technology", 10th edn., Pearson Education, 2010

Reference Books:

1. M.S. Naidu & S.Kamakshaiah, "Introduction to Electrical Engineering", Tata McGraw Hill Ltd, New Delhi.
2. B.L. Thereja, A.K. Thereja, "Electrical Technology Vol. I & II", S.Chand & Company Ltd, 2005 Edn.
3. Chakravarthy A, Sudhipanath and Chandan Kumar, "Basic Electrical Engg.", Tata McGraw Hill Ltd, New Delhi.

Course Learning Outcomes(COs):

CO1: predict the behavior of any Electrical & Magnetic Circuits.

CO2: solve Electrical Networks by mesh & nodal analysis.

CO3: analyze 1- ϕ & 3- ϕ AC Basic network and measure the 3- ϕ power

CO4: identify the type of Electrical Machines used for that particular application.

U14EE205 - Basic Electrical Engineering												
U14EE205	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14EE205.1	3	2	2	2								
U14EE205.2	2	2	1	1		1						
U14EE205.3	2	1	1	2		1						
U14EE205.4	2	1	1	1								
	2.25	1.50	1.25	1.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00

U14EE205 - Basic Electrical Engineering				
U14EE205	PSO1	PSO2	PSO3	PSO4
U14EE205.1	1	2	2	2
U14EE205.2		1	1	1
U14EE205.3	2	1		1
U14EE205.4	2	1	1	1
	1.67	1.25	1.33	1.25

U14CE206 BASIC ENGINEERING MECHANICS

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: Study the concept of force, principles of force and their application on engineering structures and machines.

LO2: To expose the students various kinds of statically determinate pin jointed structures and methods of analysing the truss.

LO3: To know the importance of geometric centre, cross sectional areas of plane bodies through centre of gravity and moment of inertia respectively.

LO4: Study the dynamic behavior of particles in motion subjected to force system.

UNIT - I (9+3)

Introduction: Basic Definitions – Mass, Particles, Rigid Body, Time, Space, Force, Branches of Mechanics, Fundamental principles of Mechanics – Parallelogram and Triangle laws of Forces, Newton’s laws of Gravitation and Motion, Laws of superposition and Transmissibility of Forces.

Force Systems: Types of Forces – Co-planar, Concurrent and Parallel Forces, Moment and Couple, Free Body Diagram, Types of Supports, Resultant of Force Systems, Resolution of Forces, Composition of Forces, Equilibrium equations of Forces, Lami’s Theorem, Varignon’s Theorem, Moment Equilibrium Equations, Distributed Forces, Resultant and Equilibrium of General Force System.

UNIT -II (9+3)

Friction: Introduction, Classification, Laws of Friction, Coefficient of Friction, Angle of Friction, Angle of Repose, Ladder Friction, Wedge Friction .

Plane Trusses and Frames: Basic Definitions, Stability and Determinacy Conditions, Rigid truss, Basic assumptions for a perfect truss, Assumptions in the Analysis of Trusses, Methods of Analysis of Trusses: Method of Joints and method of Sections of a Cantilever and simply supported statically determinate trusses.

Frames: Analysis of a Frames using Method of Members

UNIT- III (9+3)

Centroid and Centre of Gravity: Introduction, Computation of Centroid, Centre of gravity of one dimensional and two dimensional figures- centroids of composite line, simple sections, composite sections-Centre of gravity of composite areas and composite bodies.

Moment of Inertia: Introduction to Moment of Inertia, Transfer theorems of Moment of Inertia – Parallel Axis theorem and Perpendicular Axis theorem.

UNIT - IV (9+3)

Kinematics: Introduction to Dynamics, Rectilinear Motion of a particle – Displacement, Velocity and Acceleration, Motion with uniform Acceleration and Motion with variable Acceleration.

Curvilinear Motion- Components of motion, Rectangular Components, Components of Normal and Tangential Acceleration.

Kinetics: Rectilinear motion-Equations of Rectilinear motion, Equations of Dynamic Equilibrium, D'Alembert's Principle. Curvilinear Motion-Equations of Motion in Rectangular components, Tangential and Normal Components, Equations of Dynamic Equilibrium. Applications of Work-Energy, Impulse -Momentum principles of Rectilinear Motion and Curvilinear Motion.

Text Books:

1. Tayal A.K., "Engineering Mechanics: Statics and Dynamics", *Umesh Publishers*, New Delhi, 40th edn., 2014.
2. Timoshenko S., Young D.H., Rao J.V., and Sukumar Pati, "Engineering Mechanics in SI units", *McGraw Hill Education Pvt. Ltd.*, New Delhi, 5th edn., 2013.
3. Basudeb Bhattacharyya, "Engineering Mechanics", *Oxford University Press*, 9th edn., 2013.

Reference Books:

1. Singer F.L., "Engineering Mechanics: Statics and Dynamics", *Harper and Row Publishers*, 3rd edn., 1975.
2. Bhavikatti S.S., "Engineering Mechanics", *New Age International*, New Delhi, 4th edn., 2013 (reprint).

Course Learning Outcomes (COs):

CO1: understand the physical action of forces on the bodies through free body diagrams and analyse the forces using principles of force.

CO2: determine the axial forces in members of pin jointed structures subjected to various types of loadings.

CO3: understand the technical importance of geometrical shapes and centre of various cross sections.

CO4: understand equilibrium condition of particles in dynamic condition and can analyse the problems using various applications such as conservation of work energy principle.

U14CE206 - Basic Engineering Mechanics												
U14CE206	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE206.1	3	1	3	2		1						
U14CE206.2	3	2	3	1		1						
U14CE206.3	3	1	2	2		1						1
U14CE206.4	3	2	3	1		1						1
	3.00	1.50	2.75	1.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00

U14CE206 - Basic Engineering Mechanics				
U14CE206	PSO1	PSO2	PSO3	PSO4
U14CE206.1	3	3		
U14CE206.2	3			
U14CE206.3	3	2		
U14CE206.4	3			
	3.00	2.50	0.00	0.00

U14CS207 OBJECT ORIENTED PROGRAMMING LABORATORY

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:

LO1: To expose the students to the practical implementation of Object-Oriented concepts using C++ programming language

LO2: To improve students capability of object oriented programming for problem solving

LO3: To make students capable of using reusability and generic programming concepts in developing applications

LIST OF EXPERIMENTS

Experiment-I

1. Read 10 numbers and displays them in sorted order.
2. Write functions to swap two numbers using pointers and references.
3. Write a program that prints the sizes of the fundamental types, a few pointer types and a few enumeration of your choice. Use the size of operator.

Experiment-II

4. Write a function that counts the number of occurrences of pair of letters in a string, for example the pair "ab" appears twice in "xabaacbaxabb".
5. Find LCM of two, three and four numbers using function overloading.
6. Create a structure for storing students details (sno, sname, course, Array of five subject's marks) provide the functions for printing the total marks, calculating percentage and the result. (Note: Include the functions within the structure).

Experiment-III

7. Write a macro to find square (A+B)-square (C+D).
8. Create a class for complex number and provide methods for addition, subtraction, multiplication and division. Display the output in "a+ib" form.
9. Create a Distance class and provide methods for addition and subtraction of two distances.

Experiment-IV

10. Create a complex number class with default, parameterized, copy constructors and a destructor.
11. Create a class which provides a method to count the number of objects that are created for that class. (Use static method).
12. Create a class INT that behaves exactly like an int. (Note: overload +, -, *, /, %).

Experiment-V

13. Create a string class and overload + to concatenate two Strings, overload () to print substring and overload <, <=, >, >=, = operators to compare two string objects.
14. Create Date class and overload ++ to print next date and overload -- to print previous date.

Experiment-VI

15. Create a user defined array class Array and overload + to add two arrays, overload * to multiply two arrays, overload [] to access given position element and also to use left side of an assignment operator.
16. Create a complex number class and overload +, -, * operators using friend functions.
17. Program to perform Matrix operations using operator overloading with friend functions.

Experiment-VII

18. Programs to demonstrate Single, Multiple, Multilevel, Hierarchical, Hybrid and Multipath inheritance.
19. Programs to demonstrate constructors in inheritance.

Experiment-VIII

20. Create a Shape class with methods perimeter, area. Derive classes Circle, Square and Triangle from Shape class. Provide implementation for perimeter, area in the derived classes. (Declare perimeter, area as pure virtual functions).

21. Implement Multipath inheritance by declaring pointers to base class and access the derived class methods using base class pointers.
22. Program to demonstrate of manipulators

Experiment-IX

23. Write a function template to overload max method, which can find maximum of any data type.
24. Create function template to sort an array, which can sort array of any type.
25. Create a Generic calculator class to perform +, -, *, / operations on any type.
26. Create a Generic class for array of variable size and provide sorting, searching on any type.

Experiment-X

27. Find the roots of a quadratic equation. Handle exception for divide by zero.
28. Handle the Array Index out of Bounds Exception when accessing the elements of Arrays.
29. Create a text file of student information and display the contents of file.

Experiment-XI

30. Write a program to read a text file and remove all white space characters and replace each alphanumeric character with next character in the alphabet (Replace z by a and 9 by 0).
31. Copy the contents of one file into another except the blank lines using command line arguments.
32. Create a file with floating point numbers. Read pair of floating numbers from the file and write into another file.

Experiment-XII

33. Read the contents of three files, concatenate them and display it.
34. Write complex numbers into a file in binary format and in character format.
35. Create a class with integers and overload << to place integer into a file and overload >> to read an integer.

Course Learning Outcomes(COs):

- CO1: gain knowledge of implementing Object-Oriented Programming concepts using C++
 CO2: know the application of Object-Oriented Programming concepts for developing applications
 CO3: debug and document programs in C++
 CO4: develop applications using modularization technique

U14CS207 - Object Programming Laboratory

U14CS207	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CS207.1	3	3	3	3	3	2	3		3			3
U14CS207.2	3	3	3	1	3	3	3		3			3
U14CS207.3	2	2	2	2	3	1	3		2			2
U14CS207.4	2	1	3	2	2	1	3		2			2
	2.50	2.25	2.75	2.00	2.75	1.75	3.00	0.00	2.50	0.00	0.00	2.50

U14CS207 - Object Programming Laboratory

U14CS207	PSO1	PSO2	PSO3	PSO4
U14CS207.1	3	1		
U14CS207.2	3	1		
U14CS207.3				
U14CS207.4	3			
	3.00	1.00	0.00	0.00

U14CH208 ENGINEERING CHEMISTRY LABORATORY

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives:

LO1: To gain hands-on experience of conventional and instrumental methods of chemical analysis

LO2: To introduce water analysis techniques

LO3: To understand the principles involved in the polymerization reactions

LO4: To gain the knowledge of estimation of metals from their ores

LIST OF EXPERIMENTS

- 1 Determination of Alkalinity of test sample of water.
- 2 Estimation of Available Chlorine in test sample of Bleaching powder.
- 3 Determination of Hardness of water using complexometric method.
- 4 Determination of Calcium in Lime Stone / Dolomite.
- 5 Estimation of Cupric ions in the test solution.
- 6 Adsorption of an acid on a charcoal -Applicability of adsorption Isotherm.
- 7 Photochemical reduction of Ferric salt.
- 8 Synthesis of a polymer.
- 9 Conductometric Titrations.
- 10 Potentiometric Titrations.
- 11 Colorimetric analysis - Verification of Lambert-Beer's Law.
- 12 Estimation of Metal ion using ion-exchange resin.

Course Learning Outcomes(COs):

CO1: handle analytical instruments for chemical analysis.

CO2: determine alkaline species, temporary and permanent hardness of a water sample.

CO3: estimate some metals from their ores.

CO4: understand the advantages of instrumental methods of chemical analysis over conventional methods

U14CH208 - Engineering Chemistry Laboratory

U14CH208	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CH208.1	3	1	1	2								
U14CH208.2	3	1	1	2								
U14CH208.3	3	2	1	2								
U14CH208.4	3	1	1	2								
	3.00	1.25	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

U14CH208 - Engineering Chemistry Laboratory

U14CH208	PSO1	PSO2	PSO3	PSO4
U14CH208.1	3	1		
U14CH208.2	3	1		
U14CH208.3				
U14CH208.4	3	1		
	3.00	1.00	0.00	0.00

U14CH209 ENVIRONMENTAL STUDIES

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

L	T	P	C
2	-	-	2

Examination Scheme :

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: To incorporate the basic knowledge of the environmental studies

LO2: To understand the need to use resources more equitably

LO3: To understand the knowledge of conservation of biodiversity

LO4: To introduce the causes, effects and control measures of environmental pollution

UNIT-I (6)

Introduction: The Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over - exploitation of forests, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over- utilization of surface and ground water, floods; drought; conflicts over water.

Mineral Resources: Environmental effects of extracting and using mineral resources.

Agricultural Land: Land as a resource, land degradation, soil erosion and desertification.

Food Resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity:

Ecosystem: Concepts of an ecosystem: Food chain, food webs and ecological pyramids: Energy flow in the ecosystem: ecological succession.

Biodiversity and its conservation: Introduction: Definition. genetic, species and ecosystem diversity; value of biodiversity. Biodiversity in India, Hot spots of biodiversity, Man- wildlife conflicts, Endangered and endemic species of India, In-situ and Ex-situ conservation

UNIT-III (6)

Environmental Pollution: Global climatic change, Green house gases, Acid rain. Causes and effects of Air, Water, Soil, Marine and Noise pollution with case studies. Solid and Hazardous waste management, effects of urban, industrial and nuclear waste. Natural disaster management: flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Environment Protection and Society:

Role of Individual and Society: Role of individual in prevention of pollution, Water conservation, Rain water harvesting, Watershed management, wasteland reclamation.

Environmental Protection / Control Acts: Environmental legislation with respect to Air, Water, Forest and Wildlife, Enforcement of environmental legislations, Population growth, Role of Information Technology in Environment and Human Health.

Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses - 2nd edn., Universities Press (India) Private Limited
2. Anjaneyulu Y., "Environmental Studies", B.S. Publications.

Reference Books:

1. Bharucha Erach, "The Biodiversity of India" *Mapin Publishing Pvt. Ltd.*
2. Odum, E.P. 1971, "Fundamental of Ecology", *W.B. Saunders Co., USA, 574p.*
3. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", *Technoscience Publications.*
4. Gilbert M. Masters, "**Introduction to Environmental Engineering & Science**", 1991, *PHI*
5. A.S. Chauhan, "Environmental Studies", *Jain Brothers (New Delhi) 3rd revised and enlarged edition*
6. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*

Course Learning Outcomes(COs):

CO1: *understand human interaction with the environment*

CO2: *understand utmost importance of the sustainable use of natural resources*

CO3: *get acquainted with ecosystem and conservation of biodiversity*

CO4: *gain the knowledge of control measures of environmental pollution and natural disaster management*

U14CH209 - Environmental Studies												
U14CH209	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CH209.1	3	1	1	2								
U14CH209.2	3	1	1	2								
U14CH209.3	3	2	1	2								
U14CH209.4	3	1	1	2								
	3.00	1.25	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

U14CH209 - Environmental Studies				
U14CH209	PSO1	PSO2	PSO3	PSO4
U14CH209.1	3	1		
U14CH209.2	3	1		
U14CH209.3				
U14CH209.4	3			
	3.00	1.00	0.00	0.00

U14EA210 EAA PHYSICAL EDUCATION & NSS

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

Examination Scheme :

L	T	P	C
-	-	2	1

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

III. PHYSICAL EDUCATION

Course Learning Objectives & Outcomes:

LO1: To perform and engage in a variety of physical activities

LO2: To develop and maintain physical health and fitness through regular participation in physical activities

LO3: To demonstrate positive self-esteem, mental health and physiological balance through body awareness and control

LO4: To exhibit the spirit of fair play, team work and sportsmanship

Activities related to :

1. Physical Fitness
2. Games & Sports

IV. NATIONAL SERVICE SCHEME (NSS)

Course Learning Objectives:

LO1: arouse the social consciousness of the students

LO2: provide them with opportunity to work with people in villages and slums

LO3: expose them to the reality of life

LO4: bring about a change in their social perceptions

List of Activities:

1. Shramadanam
2. Tree Plantation
3. General Medical Camps in Villages
4. Awareness on Eye Donation
5. Awareness on "Child Labour and Child Marriages"
6. Awareness programs on "Literacy, Good Health Practices, etc."
7. Safe Riding Program
8. Awareness program on "RTI Act"
9. Awareness on Blood Donation

Course Learning Outcomes:

CO1: develop his / her personality through community service rendered

CO2: apply their education to find solutions to individual and community problems

CO3: acquire capacity to meet emergencies and natural disasters

CO4: acquire a democratic attitude, leadership qualities and practice national integration

U14EA210 - EAA: Physical Education & NSS

U14EA210	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14EA210.1				1	2	3	2	2	2	1	1	2
U14EA210.2				1	3	2	1	2	3	1	1	2
U14EA210.3				1	2	2	2	2	2	1	1	2
U14EA210.4						2	1	2	2	2	3	1
	0.00	0.00	0.00	1.00	2.33	2.25	1.50	2.00	2.25	1.25	1.50	1.75

U14EA210 - EAA: Physical Education & NSS

U14EA210	PSO1	PSO2	PSO3	PSO4
U14EA210.1	3	1		
U14EA210.2	3	1		
U14EA210.3				
U14EA210.4	3			
	3.00	1.00	0.00	0.00

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

III SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(6+2) +1]

Sl. No.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	BS	U14MH301	Engineering Mathematics - III	3	1	-	4	15	25	40	60	100
2.	PC	U14CE302	Strength of Materials - I	3	1	-	4	15	25	40	60	100
3.	PC	U14CE303	Fluid Mechanics	3	1	-	4	15	25	40	60	100
4.	PC	U14CE304	Surveying - I	3	1	-	4	15	25	40	60	100
5.	PC	U14CE305	Building Materials and Construction	4	0	-	4	15	25	40	60	100
6.	PC	U14CE306	Engineering Geology	4	0	-	4	15	25	40	60	100
7.	PC	U14CE307	Survey Field Work - I	-	-	3	2	40	-	40	60	100
8.	PC	U14CE308	Fluid Mechanics Laboratory	-	-	3	2	40	-	40	60	100
Total				20	4	6	28	170	150	320	480	800
9.	MC	U14MH309	Soft and Inter Personal Skills	-	-	2	1	100	-	100		100

Student Contact Hours/Week: 32

Total Credits: 28

U14MH301 ENGINEERING MATHEMATICS- III

Class: B.Tech. III semester

Branch: Common to all

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: Laplace transform and its use to find the solutions of certain initial and boundary value problems occur in engineering

LO2: Fourier series and its importance

LO3: application of Fourier series to a few partial differential equations of specific importance like wave equation, heat conduction equation, etc. which arise in engineering

LO4: integration of a function of complex variable, and evaluation of certain real integrals using complex analysis

UNIT-I (9+3)

Laplace Transforms: Integral transforms, Kernel of a transform, Laplace transform of a function; Inverse Transform, Existence and uniqueness of Laplace Transforms, S- plane and region of convergence (ROC); Laplace Transform of some commonly used signals-Dirac-delta (impulse) function $[\delta(t)]$, Step $[u(t)]$, Ramp $[tu(t)]$, Parabolic $[t^2u(t)]$, Real exponential $[e^{at}u(t)]$, Complex exponential $[e^{j\Omega t}u(t)]$, Sine & cosine functions, Damped sine & cosine functions, Hyperbolic sine & cosine functions, Damped hyperbolic sine & cosine functions, Rectangular pulse & triangle; Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property), Multiplication by 't' and division by 't', Laplace transforms of derivatives and integrals, Time scaling property, Time reversal property, Laplace transform of Heaviside unit step function, Second shifting theorem (time shift property); Initial value and final value theorems; Laplace transform of periodic functions, Convolution theorem.

Operational Calculus: Transfer functions, Solution of ordinary differential equations with constant coefficients and system of ordinary differential equations with constant coefficients using Laplace transforms, Application of Laplace transforms to the first order and second order systems subjected to impulse, Step, Periodic, Rectangular, Square, Ramp, Triangular and Sinusoidal functions.

UNIT-II (9+3)

Fourier Series: Periodic functions, Orthogonal and orthonormal functions and systems of orthogonal functions, Representation of a function as trigonometric Fourier series (FS) in a range of length 2π , Euler formulae, Conditions for the existence of Fourier series (Dirichlet's conditions), FS for typical wave forms - Square wave, Pulse train, Impulse train (comb function), Periodic rectangular wave, Triangle, Saw-tooth, Half-wave rectified signal, Full-wave rectified signal; Plotting FS coefficients - Line spectrum (magnitude and phase spectra); Effects of symmetry of function on FS coefficients, Exponential FS, Fourier series of $\sin \omega t$, $\cos \omega t$ and combination of Sinusoids, Fourier series on an arbitrary period; Half range series - Half range cosine and sine series expansions.

UNIT-III (9+3)

Applications of Partial Differential Equations: Basic concepts of partial differential equations, Classification of second order partial differential equations, Solution of a partial differential equation, Solution through the method of separation of variables.

Vibrating string: Wave equation and its solution by the method of separation of variables, D'Alembert's solution of wave equation, solutions of various boundary value problems based on vibrating string.

One dimensional heat flow: Transient heat flow equation, Heat flow through a bar of finite length with homogeneous and non-homogeneous boundary conditions, Heat flow through a bar with insulated ends.

Two dimensional heat flow: Equation of two dimensional heat flow (Laplace's equation) under steady state/the electrostatic potential of electrical charges in any region that is free of these charges (problems based on Trigonometric FS only), Solution of Laplace's equation in cartesian and polar form, Heat flow through infinite rectangular plates, Finite square plate and semi circular and circular plates.

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, Integral of a non analytic function, Dependence on path of integration, Bounds for integrals, *ML*-Inequality, Cauchy's integral theorem, Cauchy's integral formula; Series expansion of complex functions- Taylor's series and Laurent's series; Zeros and singularities, Residues; Residue Theorem - Applications of Residue theorem to the properly chosen integrals around a unit circle and semi circle.

Text Books:

1. Grewal. B.S., "Higher Engineering Mathematics", *Khanna Publishers*, New Delhi, 43rd edn., 2014.

Reference Books:

1. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.*, U.K 9th edn., 2013.
2. R.V.Churchill, "Complex Variables and its Applications", *McGraw-Hill*, New York, 9th edn., 2013.
3. S.S.Sastry, "Engineering Mathematics", Vol. II, *Prentice Hall of India*, 3rd edn., 2014.

Course Learning Outcomes (CO s):

- CO1: find Laplace transform of a given function and apply Laplace transforms to solve certain differential equations
- CO2: express given function as a Fourier series in an interval
- CO3: find solutions of partial differential equations by the method of separation of variables and apply the same to wave equations, equation of heat flow and Laplace's equation (cartesian & polar forms)
- CO4: represent a given function in Taylor's & Laurent's series along a given path and evaluate certain real integrals using integral theorems

U14MH301 – MATHEMATICS – II

U14MH301	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH301.1	3	3		2								2
U14MH301.2	3	2										
U14MH301.3	3	2										
U14MH301.4	2	3		2								3
	2.75	2.50	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.50

U14MH301 – MATHEMATICS – II

U14MH301	PSO1	PSO2	PSO3	PSO4
U14MH301.1	3			
U14MH301.2	3			2
U14MH301.3				3
U14MH301.4				
	3.00	0.00	0.00	2.50

U14CE302 STRENGTH OF MATERIALS - I

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: behavior of bodies subjected to various types of stresses and the associated strains

LO2: shear force and bending moment for determinate beams

LO3: bending and shear stresses for beams in flexure

LO4: behavior of springs and circular shafts subjected to loading

UNIT - I (9+3)

Simple stress and strain: Stress, Types of stresses, Strain, Stress - Strain diagram, Elastic limit, Hooke's law, Bars of varying sections, Uniformly tapering Circular and Rectangular sections, Elongation of bars due to self weight, Temperature stresses in uniform bars, Stresses due to lack of fit, Statically indeterminate problems.

Elastic Moduli: Elastic constants, Longitudinal strain, Lateral strain, Poisson's ratio, Complimentary shear stress, State of simple shear, Modulus of elasticity (E), Modulus of rigidity (N), Bulk modulus (K), Relation between E, N and K, St. Venant's principle, Strain energy, Resilience, Impact loading.

UNIT - II (9+3)

Principal stresses: Definition, Normal and Shear stress, Principal stresses and their graphical representation by Mohr's circle.

Shear force and bending moment: Types of supports, Classification of beams, Concept of shear force and bending moment, Shear force diagram and Bending moment diagram for Simply supported, Cantilever and Overhanging beams, Loading from shear force and bending moment diagram, Principle of superposition.

UNIT - III (9+3)

Theory of simple bending: Assumptions, Theory of simple bending, Application of bending equation and Calculation of bending stresses in beams of homogeneous and Flitched beam material, Beams of Uniform strength.

Shear stress distribution: Shearing stress due to bending, Variation of flexural shear stress distribution across various shapes of beams, Shear resilience.

UNIT - IV (9+3)

Torsion of circular shafts and springs: Close-coiled and Open-coiled helical spring subjected to axial load and axial twist, Springs in series, Springs in parallel, Strain energy in springs, Theory of pure torsion in Solid and Hollow circular shafts, Shear stresses, Angle of twist, Power transmitted by shaft.

Theories of failure: Maximum principal stress theory, Maximum principal strain theory, Maximum shear stress theory, Strain energy theory and Shear strain energy theory.

Text Books:

1. R. K. Rajput, "Strength of Materials", S. Chand and Company, 4th edn., 2006.
2. S. Ramamrutham and R. Narayanan, "Strength of Materials", Danpath Rai and sons, 16th edn., 2011.

Reference Books:

1. Timoshenko and Gere, "Mechanics of Materials", PWS Publishing Company, Boston, 4th edn., 1997.
2. R. K. Bansal, "A text book of Strength of Materials", Laxmi Publications, 4th edn., 2010.
3. Andrew Pytel and L. Ferdinand Singer, "Strength of Materials", Harper and Row Publishers, New York, 4th edn., 2011.

Course Learning Outcomes (COs):

CO1: explicate the various types of stresses and the associated strains

CO2: compute the shear force and bending moment for determinate beams

CO3: assess the bending and shear stresses for beams in flexure

CO4: explore the behavior of springs and circular shafts subjected to loading

U14CE302 – STRENGTH OF MATERIALS –I												
U14CE302	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE302.1	3	2	1			2			1	1		1
U14CE302.2	3	2	1			2			1	1		1
U14CE302.3	3	2	1	2		2			1	1		1
U14CE302.4	3	2	1	2		2	1		1	1		1
	3.00	2.00	1.00	2.00	0.00	2.00	1.00	0.00	1.00	1.00	0.00	1.00

U14CE302 – STRENGTH OF MATERIALS –I				
U14CE302	PSO1	PSO2	PSO3	PSO4
U14CE302.1	3	2		1
U14CE302.2	3	2		1
U14CE302.3	3	2		1
U14CE302.4	3	2		1
	3.00	2.00	0.00	1.00

U14CE303 FLUID MECHANICS

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: fluid properties, hydrostatic forces on submerged plane and curved surfaces

LO2: application of Euler's equation of motion and Bernoulli's equation

LO3: methods of dimensional analysis and importance of Reynold's and Froude's model laws

LO4: energy losses in pipe flows

UNIT - I (9+3)

Fluid fundamentals: Introduction, Difference between a Solid and Fluid, Conservation principles applied in Fluid Mechanics, Ideal fluid and Real fluid, Fluid Continuum, Fluid properties - Density, Specific weight, Specific gravity, Specific volume, Viscosity, Capillarity, Vapour pressure, Compressibility, Surface tension, Cohesion and Adhesion.

Fluid Statics: Equilibrium of fluid, Pressure at a point, Pascal's Law, Hydrostatic Law, Measurement of Pressure, Atmospheric, Gauge and Absolute pressures, Manometers - Principle of Manometry, Piezometer, U-tube differential manometer, Inverted differential manometer, Mechanical gauges - Bourdon's tube pressure gauge, Hydrostatic forces on Submerged plane and Curved surfaces, Total pressure and Center of pressure. Buoyancy and Floatation - Archimedes principle, Metacentre, Metacentric height - Analytical expression for Metacentric height, Stability of floating and submerged bodies.

UNIT - II (9+3)

Fluid Kinematics: Classification of fluid flow- Steady and Unsteady, Uniform and non uniform, one, Two and three dimensional flow, Streamline, Path line, Streak line and stream tube, Acceleration of fluid particle, Continuity equation in one, two and three dimensional flow, Circulation and Vorticity, Rotational and Irrotational flow, Conditions for irrotational flow, Velocity potential and Stream function.

Fluid Dynamics: Forces causing motion, Euler's equation of motion and its integration, Bernoulli's equation, Linear momentum equation, Application of Linear momentum equation to forces on pipe bend, Flow measurements - Venturimeter, Orificemeter, Pitot tube, Orifices, Mouthpieces, Notches and Weirs.

UNIT - III (9+3)

Dimensional Analysis: Dimensions and Dimensional Homogeneity, Dimensional analysis by Rayleigh's method and Buckingham's π -Theorem, Dimensionless numbers and their consequences in Fluid Mechanics.

Model Analysis: Forces Influencing Hydraulic phenomena, Types of Similarities, Model Analysis, Similitude studies and Modeling, Classification of Models, Model Laws - Reynold's and Froude's Model laws.

UNIT - IV (9+3)

Flow Through Pipes: Energy losses in pipes - Major and Minor losses - Expression for head loss due to Friction - Darcy's Weisbach equation, Expressions for head loss due to Pipe Expansion and Pipe Contraction, Hydraulic Gradient and Total Energy Lines, Pipes in Series and parallel, Equivalent pipe, Power transmission through pipes.

Laminar Flow: Characteristics of Laminar flow, Reynold's experiment, Critical Reynold's number,

Critical velocity, Steady laminar flow through a circular pipe, Hagen Poiseuille equation.

Text Books:

1. P. N. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics Including Hydraulic Machines", Standard Book House, Rajsons Publications Private Limited, 18th edn., 2011.
2. A. K. Jain, "Fluid Mechanics Including Hydraulic Machines", Khanna Publications, 2010.

Reference Books:

1. L. Victor Streeter and E. Benjamin Wylie, "Fluid Mechanics", McGraw Hill, Singapore, 1st Metric Edition, 1983.
2. M. Frank White, "Fluid Mechanics", Tata McGraw Hill, New Delhi, Special Indian edn., 2007.

Course Learning Outcomes (COs):

CO1: identify the properties of fluid and analyze the hydrostatic forces on plane and curved surfaces

CO2: explain the kinematics of a fluid element and flow measurement techniques

CO3: apply the Rayleigh's method and Buckingham's π -theorem

CO4: evaluate energy losses in a pipe flow and apply the Hagen Poiseuille equation for pipe flow

U14CE303 – FLUID MECHANICS												
U14CE303	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE303.1	3	2	2	3	1	3	2	2	2	3	2	3
U14CE303.2	3	2	2	2	3	2	2	2	3	3	2	2
U14CE303.3	3	3	2	3	1	2	2	3	2	2	3	2
U14CE303.4	3	3	2	3	3	3	2	2	3	2	2	3
	3.00	2.50	2.00	2.75	2.00	2.50	2.00	2.25	2.50	2.50	2.25	2.50

U14CE303 – FLUID MECHANICS				
U14CE303	PSO1	PSO2	PSO3	PSO4
U14CE303.1	3	2	2	2
U14CE303.2	3	3	2	3
U14CE303.3	3	3	3	3
U14CE303.4	3	3	2	3
	3.00	2.75	2.25	2.75

U14CE304 SURVEYING - I

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: concepts of surveying

LO2: concepts of meridian, bearings and their interrelationships

LO3: principles and methods of traversing and leveling

LO4: concepts of trigonometric levelling and plot contours maps

UNIT - I (9+3)

Principles of Surveying: Introduction, Principles of surveying, Classifications of surveys, Preparation of Maps and Plans, Units of measurement, Sources of errors.

Linear measurements: Methods of making Linear measurements by chain and tape, Correction to lengths by chain and tape, Ranging, Chaining on level ground and sloping ground, Survey stations and survey lines, Offsets, Errors and Obstacles in chaining.

UNIT - II (9+3)

Compass Surveying: Meridians, Bearings and their inter-relationships, Designations of bearings, Calculations of angles from bearings - Vice versa, Magnetic declination, Local Attraction.

Theodolite Surveying: Theodolite description, Uses and adjustments - Temporary and permanent, Fundamental lines and relations, Measurement of horizontal and vertical angles - Repetition and Reiteration methods.

UNIT - III (9+3)

Traverse surveying: Traversing methods, Checks in Traverse, Measurement of traverse angles, Traverse computations using compass and theodolite, Balancing Traverse, Omitted measurements.

Levelling: Definitions, Principles of Levelling, spirit levelling, limitations, and Levelling instruments, Terms in Levelling, Booking and reduced levels, Curvature and refraction.

UNIT - IV (9+3)

Trigonometrical surveying: Base of the object accessible, Base of an inclined object accessible, Reduced level of the elevated points with inaccessible bases, Instrument axes at different levels.

Contour surveying: Characteristics of contours, Methods of contouring, Contours of natural features, Interpolation, Contour gradient, Uses of contour maps.

Text Books:

1. B. C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publications, 16th edn., 2011.
2. S. K. Duggal, "Surveying Volume 1 and II", McGraw Hill Education (India) Pvt., Ltd., 2015.

Reference Books:

1. K. R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.
2. T. P. Kanetker and S. V. Kulkarni, "Surveying and Leveling Volume I and II", Pune Vidyarthi Griha Prakashan, 24th edn., 2014.
3. R. Subramanian, "Surveying and Leveling", Oxford University Press, New Delhi, 2nd edn., 2007.
4. S. K. Roy, "Fundamentals of Surveying", PHI Learning Private Limited, New Delhi, 2nd edn., 2010.

Course Learning Outcomes (COs):*CO1: describe the concepts of surveying**CO2: apprise compass and theodolite surveying**CO3: describe the concepts traversing and levelling**CO4: apply trigonometric principles in surveying and plot contour maps*

U14CE304 - SURVEYING – I												
U14CE304	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE304.1	3	2	3	2	3	2	1	2	2	1	1	2
U14CE304.2	3	3	3	3	3			1				3
U14CE304.3	3	3	3	2	3						2	2
U14CE304.4	3	3	3	2	3						2	2
	3.00	2.75	3.00	2.25	3.00	2.00	1.00	1.50	2.00	1.00	1.67	2.25

U14CE304 - SURVEYING – I				
U14CE304	PSO1	PSO2	PSO3	PSO4
U14CE304.1	2	2	3	2
U14CE304.2	2	2	1	1
U14CE304.3	2	1	2	1
U14CE304.4	2	1	2	2
	2.00	1.50	2.00	1.50

U14CE305 BUILDING MATERIALS AND CONSTRUCTION

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	0	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: occurrence and existence of stone and preparation of brick

LO2: classification of lime, composition of cement and properties of other building materials

LO3: functional requirements of building and building components

LO4: masonry, finishing works, adopting suitable building services and temporary supporting system

UNIT - I (12)

Properties of building materials: Introduction, Identification of materials for construction in Civil Engineering practice - Physical and Mechanical properties of building materials.

Stones and Bricks: Classification of stones, Properties of stones, Natural bed of stones, Characteristics of good building stones, Bricks, Composition of brick earth, Manufacturing process of brick- preparation of clay, Moulding, Drying, Burning- clamp, Kiln, Characteristics of good building bricks, Classification of bricks, Tests on bricks.

UNIT - II (12)

Lime and Cement: Source of lime, Classification of limes, Slaking of lime, Hydraulic lime, Uses of lime, Cement, Composition of Ordinary Portland cement, Functions of ingredients, Setting and hydration of cement, Manufacturing process - IS recommendations.

Timber: Definition, Classification of trees, Structure of tree, Seasoning of timber, Preservation of timber, Defects in timber. Other building materials: Glass- composition and types, Plastics- Types, Asbestos - Composition and Uses.

UNIT - III (12)

Building Planning: Functional planning of building- General principles of site selection, objectives of planning and sun diagram, IS / NBC recommendations.

Building Components: Foundations-Brief introduction to shallow and deep foundations, Walls-Types of walls, Thickness of walls, Cavity wall. Openings in Buildings - Doors and Windows-Types, Functions, Sizes and suitability for different locations, Ventilators. Roofs - Flat roofs - Madras terrace and jack arch roof, Brief description of RCC roof, Method of construction of RCC roof. Floors - Common types of flooring used in buildings.

UNIT - IV (12)

Masonry Works: Stone masonry - Dressing of stones, Specifications for stone masonry. Brick masonry - Bonds in brick masonry, Classification, Stretcher, Header, English and Flemish bond, Specifications for construction of brick masonry. Temporary Supporting Structures - Brief description of Centering, Formwork, Scaffolding, Shoring and Underpinning.

Building Services and Finishing works: Types of vertical transportation in building, Stairs - Types of stairs, Design of stairs. Building Services - Plumbing services, Electrical services, Air conditioning, Acoustics and sound insulation, Fire protection measures. Brief description of Plastering, Pointing, White and color washing, False ceiling works.

Text Books:

1. S. P Arora and Bindra, "A Textbook of Building Construction", Dhanpat Rai and Sons, 4th Edn., 2010.
2. B. C. Punmia, "Building construction", Laxmi Publications Pvt., Ltd., New Delhi, 19th Edn., 2005

Reference Books:

1. S. K. Duggal, "Building materials", New Age international Pvt., Ltd., New Delhi
2. S. V. Deodhar, "Building science and planning", Khanna Publishers, New Delhi.
3. N. L. Arora and B. L. Gupta, "Building construction", Satya prakshan publications, New Delhi.
4. C. Rangwala, K .S. Rangwala and P. S. Rangwala, "Engineering materials", Charotar Publishers.

Course Learning Outcomes (COs):

CO1: classify and demonstrate the occurrence and existence of stone and brick

CO2: describe the manufacturing of lime, cement and identify other materials

CO3: frame and describe the building components and other statutory requirements

CO4: describe the masonry work, finishing work, building services and temporary supporting system

U14CE305 - BUILDING MATERIALS AND CONSTRUCTION												
U14CE305	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE305.1	3	2	3	3	3	3	3	1	2	3	1	1
U14CE305.2	3	2	2	3	3	3	2	1	2	3	1	1
U14CE305.3	3	3	2	3	3	3	3	1	3	3	1	1
U14CE305.4	3	1	3	2	3	3	2	1	2	3	1	1
	3.00	2.00	2.50	2.75	3.00	3.00	2.50	1.00	2.25	3.00	1.00	1.00

U14CE305 - BUILDING MATERIALS AND CONSTRUCTION				
U14CE305	PSO1	PSO2	PSO3	PSO4
U14CE305.1	3	3	3	3
U14CE305.2	3	2	2	2
U14CE305.3	3	2	2	2
U14CE305.4	3	2	2	2
	3.00	2.25	2.25	2.25

U14CE306 ENGINEERING GEOLOGY

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: study of weathering and its effects on rocks

LO2: different rocks and the various tests to be done on them

LO3: study of geological structures, geological maps and investigations on ground water table.

LO4: geological problems associated with earthquakes, landslides, reservoir and tunnels.

UNIT - I (12)

General Geology: Scope of geology from Civil Engineering point of view, Branches of Geology, Surface features and Earth's interior, Processes and end products of weathering, Susceptibility of rocks to weathering.

Mineralogy: Definition of crystal and mineral, Study of the physical properties and importance of minerals such as Quartz and its varieties, Feldspar, Augite, Hornblende, Olivine, Mica, Granite, Kyanite, Calcite, Talc, Bauxite, Corundum, Gypsum, Fluorite, Apatite and important Civil Engineering minerals.

UNIT - II (12)

Petrology: Formation and Geological classification of different rocks - Applications.

Texture & Structure: Physical and Engineering properties of rocks for constructional purposes, Tests for rocks as building stone, Aggregates, Foundation stone, Roofing and facing stones.

UNIT - III (12)

Structural Geology: Structural features like stratification, Lamination, Bedding planes, Dip, Strike, Study of common geological structures associating with the rocks such as faults, Folds, joints and their field identifications, Unconformities, Overlaps, Inliers, Outliers, Importance of geological structures in Civil Engineering activities.

Geological Investigations: Interpretation of geological maps and aerial maps, Hydrogeology, ground water table investigations and explorations, Geophysical methods - electrical resistivity and seismic refraction methods, Bore hole drilling.

UNIT - IV (12)

Geology of Dams, Reservoirs and Tunnels: Types of dams, requirement of dam sites, reconnaissance - preliminary and detailed Geological investigations for a dam site. Geology of the major dam sites of India, Leakage and Silting of reservoirs, Remedial measures, Purpose of tunneling and Geological problems connected with tunneling.

Natural Hazards: Causes and effects of earthquakes and landslides, Remedial measures to prevent damage to engineering structures, Causes and Remedial measures of soil erosion.

Text Books:

1. N. Chenna Keshavulu, "Textbook of Engineering Geology", Macmillan Publishers, New Delhi, 2nd edn., 2009.
2. Parbin Singh, "Engineering and General Geology", S. K. Kataria and Sons, New Delhi, 8th edn., 2013.

Reference Books:

1. K. V. G. K. Gokhale, "Principles of Engineering Geology", BS Publications, Hyderabad, 1st edn., 2013.
2. B. S. S. Narayanaswamy, "Engineering Geology", Dhanpat Rai and Co., New Delhi.

Course Learning Outcomes (COs):

CO1: identify various minerals

CO2: classify different rocks

CO3: interpret geological maps and Explore ground water table investigations

CO4: describe in detail about earthquakes, landslides, reservoirs and tunnels.

U14CE306 - ENGINEERING GEOLOGY

U14CE306	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE306.1	1	1		2	2	3	3	3	3	3	2	3
U14CE306.2	2	2		2		2	3	3	3	3	1	3
U14CE306.3	2	2	1	3	3	3	3	3	2	2	2	2
U14CE306.4	1	1		2		1	2	3	1	1	1	2
	1.50	1.50	1.00	2.25	2.50	2.25	2.75	3.00	2.25	2.25	1.50	2.50

U14CE306 - ENGINEERING GEOLOGY

U14CE306	PSO1	PSO2	PSO3	PSO4
U14CE306.1	1		2	3
U14CE306.2	1		3	3
U14CE306.3	2	2	2	2
U14CE306.4			2	3
	1.33	2.00	2.25	2.75

U14CE307 SURVEY FIELD WORK - I

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

- LO1: chain surveying
 LO2: measuring the angles between survey lines
 LO3: methods of Leveling
 LO4: develop contour maps

LIST OF EXPERIMENTS

1. Chain Surveying: Ranging and Chaining
2. Chain Surveying: Use of Optical square or Cross staff, check line, tie line
3. Horizontal Angles measurement by Repetition and Re-iteration methods
4. Measuring the distance between two inaccessible points using theodolite
5. Theodolite Traversing- Closed Traverse
6. Levelling - Temporary adjustments and recording staff readings
7. Fly Levelling using Auto level
8. Profile Levelling using Auto level
9. Longitudinal and cross section using Auto level
10. Block levelling using Theodolite
11. Trigonometric Levelling - Single plane method
12. Trigonometric Levelling - Double plane method

Laboratory manual:

1. "Survey Field Work - I Laboratory Manual", prepared by the faculty of Department of Civil Engineering.

Text Books:

1. B. C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publication, Pvt., Ltd., 16thedn., 2011
2. Dr. K. R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.

Course Learning Outcomes (COs):

- CO1: conduct Chain surveying
 CO2: establish the survey lines
 CO3: determine the elevations of points by different methods
 CO4: plot contour maps

U14CE307 - SURVEY FIELD WORK - I

U14CE307	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE307.1	3	3	2	2	3			3			1	1
U14CE307.2	3	3	3	2		2		1	2			2
U14CE307.3	2	3	3	2	2	1		2	2			2
U14CE307.4	3	3	3	2	2			2	2	2		2
	2.75	3.00	2.75	2.00	2.33	1.50	0.00	2.00	2.00	2.00	1.00	1.75

U14CE307 - SURVEY FIELD WORK - I

U14CE307	PSO1	PSO2	PSO3	PSO4
U14CE307.1				
U14CE307.2	2	1	1	2
U14CE307.3	1	1	2	1
U14CE307.4	2	1	2	2
	1.67	1.00	1.67	1.67

U14CE308 FLUID MECHANICS LABORATORY

Class: B.Tech. III-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: flow measuring devices

LO2: implementation of Bernoulli's equation

LO3: major and minor losses in a pipe flow

LO4: Reynolds experiment to verify different types of flows in a pipe

LIST OF EXPERIMENTS

1. Calibration of Triangular Notch
2. Calibration of Rectangular Notch
3. Calibration of sharp edged circular Orifice (Both steady and unsteady flows)
4. Calibration of external Mouthpiece (Both steady and unsteady flows)
5. Verification of Bernoulli's theorem
6. Performance of Venturimeter and Orifice meter
7. Losses in pipe lines due to sudden enlargements and sudden contractions
8. Losses in pipe lines due to bends and elbows
9. Determination of friction factor in Pipes
10. Performance of Nozzle meter and Rotameter
11. Broad crested weir – discharge measurement
12. Study of flow through a Reynold's apparatus

Laboratory manual:

1. "Fluid Mechanics Laboratory Manual", prepared by the faculty of Department of Civil Engineering.

Text Books:

1. N. Kumara Swamy, "Fluid Mechanics and Machinery Laboratory Manual", Charotar Publishing House Pvt., Ltd., 1st edn., 2008.
2. Sarbjit Singh, "Experiments in Fluid Mechanics", PHI Learning Private Limited, New Delhi, 2009.

Course Learning Outcomes (COs):

CO1: measure discharge through pipes, channels and tanks

CO2: verify Bernoulli's theorem

CO3: measure the energy losses in a pipe flow

CO4: classify the different types of flows in a pipe

U14CE308 - FLUID MECHANICS LABORATORY

U14CE308	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE308.1	3	3	2	2	1	2	1	2		1	1	2
U14CE308.2	3	3	2	2	2	2	1	2	1	1	1	2
U14CE308.3	3	3	3	2	2	1	1	2	2	2	1	2
U14CE308.4	3	3	2	2	1	2	1	2	2	1	2	3
	3.00	3.00	2.25	2.00	1.50	1.75	1.00	2.00	1.67	1.25	1.25	2.25

U14CE308 - FLUID MECHANICS LABORATORY

U14CE308	PSO1	PSO2	PSO3	PSO4
U14CE308.1	3	2	3	2
U14CE308.2	2	3	2	3
U14CE308.3	3	2	3	2
U14CE308.4	2	3	2	2
	2.50	2.50	2.50	2.25

U14MH309 SOFT AND INTERPERSONAL SKILLS

Class: B.Tech. III semester

Branch: CE, ME and CSE

Teaching Scheme :

Examination Scheme :

L	T	P	C
-	-	2	1

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

LO1: language skills and speaking with logical sequence & confidence

LO2: knowing their skills in public speaking and practice to reveal true qualities of personality & leadership

LO3: knowing their suitable and apt career objectives in-line with the industry expectations

LO4: developing career goals, and strategies for gaining employability skills

LIST OF ACTIVITIES

Activity 1: Team interaction

Activity 2: JAM round

Activity 3: Extempore

Activity 4: Debate

Activity 5: GD

Activity 6: Elocution

Activity 7: Presentations through PPTs

Activity 8: Oral presentations on career planning and “my dream-career”

Activity 9: SWOT analysis presentation

Activity 10: Mock Interview

Activity 11: Hosting and anchoring an event

Activity 12: Story narration

Suggested readings:

1. Robert.T.Kiyosaki and Sharon L.Lechter, “Rich Dad Poor Dad”, Warmer Books,1997.
2. Shiv Khera, “You can Win” New Dawn Press, 2004.
3. APJ Abdul Kalam, “Wings of Fire: An Autobiography of APJ Abdul Kalam”, University Press, 1999.
4. David Joseph Schwartz, “The magic of thinking big”, Simon & Schuster Inc., 1/e, 1987.
5. Stephen Covey, “The 7 Habits of Highly Effective People”, Free Press, 1989.

Course Learning Outcomes (COs):

CO1: exhibit their verbal skills and non verbal skills

CO2: identify clearly defined career objective and apply skills to achieve excellence in their career

CO3: analyze and relate their competencies as per the industry requirements

CO4: excel in interviews to attain better opportunities.

U14MH309 – SOFT AND INTER PERSONAL SKILLS

U14MH309	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH309.1						1		1	1	3	1	3
U14MH309.2						2	1	1	2	3	1	3
U14MH309.3						1	2	1		3	1	3
U14MH309.4					1			1	1	3	1	3
	0.00	0.00	0.00	0.00	1.00	1.33	1.50	1.00	1.33	3.00	1.00	3.00

U14MH309 – SOFT AND INTER PERSONAL SKILLS

U14MH309	PSO1	PSO2	PSO3	PSO4
U14MH309.1	2	1	2	2
U14MH309.2	1		2	1
U14MH309.3	1	2	1	2
U14MH309.4	2			3
	1.50	1.50	1.67	2.00

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

IV SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(5+3) +2]

S. No.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	BS	U14MH401	Engineering Mathematics - IV	3	1	-	4	15	25	40	60	100
2.	PC	U14CE402	Strength of Materials - II	3	1	-	4	15	25	40	60	100
3.	PC	U14CE403	Hydraulics and Hydraulic Machines	3	1	-	4	15	25	40	60	100
4.	PC	U14CE404	Surveying - II	3	1	-	4	15	25	40	60	100
5.	PC	U14CE405	Concrete Technology	3	1	-	4	15	25	40	60	100
6.	PC	U14CE406	Survey Field Work - II	-	-	3	2	40	-	40	60	100
7.	PC	U14CE407	Hydraulics and Hydraulic Machines Laboratory	-	-	3	2	40	-	40	60	100
8.	ES	U14EE410	Basic Electrical Measurements and Instrumentation Laboratory	-	-	3	2	40	-	40	60	100
Total				15	5	9	26	195	125	320	480	800
9.	MC	U14MH409	Compliance with Current English	-	-	2	-	100	-	100	-	100
10.	MC#	U14CH209	Environmental Studies	2	-	-	2	15	25	40	60	100

Student Contact Hours/Week: 31+2#

For lateral entry students only

Total Credits: 26

U14MH401 ENGINEERING MATHEMATICS- IV

Class: B.Tech. IV semester

Branch: Common to all

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: various methods of solving system of linear equations and eigen value problem

LO2: methods of fitting curves by the method of least squares

LO3: probability distributions and applications to engineering disciplines

LO4: numerical methods to solve various problems

UNIT-I (9+3)

Matrices: Elementary transformations on a matrix to find inverse of a matrix, Rank of matrix, Normal form of a matrix, Solution of system of homogenous and non homogeneous linear equations, Linear dependence and independence of vectors.

Eigen values and eigen vectors of a matrix - Cayley Hamilton theorem, Reduction of a matrix to diagonal form, Reduction of a quadratic form to canonical form.

UNIT-II (9+3)

Probability & Statistics: Statistical data: Review of measures of central tendency and measures of dispersion, Correlation coefficient, Rank correlation, Regression – Linear regression equations.

Curve fitting: Method of least squares –Fitting of (i) Straight line (ii) Second degree parabola (iii) Exponential curves, Most plausible solution of a system of linear algebraic equations.

Review of the concepts of probability, Random variables, Discrete and continuous probability distributions, Mean and variance of a distribution, Binomial distribution, Poisson distribution and normal distribution, Fitting of these probability distributions to the given data.

UNIT-III (9+3)

Numerical Analysis: Finite differences and difference operators.

Interpolation: Lagrange interpolation, Newton's forward and backward interpolation formulae.

Numerical differentiation: First and second derivatives using forward and backward interpolation polynomials at the tabulated points.

Numerical integration: Gaussian quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule and Simpson's 3/8th rule.

UNIT-IV (9+3)

Solution to system of linear equations: Gaussian elimination method, Jacobi and Gauss-Siedel iteration methods.

Numerical Solution of algebraic and transcendental equations: Bisection method, Regula-Falsi method and Newton Raphson's method.

Numerical solution of ordinary differential equations: Taylor's method, Picard's method, Euler's method and Runge - Kutta methods of second and fourth order.

Text Books:

1. Grewal. B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd edn. 2014.

Reference Books:

1. Gupta and Kapoor, "Fundamentals of Mathematical Statistics", Sulthan Chand and & sons, New Delhi, 11th edn. , 2010.
2. Kreyszig E., "Advanced Engineering Mathematics", John Wiley & Sons, Inc., U.K., 9th edn., 2013.

Course Learning Outcomes (COs):

CO1: compute rank of a matrix to solve a system of linear algebraic equations, eigen values, eigen vectors of a given square matrix and reduce a given quadratic form to canonical form

CO2: fitting various types of curves arising in the analysis of engineering problems, find correlation regression coefficients of given data and apply theoretical probability distributions in decision making

CO3: find the polynomial for the given set of data & its derivative and evaluate definite integrals using numerical methods

CO4: compute the solution of system of linear equations, algebraic, transcendental and ordinary differential equations

U14MH401 - ENGINEERING MATHEMATICS - IV

U14MH401	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH401.1	3	3		2								2
U14MH401.2	3	2										
U14MH401.3	3	3		2								2
U14MH401.4	3	3		3								3
	3.00	2.75	0.00	2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.33

U14MH401 - ENGINEERING MATHEMATICS - IV

U14MH401	PSO1	PSO2	PSO3	PSO4
U14MH401.1	3	2	3	2
U14MH401.2	3			
U14MH401.3		3		2
U14MH401.4			1	
	3.00	2.50	2.00	2.00

U14CE402 STRENGTH OF MATERIALS - II

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: various methods to evaluate slope and deflection

LO2: stresses developed in short and long columns and chimneys

LO3: analysis of statically indeterminate structures

LO4: stresses arise in thin and thick cylinders subjected to pressure

UNIT - I (9+3)

Deflection of beams: Double integration method, Macaulay's method, Moment area method, Conjugate beam method, Application of above methods in calculation of slope and deflections of simply supported, Cantilever and Overhanging beams.

Strain energy: Strain energy of beams in bending, Deflection of beams from strain energy, Unit load method, Castigliano's theorem 1, Application to deflection of determinate plane truss.

UNIT - II (9+3)

Direct and bending stresses: Stresses in a member subjected to axial load, Eccentric loads, Core or Kernel of a section, Wind pressures on chimneys.

Theory of long columns: Euler's theory, Euler's critical load for columns with various end conditions, Limitations, Rankine's hypothesis, IS code formula, Critical load for eccentrically loaded columns.

UNIT - III (9+3)

Fixed and continuous beams: Analysis of fixed beams for shear and bending moments, Deflection of fixed beams, Effect of sinking of supports, Analysis of continuous beams using Clapeyron's theorem of three moments, Effect of sinking of supports.

Statically indeterminate frames: Analysis of statically indeterminate frames up to two degree of indeterminacy using Castigliano's theorem.

UNIT - IV (9+3)

Thin cylinders: Analysis of thin walled pressure vessels, Hoop stress, longitudinal stress.

Thick cylinders: Lamé's theory, Stresses in cylinders subjected to internal and external pressure, compound cylinders, Shrink fitting.

Text Books:

1. B. C Punmia, K. Arun Jain, K. Ashok Jain, "Mechanics of Materials", Laxmi Publications Pvt., Ltd., New Delhi, 15th edn., 2005
2. H. J. Shah and S. B. Junnarkar, "Mechanics of Structures Volume - I and Volume - II", Charotar Publishing House Pvt., Ltd., Anand, 31st edn., 2014.

References:

1. R. K. Bansal, "A text book of Strength of Materials", Laxmi Publications, 4th edn., 2010.
2. Andrew Pytel and L. Ferdinand Singer, "Strength of Materials", Harper and Row Publishers, New York, 4th edn., 2011.

Course Learning Outcomes (COs):

CO1: analyze slope and deflection in beams subjected to loading

CO2: evaluate the stresses in long and short columns with various loading and boundary conditions

CO3: apply principles of Clapeyron's and Castigliano's theorem in analyzing indeterminate structures

CO4: analyze and design thick, thin and compound cylinders subjected to pressure.

U14CE402 - STRENGTH OF MATERIALS - II												
U14CE402	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE402.1	2	3	2		1		1					1
U14CE402.2	2	3	3	2	1	1		1	1		1	1
U14CE402.3	3	3	2	2	1	1		1		1		1
U14CE402.4	3	3	3	1	1	1					1	1
	2.50	3.00	2.50	1.67	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

U14CE402 - STRENGTH OF MATERIALS - II				
U14CE402	PSO1	PSO2	PSO3	PSO4
U14CE402.1	2	1		1
U14CE402.2	2	2	1	1
U14CE402.3	3	2	1	1
U14CE402.4	2	3	1	
	2.25	2.00	1.00	1.00

U14CE403 HYDRAULICS AND HYDRAULIC MACHINES

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: characteristics of turbulent flow and water hammer phenomenon

LO2: boundary layer concept of displacement thickness, momentum thickness and energy thickness

LO3: most economical channel cross sections for maximum discharge

LO4: classification of turbines and pumps

UNIT - I (9+3)

Turbulent flow in Pipes: Characteristics of Turbulent flow, Shear stress due to Turbulence, Reynolds stresses, Prandtl's mixing length theory, Universal velocity distribution law near a solid boundary, Smooth and Rough boundaries, Nikuradse's experiment, Karman - Prandtl resistance equations, Variation of friction factor with Reynold's number - Moody's Chart.

Water Hammer in Pipes: Water hammer phenomenon, Gradual and sudden closure of valves, Expression for pressure rise considering elasticity of pipe and fluid, Pressure relieving devices.

UNIT - II (9+3)

Boundary Layer Theory: Concept of Boundary layer, Boundary layer growth over a flat plate, Boundary layer thickness, Displacement thickness, Momentum thickness and Energy thickness, Laminar and Turbulent boundary layers, Integral momentum equation for boundary layer, Separation of Boundary layer and its Control.

Fluid Flow around Submerged Bodies: Drag and Lift - Basic concepts and expressions, Drag and lift forces on Sphere and Cylinder.

UNIT - III (9+3)

Flow in Open Channels: Distinction between Pipe flow and Channel flow, Characteristics of open channels, Classification of flow, Manning's and Chezy's equations, Most economical cross sections of channels - Rectangular, Trapezoidal, Triangular and Circular shapes, Velocity distribution in channel section.

Hydraulic Jump: Energy concepts in open channel flow, Specific Energy curve, Critical depth, Critical velocity, Condition for Critical, Subcritical and Super critical flows. Hydraulic jump - expressions for depth of Hydraulic jump and Loss of energy due to Hydraulic jump. Channel transitions, Equation for gradually varied flow, Classification of surface profiles, Rapidly varied flow.

UNIT - IV (9+3)

Hydraulic Machines: Impact of Jets - Force exerted by a liquid jet on a Stationary, Moving flat plate and Curved vanes. Hydraulic Turbines - Heads and Efficiencies, Classification - Impulse and Reaction turbines, Pelton and Francis turbines, Specific speed, Draft tube, Cavitation phenomenon, Characteristic curves and Selection of turbines.

Pumps: Introduction, Centrifugal pump - Heads and Efficiencies, Specific speed, Characteristic curves, Net positive suction head, Priming, Selection and Operational difficulties. Reciprocating Pump - Single and Double acting Reciprocating pumps, Coefficient of discharge and Slip, Use of Air vessels and Characteristic curves.

Text Books:

1. P. N. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics Including Hydraulic Machines", Standard Book House, Rajsons Publications Pvt. Ltd., 18th edn., 2011.
2. A. K. Jain, "Fluid Mechanics Including Hydraulic Machines" Khanna Publications, 2010.

Reference Books:

1. Ven Te Chow, "Open Channel Hydraulics", McGraw-Hill, New York, 1973.
2. L. Victor Streeter and E. Benjamin Wylie, "Fluid Mechanics", McGraw Hill, Singapore, 1st edn., 1983.
3. Jagdeesh Lal, "Hydraulic Machines", Metropolitan Book Co., New Delhi.

Course Learning Outcomes (COs):

CO1: explain the characteristics of turbulent flow and the concept of water hammer in pipelines

CO2: explain the concept of boundary layer

CO3: identify the most economical section for a channel flow

CO4: analyze the operation of various turbines and pumps

U14CE403 - HYDRAULICS AND HYDRAULICS MACHINES – II												
U14CE403	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE403.1	3	3	3	3	1	1	1		3	1		3
U14CE403.2	2	1	2	3		1	2	1	3	1		3
U14CE403.3	2	1	1	2		1			3	1		3
U14CE403.4	3	1	2	3	1	2	2	2	3	1	1	3
	2.50	1.50	2.00	2.75	1.00	1.25	1.67	1.50	3.00	1.00	1.00	3.00

U14CE403 - HYDRAULICS AND HYDRAULICS MACHINES – II				
U14CE403	PSO1	PSO2	PSO3	PSO4
U14CE403.1	3		1	3
U14CE403.2	3	2		3
U14CE403.3	3			3
U14CE403.4	3	3	2	3
	3.00	2.50	1.50	3.00

U14CE404 SURVEYING - II

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: concepts of tacheometry

LO2: setting out various curves

LO3: plane table surveying

LO4: advanced survey instruments

UNIT - I (9+3)

Principles of Tacheometry: Introduction, Types of tacheometric measurements, Determination of Tacheometric constants, Distance and elevation formulae, uses.

Tacheometric Surveying: Analytical lens, Principle of subtense bar, Tacheometric measurements by tangential system, Methods of holding and reading staff.

UNIT - II (9+3)

Simple and Compound Curves: Theory of simple curves, Setting out simple curves by linear and angular methods, Setting out Compound curve.

Transition curves: Transition curves, Characteristics of transition curves, Computations and Setting out Transition curve.

UNIT - III (9+3)

Plane table Surveying: Plane table survey - principles, adjustment, Working operations, methods of plane table surveying, Two point problem, Three point problem, Advantages and Disadvantages.

Setting out works: Horizontal and vertical control, Setting out a pipe line, Setting out a building.

UNIT - IV (9+3)

Elements of Photogrammetry: Principle, photographs types, Vertical-aerial photographs, Relief displacement and measurement Radial line method of plotting, Principle of stereoscopy.

Total Station survey: Introduction to Total station, Angular- linear-coordinates- measurement, setting up and orienting, Accessories, Advantages.

Text Books:

1. B. C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publication, Pvt., Ltd., 16th edn., 2011.
2. S. K. Duggal, "Surveying Volume I and II", McGraw Hill Education (India) Pvt., Ltd., 2015.

Reference Books:

1. Dr. K. R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.
2. T. P. Kanetker and S. V. Kulkarni "Surveying and Levelling Volume I and II", Pune Vidyarthi Griha Prakashan, 24th edn., 2014.
3. R. Subramanian, "Surveying and Levelling", Oxford University Press, New Delhi, 2nd edn., 2007.
4. S. K. Roy, "Fundamentals of Surveying", PHI Learning Private Limited, New Delhi, 2nd edn., 2010.

Course Learning Outcomes (COs):*CO1: explain concepts of tacheometry**CO2: discuss the methods to set out various curves**CO3: execute plane table methods**CO4: operate the advance instruments in the survey*

U14CE404 - SURVEYING - II												
U14CE404	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE404.1	2	1	2		1	1	1	2	1	3	2	1
U14CE404.2	3	2	2	1	2	2	1		3	2		3
U14CE404.3	2	1				1	2			2		
U14CE404.4	2	2	2	3	3	3	2	2	2	2	2	2
	2.25	1.50	2.00	2.00	2.00	1.75	1.50	2.00	2.00	2.25	2.00	2.00

U14CE404 - SURVEYING - II				
U14CE404	PSO1	PSO2	PSO3	PSO4
U14CE404.1	3	2	1	1
U14CE404.2	2	2	1	
U14CE404.3	2	1		
U14CE404.4	2	2	1	2
	2.25	1.75	1.00	1.50

U14CE405 CONCRETE TECHNOLOGY

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: constituent materials and properties of fresh concrete

LO2: different phases in production of concrete and methods of protecting concrete

LO3: special concretes and methods of repair in concrete

LO4: different methods of mix proportioning of concrete

UNIT I (9+3)

Constituents & Properties of Fresh Concrete: Brief review of concrete making materials, Cement, Aggregate and water, Use of admixtures in concrete and the effects produced by them on concrete, Workability, Pozzolonas, Air entraining mixtures, Accelerators and Retarders Properties of fresh concrete.

Properties of hardened concrete: Concrete testing, Strengths of Concrete, Factors affecting strength, Stress-strain Characteristics, Shrinkage and creep deformations, Influence of temperature and Permeability on concrete, Other properties of concrete.

UNIT II (9+3)

Production of concrete: Batching of materials in concrete, Compaction of concrete, Different types of compaction, Types of vibrators, Vibro pressing, Vibro tamping, Centrifugation.

Curing of Concrete: Methods of curing concrete, Protection of concrete from extreme weather conditions such as temperature and corrosion.

UNIT III (9+3)

Concrete Durability: Causes of inadequate durability, Diffusion, Absorption, Water permeability, Air and vapour Permeability, Carbonation, Acid and sulphate attack, Efflorescence, Disruption by alkali silica reaction-preventive measures Abrasion, erosion, cavitation and types of cracking.

Special types of concrete: Light weight concrete, Vacuum concrete, Mass concrete, Self Compacting Cement (SCC), Polymer concrete, Prepacked concrete, Under water concreting, Ferrocement, Fibre reinforced concrete, Shotcrete and Guniting.

UNIT IV (9+3)

Proportioning of concrete mixes: Variables influencing the concrete proportioning mixes and their effect on the concrete strength.

Design Mixes: Design of concrete mixes using IS code method and ACI method.

Text Books:

1. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill, New Delhi, 5th edn., 2013.
2. M. S. Shetty, "Concrete Technology (Theory and Practice)", S. Chand Company, New Delhi, 7th edn., 2010.

REFERENCE BOOKS:

1. A. R. Santha kumar "Concrete Technology", Oxford Publishers, 1st edn., 2010.
2. A. M. Neville, "Properties of Concrete", Mc Graw Hill Publications, New Delhi, 5th edn., 2012.

Course Learning Outcomes (COs):

CO1: summarize constituent materials, properties and behavior of fresh concrete

CO2: design different grades of concrete mixes

CO3: explain different phases in production of concrete and methods of protecting concrete

CO4: summarize different special concretes and methods of repair in concrete

U14CE405 - CONCRETE TECHNOLOGY												
U14CE405	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE405.1		1	1		2	2	3			1	3	3
U14CE405.2	3	3	2	3	2	1	1	2	1	3	3	3
U14CE405.3		1	2	2	3	2	3	2	2	1	1	2
U14CE405.4		3	3	3	3	3	2	2	1		3	3
	3.00	2.00	2.00	2.67	2.50	2.00	2.25	2.00	1.33	1.67	2.50	2.75

U14CE405 - CONCRETE TECHNOLOGY				
U14CE405	PSO1	PSO2	PSO3	PSO4
U14CE405.1	1	1	2	3
U14CE405.2	3	2	2	2
U14CE405.3	1	2	1	3
U14CE405.4	2	2	3	
	1.75	1.75	2.00	2.67

U14CE406 SURVEY FIELD WORK - II

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: measuring the distances and angles by tacheometry

LO2: developing contour maps by tacheometry

LO3: setting out of curves

LO4: using Total station

LIST OF EXPERIMENTS

1. Determination of Tacheometric constants
2. Determination of horizontal and vertical distances by stadia tacheometry
3. Determination of gradient of two inaccessible points by tangential tacheometry
4. Plot contour maps of a given area using tacheometer
5. Setting out a Simple curve using chain and tape
6. Setting out a Simple curve by Rankine's method
7. Setting out a Compound curve using Theodolite
8. Setting out a Transition curve using Theodolite
9. Determination of lengths and directions of consecutive survey lines using total station
10. Determination of area of a terrain using total station
11. Determination of the elevation of a remote object using total station
12. Determination of gradient and distance between two inaccessible points using total station

Laboratory manual:

1. "Survey Field Work-II Manual", prepared by the faculty of Department of Civil Engineering.

Text Books:

1. B. C. Punmia and Ashok kumar Jain, "Surveying Volume I and II", Laxmi Publication, Pvt., Ltd., 16th edn., 2011
2. Dr. K. R. Arora, "Surveying Volume I and II", Standard Book House, 15th edn., 2015.

Course Learning Outcomes (COs):

CO1: determine the distances and angles of tacheometry

CO2: plot the contour maps by tacheometry

CO3: plot the curves using different instruments

CO4: determine distances, angles, gradient and area using total station

U14CE406 - SURVEY FIELD WORK - II												
U14CE406	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE406.1	2	2			2	1	1		1			
U14CE406.2	2	1	2	1	1	3	2		2	2	2	2
U14CE406.3	2			1	2	2	2		2		2	2
U14CE406.4	3	1	2	3	3	2	1		1	1	2	2
	2.25	1.33	2.00	1.67	2.00	2.00	1.50	0.00	1.50	1.50	2.00	2.00

U14CE406 - SURVEY FIELD WORK - II				
U14CE406	PSO1	PSO2	PSO3	PSO4
U14CE406.1	3		1	1
U14CE406.2	1	1	1	2
U14CE406.3	2	3	1	2
U14CE406.4	1	2	2	2
	1.75	2.00	1.25	1.75

U14CE407 HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: rugosity coefficient in smooth and rough channels

LO2: characteristics of hydraulic jump

LO3: application of Impulse momentum equation

LO4: performance characteristics of pumps and turbines

LIST OF EXPERIMENTS

1. Determination of Rugosity coefficient in smooth and rough channels
2. Study of hydraulic jump characteristics
3. Study of flow through a Venturi flume and Standing wave flume
4. Determination of Coefficient of discharge of Proportional weir
5. Study of forces due to impact of jet on a surface
6. Performance of Centrifugal pump
7. Performance of Turbine pump
8. Performance of Reciprocating pump
9. Performance of Submersible pump
10. Performance of Francis Turbine
11. Performance of Pelton wheel

Laboratory manual:

1. "Hydraulics and Hydraulic Machines Laboratory Manual", prepared by the faculty of Department of Civil Engineering.

Text Books:

1. N. Kumara Swamy, "Fluid Mechanics and Machinery Laboratory Manual", Charotar Publishing House Pvt., Ltd., 1st edn., 2008.
2. Sarbjit Singh, "Experiments in Fluid Mechanics", PHI Learning Private Limited, New Delhi, 2009.

Course Learning Outcomes (COs):

CO1: calculate discharge in smooth and rough channels

CO2: determine energy loss in hydraulic jump

CO3: verify Impulse momentum equation

CO4: evaluate the performance characteristics of pumps and turbines

U14CE407 - HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

U14CE407	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE407.1	3	3	3	2	1	1					1	1
U14CE407.2	3	3	2	3			3				1	2
U14CE407.3	3	3	3	1	1		1		1		1	2
U14CE407.4	3	3	3	1	1	1	1	1		1	1	2
	3.00	3.00	2.75	1.75	1.00	1.00	1.67	1.00	1.00	1.00	1.00	1.75

U14CE407 - HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

U14CE407	PSO1	PSO2	PSO3	PSO4
U14CE407.1	2	3	1	2
U14CE407.2	2		3	2
U14CE407.3	3		2	2
U14CE407.4	3	3	1	2
	2.50	3.00	1.75	2.00

U14EE410 BASIC ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

Class: B.Tech. IV-Semester

Branch: Civil Engineering

Teaching Scheme:

Examination Scheme:

L	T	P	C
-	-	3	2

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

LO1: use of strain gauge and LVDT

LO2: application of Kirchhoff's laws for DC Circuits

LO3: rectifier circuits and amplifier circuits

LO4: usage of CRO

LIST OF EXPERIMENTS

1. Determination of ripple factor for a diode bridge rectifier.
2. Biasing of a transistor and calculation of gain of CE amplifier.
3. Zener diode as a voltage regulator.
4. Measurement of unknown frequency using CRO.
5. Verification of Kirchhoff's Laws for DC circuits.
6. Determination of parameters of a choke coil.
7. Frequency of series RLC circuit.
8. Determination of efficiency and voltage regulation of a 1-phase transformer using O.C and S.C. tests.
9. Measurement of displacement using LVDT.
10. Measurement of strain of a cantilever beam using strain gauge.
11. Measurement of resistance using Wheatstone's bridge.
12. Measurement of force using strain gauge.

Laboratory Manual

1. Manual for "Basic Electrical Measurements and Instrumentation Laboratory" prepared by the department of EEE.

Course Learning Outcomes (COs):

CO1: use strain gauge and LVDT for civil engineering applications

CO2: apply Kirchhoff's laws for DC Circuits

CO3: determine the ripple factor of rectifier circuit and gain of BJT amplifier

CO4: use CRO for measurement of frequency

U14EE410 - BASIC ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY												
U14EE410	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14EE410.1	3	2	2	2								
U14EE410.2	2	2	1	1		1						
U14EE410.3	2	1	1	2		1						
U14EE410.4	2	1	1	1								
	2.25	1.50	1.25	1.50	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00

U14EE410 - BASIC ELECTRICAL MEASUREMENTS AND INSTRUMENTATION				
U14EE410	PSO1	PSO2	PSO3	PSO4
U14EE410.1	3	1	2	1
U14EE410.2				
U14EE410.3	2		1	1
U14EE410.4		1		1
	2.50	1.00	1.50	1.00

U14MH409 COMPLIANCE WITH CURRENT ENGLISH

Class: B.Tech. IV Semester

Branch: CE, ME and CSE

Teaching Scheme :

Examination Scheme:

L	T	P	C
-	-	2	1

Continuous Internal Evaluation	100 marks
End Semester Examination	--

Course Learning Objectives (LOs):

- LO1: rudiments of grammar and accuracy in spoken English*
LO2: introducing themselves, making new introductions, preparing scripts of simple dialogues, playing the assigned roles and speaking extempore and making public discourses
LO3: vocabulary to attribute quality to language
LO4: correct use of language and techniques to write an essay, a report, an official letter, to precise the given text and to prepare CV/resume

LIST OF ACTIVITIES

- Activity-1:** Identifying sub- tenses, structures and examples
Activity-2: Using tenses in different situations and detecting the errors
Activity-3: Matching the sentences with subject and verb
Activity-4: Making statements and questions using correct verb form that would go with the subject
Activity-5: Introducing oneself and introducing others
Activity-6: Developing dialogues on the given situations and playing the assigned roles
Activity-7: Predicting the meanings of different words, making sentences substituting a group of words, identifying the ambiguity in sentences and using foreign phrases in sentences
Activity-8: Speaking extempore on the given topic, making speeches and giving seminars
Activity-9: Preparing CV/resume and writing an official letter
Activity-10: Writing a report and an essay
Activity-11: Précising the given text
Activity-12: Correcting the errors in a sentence

Reference Book:

1. John Sinclair, "Collins Cobuld English Grammar," Collins Cobuild,1990

Course Learning Outcomes (COs):

- CO1: use appropriate tense in proper situations and produce grammatically acceptable sentences in speech and writing*
CO2: develop dialogues and conversations in English and make oral presentations effectively
CO3: use sound vocabulary in communication
CO4: write a report, an official letter, an essay, prepare CV / Resume and precise the given passage._

U14MH409 - COMPLIANCE WITH CURRENT ENGLISH

U14MH409	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH409.1						1		1	1	3	1	3
U14MH409.2						1		1	1	3	1	3
U14MH409.3						1		1	1	3	1	3
U14MH409.4						2	1	1	2	3	1	3
	0.00	0.00	0.00	0.00	0.00	1.25	1.00	1.00	1.25	3.00	1.00	3.00

U14MH409 - COMPLIANCE WITH CURRENT ENGLISH

U14MH409	PSO1	PSO2	PSO3	PSO4
U14MH409.1			1	3
U14MH409.2				
U14MH409.3			2	3
U14MH409.4			2	
	0.00	0.00	1.67	3.00

U14CH209 ENVIRONMENTAL STUDIES

Class: B.Tech. II Semester

Branch: Common to all branches

Teaching Scheme :

Examination Scheme :

L	T	P	C
2	-	-	2

Continuous Internal Evaluation :	40 marks
End Semester Exam :	60 marks

Course Learning Objectives(LOs):

LO1: To incorporate the basic knowledge of the environmental studies

LO2: To understand the need to use resources more equitably

LO3: To understand the knowledge of conservation of biodiversity

LO4: To introduce the causes, effects and control measures of environmental pollution

UNIT-I (6)

Introduction: The Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance.

Natural Resources:

Forest Resources: Use and over - exploitation of forests, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.

Water Resources: Use and over- utilization of surface and ground water, floods; drought; conflicts over water.

Mineral Resources: Environmental effects of extracting and using mineral resources.

Agricultural Land: Land as a resource, land degradation, soil erosion and desertification.

Food Resources :World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources.

UNIT-II (6)

Ecosystem and Biodiversity:

Ecosystem: Concepts of an ecosystem: Food chain, food webs and ecological pyramids: Energy flow in the ecosystem: ecological succession.

Biodiversity and its conservation: Introduction: Definition. genetic, species and ecosystem diversity; value of biodiversity. Biodiversity in India, Hot spots of biodiversity, Man- wildlife conflicts, Endangered and endemic species of India, In-situ and Ex-situ conservation

UNIT-III (6)

Environmental Pollution: Global climatic change, Green house gases, Acid rain. Causes and effects of Air, Water, Soil, Marine and Noise pollution with case studies. Solid and Hazardous waste management, effects of urban, industrial and nuclear waste. Natural disaster management: flood, earthquake, cyclone and landslides.

UNIT-IV (6)

Environment Protection and Society:

Role of Individual and Society: Role of individual in prevention of pollution, Water conservation, Rain water harvesting, Watershed management, wasteland reclamation.

Environmental Protection / Control Acts: Environmental legislation with respect to Air, Water, Forest and Wildlife, Enforcement of environmental legislations, Population growth, Role of Information Technology in Environment and Human Health.

Text Books:

1. Erach Bharucha, "Text Book of Environmental Studies for Under Graduate Courses - 2nd edn., Universities Press (India) Private Limited
2. Anjaneyulu Y., "Environmental Studies", B.S. Publications.

Reference Books:

1. Bharucha Erach, "The Biodiversity of India" *Mapin Publishing Pvt. Ltd.*
2. Odum, E.P. 1971, "Fundamental of Ecology", *W.B. Saunders Co., USA, 574p.*
3. Trivedi R.K. and P.K. Goel, "Introduction to Air Pollution", *Techmoscience Publications.*
4. Gilbert M. Masters, "**Introduction to Environmental Engineering & Science**", 1991, *PHI*
5. A.S. Chauhan, "Environmental Studies", *Jain Brothers (New Delhi) 3rd revised and enlarged edition*
6. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*

Course Learning Outcomes(COs):

CO1: *understand human interaction with the environment*

CO2: *understand utmost importance of the sustainable use of natural resources*

CO3: *get acquainted with ecosystem and conservation of biodiversity*

CO4: *gain the knowledge of control measures of environmental pollution and natural disaster management*

U14CH209 - Environmental Studies												
U14CH209	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CH209.1	3	1	1	2								
U14CH209.2	3	1	1	2								
U14CH209.3	3	2	1	2								
U14CH209.4	3	1	1	2								
	3.00	1.25	1.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

U14CH209 - Environmental Studies				
U14CH209	PSO1	PSO2	PSO3	PSO4
U14CH209.1	3	1		
U14CH209.2	3	1		
U14CH209.3				
U14CH209.4	3			
	3.00	1.00	0.00	0.00

***** Note: To be offered to the Lateral Entry students in the IV semester**

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

V SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(5+3) +1]

Sl. No.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	PC	U14CE501	Structural Analysis - I	3	1	-	4	15	25	40	60	100
2.	PC	U14CE502	Design of Reinforced Concrete Structures	3	1	-	4	15	25	40	60	100
3.	PC	U14CE503	Geotechnical Engineering - I	3	1	-	4	15	25	40	60	100
4.	PC	U14CE504	Highway Engineering	3	1	-	4	15	25	40	60	100
5.	PC	U14CE505	Environmental Engineering	3	1	-	4	15	25	40	60	100
6.	PC	U14CE506	Material Testing Laboratory	-	-	3	2	40	-	40	60	100
7.	PC	U14CE507	Concrete Technology Laboratory	-	-	3	2	40	-	40	60	100
8.	PC	U14CE508	Computer Aided Building Drawing Laboratory	-	-	3	2	40	-	40	60	100
9.	PR	U14CE509	Seminar	-	-	-	1	100	-	100	-	100
Total				15	5	9	27	295	125	420	480	900

Student Contact Hours/Week: 29

Total Credits: 27

U14CE501 STRUCTURAL ANALYSIS - I

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: analysis of indeterminate structures using compatibility and equilibrium equations

LO2: distribution of forces at joints

LO3: approximate analysis of tall structures subjected to horizontal loading

LO4: the variation of internal forces in a structural member for moving loads

UNIT - I (9+3)

Slope deflection method - beams: Development of Slope-Deflection equations, Sign convention, Analysis of continuous beams with and without sinking of supports. Construction of bending moment diagram, Shear force diagrams.

Slope-deflection method- Frames: Rectangular portal frames, Frames with and without side sway for single bay single storey.

UNIT - II (9+3)

Moment distribution method -beams: Introduction and calculation of distribution factors and carry over factors, Analysis of continuous beams with and without sinking of supports.

Moment distribution method-frames: Rectangular portal frames with and without side sway for single bay single storey.

UNIT - III (9+3)

Kani's method: Analysis of beams using kani's method.

Approximate methods: Approximate analysis of multi storied frames using portal method and cantilever method.

UNIT - IV (9+3)

Moving Loads: Maximum BM and SF diagrams for simple beams traversed by single point load, a pair of point loads, uniformly distributed load shorter and longer than the span, Series of point loads, Absolute maximum bending moment and shear force, Enveloping parabola and Equivalent UDL.

Influence Line Diagrams: Influence line diagram for support reaction, Bending moment and Shear force for simple and over hanging beams. Influence Line Diagrams for stresses in members for deck and through type bridges truss.

Text Books:

1. B. C. Punmia and A. K. Jain "Theory of Structures", Laxmi Publications, New Delhi, 12th edn., 2004.
2. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill Education Pvt., Ltd., New Delhi. 3rd edn., 1994.

Reference Books:

1. S. Ramamrutham and R. Narayan "Theory of Structures", Dhanpat Rai, 18th edn., 2008.
2. C. K. Wang "Indeterminate Structural Analysis", McGraw Hill Book Co.

Course Learning Outcomes (COs):*CO1: develop compatibility and equilibrium equations for the analysis of indeterminate structures**CO2: the distribution of forces at joints and also developing net bending moment and shear force diagrams for indeterminate structures**CO3: analyse the tall structures using approximate analysis for horizontal loads**CO4: draw the variation of internal forces in structural members for moving loads*

U14CE501 - STRUCTURAL ANALYSIS - I

U14CE501	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE501.1	3	3	2			1	1					
U14CE501.2	3	3	1			1	1					
U14CE501.3	3	3	2			1	1					
U14CE501.4	3	3	2				1			1		
	3.00	3.00	1.75	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00

U14CE501 - STRUCTURAL ANALYSIS - I

U14CE501	PSO1	PSO2	PSO3	PSO4
U14CE501.1	3	3		1
U14CE501.2	3	3		2
U14CE501.3	3	3		
U14CE501.4	3	3		3
	3.00	3.00	0.00	0.00

U14CE502 DESIGN OF REINFORCED CONCRETE STRUCTURES

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: concepts of limit state method of design

LO2: design of reinforced concrete beams for collapse in serviceability limit state

LO3: design of slabs and columns using limit state design

LO4: design of footings and demonstrate working stress method

UNIT - I (9+3)

Fundamentals of Limit State Design: Introduction to reinforced cement concrete, Loads on structures, Methods of design, Code of practice, Stress-strain curves of concrete, Mild steel and Tor steel, Grades of concrete as per IS: 456-2000, Characteristic loads and strengths, Partial safety factors.

Limit State of Collapse in Flexure: Analysis and design of Beams, Singly, doubly reinforced rectangular and flanged sections.

UNIT - II (9+3)

Shear and Torsion: Shear, torsion and development length.

Limit State of Serviceability: Check for short term deflection for determinate beams, Long term deflection due to creep, Long term deflection due to differential shrinkage.

UNIT - III (9+3)

Slabs: Design of one way simply supported and continuous slabs and two way slabs as per IS: 456-2000.

Columns: Axially loaded rectangular columns, Circular columns with lateral ties and helical reinforcement, Axially loaded short columns with uni-axial bending moment.

UNIT - IV (9+3)

Footings: Design of isolated footing for axially loaded columns, Design of combined footing.

Working Stress Method of Design: Design Principles, Under reinforced, Balanced and over-reinforced beams, Analysis and design of rectangular beams, Design for shear.

Text Books:

1. A. K. Jain, "Limit State Design", Nem Chand Brothers, Roorkee, 7th edn., 2012.
2. B. C. Punmia, "Reinforced Concrete Structures", Laxmi Publishing Company, New Delhi, 8th edn., 2012.

Reference Books:

1. S. Unnikrishna Pillai and Devdas Menon, "Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 3rd edn., 2011.
2. Jai Krishna and O. P. Jain, "Plain and Reinforced Concrete", Nem Chand Brothers, Roorkee, 8th edn., 2012.
3. IS 456, "Code of practice for Plain and reinforced concrete", Bureau of Indian standards, New Delhi, 2000.
4. IS 875 (part 1-5), "Code of practice for Design loads", Bureau of Indian standards, New Delhi, 1987.

Course Learning Outcomes (COs):

CO1: explain the general mechanical behavior of reinforced concrete

CO2: analyze and design reinforced concrete flexural members

CO3: design one way, two way slabs and columns

CO4: design footings and Summarize working stress method

U14CE502 - DESIGN OF REINFORCED CONCRETE STRUCTURES												
U14CE502	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE502.1	1	1	1			1	1				1	
U14CE502.2	1	1	2	2	1		2				1	
U14CE502.3	1	1	2	2	1		2				1	1
U14CE502.4	1	1	2	2	1		2				1	1
	1.00	1.00	1.75	2.00	1.00	1.00	1.75	0.00		0.00	1.00	1.00

U14CE502 - DESIGN OF REINFORCED CONCRETE STRUCTURES				
U14CE502	PSO1	PSO2	PSO3	PSO4
U14CE502.1	3			
U14CE502.2	2	3		
U14CE502.3	2	3		
U14CE502.4	2	3		
	2.25	3.00	0.00	0.00

U14CE503 GEOTECHNICAL ENGINEERING-I

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: classification of soils

LO2: permeability, seepage and compaction

LO3: consolidation settlements

LO4: shear strength parameters

UNIT - I (9+3)

Basic definitions and phase relationships: Introduction - Soil formation, Soil structure, Definitions of rock, soil and soil mechanics and Soil problems, Phase diagrams, Water content, Specific gravity, Void ratio, Porosity, Degree of saturation, Density of soil, Mass, weight, volume relationships, Relative density.

Identification and classification of soils: Sieve analysis, Stoke's law and its limitations, Grain size distribution curves, Atterberg limits, IS classification of soils, Field identification of soils consistency of soils, Activity, Thixotrophy, Liquidity index, Consistency index and Hydrometer analysis.

UNIT - II (9+3)

Permeability and Seepage: Darcy's law and its limitations, Determination of coefficient of permeability, Coefficient of permeability for different soils, Factors affecting permeability of soils, Permeability of stratified soils, Laplace's equation, Stream and potential functions, characteristics of flow net, Construction of flow net, Uses of flow net, Flow net for Anisotropic soils.

Compaction: Mechanism of compaction, Proctor's compaction test, Zero air voids curve, Factors affecting compaction, Effect of compaction on soil properties, Field compaction, and Percentage compaction.

UNIT - III (9+3)

Consolidation: Mechanism of consolidation, Characteristic compression curves, Basic definitions, Normal, under and over consolidated clays, Terzaghi's one dimensional consolidation theory- Assumptions, Derivation, Determination of consolidation properties of soils, Magnitude and rate of consolidation settlements.

Stress distribution: Need for finding of stress distribution in soils - Assumptions in elastic theories - Boussinesq equation for point, line, circular and rectangular loads, Westergaard's analysis for point load, Concept and use of pressure bulb - Principle and use of Newmark's influence chart, Contact pressure distribution under rigid and flexible footings in sand and clay.

UNIT - IV (9+3)

Shear strength: Introduction, Normal and Shear stresses, Mohr's circle characteristics of Mohr's circle, Mohr-Coulomb theory, Revised Mohr-Coulomb equation.

Shear parameters of soils: Direct shear test, unconfined compression test, Tri axial test, Vane shear test, Importance of drainage conditions, Consolidated Drained, Consolidated Undrained and Unconsolidated Undrained shear tests, Factors affecting the shear strength of clays and sands, Liquefaction, Critical void ratio.

Text Books:

1. K. R. Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers, New Delhi, 9th edn., 2013,.
2. C. Venkatramaiah, "Geotechnical Engineering", New Age Publications, 2nd edn., 2006.

Reference Books:

1. Shenbaga R. Kaniraj, "Design Aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Education Private Limited, New Delhi, 1st edn., 2013.
2. T. W. Lambe and Whiteman, "Soil Mechanics", New Age Publications, 1st edn., 1969.

Course Learning Outcomes (COs):

CO1: classify soils

CO2: determine permeability, optimum moisture content and maximum dry density

CO3: determine consolidation characteristics of a given soil

CO4: identify shear strength parameters of different soils

U14CE503 - GEOTECHNICAL ENGINEERING - I												
U14CE503	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE503.1			3			2				2		
U14CE503.2	2	3	3	2	2	2	2		2	3	2	
U14CE503.3	1	3	2	1	2	2	1		2	1		1
U14CE503.4	3	3	2	1	2	3	3		2	1	3	3
	2.00	3.00	2.50	1.33	2.00	2.25	2.00	0.00	2.00	1.75	2.50	2.00

U14CE503 - GEOTECHNICAL ENGINEERING - I				
U14CE503	PSO1	PSO2	PSO3	PSO4
U14CE503.1	1	1	1	2
U14CE503.2	2	2	1	2
U14CE503.3	2	2	1	2
U14CE503.4	3	3	3	2
	2.00	2.00	1.50	2.00

U14CE504 HIGHWAY ENGINEERING

Class: B.Tech. V- Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: *planning and geometric design of highways*

LO2: *highway materials their desirable properties and suitability*

LO3: *design of flexible, rigid pavements and also the construction*

LO4: *highway economics and financing of projects*

UNIT - I (9+3)

Highway development and planning: Introduction, Highway planning, Surveys and interpretation.

Geometric design of highways: Factors controlling alignment, Engineering surveys, Cross section elements, Sight distance, Stopping sight distance, Overtaking sight distance, Intermediate sight distance, Design of horizontal alignment, Radius, Super elevation, Design speed, Widening of pavements, Transition curve, Design of vertical alignment, Grades, Grade compensation, Summit and valley curves.

UNIT - II (9+3)

Pavement materials: Soil - CBR, tests on aggregates and their desirable properties, Tests on bitumen materials and their desirable properties, Marshall method of mix design, MORTH specifications for semi dense bituminous macadam, Dense bituminous macadam and bituminous concrete.

Pavement design: Factors, design of flexible pavements, CBR method, IRC recommendations, design of rigid pavements, Westergaards stress equation for wheel loads, Warping stresses, Frictional stresses, Critical combination of stresses, IRC recommendations.

UNIT - III (9+3)

Pavement construction: General features of highway construction, Construction specification as per MORTH for flexible and rigid pavements, Construction of joints in cement concrete pavements.

Maintenance and evaluation: Importance of highway maintenance, Failures in flexible and rigid pavements, Pavement maintenance, Periodic, Routine, Special repairs, Pavement evaluation, Strengthening of pavements, Overlay design.

UNIT - IV (9+3)

Highway drainage: Introduction, Importance of highway drainage, Surface drainage, Sub surface drainage, Erosion control, Road construction in water logged areas.

Highway economics and finance: Introduction, Highway user benefits, Highway cost, Economic analysis and highway finance.

Text Books:

1. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, "Highway Engineering", Nem Chand and Bros., 10th edn., 2014.

Reference Books:

1. E. J. Yoder and Witezak, "Principles of Pavement Design", John Wiley and Sons, 2nd edn.,
2. L. R. Kadiyali, "Principles of Highway Engineering", Khanna Publishers, 7th edn., 2014.
3. Relevant IRC Codes IRC: 37, IRC: 38, IRC: 52, IRC: 58, IRC: 66, IRC: 73, IRC 81, IRC: 86 and MORTH.

Course Learning Outcomes (COs):

CO1: analyze the planning process required for highways and design the geometric features

CO2: recommend suitable highway materials and design of flexible, rigid pavement

CO3: design overlay, analyze the causes for failure of flexible and rigid pavement

CO4: demonstrate highway drainage systems and assess feasibility of highway project

U14CE504 - HIGHWAY ENGINEERING												
U14CE504	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE504.1	2	1	3	2	1			2	1	1		1
U14CE504.2	3	2	1	1	2	1	1	1	1	1		2
U14CE504.3	2	3	3	2	1	2	2	2	2	1	1	2
U14CE504.4	1	2	2	1	2	1	2	1	3	1	2	2
	2.00	2.00	2.25	1.50	1.50	1.33	1.67	1.50	1.75	1.00	1.50	1.75

U14CE504 - HIGHWAY ENGINEERING				
U14CE504	PSO1	PSO2	PSO3	PSO4
U14CE504.1	2	3	2	3
U14CE504.2		3	3	3
U14CE504.3			3	3
U14CE504.4	1		2	2
	1.50	3.00	2.50	2.75

U14CE505 ENVIRONMENTAL ENGINEERING

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: *quality and quantity aspects of water*

LO2: *operations involved in water treatment and distribution*

LO3: *sewage analysis and hydraulic design of sewer*

LO4: *methods of sewage treatment and operations involved in them*

UNIT - I (9+3)

Water Demand: Classification of sources of water supply, Choice of source, Types of water demand, Per Capita Demand, Factors affecting per-capita demand, Factors affecting water losses, Fluctuations in demand and its effects on different components of water supply scheme, Design period, Population forecasting methods, Fire demand.

Water Quality: Physical, chemical and biological characteristics of water quality, Water borne diseases and their control, Quality standards for municipal supplies.

UNIT - II (9+3)

Purification of Water: Purification of water - water treatment: Operations involved in water treatment, Screening, Plain sedimentation, Sedimentation aided with coagulation, Filtration, Disinfection, Softening, Aeration.

Distribution System: General requirements, Layouts of distribution networks, Methods of supply, Systems of supply, Distribution reservoirs - types, functions, Storage capacity of distribution reservoirs, Design of distribution networks, Analysis of complex pipe networks-Hardy Cross method, Appurtenances in distribution system.

UNIT - III (9+3)

Quality and Quantity Perspectives of Sewage: Physical, chemical and biological characteristics of sewage, Analysis of sewage, Biological Oxygen Demand and Dissolved Oxygen profile-processes and kinetics involved, Sewerage systems-merits and demerits, Estimation of dry weather flow, Estimation of storm water flow.

Sewer and sewer appurtenances: Hydraulic design of sewer, Hydraulic formulae for design of sewers, Minimum and maximum velocity of flow in sewers, Materials for sewers, Joints in sewers, Shapes of sewers, Sewer appurtenances.

UNIT - IV (9+3)

Sewage treatment: Process flow diagram, Primary treatment, Screens, Grit chamber, Skimming Tanks, Sedimentation Tanks, Theory and Design, Activated sludge process.

Secondary treatment of sewage: Sewage filtration, Oxidation ditch, Oxidation ponds, Aerated lagoons, Rotating biological contractors, Treatment and disposal of sludge, On-site disposal methods.

Text Books:

1. P. N. Modi, "Water supply Engineering- Environmental Engineering-I", Standard Book House., New Delhi, 5th edn., 2013.
2. P. N. Modi, "Sewage Treatment and Disposal - Environmental Engineering-II", Standard Book House., New Delhi, 5th edn., 2013.

Reference Books:

1. Howard S. Peavy, Donald R. Rower and George Tchobanoglous, "Environmental Engineering", McGraw-Hill International Edition, 1st edn., 2014.
2. The Expert Committee, CPHEEO "Manual on Water Supply and Treatment", Ministry of Urban Development, Govt. of India, New Delhi, 3rd edn., 1999.
3. The Expert Committee, CPHEEO, "Manual on Sewerage and Sewage Treatment Systems", Ministry of Urban Development, Govt. of India, New Delhi, 3rd edn., 2013.

Course Learning Outcomes (COs):

CO1: analyze problems related to analysis of water quality and quantity

CO2: design various unit processes of water treatment and distribution

CO3: explain various parameters of sewage and design the sewerage systems

CO4: explain and design various units of sewage treatment

U14CE505 - ENVIRONMENTAL ENGINEERING												
U14CE505	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE505.1	3	3	2		1	2	2	1		1	1	1
U14CE505.2	2	1	3	2	1	1	1	1			1	
U14CE505.3	2	3	1	3	1		1				1	
U14CE505.4	3	2	2	1	1						1	
	2.50	2.25	2.00	2.00	1.00	1.50	1.33	1.00	0.00	1.00	1.00	1.00

U14CE505 - ENVIRONMENTAL ENGINEERING				
U14CE505	PSO1	PSO2	PSO3	PSO4
U14CE505.1	3	2	1	2
U14CE505.2	3	1	1	1
U14CE505.3	1	2	2	1
U14CE505.4	2	1	1	1
	2.25	1.50	1.25	1.25

U14CE506 MATERIAL TESTING LABORATORY

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

- LO1: testing of civil engineering materials
- LO2: mechanical properties of civil engineering materials
- LO3: behaviour of civil engineering materials when tested
- LO4: codal specifications of various engineering materials

LIST OF EXPERIMENTS

1. Stress – strain characteristics of (a) Mild steel and (b) TOR steel
2. Determination of the compressive strength of wood and punching shear strength
3. Determination of the Brinell’s hardness numbers for Steel, Brass and Aluminum
4. Determination of the modulus of rigidity by conducting Torsion test on Solid shaft or Hollow shaft
5. Determination of the stiffness and modulus of rigidity by conducting compression test on spring
6. Determination of the Young’s modulus of the given material by measuring deflection for a given Simply Supported Beam
7. Determination of the Young’s modulus of the given material by measuring deflection for a given continuous beam
8. Determination of the Young’s modulus of the given material by measuring deflection for a given propped cantilever beam
9. Ductility test for steel
10. Shear test for Mild steel specimen
11. Impact test on Metal Specimens using Izod test
12. Impact test on Metal Specimens using Charpy test

Laboratory Manual:

1. “Material Testing Laboratory Manual”, prepared by the faculty of Department of Civil Engineering.

Text Books:

1. E. Harmer Davis and George Earl Troxell, “Testing and Inspection of Engineering Materials”, McGraw-Hill book company, inc, 2nd edn., 1955.
2. A. V. K. Suryanarayana, “Testing of Metallic Materials”, Prentice-Hall of India, 2nd edn., 2007.

Course Learning Outcomes (COs):

- CO1: correlate theory with the testing of engineering material.
- CO2: establish the mechanical properties of civil engineering materials.
- CO3: appraise the behavior of civil engineering materials when tested under various loads.
- CO4: realize the specifications recommended by various codes to civil engineering materials.

U14CE506 - MATERIAL TESTING LABORATORY												
U14CE506	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE506.1	3	2	3		3	2		1	2	2	1	1
U14CE506.2	3	3	2	2	1	3		2	2	1	1	2
U14CE506.3	2		1	1	1	2	1	2	2	1	1	1
U14CE506.4		2	1	2	2	1	2	3	3	1	2	1
	2.67	2.33	1.75	1.67	1.75	2.00	1.50	2.00	2.25	1.25	1.25	1.25

U14CE506 - MATERIAL TESTING LABORATORY				
U14CE506	PSO1	PSO2	PSO3	PSO4
U14CE506.1	3	1	1	
U14CE506.2	3	1	2	1
U14CE506.3	1		1	2
U14CE506.4			2	1
	2.33	1.00	1.50	1.33

U14CE507 CONCRETE TECHNOLOGY LABORATORY

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

- LO1: testing of cement*
- LO2: testing of fine aggregates and coarse aggregates*
- LO3: testing of fresh and hardened concrete*
- LO4: non-destructive testing of concrete*

LIST OF EXPERIMENTS

1. Fineness and Specific Gravity of Cement
2. Standard Consistency of Cement
3. Initial and Final Setting Times of Cement
4. Compressive Strength of Cement
5. Fineness Modulus of Fine and Coarse Aggregates
6. Bulk Density, Specific gravity, Porosity and Void ratio of Fine Aggregate and Coarse Aggregate
7. Bulking of Fine Aggregate
8. Workability of Fresh Concrete
9. Compressive Strength of Concrete
10. Modulus of concrete
11. Split tensile strength of concrete
12. Modulus of rupture of concrete
13. Non- Destructive Testing of Concrete

Laboratory Manual:

1. "Concrete Technology Laboratory Manual", prepared by faculty of Department of Civil Engineering.

Text Books:

1. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill, New Delhi, 5th edn., 2013.
2. M. S. Shetty, "Concrete Technology (Theory and Practice)", S. Chand Company, New Delhi, 7th edn., 2010.
3. A. R. Santha Kumar, "Concrete Technology", Oxford Publishers, 1st edn., 2010.
4. A. M. Neville, "Properties of Concrete", McGraw Hill Publications, New Delhi, 5th edn., 2012.

Course Learning Outcomes (COs):

- CO1: interpret laboratory testing results of cement for construction*
- CO2: interpret laboratory testing results of fine aggregate and coarse aggregate for construction*
- CO3: interpret laboratory testing results of fresh and hardened concrete for construction*
- CO4: demonstrate various methods of non-destructive testing of concrete*

U14CE507 - CONCRETE TECHNOLOGY LABORATORY												
U14CE507	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE507.1	3			2		1		1	1		1	
U14CE507.2	3			2		1		1	1		1	
U14CE507.3	3			2		1		1	1		1	
U14CE507.4	3			2		1			2		2	
	3.00	0.00	0.00	2.00	0.00	1.00	0.00	1.00	1.25	0.00	1.25	0.00

U14CE507 - CONCRETE TECHNOLOGY LABORATORY				
U14CE507	PSO1	PSO2	PSO3	PSO4
U14CE507.1		2		1
U14CE507.2		2		1
U14CE507.3		2		1
U14CE507.4		2		1
	0.00	2.00	0.00	1.00

U14CE508 COMPUTER AIDED BUILDING DRAWING LABORATORY

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: functional planning of building and conventional signs

LO2: different types of doors, windows and stair cases

LO3: developing plan, section and elevation of buildings on a drawing sheet

LO4: developing plan, section and elevation of buildings using AUTOCAD

LIST OF EXERCISES

1. Importance and types of buildings, functional planning and conventional signs
2. Planning of space from Line diagram and development of plan, section and elevation

Exercises on Drawing Sheet

3. Drawings of Various types of doors, windows
4. Drawing of Dog-Legged stair case
5. Planning of a residential building with restricted / unrestricted plinth area
6. Planning of a school building / dispensary
7. Planning of a Bank with ATM / Post office
8. Planning of a Apartment / Residential complex

Exercises Using AUTOCAD

9. Planning of a residential building with restricted / unrestricted plinth
10. Planning of a school building / dispensary
11. Planning of a Bank with ATM / Post office
12. Planning of a Apartment / Residential complex

Laboratory manual:

1. "Computer Aided Building Drawing Laboratory Manual", prepared by faculty of Department of Civil Engineering.

Text Books:

1. "National Building Code of India", Bureau of Indian Standards, New Delhi, 2000.
2. Shah, Kale and Patki, "Building Drawing", Tata Mc Graw Hill Book Company Ltd., New Delhi.

Course Learning Outcomes (COs):

CO1: explain functional planning of buildings and illustrate conventional signs

CO2: differentiate types of doors, windows and staircases

CO3: draw the plan, section and elevation of buildings on a drawing sheet

CO4: draft the plan, section and elevation of buildings using AUTOCAD

U14CE508 - COMPUTER AIDED BUILDING DRAWING LABORATORY												
U14CE508	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE508.1	2	2	2	1	2	2	2	1	2	2		2
U14CE508.2	2	2	1	2	1	2	2	1	1	1		1
U14CE508.3	3	3	3	3	1			2		2		2
U14CE508.4	3	3	3	3	1	1	1	2	3	2		2
	2.50	2.50	2.25	2.25	1.25	1.67	1.67	1.50	2.00	1.75	0.00	1.75

U14CE508 - COMPUTER AIDED BUILDING DRAWING LABORATORY				
U14CE508	PSO1	PSO2	PSO3	PSO4
U14CE508.1		1	1	2
U14CE508.2	1	1	1	2
U14CE508.3	3	2	2	
U14CE508.4	3	2	2	
	2.33	1.50	1.50	2.00

U14CE509 SEMINAR

Class: B.Tech. V-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	-	1

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

LO1: literature review and report writing

LO2: presentation skills and speaking with logical sequence & confidence

LO3: latest and current trends in technologies

LO4: critical thinking

Student has to give independent seminar on the state-of-the-art technical topics relevant to their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Seminar Evaluation Committee (DSEC)*
2. DSEC shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective seminar presentation
3. There shall be only continuous Internal Evaluation (CIE) for seminar
4. The CIE for seminar is as follows:

Assessment	Weightage
Seminar Supervisor Assessment	20%
Seminar Report	30%
DSEC Assessment: <i>Oral presentation (PPT) and viva-voce</i>	50%
Total Weightage:	100%

- (a) **Report:** Students are required to submit a well-documented report on the chosen seminar topic as per the prescribed format as per the dates specified by DSEC
- (b) **Presentation:** The students are required to deliver the seminar before the DSEC as per the schedule notified by the department
- (c) DSEC shall decide the course of action on the students, who fail to submit the seminar report and give oral presentation

Course Learning Outcomes (COs):

CO1: analyze the technical content and prepare a well-documented report

CO2: make effective seminar presentation by exhibiting the presentation skills with confidence in a logical sequence

CO3: explain the current and upcoming technologies

CO4: propose and defend opinions and technical ideas with conviction (not as mere recipient of ideas)

U14CE509 - SEMINAR												
U14CE509	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE509.1	2	2	3	3	2	2	2	2	2	2	2	2
U14CE509.2	2	3	2	3	2	3	2	3	2	2	2	3
U14CE509.3	2	2	3	2	2	2	3	2	3	2	3	2
U14CE509.4	3	3	2	3	2	3	2	2	3	2	2	2
	2.25	2.50	2.50	2.75	2.00	2.50	2.25	2.25	2.50	2.00	2.25	2.25

U14CE509 - SEMINAR

U14CE509	PSO1	PSO2	PSO3	PSO4
U14CE509.1	3	2	1	3
U14CE509.2	2	1	3	2
U14CE509.3	2	3	2	2
U14CE509.4	2	3	2	2
	2.25	2.25	2.00	2.25

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

VI SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(6+2) +1]

Sl. No.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	OE	U14OE601	Open Elective-I	4	0	-	4	15	25	40	60	100
2.	PC	U14CE602	Structural Analysis-II	3	1	-	4	15	25	40	60	100
3.	PC	U14CE603	Design of Steel Structures	3	1	-	4	15	25	40	60	100
4.	PC	U14CE604	Geotechnical Engineering - II	3	1	-	4	15	25	40	60	100
5.	PC	U14CE605	Engineering Hydrology	3	1	-	4	15	25	40	60	100
6.	PE	U14CE606	Professional Elective-I	4	0	-	4	15	25	40	60	100
7.	PC	U14CE607	Highway Engineering Laboratory	-	-	3	2	40	-	40	60	100
8.	PC	U14CE608	Geotechnical Engineering Laboratory	-	-	3	2	40	-	40	60	100
9.	PR	U14CE609	Mini Project	-	-	-	2	100	-	100	-	100
Total				20	4	6	30	270	150	420	480	900

Student Contact Hours/Week: 30

Total Credits: 30

Open Elective-I

4OE601A Disaster Management
 4OE601B Project Management
 4OE601C Professional Ethics in Engineering
 4OE601D Rural Technology and Community Development

Professional Elective-I

4CE606A Prestressed Concrete
 4CE606B Ground Improvement Techniques
 4CE606C Railway Engineering

U14OE601A DISASTER MANAGEMENT

Class: B.Tech.VI-Semester

Branch: Common to All

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: nature of disaster and types of disasters

LO2: prevention, preparedness and mitigation measures for Earth Quake, floods, fire, landslides, cyclones, tsunamis, nuclear & chemical disasters

LO3: financial management of disaster and related losses

LO4: information and communication technology in disaster management and training

UNIT - I (12)

Introduction & principles of disaster management: Nature - Development, Hazards and disasters; Natural disasters - Earth quakes, Floods, Fire, Landslides, Cyclones, Tsunamis, Nuclear; Chemical dimensions and Typology of disasters - Public health disasters, National policy on disaster management.

UNIT -II (12)

Prevention and mitigation measures: Prevention, Preparedness and mitigation measures for various disasters, Post disaster reliefs and Logistics management, Emergency support functions and their coordination mechanism, Resources and material management, Management of relief camp.

UNIT- III (12)

Risk and vulnerability: Building codes and Land use planning, social vulnerability Environmental vulnerability, Macroeconomic management and sustainable development, Climate change, risk rendition, Financial management of disaster and related losses.

UNIT - IV (12)

Role of technology in disaster management: Disaster Management for Infrastructures, Taxonomy of infrastructure, Treatment plants and process facilities, electrical sub stations, roads and bridges, geo spatial information in agriculture, drought assessment, multimedia technology in disaster risk management and training.

TEXT BOOKS:

1. Rajib shah and R.R Krishnamurthy, "Disaster management – Global Challenges and local solutions" University Press,1st edn,2009.
2. Satish Modh, "Introduction to Disaster management", Macmillan Publishers, India, 1st edn., 2010.

REFERENCES:

1. Jagbir Singh, "Disaster Management-Future Challenges and Opportunities", I.K Publishers, 1st edn., 2007.
2. H.K Gupta, "Disaster management", Universities Press, India,1st, edn.,2003.
3. G.K. Ghosh, "Disaster management", A.P.H. Publishing Corporation, 1st, edn., 2012.

Course Learning Outcomes (COs):

CO1: describe & differentiate types of disasters

CO2: identify prevention & mitigation measures in case of earthquakes, floods, fire, landslides, Cyclones and tsunamis, nuclear & chemical disasters and plan preparedness & execute

CO3: assess financial management of disaster and related losses

CO4: apply information & communication technology for disaster risk management and training the affected

U14OE601A OPEN ELECTIVE - I : DISASTER MANAGEMENT												
U14OE601A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE601A.1	1			1		2	2					1
U14OE601A.2	1		2	1	3	2	3	1	3	3	2	3
U14OE601A.3	3	3	2	2	2	2	1		3	2	3	1
U14OE601A.4	3	2		2	2	1		2	3	3	3	3
	2.00	2.50	2.00	1.50	2.33	1.75	2.00	1.50	3.00	2.67	2.67	2.00

U14OE601A OPEN ELECTIVE - I : DISASTER MANAGEMENT				
U14OE601A	PSO1	PSO2	PSO3	PSO4
U14OE601A.1		3		
U14OE601A.2	2	2	1	
U14OE601A.3	2	1	1	1
U14OE601A.4	2	2		
	2.00	2.00	1.00	1.00

U14OE601B PROJECT MANAGEMENT

Class: B.Tech. VI Semester

Branch: Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop student's knowledge in/on

LO1: role of project manager, organization and management functions

LO2: effective time and conflict management

LO3: project planning, scheduling and budgeting

LO4: cost control, risk management and quality control techniques

UNIT - I (12)

Project Management: Understanding project management, Role of project manager, Classification of projects; Project management growth - Definitions and Concepts; Organizational structures - Organizing and staffing the project management office and team; Management functions.

UNIT - II (12)

Time and Conflict management: Understanding time management, Time management forms, Effective time management, Stress and burnout; The conflict environment, Conflict resolution, The management of conflicts, Conflict resolution modes; Performance measurement, Financial compensation and rewards, Morality, ethics, and corporate culture, Professional responsibilities, Success variables, Working with executives.

UNIT - III (12)

Project planning: General planning, Life-cycle phases, Proposal preparation, Project planning, The statement of work, Project specifications, Milestone schedules, Work breakdown structure, Executive role in planning, The planning cycle, Handling project phase outs and transfers, Stopping projects, Scheduling techniques - CPM and PERT, Pricing and estimating.

UNIT - IV (12)

Cost and quality control: Understanding cost control, Earned value measurement system, Cost control problems, Methodology for trade-off analysis; Risk management process, Risk analysis, Risk responses, Monitoring and control of risks, Contract management; Quality management concepts, Cost of quality, Quality control techniques.

Text Books:

- 1 Harold Kerzner, "Project Management: A Systems Approach to Planning, Scheduling and Controlling", John Wiley & Sons Inc., 10th edn., 2009.

Reference Books:

- 1 Jack R Meredith & Samuel J mantel Jr, "Project Management : A Managerial Approach" , John Wiley & Sons Inc., 8th edn., 2012.
- 2 John M Nicholas & Herman Steyn, "Project Management for Business, Engineering and Technology", Taylor & Francis, 4th edn., 2012.
- 3 Adedeji B. Badiru, "Project Management: Systems, Principles and Applications", CRC Press, 2012.

Course Learning Outcomes(COs):*CO1: identify desirable characteristics of effective project managers**CO2: manage executives, use success factors and resolve conflicting environments**CO3: apply appropriate approaches to plan a new project in-line with project schedule and suitable budget**CO4: identify & explain important risks expected to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance***U14OE601B OPEN ELECTIVE - I : PROJECT MANAGEMENT**

U14OE601B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE601B.1	2	2	2	3	3	2	2	3	3	3	3	3
U14OE601B.2	2	2		1		1	3		1	2	1	1
U14OE601B.3	1	2			2	3		1	2	1	3	2
U14OE601B.4	3	2	2	2	3	2	3	1	3	3	3	2
	2.00	2.00	2.00	2.00	2.67	2.00	2.67	1.67	2.25	2.25	2.50	2.00

U14OE601B OPEN ELECTIVE - I : PROJECT MANAGEMENT

U14OE601B	PSO1	PSO2	PSO3	PSO4
U14OE601B.1	2	1	1	1
U14OE601B.2		2	2	2
U14OE601B.3			2	
U14OE601B.4	1		3	
	1.50	1.50	2.00	1.50

U14OE601C PROFESSIONAL ETHICS IN ENGINEERING

Class: B.Tech. VI-Semester

Branch: Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

LO1: human values and engineering ethics

LO2: professionalism and theory of virtues

LO3: safety & risk benefit analysis, professional and intellectual property rights

LO4: environmental & computer ethics and various roles of engineers in a company

UNIT - I (12)

Human Values: Morals, values & ethics , Integrity, Work ethic, Service learning, Civic virtue, Respect for others , Living peacefully ,caring , Sharing , Honesty , Courage ,Valuing time , Co-operation , Commitment , Empathy , Self-confidence , Character , Spirituality.

Engineering Ethics: Senses of "Engineering Ethics", Variety of moral issues, Types of inquiry, Moral dilemmas, Moral autonomy, Kohlberg's theory, Gilligan's theory - Consensus and Controversy.

UNIT - II (12)

Profession and professionalism: Profession and its attributes, models of Professional roles

Theory of Virtues: Definition of virtue and theories of virtues, self-respect, responsibility and senses, modern theories of Virtues, uses of ethical theories

Engineering as social experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study

UNIT -III (12)

Safety, Responsibilities and Rights: Safety and risk - assessment of safety and risk - risk benefit analysis and reducing risk - Three Mile Island and Chernobyl case studies, collegiality and loyalty - respect for authority - collective bargaining - confidentiality - conflicts of interest - occupational crime - professional rights - employee rights - Intellectual Property Rights (IPR) - discrimination.

UNIT - IV (12)

Global Issues: Multinational corporations - environmental ethics, computer ethics, weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample Code of Ethics (specific to a particular Engineering Discipline).

Text Books:

1. D R Kiran, "Professional Ethics and Human Values", McGraw-Hill Education (India) Pvt. Ltd., 1/e, 2013.

Reference Books:

1. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Professional Ethics and Human Values", Prentice Hall of India, 1/e, 2013.
2. Mike Martin and Roland Schinzingler, "Ethics in Engineering", McGraw-Hill, 4/e, 2014.
3. Charles D. Fleddermann, "Engineering Ethics", Prentice Hall, 4/e, 2004

Course Learning Outcomes (COs):*CO1: summarize the need of human values and professional ethics**CO2: explain the concept of professionalism and theory of virtues**CO3: perform risk benefit analysis and describe professional rights & IPR**CO4: describe the various roles of engineer in a company and analyze code of ethics specific to a particular engineering discipline***U14OE601C OPEN ELECTIVE - I : PROFESSIONAL ETHICS IN ENGINEERING**

U14OE601C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE601C.1						2	1	3	1	2	1	2
U14OE601C.2						2	1	3	1	1	1	2
U14OE601C.3						2	1	3	1	2	1	2
U14OE601C.4						2	1	3	1	2	1	2
	0.00	0.00	0.00	0.00	0.00	2.00	1.00	3.00	1.00	1.75	1.00	2.00

U14OE601C OPEN ELECTIVE - I : PROF. ETHICS IN ENGINEERING

U14OE601C	PSO1	PSO2	PSO3	PSO4
U14OE601C.1	2		3	2
U14OE601C.2		1	3	1
U14OE601C.3	2		3	2
U14OE601C.4		1	3	1
	2.00	1.00	3.00	1.50

U14OE601D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Class: B.Tech.VI-Semester

Branch: Common to all

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: wide spectrum of technologies and processes for implementation in rural and tribal areas

LO2: medicinal and aromatic plants to fulfill the needs of pharmaceuticals industries and rural energy for eradication of drudgery

LO3: purification of drinking water, rain water harvesting and employment generating technologies

LO4: concepts of community organization and development and other related issues in an accessible manner

UNIT - I (12)

Technologies and Process: Building materials and components - Micro concrete roofing tiles, water & fire proof mud walls and thatch, red mud/rice husk cement, types of bricks, ferro-cement water tanks and other products, Cement blocks, Preservation of mud walls; Agricultural implements - Naveen sickle, Animal drawn digger, Grubber weeder, Self propelled reaper, Seed drill, Improved bakhar.

Food Processing: Introduction; Fruit and vegetable preservation - Process flow sheet, Scale of operation, Economic feasibility, Source of technology; Soya milk - Process, Economics; Dehydration of fruits and vegetables; Cultivation of oyster mushroom - Preparation of beds, Spawning, Removal of bags for production of mushrooms, Harvesting and marketing, Economics, Process flow sheet, Source of technology.

UNIT - II (12)

Medicinal and Aromatic plants: Introduction, Plants and its use, Aromatic plants, Cymbopogons, Geranium, Manufacturing of juice, Gel and powder; Rural energy - Cultivation of jatropha curcus and production of biodiesel, Low cost briquetted fuel, Solar cookers and oven, Solar drier, Biomass gasifier.

Bio-fertilizers: Introduction, Vermicompost, Improvement over traditional technology/process, Techno economics, Cost of production, Utilization of fly ash for wasteland development and agriculture.

UNIT - III (12)

Purification of Drinking water: Slow sand filtration unit, Iron removal, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal; Rain water harvesting - Availability of rain water through roof top rain water harvesting, Through percolation tank, Check dams recharging of dug wells.

Employment Generating Technologies: Detergent powder and cake - Process, Process for liquid detergent; Carcass utilization - Improvement over traditional technology, Flow chart, Process, Capital investment; Indigo blue - Dye, Organic plant production, Dye extraction techniques, Aspects of indigo market, Economics; Modernization of bamboo based industries -Introduction, Process for bamboo mat making, Machinery, Products; Agarbatti manufacturing; Vegetable tanning of leathers - Raw material, Soaking, Liming, Reliming, Deliming, Pretanning, Malani, Setting, Yield.

UNIT - IV (12)

Community development: Community organization - Concept, Definition, Need, Functions, Principles, Stages; Community development - Introduction, Concept, Definition, Need, Objectives, Characteristics, Elements, Indicators; Distinguish between community organization and community development;

Community Mobilization: Need, Benefits, Preparing, Initial contact with community, Coordinating, Functions of the community, Challenges, Techniques for mobilizing community, Community contributions, Leadership and capacity building, Community participation, Role of community worker in community mobilization; Models of community organization practice - Local development model, Social planning model, Social action model, Approaches to community organization.

Text Books:

1. M.S. Viridi, "Sustainable Rural Technology", *Daya Publishing House*, ISBN: 8170355656, 2009.
2. Asha Ramagonda Patil, "Community Organization and Development: An Indian Perspective", *PHI Learning private ltd*, 2013.

Reference Books:

1. Punia Rd Roy, "Rural Technology", *Satya Prakashan Publishers*, 2009
2. S B Verma, S K Jiloka, Kannaki Das, "Rural Education and Technology", *Deep & Deep Publications Pvt. Ltd.* 2006.
3. Edwards, Allen David and Dorothy G. Jones. "Community and Community Development". *The Hague, Netherlands: Mouton*, 1976.
4. Lean, Mary. "Bread, Bricks, and Belief: Communities in Charge of Their Future". *West Hartford, Kumarian Press*, 1995.
5. Heskin, Allen David, "The Struggle for Community", *West View Press*. 1991
6. Clinard, Marshall Barron. "Slums and Community Development: Experiments in Self-Help", *Free Press*, 1970.

Course Learning Outcomes (COs):

- CO1: describe various technologies and process which can be implemented in rural and tribal areas
 CO2: identify the major medicinal plants are required for commercial supply to Pharma companies and alternative fuel that could meet substantial oil need in the country
 CO3: analyze several cost effective technologies for purification of water which can adopted in rural areas, various rain water harvesting techniques of collection and storage of rain water
 CO4: describes in detail the process of community development, different aspects of community organization and community mobilization covering needs, benefits and challenges related to it

U14OE601D OPEN ELECTIVE - I : RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT												
U14OE601D	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE601D.1						2	2	2	2	1	1	2
U14OE601D.2						2	2	1	1	1	1	2
U14OE601D.3						2	1	2	1	1	1	2
U14OE601D.4						2	1	1	1	2	1	2
	0.00	0.00	0.00	0.00	0.00	2.00	1.50	1.50	1.25	1.25	1.00	2.00

U14OE601D OPEN ELECTIVE - I : RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT				
U14OE601D	PSO1	PSO2	PSO3	PSO4
U14OE601D.1	2		3	2
U14OE601D.2		1	3	1
U14OE601D.3	2		3	2
U14OE601D.4		1	3	1
	2.00	1.00	3.00	1.50

U14CE602 STRUCTURAL ANALYSIS - II

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

Examination Scheme:

L	T	P	C
3	1	-	4

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: analysis of three and two hinged arches

LO2: cable and suspension bridges under different loads

LO3: analysis of indeterminate structures using flexibility matrix method

LO4: analysis of indeterminate structures using stiffness matrix method

UNIT - I (9+3)

Three Hinged Arches: Principle of Arch action, Eddy's theorem, Circular and parabolic arches, Determination of horizontal thrust, Bending moment, Normal thrust and radial shear force. Influence line diagrams.

Two Hinged Arches: Principle involved in analysis of two hinged arches. Determination of horizontal thrust, Bending moment, Normal thrust and radial shear force. Influence line diagrams.

UNIT - II (9+3)

Cables: Forces in cables subjected to point loads and uniformly distributed load. Cables with supports at same levels and different levels, Length of cable, different support conditions, Influence lines diagrams.

Suspension Bridges: Simple suspension bridges with two hinged and three hinged stiffening girders. Bending Moment and Shear Force diagrams, Influence line diagrams.

UNIT - III (9+3)

Flexibility matrix method-Beams:

Introduction, determination of internal and external statical indeterminacy for different types of structures. Analysis of beams up to second degree of indeterminacy, Bending moment and shear force diagrams.

Flexibility matrix method-Frames: Rectangular portal frames upto 2nd degree of static indeterminacy. Bending moment and shear force diagrams. Analysis of statically indeterminate plane trusses-Up to second degree.

UNIT - IV (9+3)

Stiffness matrix method -Beams: Introduction, determination of kinematic indeterminacy for different types of structures. Analysis of continuous beams up to second degree of kinematic indeterminacy, Bending moment and shear force diagrams.

Stiffness matrix method -Frames: Rectangular portal frames up to second degree of kinematic indeterminacy. Bending moment and shear force diagrams. Analysis of statically indeterminate plane trusses-Up to second degree of kinematic indeterminacy.

Text Books:

1. G. S. Pandit and S. P. Gupta "*Structural Analysis a Matrix analysis of Structures*", Tata McGraw-Hill, New Delhi. 26th edn., 2007
2. C. S. Reddy "*Basic Structural Analysis*", Tata Mc Graw Hill Education Pvt., Ltd., New Delhi. 3rd edn., 1994.

Reference Books:

1. R. L. Jindal, "*Indeterminate Structures*", S. Chand and Company, New Delhi, 4th edn., 1994.
2. 2.Weaver and Gere "*Analysis of framed structures*", Van Nostrand Company.
3. Sujit Kumar Roy and Subrata Chakrabarty, "*Fundamentals of structural analysis with computer analysis and applications*", S. Chand and Company Ltd., New Delhi, 1st edn., 2003.

Course Learning Outcomes (COs):*CO1: analyse three and two hinged arches**CO2: analyse cables and suspension bridges under different loadings**CO3: develop SFD and BMD for beams and frames using flexibility matrix method**CO4: develop SFD and BMD for beams and frames using stiffness matrix method*

U14CE602 - STRUCTURAL ANALYSIS - II												
U14CE602	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE602.1	3	3	1			1	1			1		
U14CE602.2	3	3	1			1	1			1		
U14CE602.3	3	3	1			1	1			1		
U14CE602.4	3	3	1			1	1			1		
	3.00	3.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00

U14CE602 - STRUCTURAL ANALYSIS - II				
U14CE602	PSO1	PSO2	PSO3	PSO4
U14CE602.1	3	3		1
U14CE602.2	3	3		2
U14CE602.3	3	3		
U14CE602.4	3	3		3
	3.00	3.00	0.00	2.00

U14CE603 DESIGN OF STEEL STRUCTURES

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: *steel structures and philosophy of limit state design*

LO2: *bolted and welded connections*

LO3: *tension members and compression members*

LO4: *flexural members and column bases*

UNIT - I (9+3)

Structural steel: Historical development, Advantages and disadvantages of structural steel, Types of structural steel, various design philosophies of structural steel, Specifications and codes, loading and load combinations.

Principles of Limit State Design: Limit state design philosophy, Load and material partial safety factors, Design criteria, ultimate limit states and serviceability limit states.

UNIT - II (9+3)

Bolted Connections: General considerations, Riveted connections, Bolted connections, specifications for connected parts, Types of bolted joints, Lap and Butt connection, Assumptions made in analysis, Failure of bolted connections, Limit states, Efficiency of joints, Strength of plate connections.

Welded Connections: Introduction, Welding, principal types of welds, Types of welded joints, Specifications for fillet welded joints, Strength of fillet welds, Stresses due to individual forces, Combination of stresses, Design of joint.

UNIT - III (9+3)

Tension Members: Types of tension members, Behavior of tension members, Net sectional area, Analysis of tension members, Sectional efficiency, Design of tension members, Splices in tension members.

Compression Members: Types of column sections, Behavior of compression member, Classification of cross sections, Slenderness for flexural bulking, Design considerations, Analysis and design of compression member, Design of built-up compression member.

UNIT - IV (9+3)

Flexural Members: Types of sections for beams, Behavior of beams in flexure, Classification of beam cross sections, Stability of beams, Failure modes, Design criteria for beams, Design moment strength for supported beams, Design shear strength of beams, Effective span of beams, Design procedure of simple beams, Built up beam sections, Lateral torsional buckling, Effective length for lateral torsional buckling, Laterally unsupported beams.

Column Bases: Design of slab base, Design of gusseted base and grillage foundation.

Text Books:

1. S. K. Duggal, "*Limit state design of steel structures*", Mc Graw Hill, 2nd edn., 2014.
2. M. L. Gambhir, "*Fundamentals of Structural steel design*", Mc Graw Hill, 1st edn., 2013.

Reference Books:

1. S. S. Bhavikatti, "*Design of steel structures*", International Publishing House.
2. N. Subramanian, "*Design of steel structures*", Oxford Higher Education, 2nd edn.
3. IS 800, "*Code of practice for General construction in steel*", Bureau of Indian standards, New Delhi, 2007.

4. SP: 6 (1-7), "Handbook for structural engineers", Bureau of Indian standards, New Delhi, 1980.
5. IS 808, "Dimensions for hot rolled steel beam, column, channel and angle sections", Bureau of Indian standards, New Delhi, 1989.

Course Learning Outcomes (COs):

CO1: appraise the importance of steel structures and limit state method of design

CO2: design different types of bolted and welded connections

CO3: classify and design various types of tension and compression members

CO4: design different flexural members and column bases

U16CE603 - DESIGN OF STEEL STRUCTURES												
U16CE603	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U16CE603.1	3	3	2	3	3	1				1		2
U16CE603.2	2	3	3	2	1	1			1	1		2
U16CE603.3	2	3	3	2	2	1	1		2	1		2
U16CE603.4	2	3	3	2	2	1	1		2	1		2
	2.25	3.00	2.75	2.25	2.00	1.00	1.00	0.00	1.67	1.00	0.00	2.00

U16CE603 - DESIGN OF STEEL STRUCTURES				
U16CE603	PSO1	PSO2	PSO3	PSO4
U16CE603.1	2	3	1	2
U16CE603.2	2	3	1	2
U16CE603.3	2	3	1	2
U16CE603.4	2	3	1	2
	2.00	3.00	1.00	2.00

U14CE604 GEOTECHNICAL ENGINEERING - II

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: shallow and deep foundations

LO2: bearing capacity of soils and foundation settlements

LO3: expansive soils

LO4: earth pressures on foundations and retaining structures

UNIT - I (9+3)

Site investigation and Types of foundation: Types of exploration, Types of samplers, SPT test, Static and dynamic cone penetration tests, Plate load test, Types of foundations, Different types of loads coming on foundations, Choice of foundations.

Shallow foundations: Bearing capacity- Definitions and theories-Terzaghi, Meyerhof, Skempton and Vesic, Terzaghi's bearing capacity equation, Effect of size, shape, Ground water table, depth of embedment and load inclination on bearing capacity, Field determination of bearing capacity, Settlement of foundations, Elastic settlements, Permissible settlements.

UNIT - II (9+3)

Deep Foundations: Pile Foundations-Classification of piles, Load bearing capacity of piles, Static formulae, Negative skin friction, Dynamic formulae, ENR and Hiley's formulae, Pile load tests, Group action of piles, Pile Groups in sand, gravel and clay, Settlement of pile groups.

Caissons: Types of well foundations, Construction of well foundation, Sinking of open wells, pneumatic caissons, Box caissons and rectification methods.

UNIT - III (9+3)

Foundations on expansive soils: Identification of expansive soils, Problems associated with expansive soils, Design considerations for foundations in expansive soils, Under reamed piles.

Slope stability analysis: Introduction, Infinite and Finite slopes, Types of slope failures, Different factors of safety, Stability analysis of finite slope by Swedish and Friction Circle methods, Taylor's stability number, Stability analysis of earthen dam for different conditions.

UNIT - IV (9+3)

Earth Pressures: Introduction, Types of lateral earth pressure - Active, at rest and passive earth pressure, Rankine's and Coulomb's earth pressure theories, Culmann's Graphical solution.

Machine foundations: Types of machine foundations, Basic definitions, Degree of freedom of block foundation, Field methods of determining design parameters, Cyclic plate load test, block vibration test, Design criteria and detailing for machine foundations, Vibration analysis of machine foundation.

Text Books:

1. K. R. Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers, New Delhi. 9th edn., 2013.
2. K. Shashi Gulhati, Manoj Datta, "Geotechnical Engineering", Mc Grawhill Publications, New Delhi, 18th edn., 2014.

Reference Books:

1. Srinivasulu and Vaidyanathan, "Handbook of Machine Foundations", Tata Mc Graw Hill Publications, New Delhi, 1st edn., 2013.
2. R. Shenbaga Kaniraj, "Design Aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Education Private Ltd., New Delhi. 1st edn., 1969.

Course Learning Outcomes (COs):*CO1: analyze shallow and deep foundations**CO2: calculate the bearing capacity of soils and foundation settlements**CO3: identify the problems associated with expansive soils**CO4: determine the earth pressures on foundations and retaining structures*

U16CE604 - GEOTECHNICAL ENGINEERING												
U16CE604	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U16CE604.1	2	3	2	2		3	3		2	1	1	2
U16CE604.2	1	3	2	2		1	3		1	1		1
U16CE604.3		2	1	2	1	2	2		1	1		1
U16CE604.4	1	3	3	2		2	1		1	1		1
	1.33	2.75	2.00	2.00	1.00	2.00	2.25	0.00	1.25	1.00	1.00	1.25

U16CE604 - GEOTECHNICAL ENGINEERING				
U16CE604	PSO1	PSO2	PSO3	PSO4
U16CE604.1	2	2	1	3
U16CE604.2	3	3	3	3
U16CE604.3				2
U16CE604.4	3	2	2	3
	2.67	2.33	2.00	2.75

U14CE605 ENGINEERING HYDROLOGY

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: hydrologic cycle and analysis of rainfall data

LO2: evaporation, Infiltration and runoff

LO3: characteristics of hydrograph and ground water hydraulics

LO4: principles of flood routing in reservoirs

UNIT - I (9+3)

Elements of Hydrology: Definition, Hydrologic cycle, Water budgeting, Water potential in India.

Precipitation and its Measurement: Types of Precipitation, Recording and Non-recording type of rain gauges - errors in measurement - Location of rain gauges. Analysis of rain falls data by mass curves, Hyetograph, Intensity duration analysis, Estimation of missing precipitation data, Consistency test of data by double mass curve technique, Probable maximum precipitation.

UNIT - II (9+3)

Evaporation and Evapotranspiration: Factors affecting the processes and their estimation, Pan evaporation, Blaney Criddle, Hargreaves, Penmann and Lysimeter methods, Methods of reducing evaporation from reservoirs.

Infiltration and Runoff: Factors affecting Infiltration, Measurements of infiltration, Infiltration indices, Factors affecting runoff, Estimation of runoff from rainfall, Flow duration curve and Mass curve and their uses.

UNIT - III (9+3)

Hydrograph analysis: Characteristics of hydrograph, separation of base flow, Unit hydrograph, S-Curve hydrograph, Synthetic unit hydrograph, and Dimensionless unit hydrograph.

Groundwater: Types of Aquifers-Unconfined and Confined Aquifers, Well Hydraulics, Recuperation test for yield of open well.

UNIT - IV (9+3)

Floods: Rating curve and its extension, Reservoir routing, Establishing Storage - Discharge relationship, I.S.D method, channel routing-Muskingum Method, determination of Muskingum parameters k and x.

Design Flood: Methods of estimation of design flood empirical formulae, Rational method, Frequency analysis, Gumbel's distribution and Unit Hydrograph method.

Text Books:

1. K. Subramanya, "Engineering Hydrology", Tata Mc Graw Hill Book Co., New Delhi, 3rd edn., 2011.
2. P. Jayarami Reddy, "A Textbook of Hydrology", Laxmi Publishers, New Delhi, 4th edn., 2013.

Reference Books:

1. R. K. Linsley, M. A. Kohler and J. L. Paulus, "Hydrology for Engineers", Mc Graw Hill Book Co., New Delhi, 3rd edn., 1982.
2. R. S. Varshney, "Engineering Hydrology", Nemchand Bros., Roorkee, 4th edn., 2012.
3. H. M. Raghunath, "Hydrology", New Age International Publishers, New Delhi, 3rd edn., 2015.

Course Learning Outcomes (COs):*CO1: describe hydrologic cycle and analyze rainfall data**CO2: estimate evaporation, infiltration and runoff**CO3: examine characteristics of hydrograph and compute ground water hydraulics**CO4: apply principles flood routing in reservoirs*

U16CE605 - ENGINEERING HYDROLOGY												
U16CE605	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U16CE605.1	3	1				1						1
U16CE605.2	3	2				1						1
U16CE605.3	3	2			1	1						1
U16CE605.4	3	2	1	1	2	1	1					1
	3.00	1.75	1.00	1.00	1.50	1.00	1.00	0.00	0.00	0.00	0.00	1.00

U16CE605 - ENGINEERING HYDROLOGY				
U16CE605	PSO1	PSO2	PSO3	PSO4
U16CE605.1		1		
U16CE605.2		2		
U16CE605.3	2	2		2
U16CE605.4	3	3		2
	2.50	2.00	0.00	2.00

U14CE606A PRESTRESSED CONCRETE

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	0	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: elements of prestressed concrete and systems of prestressing

LO2: losses and analysis of prestressed concrete

LO3: analysis and design of section in flexure and shear

LO4: analysis and transfer of prestress

UNIT - I (12)

Elements of Prestressed concrete: Historical development, concepts of pre-stressing, Terminology, basic definitions, Advantages, Applications of prestressed concrete, Pre-tensioning and Post-tensioning.

Prestressing Systems: Hoyer, Freyssinet, Magnel blaton and Lee-Mc call system, material properties, Need for High strength steel and High strength concrete.

UNIT - II (12)

Losses of Prestress: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of steel, slip in anchorage, bending of member and frictional loss.

Analysis of Sections: Stress concept, Strength concept, Load balancing concept, Effect of loading on the tensile stresses in tendons, Effect of tendon profile on deflections, Factors influencing deflections, Calculation of Short term and long term deflections.

UNIT - III (12)

Design of Section for Flexure: Allowable stresses, Elastic design of simple beams having rectangular and I-section for flexure, kern lines, Cable profile and cable layout.

Design of Section for Shear: Shear and Principal Stresses, Improving shear resistance by different prestressing techniques, horizontal, sloping and vertical prestressing, Analysis of rectangular and I-beam, Design of shear reinforcement, Indian code provisions.

UNIT - IV (12)

Transfer of Prestress: Transmission of prestressing force by bond, Transmission length, Flexural bond stresses, IS code provisions, Anchorage zone stresses in post tensioned members, stress distribution in End block.

Methods of transfer: Analysis by approximate, Guyon and Magnel methods, Anchorage zone reinforcement.

Text Books:

1. N. Krishna Raju, "Prestressed concrete", Tata McGraw Hill Company, New Delhi, 5th edn., 2012.
2. S. K. Mallic and A. P. Gupta, "Prestressed concrete", Oxford and IBH publishing Co. Pvt. Ltd., 4th edn., 1987.

Reference Books:

1. T. Y. Lin "Design of prestressed concrete structures", John Wiley and sons and Asia Publishing House, Mumbai, 3rd edn., 1982.
2. G. S. Ramaswamy "Modern prestressed concrete design", Arnold Heinimen, New Delhi, 2007.
3. N. Rajagopalan "Prestressed Concrete", Alpha Science publishers, New Delhi, 2005.

Course Learning Outcomes (COs):*CO1: appraise the concept of Prestressing in concrete**CO2: analyze prestressed concrete sections**CO2: design prestressed concrete members in flexure and shear**CO3: appreciate the transfer of prestress in concrete***U14CE606A - PROFESSIONAL ELECTIVE - I : PRESTRESSED CONCRETE**

U14CE606A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE606A.1	3			1			2	1		2		
U14CE606A.2	3	3	2	2					2			2
U14CE606A.3	3	3	3	2	1				2			2
U14CE606A.4	3	1					1			2		
	3.00	2.33	2.50	1.67	1.00	0.00	1.50	1.00	2.00	2.00	0.00	2.00

U14CE606A - PROFESSIONAL ELECTIVE - I : PRESTRESSED CONCRETE

U14CE606A	PSO1	PSO2	PSO3	PSO4
U14CE606A.1				
U14CE606A.2	2			
U14CE606A.3	2			2
U14CE606A.4			1	
	2.00	0.00	1.00	2.00

U14CE606B GROUND IMPROVEMENT TECHNIQUES

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: ground improvement techniques like dewatering technique and grouting

LO2: different methods of soil stabilization

LO3: reinforced earth and materials used for reinforcing

LO4: different ground improvement techniques and their applications

UNIT - I (12)

Dewatering: Definition, Methods of de-watering, Sumps and interceptor ditches, Single and multi stage well Points, Vacuum well points, Horizontal wells, Foundation drains, Blanket drains, Criteria for Selection of fill material around drains.

Grouting: Definition, Objectives of grouting, Grouts and their properties, Grouting methods - Ascending, Descending and Stage grouting, Hydraulic fracturing in soils and rocks, Post grout tests.

UNIT - II (12)

Compaction: Compaction equipment for shallow/surface compaction, Placement water content, Factors affecting field compaction of soils, Deep compaction, Vibration techniques, Vibro - Flotation Terra Probe method, Blasting, compaction piles, Field compaction and control.

Liquefaction Control: Liquefaction, Differences between liquefaction and quick sand condition, damage potential of liquefaction, Factors affecting liquefaction, Methods to prevent liquefaction.

UNIT - III (12)

Reinforced Earth: Concept of reinforced earth, Effect of reinforcement on soils, Materials, Geotextiles, Types, Functions and applications, Principles of interfacial friction and its determination, Factors affecting friction coefficient, Applications of reinforced earth.

In-Situ Reinforcing Techniques:

Necessity, Ground anchors, Types and application, Tie back, Soil nailing, Driven and grouted nails, Anchored spider netting.

UNIT - IV (12)

Stabilization: Introduction, Methods of stabilization, Mechanical, Cement, lime, Bituminous, Chemical stabilization with calcium chloride, Sodium silicate and gypsum.

Techniques of Stabilization: Vertical drains, Sand wicks, Synthetic drains, Stone columns, Soil-lime columns, Soil-cement columns.

Text Books:

1. Purushotham Raj, "Ground Improvement Techniques", Laxmi Publications, New Delhi, 4th edn., 2006.
2. M. R. Hausmann, "Engineering Principles of Ground Modification", McGraw Hill International Edition, 3rd edn., 2002.

Reference Books:

1. M. P. Moseley, "Ground Improvement", Blackie Academic and Professional, Boca Taton, Florida, USA, 22nd edn., 2007.
2. Gopal Ranjan and A. S. R. Rao, "Basic and Applied Soil Mechanics", New Age Publishers, New Delhi, 2006.
3. M. Braja Das and G. V. Ramana, "Principles of Soil Dynamics", Cengage learning, Stamford USA, 2nd edn., 2006.

Course Learning Outcomes (COs):*CO1: apply dewatering and grouting techniques for ground improvement.**CO2: adopt suitable stabilization method.**CO3: apply different methods and materials for reinforcement of soil.**CO4: describe techniques for stabilization and liquefaction control.***U14CE606B - PROFESSIONAL ELECTIVE - I : GROUND IMPROVEMENT TECHNIQUES**

U14CE606A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE606A.1	1		1		3		1		2	1	2	3
U14CE606A.2	1	1		2	1	1	1		2	1	1	1
U14CE606A.3	1		1		1		1		2		1	1
U14CE606A.4	1	1		1	2	1	1	1	2	1	1	1
	1.00	1.00	1.00	1.50	1.75	1.00	1.00	1.00	2.00	1.00	1.25	1.50

U14CE606B - PROFESSIONAL ELECTIVE - I : GROUND IMPROVEMENT TECHNIQUES

U14CE606A	PSO1	PSO2	PSO3	PSO4
U14CE606A.1	1	2	1	3
U14CE606A.2	1	1	1	
U14CE606A.3	1		1	1
U14CE606A.4	2	1	1	1
	1.25	1.33	1.00	1.67

U14CE606C RAILWAY ENGINEERING

Class: B.Tech.VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: structure and organization of railways, development of railways and its requirements

LO2: railway track components as per requirements and also geometric design of railway line

LO3: essential features of railway stations and yards

LO4: railway automatic signaling and interlocking systems

UNIT - I (12)

History of Indian railways: Developments in Indian railways, Organization, Railway finance, Classification of railway lines, Undertakings under ministry of railways.

Railway Track gauge: Gauges, types, choice of gauge, Problems caused by change of gauge, Importance of good alignment, Basic requirements of an ideal alignment, Traffic, Reconnaissance, Preliminary and Final location surveys.

UNIT - II (12)

Tracks, Rails and Sleepers: Requirements of a good track, maintenance, Forces acting on the track, coning of wheels, Functions of rails and types of rail, Rail wear, Rail failure and flaw detection, Functions and requirements of sleepers, Sleeper density, Types of sleepers.

Ballast, Subgrade and Creep of Rails: Types and functions of ballast, Requirements of good ballast, Design of ballast section, Specification, tests on ballast, Slopes, execution of earth work in embankment and cutting, Failure of railway embankment, Theories for the development of creep, Causes, effects of creep, Measurement of creep, Adjustments of creep.

UNIT - III (12)

Geometric Design: Details of geometric design, Gradients, grade compensation, Circular curves, Super elevation, safe speed on curves, Transition curves, widening of gauge on curves, Vertical curves, Check rails

Points, Crossing, Level Crossing: Important terms, switches, Tongue rails, Crossing, Turnouts, Layout of turnout, Classification of level crossing, Dimensions.

UNIT - IV (12)

Railway Stations and Yards, Signal Interlocking: Site Selection, Classification and layout of stations, Marshalling yard, Locomotive yard, Equipments at railway stations, Objectives and classification of signals, Types of signals in station and yards, Automatic signaling, Principles of interlocking.

Sub urban Railways and Modernization: Urban transport, Delhi, Kolkata, Mumbai and Chennai metro systems, Modernization of railways, High speed tracks, improvement in existing track for high-speed, Ballast less track

Text Books:

1. Satish Chandra and M. M. Agarwal , "Railway Engineering", Oxford Publishers, 2nd edn., 2013.
2. S. C. Saxena and S. P. Arora, "A Text Book of Railway Engineering", Dhanpat Rai and Sons, Delhi, 1997.

Reference Books:

1. J. S. Mundrey, "Railway Track Engineering", Tata McGraw Hill, 4th edn., 2009.
2. Rangwala, "Railway Engineering" Charotar Publishers, 25th edn., 2015.

Course Learning Outcomes (COs):

CO1: explain the importance of railways and also mention the requirements of alignment.

CO2: design the elements of railway track.

CO3: identify the essential features at railway stations and yards.

CO4: elucidate the concept of signaling and interlocking.

U14CE606C - PROFESSIONAL ELECTIVE - I : RAILWAY ENGINEERING

U14CE606C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE606C.1	2	1	1	1	1	1	2	1	2	1	1	2
U14CE606C.2	2	2	3	1	2		1	2	1	1		2
U14CE606C.3	2	2	3	1	2	1	1	2	1	1	1	
U14CE606C.4			2		2	1	1					
	2.00	1.67	2.25	1.00	1.75	1.00	1.25	1.67	1.33	1.00	1.00	2.00

U14CE606C - PROFESSIONAL ELECTIVE - I : RAILWAY ENGINEERING

U14CE606C	PSO1	PSO2	PSO3	PSO4
U14CE606C.1		2	2	2
U14CE606C.2	2	2	2	1
U14CE606C.3			1	1
U14CE606C.4	1	1	1	3
	1.50	1.67	1.50	1.75

U14CE607 HIGHWAY ENGINEERING LABORATORY

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: highway material testing

LO2: desirable properties of pavement materials and their applications

LO3: conducting traffic volume and speed studies

LO4: performing the CBR test

LIST OF EXPERIMENTS

1. Aggregate crushing test
2. Aggregate abrasion test
3. Aggregate specific gravity
4. Aggregate impact test
5. Aggregate shape test
6. Ductility test for bitumen
7. Softening point test for bitumen
8. Penetration test for bitumen
9. Flash and fire point test for bitumen
10. Traffic volume studies
11. Traffic Speed Studies
12. CBR Test

Laboratory Manual:

1. "Highway Engineering Laboratory Manual", prepared by faculty of Department of Civil Engineering.

Text books:

1. S. K. Khanna, C. E. G. Justo and A. Veeraraghavan, "Highway Material Testing", Nem Chand and Bros. Publications, 2014.

Course Learning Outcomes (COs):

CO1: conduct various tests on pavement materials

CO2: interpret the results obtained from testing

CO3: recommend the tested material for pavement construction

CO4: predict the vehicular traffic behavior

U14CE607 - HIGHWAY ENGINEERING LABORATORY												
U14CE607	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE607.1	2	2	2	2		1	1	1		1		1
U14CE607.2			3	1		1	1				1	1
U14CE607.3	1	1	2	3			1	1			1	1
U14CE607.4		2	1	1		1		1		1		1
	1.50	1.67	2.00	1.75	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00

U14CE607 - HIGHWAY ENGINEERING LABORATORY				
U14CE607	PSO1	PSO2	PSO3	PSO4
U14CE607.1	1	3	2	2
U14CE607.2	1	2	2	2
U14CE607.3		2	1	3
U14CE607.4	1	2	2	3
	1.00	2.25	1.75	2.50

U14CE608 GEOTECHNICAL ENGINEERING LABORATORY

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

- LO1: classification of Indian soils
LO2: determination of coefficient of permeability
LO3: determination compaction characteristics
LO4: determination of shear strength parameters

LIST OF EXPERIMENTS

1. Determination of Consistency Limits:
(a) Liquid limit (b) Plastic limit (c) Shrinkage limit
2. Classification of Coarse Grained Soil through Sieve Analysis
3. Determination of Insitu Density by
a) Core cutter method b) Sand replacement method
4. Determination of OMC and Maximum Dry Density
a) IS light compaction test b) IS heavy compaction test
5. Determination of Coefficient of Permeability
a) Constant head method b) Falling head method
6. Determination of Coefficient of Consolidation
7. Determination of Unconsolidated Undrained Shear Strength Parameters
a) Direct Shear test. b) Unconfined compression Test
8. Determination of Differential Free Swell.
9. Specific Gravity of Solids
10. Demonstration of
a) Hydrometer Analysis for Fine Grained Soils b) Standard penetration test.
11. Demonstration of
(a) Tri- Axial Shear test
12. Demonstration of
a) Plate load test (b) California Bearing Ratio test

Laboratory Manual:

1. "Geotechnical Engineering Laboratory Manual", prepared by faculty of Department of Civil Engineering.

Text Books:

1. B. M. Das, "Soil Mechanics Laboratory Manual", Oxford University Press, 8th edn, 2012
2. SP 36 (Part - I): 1987-"Compendium of Indian Standards on Soil Engineering", Bureau of Indian Standards, New Delhi.

Course Learning Outcomes (COs):

- CO1: classify the given soil
CO2: determine coefficient of permeability of different soils
CO3: determine optimum moisture content and maximum dry density for different soils
CO4: determine shear strength parameters

U14CE608 - GEOTECHNICAL ENGINEERING LABORATORY												
U14CE608	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE608.1	1	1	1			1	2		2	1	1	1
U14CE608.2	1	1	1			1	1		1	2	1	1
U14CE608.3	2	1	1			1		1		1	2	1
U14CE608.4	2	1	1			1		1	1	1	2	1
	1.50	1.00	1.00	0.00	0.00	1.00	1.50	1.00	1.33	1.25	1.50	1.00

U14CE608 - GEOTECHNICAL ENGINEERING LABORATORY				
U14CE608	PSO1	PSO2	PSO3	PSO4
U14CE608.1	1	1		
U14CE608.2	1	1		
U14CE608.3	1	1		
U14CE608.4	1	1	1	
	1.00	1.00	1.00	0.00

U14CE609 MINI PROJECT

Class: B.Tech. VI-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	-	2

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

LO1: mini project design in one of the selected areas of specialization with substantial multi-disciplinary component

LO2: using current technologies

LO3: problem solving, motivational and time-management skills for career and life

LO4: problem based learning

Student has to take up independent mini project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

Guidelines:

1. The HoD shall constitute a *Department Mini Project Evaluation Committee (DMPEC)*
2. *DMPEC* shall allot a faculty supervisor to each student for guiding on (i) selection of topic (ii) literature survey and work to be carried out (iii) preparing a report in proper format and (iv) effective mini project oral presentation
3. There shall be only continuous Internal Evaluation (CIE) for mini project
4. The CIE for mini project is as follows:

Assessment	Weightage
Mini project Supervisor Assessment	20%
Working model developed under mini project	40%
Final Report on mini project	20%
<i>DMPEC</i> Assessment: Oral presentation (PPT) and viva-voce	20%
Total Weightage:	100%

Note:

- a) **Working Model:** Students are required to develop a working model on the chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*
- b) **Report:** Students are required to submit a well-documented report on the work carried out in the prescribed format as per the dates specified by *DMPEC*
- c) **Presentation:** The students are required to deliver the seminar before the *DMPEC* as per the schedule notified by the department
- d) *DMPEC* shall decide the course of action on the students, who fail to complete mini project, submit report and give oral presentation

Course Learning Outcomes (COs):

CO1: identify, formulate and solve problems related to their program of study

CO2: work independently with minimal supervision

CO3: demonstrate mastery of knowledge, techniques, practical skills and use modern tools of their discipline

CO4: write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic

U14CE609 - MINI PROJECT												
U14CE609	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE609.1	2	2	3	3	2	2	2	2	2	2	2	2
U14CE609.2	2	3	2	3	2	3	2	3	2	2	2	3
U14CE609.3	2	2	3	2	2	2	3	2	3	2	3	2
U14CE609.4	2	2	2	2	2	2	2	2	2	2	2	2
	2.00	2.25	2.50	2.50	2.00	2.25	2.25	2.25	2.25	2.00	2.25	2.25

U14CE609 - MINI PROJECT				
U14CE609	PSO1	PSO2	PSO3	PSO4
U14CE609.1	3	2	3	3
U14CE609.2	3	3	3	2
U14CE609.3	2	3	2	2
U14CE609.4	2	3	2	2
	2.50	2.75	2.50	2.25

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

VII SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(5+2) +1]

Sl. No.	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	OE	U14OE701	Open Elective - II	4	0	-	4	15	25	40	60	100
2.	PC	U14CE702	Irrigation Engineering and Hydraulic Structures	3	1	-	4	15	25	40	60	100
3.	PC	U14CE703	Estimation and Valuation	1	3	0	4	15	25	40	60	100
4.	PE	U14CE704	Professional Elective - II	4	0	-	4	15	25	40	60	100
5.	PE	U14CE705	Professional Elective -III	4	0	-	4	15	25	40	60	100
6.	PC	U14CE706	Environmental Engineering Laboratory	-	-	3	2	40	-	40	60	100
7.	PC	U14CE707	Civil Engineering Detailing Laboratory	-	-	3	2	40	-	40	60	100
8.	PR	U14CE708	Major Project Work: <i>Phase - I</i>	-	-	7	4	100	-	100	-	100
Total				16	4	13	28	255	125	380	420	800

S Student Contact Hours/Week: 33

T Total Credits: 28

Open Elective-II

4OE701A Operation Research
 4OE701B Management Information systems
 4OE701C Entrepreneurship Development
 4OE701D Forex and Foreign Trade

Professional Elective-II

4CE704A Elements of Structural Dynamics
 4CE704B Bridge Engineering
 4CE704C Remote Sensing and Geographical Information systems

Professional Elective-III

4CE705A Advanced Structural Design
 4CE705B Airport Engineering
 4CE705C Design of Environmental Engineering Systems.

U14OE701 A OPEARTIONS RESEARCH

Class: B.Tech. VII semester

Branch: CE, ME and CSE

Teaching Scheme :

L	T	P	C
4	-	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: concepts to solve linear programming problems arise in real life situations involving several parameters using various methods and their advantages

LO2: applications of linear programming namely transportation, assignment and travelling salesman problem which arise in different situations in all engineering branches

LO3: non-linearity in optimization problems, direct search techniques and iterative methods

LO4: applications of optimization techniques in the problem of queuing systems under several situations and their practical relevance

UNIT-I (12)

Linear Programming Problems (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problems - Graphical method, Analytical method, Simplex method, Artificial variable technique (Big-M and Two-phase methods), Duality principle and dual simplex method.

UNIT-II (12)

Special type of LPPs: Mathematical model of transportation problem, Methods of finding initial basic feasible solution to find the optimal solution of transportation problem, Exceptional cases in transportation problem, Degenerate solution of transportation problem, Assignment problem as a special case of transportation problem, Hungarian algorithm to solve an assignment problem, Special cases in assignment problem. The travelling salesman problem, Formulation of travelling salesman problem as an assignment problem.

UNIT-III (12)

Non-linear Programming Problems (NLPP): Classical method of optimization using Hessian matrix, Iterative methods - Random search methods, Steepest decent method and Conjugate gradient method; Direct methods - Lagrange's method, Kuhn-Tucker conditions, Penalty function approach.

UNIT-IV (12)

Queuing Theory: Elements of operating characteristics of a queuing system, Probability distribution of arrivals and services system, Generalized model (Birth-Death process), Poisson queuing system, Study of various queuing models with single server and multiple servers having finite and infinite populations.

Text Books:

1. Kanti swarp, P.K.Gupta, Man Mohan, "Operations Research", S. Chand & Sons, New Delhi. 16th edn., 2013. (Unit I,II,IV)
2. S.S. Rao, "Optimization Techniques", New Age International, New Delhi, 3rd edn., 2013. (Unit III)

Reference Books:

1. Hamdy. A. Taha, Operations Research, Prentice Hall of India Ltd, New Delhi, 7th edn., 2002.
2. J.C. Pant, "Introduction to Optimization", Jain Brothers, New Delhi, 7th edn., 2012.

Course Learning Outcomes (COs):

CO1: *develop the mathematical model of an optimization problem and identify particular case of activities among the several alternatives and solve a given linear programming problem using suitable method*

CO2: *obtain solution for a special type linear programming problem namely transportation, assignment & travelling salesman problem and infer their practical relevance*

CO3: *analyze the characteristics of non-linearity in optimization and solve certain NLPP using searching and iterative techniques*

CO4: *state the importance of queuing system and solve the problems of Poisson queuing models of different types*

U14OE701A OPEN ELECTIVE - II : OPERATION RESEARCH												
U14OE701A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE701A.1	2	2		2							2	2
U14OE701A.2	2	2		2							1	2
U14OE701A.3	2	3		2							1	2
U14OE701A.4	2	3		2							2	2
	2.00	2.50	0.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	2.00

U14OE701A OPEN ELECTIVE - II : OPERATION RESEARCH				
U14OE701A	PSO1	PSO2	PSO3	PSO4
U14OE701A.1	3			3
U14OE701A.2				3
U14OE701A.3	3			2
U14OE701A.4				3
	3.00	0.00	0.00	2.75

U14OE701B MANAGEMENT INFORMATION SYSTEM

Class:B. Tech VII-Semester

Branch:Common to CE, ME, CSE

Teaching Scheme :

L	T	P	C
4	-	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

LO1: essentials and strategies of managing information systems

LO2: information technology impacts on society and decision making

LO3: information system applications in manufacturing and service sectors

LO4: information systems in enterprise and supply chain management

UNIT-I (12)

Management information systems: Concepts, Role of the management information system, Impact of the management information system.

E-Business enterprise: Introduction, Organization of business in an E-enterprise, E-business, E-commerce, E-communication, E-collaboration.

Strategic management of business: The concept of corporate planning, Essentiality of strategic planning, Development of the business strategies, Types of strategies, Short-range planning, Tools of planning, Strategic analysis of business.

Information security challenges in E-enterprises: Introduction, Security threats and vulnerability, Controlling security threat and vulnerability, Management security threat in E-business, Disaster management, MIS and security challenges.

UNIT-II (12)

Information technology impact on society: Introduction, Impact of IT on privacy, Ethics, Technical solutions for privacy protection, Intellectual property, Copyright and patents, Impact of information technology on the workplace, Information system quality and impact, Impact on quality of life.

Decision making: Decision-making concepts, Decision-making process, Decision analysis by analytical modeling, Behavioral concepts in Decision-making, Organizational Decision-making, MIS and Decision-making.

Information and knowledge: Information concepts, Information - a quality product, Classification of the information, Methods of data and information collection, Value of the information, General model of a human as an information processor, Knowledge, MIS for knowledge.

UNIT-III (12)

Development of MIS: Development of long range plans of the MIS, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, MIS - Development process model.

Applications in manufacturing sector: Introduction, Personal management, Financial management, Production management, Raw materials management, Marketing management, Corporate overview.

Applications in service sector: Introduction to service sector, Service concept, Service process cycle and analysis, Customer service design, Service management system, MIS applications in service industry.

UNIT-IV (12)

Business processing Re-engineering (BPR): Introduction, Business process, Process model of the organization, Value stream model of the organization, What delays the business process, Relevance of information technology, MIS and BPR.

Decision support system and Knowledge management: Decision support systems (DSS) concepts and philosophy, DSS application in E-enterprise, Knowledge management, Knowledge management systems, Knowledge based expert system.

Enterprise management systems: Enterprise resource planning (ERP) systems, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM.

Text Books:

1. Waman S Jawadekar, "Management Information Systems", Tata McGraw Hill, Third Edition, ISBN 0-07-061634-5, 2007.

Reference Books:

1. Ken Laudon, Jane Laudon, Rajnish Dass, "Management information system", Pearson, Eleventh Edition, ISBN 978-81-317-3064-5, 2010.
2. Robert Schultheis, Mary Sumner, "Management Information Systems - The Manager's View", Fourth Edition, Tata McGraw Hill, ISBN: 0 - 07 - 463879 - 3, 2003.
3. Robert G.Murdick, Joel E.Ross, James R.Clagget, "Information Systems for Modern Management", Third Edition, Prentice Hall of India, ISBN: 81 - 203 - 0397 - 0, 2002.
4. Gordon B.Davis, Margrethe H.Olson, "Management Information Systems", Second Edition, Tata McGraw Hill, ISBN: 0 - 07 - 040267 - 1, 2000.

Course Learning Outcomes(COs):

CO1: describe concepts of managing information systems in e-business enterprises

CO2: evaluate privacy, security and quality of information management and decision making systems

CO3: analyze systems for managing information in manufacturing and service sector

CO4: asses effective of information systems which can be adopted in enterprise and supply chain management

U14OE701B OPEN ELECTIVE - II : MANAGEMENT INFORMATION SYSTEMS

U14OE701B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE701B.1					1				1	1	2	2
U14OE701B.2						1				1	2	1
U14OE701B.3					1				1	1	2	2
U14OE701B.4					2	1				1	2	2
	0.00	0.00	0.00	0.00	1.33	1.00	0.00	0.00	1.00	1.00	2.00	1.75

U14OE701B OPEN ELECTIVE - II : MANAGEMENT INFORMATION SYSTEMS

U14OE701B	PSO1	PSO2	PSO3	PSO4
U14OE701B.1	3		3	
U14OE701B.2	2		2	
U14OE701B.3		2		2
U14OE701B.4	3		3	
	2.67	2.00	2.67	2.00

U14OE 701C ENTREPRENEURSHIP DEVELOPMENT

Class: B. Tech. VII Semester

Branch: CE, ME and CSE

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

LO1: various characteristics of entrepreneur and his role in development of the nation

LO2: market survey and demand survey

LO3: functions of various managements/managers in industry

LO4: legal issues in entrepreneurship and intellectual property rights

UNIT -I (12)

Entrepreneurship: Definition, Significance of entrepreneurship, Role of entrepreneurship in development of nation, Characteristics of an entrepreneur, Motivation theories, Role of women entrepreneurship, Types of business organizations, Agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs-Identification of business opportunity.

UNIT-II (12)

Business opportunity: Definition, selection, opportunities in various branches of engineering, Sources of new ideas and screening of ideas

Planning and Launching of an entrepreneurial activity: Market survey and demand survey.

Feasibility studies: Technical feasibility, financial viability and social acceptability.

Break even analysis: Graphical and analytical methods, Preparation of preliminary and bankable project reports, Factors influencing site selection.

UNIT-III (12)

Project Planning: Product planning and development process, Definition of a project, Sequential steps in executing the project.

Plant layout: Principles, types and factors influencing layouts.

Material Management: Purchase procedures, procurement of material.

Fundamentals of Production Management: Production Planning and Control (PPC)-Concepts and Functions, Long & short run problems.

Marketing Management: Definition, Functions and market segmentation.

Financial Management: Objectives & Functions; Sources of finance-internal and external.

UNIT-IV (12)

Human Resource Management: Introduction, Importance, Selection, Recruitment, Training, Placement, Development, Performance appraisal systems.

Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws- Indian Factories Act, Workmen Compensation Act; Intellectual Property Rights.

Text Books:

1. Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", Tata McGraw-Hill, 5th Edition 2002.
2. David H. Holt, "Entrepreneurship New venture creation" Prentice Hall of India.2004.

Reference Books

1. Handbook for "New Entrepreneurs", Entrepreneurship Development Institute of India, Ahmadabad.
2. T.R. Banga, "Project Planning and Entrepreneurship Development", CBS Publishers, New Delhi,1984.
3. Personnel efficiency in Entrepreneurship Development-"A Practical Guide to Industrial Entrepreneurs", S. Chand & Co., New Delhi.

Course Learning Outcomes(COs):*CO1: describe characteristics of entrepreneur and his role in development of the nation**CO2: apply market survey and demand survey methods to real time situations**CO3: explain the functions of production, marketing and financial managements**CO4: identify the legal issues in entrepreneurship and explain intellectual property rights***U14OE701C OPEN ELECTIVE - II : ENTREPRENEURSHIP DEVELOPMENT**

U14OE701C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE701C.1		1				3	2	1	2	2	3	1
U14OE701C.2				3		2	1		2	3		1
U14OE701C.3		1		2	1		1	1	2	2	2	
U14OE701C.4		1				3	2	3	1	1	2	1
	0.00	1.00	0.00	2.50	1.00	2.67	1.50	1.67	1.75	2.00	2.33	1.00

U14OE701C OPEN ELECTIVE - II : ENTREPRENEURSHIP DEVELOPMENT

U14OE701C	PSO1	PSO2	PSO3	PSO4
U14OE701C.1		3		3
U14OE701C.2		2		2
U14OE701C.3	2		2	
U14OE701C.4		3		3
	2.00	2.67	2.00	2.67

U14OE701D FOREX & FOREIGN TRADE

Class: B.Tech. VII semester

Branch: CE, ME and CSE

Teaching Scheme :

L	T	P	C
4	-	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

COURSE LEARNING OBJECTIVES (LOs):

LO1: business, business system and its objectives

LO2: fundamentals of foreign trade, procedure and documents required in all the clearances of foreign trade

LO3: foreign exchange market, exchange rate and its determination under various monetary systems

LO4: exchange control objectives, features and methods of exchange control

UNIT-I (12)

Business: Nature and scope, Classification of business activities, Functions of commerce & trade.

Business System: Characteristics and components of business system.

Objectives of Business: Concept, Significance and classification of objectives, Objections against profit maximization.

UNIT-II (12)

Foreign Trade: Introduction of international trade, Basic of external trade, special problems of foreign trade, stages in import procedure, stages in export procedure-bill of lading, mate's receipt, certificate of origin.

Corporations assisting foreign trade: state trading corporation of India, export credit and guarantee corporation, minerals and metals trading corporation of India.

UNIT-III (12)

Foreign Exchange: meaning and importance of exchange rate, methods of foreign payments, the demand and supply of foreign exchange, the equilibrium rate of foreign exchange, functions of foreign exchange market, determination of foreign exchange rate under different monetary systems, mint policy theory, balance of payment theory.

UNIT-IV (12)

Objectives of Exchange Control: characteristics, advantages and disadvantages of exchange control, methods of exchange controls-intervention, exchange restriction, multiple exchange rates, exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

Text books:

1. C.B. Gupta, "Business Organization & Management" Sultan & Sons Publishers, New Delhi 14/e, 2012.
2. M.L. Seth, "Macro Economics " Lakshmi Narayan Agarwal, Publishers, New Delhi , 22/e 2014.
3. M.C. Vaish, Ratan Prakashan Mandir, "Monetary Theory "Vikas Publications, New Delhi 16/e, 2014.

Reference Books:

1. Y.K.Bhushan, "Business Organization and Modern Management" Sultan & Sons Publishers, New Delhi. 15/e, 2014.
2. S.A. Sherlekar "Business Organization and Management", Himalaya Publishing House, 2000.
3. K.P.M. Sundaram, "Money Banking, Trade & Finance ", Sultan & Sons Publishers, New Delhi.
4. P.N.Chopra, "Macro Economics", Kalyani Publishers, 1/e, Ludhiana

COURSE LEARNING OUTCOMES (COs):

CO1: describe business, business system and classify the business objectives

CO2: outline the foreign trade procedure and explain the special problems involved in foreign trade

CO3: describe the foreign exchange market, determine exchange rate and explain theories of exchange rate determination

CO4: state objectives and illustrate methods of exchange control

U14OE701D OPEN ELECTIVE - II : FOREX AND FOREIGN TRADE

U14OE701D	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14OE701D.1						1	1	1	1	1	2	1
U14OE701D.2						1	1	1	2	1	2	1
U14OE701D.3						1	1	1	1		2	1
U14OE701D.4						1	1	1	1	1	2	1
	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.25	1.00	2.00	1.00

U14OE701D OPEN ELECTIVE - II : FOREX AND FOREIGN TRADE

U14OE701D	PSO1	PSO2	PSO3	PSO4
U14OE701D.1	1	1		1
U14OE701D.2	2		1	
U14OE701D.3	1	1		
U14OE701D.4	1		1	1
	1.25	1.00	1.00	1.00

U14CE702 IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: methods of irrigation and channel design

LO2: weirs, canal falls, and regulation works on permeable foundations

LO3: cross-drainage works and components of hydropower plant

LO4: hydraulic structures

UNIT-I (9+3)

Methods of Irrigation: Necessity and scope of Irrigation - Types of Irrigation, Methods of applying water to crops, Soil-water-plant relationship, Soil moisture, Field capacity, Permanent wilting point, Function of Irrigation water, Duty, Delta, Irrigation frequency, Water requirements of crops, Irrigation efficiencies, Benefits and Ill effects of irrigation, Crop rotation.

Canal Irrigation: Classification of canals, Canal alignment, Channel design based on Kennedy's theory & Lacy's regime theory, Channel cross-section in cutting and filling, Balancing depth, Necessity of canal lining, Types of lining, Canal outlets, Causes, Effects and remedial measures of water logging.

UNIT-II (9+3)

Diversion Head works: Components, layout of diversion head work, Weirs and barrages, Types of weirs, Bligh's creep theory, Lane's theory and Khosla's theory on design of weirs on permeable foundations, Divide wall, Fish ladder, Under sluice, Silt ejectors and Silt excluders, Upstream and downstream protection measures.

Canal fall and Head regulators: Canal fall, Necessity, Location and types of falls, Cistern design, Design principles of slopping glacis fall. Head regulators and cross regulators, Design principles of head regulator and Cross regulator.

UNIT-III (9+3)

Cross - drainage works: Necessity, Types of cross-drainage works and selection, Design principles of Aqueduct and Siphon aqueduct, Bank connections, Bed and bank protection. River meandering and its causes, River training works, Groynes and Guide banks.

Hydropower Engineering: Introduction - Source of energy, Power potential studies, Flow duration and Power duration curves, Load curves, Load factor, Utilization and capacity factor - Classification of hydropower plants, General layout and components, Penstock and Water hammer effect. Power house general layout and its classifications based on location.

UNIT-IV (9+3)

Design of Weir and Fall structure: Vertical drop weir - Hydraulic calculations for fixing various elevations, Design of weir wall, Design of impervious aprons, Design of inverted filter and d/s talus. Fall with Baffle wall - Baffle platform, baffle wall, Cistern, upstream wings, Downstream wings, Downstream wings, Downstream glacis.

Design of Regulator and Aqueduct: Head regulator - Crest levels, Conditions of flow for design, Cistern level, Length of downstream floor, Cut-offs, total floor length, Uplift pressures and floor thickness, Protection works. Siphon Aqueduct. - Design of drainage waterway, Design of canal waterway, Design of bed levels, Design of transitions, Design of trough, and Uplift on bottom floor of barrel.

Text books:

1. B. C. Punmia, "Irrigation and Water Power Engineering", Standard Publishers, New Delhi, 16th edn., 2009.
2. S. K. Garg, "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 30th edn., 2013.

References:

1. G. L. Asawa, "Irrigation Engineering", New Age Publications, New Delhi, 4th edn., 1994.
2. K. R. Arora, "Irrigation, Water Power and Water Resources Engineering", Standard Publications, New Delhi, 4th edn., 2002.
3. R. S. Varshney, et. al., "Theory and Design of Irrigation of Structures – Volume I and II, Nem Chand Bros, Roorkee, 4th edn., 1982.

Course Learning Outcomes (COs):

CO1: distinguish methods of irrigation and design channel

CO2: design weirs, canal falls, and regulation works on permeable foundations

CO3: design cross-drainage works and identify components of hydropower plant

CO4: design hydraulic structures

U14CE702 - IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES												
U14CE702	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE702.1	3	3	3	2	1	2	1					1
U14CE702.2	3	3	3	2	1	2	1					1
U14CE702.3	3	3	3	2	2	2	1					1
U14CE702.4	3	3	3	2	2	2	1					1
	3.00	3.00	3.00	2.00	1.50	2.00	1.00	0.00	0.00	0.00	0.00	1.00

U14CE702 - IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES				
U14CE702	PSO1	PSO2	PSO3	PSO4
U14CE702.1	3	3	1	1
U14CE702.2	3	3	1	1
U14CE702.3	3	3	1	1
U14CE702.4	3	3	1	1
	3.00	3.00	1.00	1.00

U14CE703 ESTIMATION AND VALUATION

Class: B.Tech. VII -Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
1	3	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: measurements and Estimation of various elements in Civil Engineering works

LO2: detailed Estimate for a given building and preparing a tender document

LO3: performing rate analysis and preparing valuation report for a residential building

LO4: types of contract and estimating Civil Engineering works

UNIT-I (3+9)

Elements of Quantity Surveying: Scope of Civil Engineering works- Standard terminology used in quantity Surveying- Standard method of measurement.

Measurements: General, Units of measurements, Requirements of estimation, Advantages, Estimation of Isolated and Step foundations. Importance and maintenance of M-Book, Measurement of earth work, Brick Masonry work, Concrete Work, Prestressed concrete work, Steel work and Timber work.

UNIT-II (3+9)

Estimate of Buildings: Different types of estimates- Methods of estimation - Centre line method and individual wall method-Calculation of quantities of brick work, RCC, PCC, Plastering, White washing and Painting, Estimate of wood works for doors and frames. Preparation of detailed and abstract estimate for framed structures -RCC work, Steel work including bar bending schedule.

Tenders: Types of tender, Tender notice, Earnest money, Security deposit, Liquidated Damages, Arbitration, Escalation, Costing and preparation of tender document.

UNIT-III (3+9)

Specification and Rate analysis: Objective of specifications, General and detailed specifications for various items of work - Earth work excavation, Lime mortar, Cement concrete, damp proof course, Form work, Brick and stone masonry, Flooring, Painting and wood work, Purpose and requirements of schedule of rates, Procedure of rate analysis, Obtaining rate for different works namely cement works, DPC, Stone masonry, Brick masonry, Plastering, Flooring, and Painting.

Valuation: Objective of valuation - Definition of various terms such as market value, Book value, Assessed value, Mortgage value, Replacement value, Capital cost, Cost escalation, Sinking fund and Depreciation methods, Fixation of rent, Preparation of valuation report for residential building.

UNIT-IV (3+9)

Contracts: General requirements of contract, Types of contract, Conditions, Termination of contract, Departmental procedures for execution of works.

Estimate of other civil works: Preparation of detailed and abstract estimate for Septic tank with soak pit, Slab culvert and Road project.

Text Books:

1. B. N. Dutta, "Estimating and Costing in Civil Engineering", UBS Publishers, New Delhi, 27th edn., 2014.
2. M. Chakraborty, "Estimating, Costing, Specification and Valuation in Civil Engineering" (English) 24th edn., 2010.

Reference Books:

1. D. D. Kohli and R. C. Kohli, "A Text Book of Estimating and Costing (Civil)", S. Chand and Company Ltd., 2004.

Course Learning Outcomes (COs):*CO1: discuss types of measurements pertaining Civil Engineering works**CO2: prepare detailed estimate and tender document for building**CO3: prepare valuation report for a residential building**CO4: prepare detailed contract document and estimate for Civil Engineering works***U14CE703 - ESTIMATION AND VALUATION**

U14CE703	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE703.1	3	2			2	1		2			2	
U14CE703.2	2	2		1		2		2			1	
U14CE703.3	2	2		1			2	2		1	2	
U14CE703.4	3	2				2		2			2	
	2.50	2.00	0.00	1.00	2.00	1.67	2.00	2.00	0.00	1.00	1.75	0.00

U14CE703 - ESTIMATION AND VALUATION

U14CE703	PSO1	PSO2	PSO3	PSO4
U14CE703.1	2		2	1
U14CE703.2	2		3	1
U14CE703.3	2		1	1
U14CE703.4	2		2	1
	2.00	0.00	2.00	1.00

U14CE704A ELEMENTS OF STRUCTURAL DYNAMICS

Class: B.Tech. VII -Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: basic of theory of vibration related to dynamic motion

LO2: single and multi degree of freedom system

LO3: vibration analysis and various cases of continuous systems

LO4: basics of earthquake engineering

UNIT - I (12)

Theory of Vibrations: Introduction, Elements of vibratory system, Degrees of Freedom, Oscillatory motion, Simple Harmonic motion, Vectorial representation of simple harmonic motion, Free vibrations of single degree of freedom system, Undamped and damped vibrations, Critical damping, Logarithmic decrement, Forced vibration of single degree of freedom systems, Harmonic excitation, Dynamic magnification factor.

Fundamentals of Structural Dynamics: Objectives of dynamic analysis, Types of prescribed loading, Methods of discretization, Formulation of equations of motion by different methods, Direct equilibration using Newton's law of motion / D'Alembert's principle, Principle of virtual work and Hamilton principle.

UNIT - II (12)

Single Degree of Freedom Systems: Formulation and solution of the equation of motion, Free vibration response, Response to Harmonic, Periodic, Impulsive and general dynamic loadings, Duhamel integral.

Multi Degree of Freedom Systems: Selection of the degrees of Freedom, Evaluation of structural property matrices, Formulation of the MDOF equations of motion, Undamped free vibrations, Solutions of Eigen value problem for natural frequencies and mode shapes, Analysis of Dynamic response, Normal co-ordinates, Uncoupled equations of motion, Orthogonal properties of normal modes.

UNIT - III (12)

Vibration Analysis single degree of freedom systems: Introduction, Stodola method, Fundamental mode analysis.

Vibration Analysis of Multi degree of freedom systems: Vibration of Two and Multi degree of freedom systems, Concept of Normal Mode, Free Vibration Problems and Determination of Natural Frequencies, Forced Vibration Analysis, Vibration Absorbers, Approximate Methods, Dunkerley's Method and Holzer Method.

UNIT - IV (12)

Application of I.S. Code method: I. S. Code methods of analysis, introduction to seismic coefficient method.

Continuous Systems: Introduction, Flexural vibrations of beams, Elementary case, Derivation of governing differential equation of motion, Analysis of undamped free vibrations of beams in flexure, Natural frequencies and mode shapes of simple beams with different end conditions.

Text Books:

1. Mario Paz, "Structural Dynamics" C. B. S Publishers, New Delhi, 3rd edn., 2009.

Reference Books:

1. Clough and Penzien, "Dynamics of Structures", McGraw Hill, Newyork3rd edn.,
2. K. Anil Chopra, "Dynamics of Structures", Pearson Education (Singapore), Delhi.
3. I.S: 1893 - 2002, "Code of practice for Earthquake resistant design of Structures".

Course Learning Outcomes (COs):

CO1: *apply the theory of vibrations to structural dynamics*

CO2: *evaluate the response for single and multi-degree of freedom system*

CO3: *apply the vibration analysis for beams*

CO4: *describe various methods of earthquake analysis*

U14CE704A - PROFESSIONAL ELECTIVE - II : ELEMENTS OF STRUCTURAL DYNAMICS												
U14CE704A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE704A.1	3	2	3	2	2	1						2
U14CE704A.2	3	2	2	3	1	1						2
U14CE704A.3	3	2	3	2	1	1						1
U14CE704A.4	3	2	3	2	2	1						2
	3.00	2.00	2.75	2.25	1.50	1.00	0.00	0.00	0.00	0.00	0.00	1.75

U14CE704A - PROF. ELECTIVE - II : ELEMENTS OF STRUCTURAL DYNAMICS				
U14CE704A	PSO1	PSO2	PSO3	PSO4
U14CE704A.1	1	2	1	2
U14CE704A.2	1	2	1	2
U14CE704A.3	1	1	2	1
U14CE704A.4	2	1	1	3
	1.25	1.50	1.25	2.00

U14CE704B BRIDGE ENGINEERING

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: basics of bridges and design loads

LO2: analyze and design deck slab and T-beam bridge

LO3: plate girder and truss bridge

LO4: design of bridge bearings, piers and abutments

UNIT - I (12)

Fundamentals of Bridges: Importance of bridges, Classification of bridges, Components, economic spans, Factors effecting types of bridge-natural and economic considerations, Linear water ways and Afflux.

Design loads: IRC standard loading, Impact factors, Wind loading, Seismic forces, Longitudinal forces, Centrifugal forces, Buoyancy forces, Thermal forces, Erection stresses, Temperature effects, Standards for railway loading

UNIT - II (12)

Deck Slab Bridge: Design of Reinforced Cement Concrete deck Slab Bridge, Analysis and design of Slab culvert as per IRC loading, Analysis and Design of Box Culvert.

T- Beam Bridges:

General features, Introduction to Westergaard's analysis, Design of interior panel slab, Courbon's method of analysis for design of longitudinal and cross girders.

UNIT - III (12)

Plate Girder Bridge: Components of plate Girder Bridge, Design of plate girder bridge for railway loading.

Steel Truss Bridge: Types of Trusses, General and design features, Design of steel truss bridge as per IRC loading.

UNIT - IV (12)

Bridge Bearings: Types of bearing, forces on bearing, Design of elastomeric bearings, Types of expansion joints.

Pier and Abutments: Types of piers and abutments, Forces acting, Stability analysis and design.

Text Books:

1. N. Krishna Raju, "Design of Bridges", Oxford and IBH Publishing Company Pvt. Ltd., 3rd edn., 2007.
2. T. R. Jagadeesh and M. A. Jayaram "Design of Bridge Structures", PHI Learning Pvt., Ltd, New Delhi, 2nd edn., 2009.

Reference Books:

1. D. J. Victor, "Essentials of Bridge Engineering, Oxford and IBH Publishing Company Pvt. Ltd.
2. B. C. Punmia, Design of Reinforced Concrete Structures, Volume-II, Laxmi Publishers, New Delhi.
3. Ram Chandra, "Design of Steel Structures", Volume-II, Standard book house, 10th edn., 2007, New Delhi.
4. IRC 5, 6 and 7, "Code of Practice for Design of Bridges", Indian Road Congress, New Delhi.
5. IS: 800-1984: "Code of practice for steel construction", Bureau of Indian Standards, New Delhi.

6. IS: 456-2000: "Code of practice for Plain and Reinforced Concrete", Bureau of Indian Standards, New Delhi.

Course Learning Outcomes (COs):

CO1: classify bridges and loads acting on them

CO2: design Deck slab and T-beam bridges

CO3: design plate girder bridge and steel truss bridge

CO4: design bridge bearings, piers and abutments

U14CE704B - PROFESSIONAL ELECTIVE - II : BRIDGE ENGINEERING

U14CE704B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE704B.1	2	3	3	2	2	2		1		1	2	
U14CE704B.2	2	3	3	2		1				1	1	
U14CE704B.3	2	3	3	2		1				1	1	
U14CE704B.4	2	3	3	2		1				1	1	
	2.00	3.00	3.00	2.00	2.00	1.25	0.00	1.00	0.00	1.00	1.25	0.00

U14CE704B - PROFESSIONAL ELECTIVE - II : BRIDGE ENGINEERING

U14CE704B	PSO1	PSO2	PSO3	PSO4
U14CE704B.1	2	2	1	2
U14CE704B.2	2	2	1	1
U14CE704B.3	2	2	1	1
U14CE704B.4	2	2	1	1
	2.00	2.00	1.00	1.25

U14CE704C REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: basic concepts of remote sensing, aerial photography and photogrammetry

LO2: basic Principles of Remote Sensing and Techniques

LO3: various types of remote sensing and image interpretation

LO4: components of GIS and its representation, scale of level of measurement

UNIT - I (12)

Fundamentals of Photogrammetry: Introduction to Aerial photography, Purpose of photography, Scale of photography, Types of aerial photography, Time and Season of photography. Basic Geometric characteristics of Aerial photographs resolution of Aerial photos, Tilt and relief displacement.

Aerial Photography and Photogrammetry: Introduction, Terrestrial and Aerial photographs, Vertical and Oblique photographs, Height determination contouring, Photographic Interpretations, Stereoscopy, Parallax bar, Flight Planning- Photo Interpretation.

UNIT - II (12)

Fundamentals of Remote Sensing: Process of remote sensing, Characteristics, Measurement and Interaction of Electromagnetic radiation (EMR) with earth surface, Image, Pixel and Swath. Remote sensing satellite, Orbits, Sensors and Resolution. Image restoration and Image enhancement.

Remote Sensing Technique: Physics of Remote Sensing, Energy Interactions with Earth Surface, Features of Vegetation, Water and Soil, Energy Interactions with Atmosphere.

UNIT - III (12)

Image Interpretation: Introduction- Active, Passive, Optical Remote sensing, visible, infrared, thermal, sensors and characters. Concept of Microwave remote sensing, SLAR, SAR Scatrometers- Altimeter, Characteristics, Image interpretation characters.

Multi Band Images: Advantages of multi date and multi band images, Digital image processing concepts, Pre-processing, Image enhancement and Classification fundamentals.

UNIT - IV (12)

Introduction to GIS: Introduction, Concepts, Information system, Components of GIS, Geospatial data architecture, Geographic co ordinate systems, Map projections, Input data for GIS, level and Scale of measurement, Importance of data quality.

GIS data processing: GIS data types, Data Representation, Data sources, Typical GIS data sets, Data Acquisition.

Text Books:

1. M. Anji Reddy, "Textbook of Remote Sensing and Geographical Information systems", BS Publications, Hyderabad, ISBN: 81-7800-112-8, 2011.
2. A. M. Chandra and S. K. Gosh. "Remote Sensing and Geographical Information System", Narosa Publishing Home", New Delhi, 2009

Reference Books:

1. Kang-tsung Chang, "Introduction to Geographical Information System", Tata McGraw Hill, 4th edn., 2008.
2. A. Paul Longley, F. Micheal Goodchild, J. David Magaine and W. David Rhind, "Geographical Information System" Volume I and II, John Wiley and Sons Inc., 1999.

Course Learning Outcomes (COs):*CO1: explain the Basic Principles of Remote Sensing and Techniques**CO2: describe the remote sensing and interpretation technique**CO3: describe the various types of remote sensing and image interpretation**CO4: illustrate the components of GIS and its representation, sources of data and data acquisition*

U14CE704C - PROFESSIONAL ELECTIVE - II : REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS												
U14CE704C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE704C.1	3	2			3	2	3		3	2	2	3
U14CE704C.2	3	3	3	3	3	2	3		3	3	3	3
U14CE704C.3	3	3		3	3	2	3		3	2	1	3
U14CE704C.4	3		2	3	3	2	3		3	2	1	3
	3.00	2.67	2.50	3.00	3.00	2.00	3.00	0.00	3.00	2.25	1.75	3.00

U14CE704C - PROF. ELECTIVE - II : REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEMS				
U14CE704C	PSO1	PSO2	PSO3	PSO4
U14CE704C.1	3		1	3
U14CE704C.2	3		2	3
U14CE704C.3	3		1	3
U14CE704C.4	3		2	3
	3.00	0.00	1.50	3.00

U14CE705A ADVANCED STRUCTURAL DESIGN

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: design of doglegged staircase and grid slab

LO2: behavior of retaining walls

LO3: the behavior of water retaining structures

LO4: the design of different types of foundations

UNIT - I (12)

Design of dog legged staircase: Introduction, Types of staircases, Loads on stair case slabs, Design of dog legged staircase.

Grid Slabs: Introduction, Proportioning of grids dimensions, Design of grid slabs.

UNIT - II (12)

Cantilever Retaining wall: Introduction, Types of reinforced walls, Theories of earth pressure, Rankine's earth pressure theory, Columb's earth pressure theory, Design of cantilever retaining wall.

Counter fort Retaining wall: Behavior of counter fort retaining wall, Design of counter fort retaining wall.

UNIT - III (12)

Rectangular Water Tank: Introduction, Design requirements as per IS 3370 - 1965, Earth pressure on tank walls, Uplift pressure on the floor of the tank, Design principles of underground rectangular water tank.

Circular Water Tank: Joints in water tanks, Circular water tank with rigid joint between floor and wall, Wall with hinged base and free top, Wall monolithic with elastic base and hinged at top.

UNIT - IV (12)

Intz Tank: Introduction, Elements of Intz tank, Design of top dome, Design of top ring beam, Design of bottom dome, Design of bottom ring beam and Design of conical bottom.

Foundations: Design of raft foundation, Design of strip footings, Effective length of pile, Reinforcement in piles, Under-reamed piles, Pile cap, Grade beams, Design of pile foundation.

Text Books:

1. B. C. Punmia, "Reinforced Concrete Structures, Volume I, II, III and IV", Laxmi Publishing Company, New Delhi, 7th edn., 2008.

Reference Books:

1. N. Subramanian, "Design of Reinforced Concrete Structures", Oxford Higher Education, New Delhi, 2nd edn., 2014.
2. P. C. Varghese, "Advanced Reinforced Concrete Design", PHI Publications, 2nd edn.
3. S. Unnikrishna Pillai and Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Limited, New Delhi.
4. IS 456, "Code of Practice for Plain and Reinforced Concrete", Bureau of Indian standards, New Delhi, 2000.
5. IS 875 (part 1-5), "Code of Practice for Design Loads", Bureau of Indian standards, New Delhi, 1987.
6. IS 3370, "Code for Water Tanks (Parts I, II, III and IV)", Bureau of Indian Standards, New Delhi, 1965.

Course Learning Outcomes (COs):*CO1: design and detail doglegged staircase and grid slab**CO2: design and detail different types of earth retaining walls**CO3: design and detail different types of water retaining structures**CO4: design and detail different types of different types of foundations***U14CE705A - PROFESSIONAL ELECTIVE - III : ADVANCED STRUCURAL DESIGN**

U14CE705A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE705A.1	3	2	3	1	1			1				2
U14CE705A.2	3	3	3	2		1		2				2
U14CE705A.3	3	3	3	2	1	1		1				2
U14CE705A.4	3	2	3	2		2		2				2
	3.00	2.50	3.00	1.75	1.00	1.33	0.00	1.50	0.00	0.00	0.00	2.00

U14CE705A - PROFESSIONAL ELECTIVE - III : ADVANCED STRUCURAL DESIGN

U14CE705A	PSO1	PSO2	PSO3	PSO4
U14CE705A.1	2	1	1	2
U14CE705A.2	2	1	2	1
U14CE705A.3	2	1	2	1
U14CE705A.4	2	1	2	2
	2.00	1.00	1.75	1.50

U14CE705B AIRPORT ENGINEERING

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: identifying and interpreting the process related to airport planning and also related surveys

LO2: zoning laws, approach zone and runway length

LO3: factors controlling taxiways and design of airfield pavement

LO4: failure criterion of airfield pavements

UNIT - I (12)

Air transportation: Structure and organization of air transport, Directorate of civil aviation, National and International airports authority, Airports Authority of India, International Civil Aviation Organization.

Airport characteristics and airport planning: Relation between aircrafts and airports, Requirements of aircraft types, Field length regulations, Weight components, Aero plane component parts, Classification of flying activity, Relation of aircraft to landing facility, Airport master plan, Regional planning, Site selection, Surveys.

UNIT - II (12)

Runway design: Zoning laws, Classification of obstructions and approach zone, Runway orientation, Basic runway length, Correction for elevation, Temperature and gradient, Runway geometric design.

Airport layout: Airport, Runway, gate and taxiway capacities, Airport and Runway configuration, Intersection design, Terminal and building area, Parking, Apron, Hanger

UNIT - III (12)

Taxiway design: Factors controlling taxiway layout, Geometric design standards for taxiway, Exit taxiways.

Structural design of airport pavements: Introduction, design factors, Design methods for flexible and rigid pavements, Load Classification Number system.

UNIT - IV (12)

Maintenance of airfield pavements: Need for maintenance, Airfield pavement failures, failures in flexible pavements, failure in rigid pavements.

Air Traffic Control: Need of air traffic control, air traffic control network, navigational aids, enroute aids, landing aids.

Text Books:

1. S. K. Khanna, M. G. Arora and S. S. Jain, "Airport Planning and Design", Nem Chand and Bros, 6th edn., 2014
2. G. Venkatapparao, "Airport Engineering", Tata McGraw hill, 2nd edn., 1992.

Reference Books:

1. Norman Ashford, Paul H. Wright., "Airport Engineering", 3rd edn., Wiley Publications, 2014.
2. Rangwala, "Airport Engineering", Charotar Publishers, 14th edn., 2014.
3. C. Subhash Saxena, "Airport Engineering and planning", CBS Publishers, 1st edn., 2014.

Course Learning Outcomes (COs):*CO1: analyze the planning process required for airport**CO2: compute runway length, its orientation and plan airport layout**CO3: design taxiway and air field pavements**CO4: explain airfield pavement failures and air traffic control***U14CE705B - PROFESSIONAL ELECTIVE - III : AIRPORT ENGINEERING**

U14CE705B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE705B.1		1	2	2	2	3	3	2	2	2	3	2
U14CE705B.2	2	2	3	2	2	1		2	2	1		2
U14CE705B.3		2	2			1				1		
U14CE705B.4	2	3	3	2	1	2	2	2	2	1	1	2
	2.00	2.00	2.50	2.00	1.67	1.75	2.50	2.00	2.00	1.25	2.00	2.00

U14CE705B - PROFESSIONAL ELECTIVE - III : AIRPORT ENGINEERING

U14CE705B	PSO1	PSO2	PSO3	PSO4
U14CE705B.1	1	1		1
U14CE705B.2	1	2		1
U14CE705B.3	1	1	1	1
U14CE705B.4		2	1	1
	1.00	1.50	1.00	1.00

U14CE705C DESIGN OF ENVIRONMENTAL ENGINEERING SYSTEMS

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: air quality and prediction of concentration of air pollutants

LO2: methods adopted for separation of pollutants from air

LO3: self-purification of streams and advanced wastewater treatment

LO4: effluent treatment and Noise pollution

UNIT - I (12)

Air Pollution: Introduction, Sources and Classification of air pollutants, Effects of air pollution, Global effects, Air quality and Emission standards, Sampling of pollutants in ambient air, Stack sampling.

Meteorology: Factors influencing air pollution, Wind rose, Mixing depths, Lapse rates and Dispersion, Atmospheric stability, Plume rise and dispersion, Prediction of air quality- Box model, Gaussian model, Dispersion coefficient, Height of chimney.

UNIT - II (12)

Control of Particulate Pollutants: Properties of particulate pollutants, Particle size distribution, Control mechanism of settling chambers, Cyclones, Wet dust scrubbers, Fabric filters and Electro static precipitators.

Control of Gaseous Pollutants: General Process and Equipment for the removal by chemical methods, Operation of absorption, Adsorption, Combustion and condensation equipment.

UNIT - III (12)

Stream Sanitation: Introduction, Characteristics of the treatment plant effluents, Self purification in a stream, Zones of pollution in the stream, Oxygen sag analysis, Mathematical analysis using Streeter Phelps equation.

Advanced Biological Wastewater Treatment: Introduction, Nitrogen removal by biological nitrification and de-nitrification, Phosphate removal, Sequential batch reactors, Upflow anaerobic sludge blanket reactor.

UNIT - IV (12)

Industrial Effluent Treatment: Characteristics of industrial effluent, Methods of treatment adopted for sugarcane, Distillery, textile and Dairy industry.

Noise Pollution: Definition, Characteristics of sound, Effects, measurement, Control of noise pollution.

Text Books:

1. M. N. Rao and H. V. N. Rao, "Air Pollution", Tata - McGraw Hill Publishing Co., Ltd., 1st edn., 2014.
2. P. N. Modi, "Sewage Treatment and Disposal - Environmental Engineering-II", Standard Book House., New Delhi, 4th edn., 2013.

Reference Books:

1. S. Howard Peavy, R. Donald Rower and George Tchobanoglous, "Environmental Engineering", Mc Graw-Hill International Edition, 1st edn., 2014.
2. G. S. Birdie, J. S. Birdie, "Water Supply and Sanitary Engineering", Dhanpat Rai Publications, 1st edn, 2013.
3. Metcalf and Eddy, "Wastewater Engineering - Treatment and Reuse", McGraw Hill Education (India) Pvt. Ltd., 4th edn., 2002.

Course Learning Outcomes (COs):*CO1: asses air quality and calculate pollutant concentration**CO2: summarize the equipment and methods required for removal of pollutants**CO3: model stream water quality and describe advanced methods of wastewater treatment**CO4: describe effluent treatment methods and noise pollution control measures***U14CE705C - PROFESSIONAL ELECTIVE - III : DESIGN OF ENVIRONMENTAL ENGINEERING SYSTEMS**

U14CE705C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE705C.1	1	2	2	1	1	1	1	1		1		1
U14CE705C.2	1	2	2	2	1	1				1		
U14CE705C.3	2	2	2	1	1	1						1
U14CE705C.4	1	2	2	1		1		1		1		
	1.25	2.00	2.00	1.25	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00

E705C - PROFESSIONAL ELECTIVE - III : DESIGN OF ENVIRONMENTAL ENGINEERING SYS

U14CE705C	PSO1	PSO2	PSO3	PSO4
U14CE705C.1	1	2	1	1
U14CE705C.2	1	2	1	1
U14CE705C.3	2	2	1	1
U14CE705C.4	1	2	1	1
	1.25	2.00	1.00	1.00

U14CE706 ENVIRONMENTAL ENGINEERING LABORATORY

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: physical analysis of water sample

LO2: chemical analysis of water sample

LO3: optimum coagulant dosage for effective sedimentation

LO4: determination of dissolved oxygen of water sample

LIST OF EXPERIMENTS

1. Determination of Acidity of water sample
2. Determination of Alkalinity and pH of water sample
3. Determination of Total Solids, Total dissolved solids and Suspended solids of water sample
4. Determination of Conductivity of water sample
5. Determination of Temporary and Permanent Hardness of water sample
6. Determination of Optimum Coagulant dosage of water sample using Jar test
7. Determination of Break-point Chlorination
8. Determination of Chloride content of water sample
9. Determination of Dissolved Oxygen of water sample
10. Determination of Biological Oxygen Demand of water sample
11. Determination of Chemical Oxygen Demand of water sample
12. Introduction to Bacteriological Analysis – MPN Test

Laboratory Manual:

1. "Environmental Engineering Laboratory Manual", prepared by the faculty of Civil Engineering.

Reference books:

1. B. Kotaiah and Dr. N. Kumara Swamy, "Environmental Engineering Laboratory Manual", Charotar Publishing House Pvt. Ltd., 1st edn., 2007.
2. P. N. Modi, "Water supply Engineering- Environmental Engineering -I", Standard Book House., New Delhi, 5th edn., 2013.
3. P. N. Modi, "Sewage Treatment and Disposal – Environmental Engineering-II", Standard Book House, New Delhi, 5th edn., 2013.

Course Learning Outcomes (COs):

CO1: characterize the quality of water for suspended matter by physical tests.

CO2: evaluate the quality of water for hardness, chlorides using chemical analysis.

CO3: measure Dissolved Oxygen concentration to assess the quality of water.

CO4: measure the concentration of degradable organic matter.

U14CE706 - ENVIRONMENTAL ENGINEERING LABORATORY

U14CE706	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE706.1	2	2	2	1	1	1	1	1			1	1
U14CE706.2	2	2	2	1				1			1	1
U14CE706.3	2	2	2	1				1			1	1
U14CE706.4	2	2	2	1				1			1	1
	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	1.00

U14CE706 - ENVIRONMENTAL ENGINEERING LABORATORY

U14CE706	PSO1	PSO2	PSO3	PSO4
U14CE706.1	2	2	1	
U14CE706.2	2	2	1	
U14CE706.3	2	2	1	
U14CE706.4	2	2	1	
	2.00	2.00	1.00	0.00

U14CE707 CIVIL ENGINEERING DETAILING LABORATORY

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

LO1: detailing Beams

LO2: detailing Slabs

LO3: detailing Columns

LO4: detailing Footings

LIST OF EXPERIMENTS

Preparation of working drawings using AUTO CAD for the following structural elements as per SP-34, the elements are to be designed prior to preparation of drawings.

1. Detailing of R.C.C beams
2. Detailing of R.C.C One Way and Two Way Slabs
3. Detailing of R.C.C Simply Supported Slab
4. Detailing of R.C.C Continuous Slab
5. Detailing of Tied Columns and Spirally Reinforced Columns
6. Detailing of R.C.C Combined Footings
7. Detailing of R.C.C Isolated Footings
8. Detailing of R.C.C Rectangular Footings
9. Detailing of R.C.C Trapezoidal Footings
10. Detailing of Beam Column steel joints
11. Detailing of RCC Water tank
12. Detailing of RCC Retaining wall
13. Detailing of steel braced column
14. Detailing of grillage foundation

Laboratory Manual:

1. "Civil Engineering Detailing Laboratory Manual", prepared by the faculty of Civil Engineering.

References:

1. "Hand book on Concrete Reinforcement and Detailing-SP 34-1987", Bureau of Indian Standards- New Delhi.
2. B. C. Punmia, A. K. Jain. "R.C.C Designs", Laxmi publishers, New Delhi, 2013.
3. Arya and Ajmani,"Design of steel structures "Nem Chand and Bros, Roorkee, U.P 1992.

Course Learning Outcomes (COs):

CO1: prepare working drawings for Beams

CO2: prepare working drawings for Slabs

CO3: prepare working drawings for Columns

CO4: prepare working drawings for Footing

U14CE707 - CIVIL ENGINEERING DETAILING LABORATORY

U14CE707	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE707.1	1	1	1	1	2	1		1	2	2		1
U14CE707.2	2	2	1	1	2	1		1	2	2		1
U14CE707.3	1	2	1	1	2	1		2	1	2		2
U14CE707.4	2.00	2.00	1.00	2.00	1.00	1.00		2.00	2.00	2.00		1.00
	1.50	1.75	1.00	1.25	1.75	1.00	0.00	1.50	0.00	0.00	0.00	1.25

U14CE707 - CIVIL ENGINEERING DETAILING LABORATORY

U14CE707	PSO1	PSO2	PSO3	PSO4
U14CE707.1	1	2		1
U14CE707.2	2	2		1
U14CE707.3	1	1		1
U14CE707.4	1.00	1.00		1.00
	1.25	1.50	0.00	1.00

U14CE708 MAJOR PROJECT WORK PHASE-I

Class: B.Tech. VII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	7	4

Examination Scheme :

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

LO1: *problem based & project based learning*

LO2: *major project design in one of the selected areas of specialization with substantial multi-disciplinary component*

LO3: *analytical and research skills*

LO4: *team work, leadership and interpersonal skills*

Student has to take up Major project on innovative ideas, innovative solutions to common problems using their knowledge relevant to courses offered in their program of study, which would supplement and complement the program assigned to each student.

- The major project work is a practical, in-depth study of a selected problem and showing an implementable solution the problem
- Major project work enables the student to synthesize and integrate knowledge, connect theory and practice as well as demonstrate holistic achievement of program learning outcomes

Guidelines:

1. The HoD shall constitute a *Department Project Evaluation Committee (DPEC)*
2. Major project work shall be normally conducted in two stages: Major project work *Phase-I* in seventh semester and Major project work *Phase-II* in eighth semester
3. There shall be only continuous Internal Evaluation (CIE) for Major project *Phase-I*
4. CIE for the Major project *Phase-I* in seventh semester is as follows:

Assessment	Weightage
Project Supervisor Assessment	50%
DPEC Assessment: <i>Registration, Presentation, Progress presentation-I, Report submission, oral (PPT) presentation & viva-voce</i>	50%
Total Weightage:	100%

DPEC shall decide the course of action on the students, who fail to complete the Major project Phase-I, submission of preliminary report and oral (PPT) presentation.

Course Learning Outcomes (COs):

CO1: *demonstrate creativity in the design of components, systems or processes of their program of study*

CO2: *design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology*

CO3: *work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics*

CO4: *write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic*

U14CE708 - MAJOR PROJECT WORK - PHASE -1												
U14CE708	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE708.1	2	2	3	3	2	2	2	2	2	2	2	2
U14CE708.2	2	3	2	3	2	3	2	3	2	2	2	3
U14CE708.3	2	2	3	2	2	2	3	2	3	2	3	2
U14CE708.4	3	3	2	3	2	3	2	2	3	2	2	2
	2.25	2.50	2.50	2.75	2.00	2.50	2.25	2.25	2.50	2.00	2.25	2.25

U14CE708 - MAJOR PROJECT WORK - PHASE -1				
U14CE708	PSO1	PSO2	PSO3	PSO4
U14CE708.1	3	3	3	3
U14CE708.2	2	3	2	2
U14CE708.3	2	2	2	2
U14CE708.4	3	2	3	2
	2.50	2.50	2.50	2.25

KAKATIYA INSTITUTE OF TECHNOLOGY AND SCIENCE: WARANGAL-506 015

(An Autonomous Institute under Kakatiya University)

SCHEME OF INSTRUCTION AND EVALUATION

VIII SEMESTER OF 4-YEAR B.TECH. DEGREE PROGRAMME

CIVIL ENGINEERING

[(4+2) +1]

Sl. No	Course Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme				
				L	T	P		CIE			ESE	Total Marks
								TA	MSE	Total		
1.	HS	U14MH801	Management Economics and Accountancy	3	1	-	4	15	25	40	60	100
2.	PC	U14CE802	Construction Technology and Management	3	1	-	4	15	25	40	60	100
3.	PE	U14CE803	Professional Elective - IV	4	0	-	4	15	25	40	60	100
4.	PE	U14CE804	Professional Elective - V	4	0	-	4	15	25	40	60	100
5.	PC	U14CE805	Civil Engineering Software Applications Laboratory	-	0	3	2	40	-	40	60	100
6.	PC	U14CE806	Engineering Geology Laboratory	-	0	3	2	40	-	40	60	100
7.	PR	U14CE807	Major Project Work: <i>Phase - II</i>	-	-	13	7	40	-	40	60	100
Total				14	2	19	27	180	100	280	420	700

Student Contact Hours/Week: 35

Total Credits: 27

Professional Elective-IV

U14CE803A Finite Elements Analysis
 U14CE803B Earth Retaining Structures
 U14CE803C Watershed Management
 U14CE803D Repair and Rehabilitation of Structures

Professional Elective-V

U14CE804A Earthquake Engineering
 U14CE804B Construction Contracts Management
 U14CE804C Traffic Engineering and Transportation
 U14CE804D Environmental Impact Assessment

U14MH801 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VIII semester

Branch: CE, ME & CSE

Teaching Scheme :

L	T	P	C
3	1	-	4

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: *the concepts of management*

LO2: *the concepts of economics and forms of business organizations*

LO3: *fundamentals of accountancy*

LO4: *preparation of final accounts*

UNIT-I (9+3)

Management: Meaning and definition, Scope of management, Principles of management; Scientific management- Definition, Characteristics.

Functions of Management: Planning-Definition, Process, Characteristics. Organizing; Definition of organization, Characteristics, Types, Principles of organization. Centralization and Decentralization; Definitions, Features, Merits and Demerits. Communication; process of communication- channels-media and barriers.

Staffing: Meaning and functions of personnel management.

Coordination : Definition, steps to achieve effective coordination.

Controlling: Definition and process.

UNIT-II (9+3)

Economics: Meaning and definition, scope; Micro and macro-Assumptions-Methods and usefulness of economics. Laws of economics-Differences with laws of physical sciences.

Factors of Production: Meaning, definition and characteristics of Land-Labor-capital and entrepreneur. Division of Labor: Types, advantages and disadvantages.

Forms of Business Organization: Sole Proprietor ship, Partnership firm, Types of Partners Cooperative society & Joint stock company-features-Types of Joint stock companies-Merits and demerits.

UNIT-III (9+3)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting-cycle. Journal-meaning and journalisation; Ledger- meaning, Ledger posting, Balancing; Two- column-cash book (cash and bank), Preparation of trial balance.

UNIT - IV (9+3)

Preparation of Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments.

Text Books:

1. Y.K Bhushan, Business Organization and Mamgt., *Sultan Chand*,2012, (Unit I)
2. K.K. Dewett, Modern Economic Theory., *Pearson Ed.*, 2010 (Unit II).
3. T S Grewal. Introduction to Accountancy., *Sultan Chand.*,(Unit III & IV).

Reference Books:

1. Koontz and O'Donnell, Management. ,*Oxford Publications.*,2011
2. L.M.Prasad, Principles and Practice of Management Sultan Chand.,2010
3. R.L.Gupta Principles of Accountancy., *Sultan and Chand Co.*,2010

Course Learning Outcomes (COs):*CO 1: judge the differences between practical and theoretical management.**CO 2: associate an idea of Micro, Macro Economics and Forms of Business Organisations**CO 3 distinguishes between Journal and Ledger.**CO 4: assess the profits and losses & financial position through the Balance Sheet.***U14MH801 - MANAGEMENT ECONOMICS AND ACCOUNTANCY**

U14MH801	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14MH801.1						2					3	
U14MH801.2						2					3	
U14MH801.3						2					3	
U14MH801.4							1	1	1	1	3	1
	0.00	0.00	0.00	0.00	0.00	2.00	1.00	1.00	1.00	1.00	3.00	1.00

U14MH801 - MANAGEMENT ECONOMICS AND ACCOUNTANCY

U14MH801	PSO1	PSO2	PSO3	PSO4
U14MH801.1	3		3	
U14MH801.2	2		2	
U14MH801.3		2		2
U14MH801.4	3		3	
	2.67	2.00	2.67	2.00

U14CE802 CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
3	1	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: pre-requisites for a project

LO2: functions of construction management and network development

LO3: network and cost analyses and for scheduling the project

LO4: construction equipment and implementation of quality and safety measures

UNIT - I (9+3)

Fundamentals of Construction Technology: Definition, Construction activities, Processes, Workers, Estimating, Schedule, Productivity and Mechanized construction, Construction documents, Quality and Safety.

Preliminary Project Planning: Site layout, Infrastructure Development-security, Office and Residence, Power, Water, Access roads, Drainage, Illumination, Storage yards, Workshop, Garage, Parking, Testing facilities, Medical care, Firefighting facilities, Communication and Fuel station facilities.

UNIT - II (9+3)

Construction Management: Stages of construction project, Construction team and their functions, Functions of construction management-planning, Organizing, Staffing, Directing, Controlling and Coordinating.

Project scheduling: Methods of scheduling-Bar charts/Gantt chart, Milestone charts, Network analysis, Limitations and advantages, Network and its development, Work breakdown structure.

UNIT - III (9+3)

Network Techniques: Introduction and necessity, Definition- activity, Event and network, modes of network, Network diagram by Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) and calculating activity and event times, Floats and Slacks.

Cost Management: Direct and indirect cost of project, cost slope and crashing of activities. Introduction to resource allocation- leveling and smoothing.

UNIT - IV (9+3)

Construction Equipment: Introduction and necessity, Classification of tractor and dozer- wheel, Crawler units and their uses, Classification of excavator- front shovel and its operation. Hoisting equipment: tower crane and heavy lifting crane. Hauling equipment-Trucks, dumpers, elevators and conveyors.

Quality Control and Safety Measures: Techniques for ensuring quality of construction, Safety measures taken to avoid accidents, Location hazards and their elimination, Safety in demolition of buildings, Safety in handling and transport of materials and equipment.

Text Books:

1. B. L. Gupta, "Construction Management, machinery and accounts", Standard publishers, 3rd edn., 2005.
2. Subhajit Saraswati, "Construction Technology", Oxford University Press, 2008.

Reference Books:

1. L. S. Srinath, "PERT and CPM principles and applications", East west press.
2. "CPWD 7/8: General Conditions of Contracts", Govt of India, Central Public Works Department,
3. S. Seetharaman, "Construction Engineering and Management", Umesh Publications, New Delhi, 1997.
4. S. B. Patil, "Building and Engineering Contracts" Pune.

Course Learning Outcomes (COs):

CO1: frame the methodologies involved in various construction project

CO2: describe the functions of construction management

CO3: develop the network and schedule the project

CO4: suggest suitable construction equipment and implement quality and safety aspects

U14CE802 - CONSTRUCTION TECHNOLOGY AND MANAGEMENT												
U14CE802	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE802.1	2	1	2	1	1	2	2	1	2	2	2	2
U14CE802.2					3	2	1	2	2	2	2	1
U14CE802.3	2	2	2	1	2		2				2	
U14CE802.4	2		1	1	2	3	3	2	2	2	2	2
	2.00	1.50	1.67	1.00	2.00	2.33	2.00	1.67	2.00	2.00	2.00	1.67

U14CE802 - CONSTRUCTION TECHNOLOGY AND MANAGEMENT				
U14CE802	PSO1	PSO2	PSO3	PSO4
U14CE802.1	2	1	2	2
U14CE802.2	2		2	1
U14CE802.3		3		2
U14CE802.4	2	2	2	1
	2.00	2.00	2.00	1.50

U14CE803A FINITE ELEMENT ANALYSIS

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: principles of Finite Element Method

LO2: properties of general elements and formulation for Isoparametric elements

LO3: formulation of stiffness matrix for Trusses, Beams and Frames

LO4: evaluation of stiffness matrices for Two Dimensional solids and Axi-symmetric members

UNIT - I (12)

Concepts of Finite Element Method: Introduction, Basic concepts, Need for study, Advantages, Disadvantages, Basic equations of elasticity – Plane stress, Plane strain and Axi-symmetric problems, Steps in finite element method.

Finite Element Formulation: Virtual Work and Variational Principle, Galerkin Method, Finite Element Method: Displacement Approach, Stiffness Matrix and Boundary Conditions.

UNIT - II (12)

General elements: Properties - Natural Coordinates, Triangular Elements, Rectangular Elements, Lagrange and Serendipity elements.

Isoparametric elements: Isoparametric Formulation, Stiffness Matrix of Isoparametric Elements, Numerical Integration: One and Two Dimensional using Gauss-Quadrature and Jacobian methods.

UNIT - III (12)

Trusses and Beams: Formulation of stiffness matrices for truss and beam members, Assembly of elements and solution techniques for static loads.

Plane frames: Formulation of stiffness matrix for plane frame, Assembly of elements and solution techniques for static loads.

UNIT - IV (12)

Two Dimensional Elements: Formulation and evaluation of stiffness matrix for various 2D elements-Constant Strain Triangle, Linear Strain Triangle, Rectangular Elements.

Axi-symmetric Elements: Axi-symmetric Element, Finite Element Formulation of Axi-symmetric Element.

Text Books:

1. P. Sheshu, "Finite Element Analysis", PHI Learning Private Limited-New Delhi, 10th edn., 2012.
2. R. Tirupati, Chandupatla and D. Ashok Belegundu, "Finite Elements Methods in Engineering", Pearson Education Publications, New Delhi, 2nd edn, 1997.

Reference Books:

1. O. C. Zienkiewicz, R. L. Taylor, "The Finite Element Method", Butterworth and Heinemann publishers, New Delhi, 5th edn, 2000.
2. C. S. Krishna Murthy "Finite Element analysis - Theory and Programming" Tata McGraw Hill, New Delhi, 2nd edn., 2001.
3. S. S. Bhavikatti, "Finite element analysis", New Age International Publishers, 2005.
4. D. Robert Cook, S. David Malkus and E. Michael Plesha, "Concepts and Applications of Finite Element Analysis", John Wiley and Sons, 4th edn, 2007.
5. Daryl Logan, "A first course in the finite element method", Cengage Learning, 5th edn., 2012.

Course Learning Outcomes (COs):*CO1: appraise importance of Finite Element Method**CO2: develop Stiffness matrices for Isoparametric elements**CO3: analyze Trusses, Beams and Frames by developing Stiffness matrices.**CO4: develop stiffness matrices for two dimensional solids and axi-symmetric members***U14CE803A - PROFESSIONAL ELECTIVE - IV : FINITE ELEMENT ANALYSIS**

U14CE803A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE803A.1	1											1
U14CE803A.2	1	2	3	1	1							
U14CE803A.3	1	2	3	2	1							
U14CE803A.4	1	3	3	1	1							
	1.00	2.33	3.00	1.33	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

U14CE803A - PROFESSIONAL ELECTIVE - IV : FINITE ELEMENT ANALYSIS

U14CE803A	PSO1	PSO2	PSO3	PSO4
U14CE803A.1	1		1	3
U14CE803A.2	2	3		
U14CE803A.3	1	3		
U14CE803A.4	2	3		
	1.50	3.00	1.00	3.00

U14CE803B EARTH RETAINING STRUCTURES

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

- LO1: design principles of earth and rock fill dams
- LO2: design of sheet pile walls and earth retaining walls
- LO3: loads on conduits
- LO4: design components of braced cuts and cofferdams

UNIT - I (12)

Earth Dams: Introduction, Types of earthen dams, Site selection, Methods of construction, Densities and their relations, Pore-water pressure and its significance in the design of earth dams, Dam failures- Hydraulic, Seepage and Structural failures, Design criteria of earth dams, Design for slope stability under critical conditions, Seepage control in earth dams, Design of filters, Slope protection, Advantages and disadvantages of earthen dams.

Rock fill dams: Definition, Site selection, Types of rock fill dams, Construction methods, Merits and demerits of rock-fill dams.

UNIT - II (12)

Earth retaining Walls: Types of retaining walls, Design principles of retaining walls, Gravity and cantilever retaining walls, Constructional aspects of retaining walls, Expansion and contraction joints.

Underground Conduits: Types of conduits- positive, Negative projecting and ditch conduits, Imperfect ditch conduit, Tunnel conduits, Loads on Conduits, Construction of conduits.

UNIT - III (12)

Shafts and Tunnels: Arching in soils, Stresses in the vicinity of vertical shafts and tunnels.

Sheetpile Walls: Types of sheet piles, Use of sheet pile walls, Design of cantilever sheet pile walls in granular and cohesive soils, Design of anchored sheet pile walls by free earth method in granular and cohesive soils, Rowe's moment reduction theory, Design of anchored sheet pile wall by fixed earth method, Design of anchors, Location of anchorage.

UNIT - IV (12)

Braced cuts: Introduction, Lateral earth pressure on sheeting in sand and clayey soils, Types of sheeting and bracing system, Design components of braced cuts, Safety of bottom of excavation against boiling and heave.

Coffer Dams: Uses of coffer dams, Types of coffer dams, Relative merits and demerits, Design of circular cellular coffer dam by TVA method on rocks and on soil.

Text Books:

1. K. R. Arora, "Soil Mechanics and Foundation Engineering", Standard Publishers Distributors, Delhi. 9th edn., 2013.
2. Swami Saran, "Analysis and Design of Substructures Limit State Design", Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. 9th edn., 2013.

Reference Books:

1. M. Braja Das, "Principles of foundation engineering", International Student edn.
2. Peck, Hanson and Thornborn, "Foundation Engineering", John Wiley Publications, New York.

Course Learning Outcomes (COs):

CO1: learn design principles of earth and rock fill dams

CO2: design earth retaining walls and conduits

CO3: design sheet pile walls

CO4: design the components of braced cuts and cofferdams

U14CE803B - PROFESSIONAL ELECTIVE - IV : EARTH RETAINING STRUCTURES

U14CE803B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE803B.1	1	2	2	2	1	1	1		2	1		1
U14CE803B.2	1	2	3		2	1	1		2	1		1
U14CE803B.3	1	2	3		2	1	1		2	1		1
U14CE803B.4	1	2	2		1	1	1		2	1		1
	1.00	2.00	2.50	2.00	1.50	1.00	1.00	0.00	2.00	1.00	0.00	1.00

U14CE803B - PROFESSIONAL ELECTIVE - IV : EARTH RETAINING STRUCTURES

U14CE803B	PSO1	PSO2	PSO3	PSO4
U14CE803B.1	1	2	1	1
U14CE803B.2	1	3	1	1
U14CE803B.3	1	2	1	1
U14CE803B.4	1	2	1	1
	1.00	2.25	1.00	1.00

U14CE803C WATERSHED MANAGEMENT

Class: B.Tech.VI-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

LO1: concept, characteristics of watershed and soil erosion

LO2: participatory rural appraisal and erosion control measures

LO3: water conservation, harvesting and ground water management

LO4: ecosystem and grassland management

UNIT - I (12)

Watershed Basic Concepts: Definition, Objectives and need for watershed development, Characteristics of Watershed - Size, shape, Physiographic, Slope, Climate, Drainage, Land use, Vegetation, Geology and Soils, Hydrology, Hydrogeology and Socioeconomic, Watershed management.

Soil erosion: Basic processes, Factors affecting soil erosion, Land capability classification.

UNIT -II (12)

Participatory Rural Appraisal (PRA) in Watershed Programme: Basic principles, Assumptions, Basis, Important types, Benefits, tools, Maps and Models of PRA programmes.

Erosion Control Measures on Agricultural Land: Contour cultivation, Contour bunding, Graded bunds, Bench terracing, Grassed water ways, Mechanical erosion control measures for non agricultural land, Contour trenching, Gully control measures, Vegetative control measures, Check dams, Brush dams, Semi permanent gully, Control structures.

UNIT- III (12)

Water Conservation and Harvesting: Rainwater harvesting, Catchment harvesting, Harvesting structures, Soil moisture conservation, Check dams, Artificial recharge, Farm Ponds, Percolation tanks.

Groundwater Management in Watershed: Types of aquifers, vertical distribution of groundwater, Conjunctive use of surface and Use of groundwater.

UNIT - IV (12+0)

Ecosystem Management: Role of ecosystem, Crop husbandry, Soil enrichment, Inter mixed and strip-cropping, Cropping pattern, Sustainable agriculture, Bio-mass management, Dry land agriculture, Silvi pasture, Horticulture, Social forestry and Afforestation.

Grassland Management: Joint forestry management Monitoring and evolution of watershed, Planning of watershed management activities, Preparation of Action plan, Administrative requirements.

Text Books:

1. J. V. S. Murthy "*Watershed Management*", New Age International Publishers, New Delhi, 2nd edn., 1998.
2. V. V. N. Murthy, "*Land and Water Management*", Kalyani Publications, 6th edn., 2011.

References:

1. R. Awurbs and W. P. James, "*Water Resource Engineering*", Prentice Hall Publishers, 1st edn., 2001.
2. Rajesh Rajora, "*Integrated watershed management*", Rawat publications, 2nd edn., 1998.
3. D. K. Majumdar, "*Irrigation and Water Management*", Printice Hall of India, 2nd edn., 2005.

Course Learning Outcomes(Cos):

CO1: explain concept, characteristics of watershed and evaluate soil erosion.

CO2: describe participatory rural appraisal and apply erosion control measures

CO3: apply water conservation, harvesting and ground water management

CO4: apply ecosystem and grassland management

U14CE803C - PROFESSIONAL ELECTIVE - IV : WATERSHED MANAGEMENT

U14CE803C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE803C.1	2	2	2	2	1	2	3	1	3	3	3	3
U14CE803C.2	1	1	1	2		3	3	2	3	3	3	3
U14CE803C.3	3	3	3	1	1	1		3	3	1	1	3
U14CE803C.4	1	3	1	2		1	3	1	3	1	1	3
	1.75	2.25	1.75	1.75	1.00	1.75	3.00	1.75	3.00	2.00	2.00	3.00

U14CE803C - PROFESSIONAL ELECTIVE - IV : WATERSHED MANAGEMENT

U14CE803C	PSO1	PSO2	PSO3	PSO4
U14CE803C.1	3	2	1	3
U14CE803C.2	2	1	1	3
U14CE803C.3	3	1	2	3
U14CE803C.4	2	2		3
	2.50	1.50	1.33	3.00

U14CE803D REPAIR AND REHABILITATION OF STRUCTURES

Class: B.Tech.VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: damage assessment and causes of distress

LO2: non-destructive evaluation tests

LO3: essential parameters for repair materials and various repair materials

LO4: various repair methods and repair strategies

UNIT - I (12)

Overview:Maintenance, Repair and Rehabilitation, importance of Maintenance, Various aspects of Inspection.

Damage assessment:Site survey, Cracking, Disintegration and spalling, Scaling, Dusting,Distortion, Erosion, Seepage, Crack survey, Joint inspections, Physical and chemical analysis, NDT testing, Causes of deterioration- Accidental loading, Chemical reactions, Corrosion, Freezing and thawing, Settlement and movement, Shrinkage, Temperature changes.

UNIT - II (12)

Condition Survey:Definition, Objective, Stages, Consideration for Repair Strategy.

Non-destructive Evaluation Tests:Concrete Strength Assessment - Rebound Hammer Test, Ultrasonic Pulse Velocity (UPV) and Core Sampling and Testing, Chemical Tests - Carbonation Test and Chloride Content, Corrosion Potential Assessment - Cover meter survey, Fire Damage Assessment - Differential Thermal Analysis (DTA) and X-ray Diffraction (Xrd), Soundness Assessment - Radiography, Impact-echo test, Dynamic Testing of Structures.

UNIT - III (12)

Essential Parameters for Repair Materials:Low Shrinkage, requisite setting/hardening properties, workability, Bond with the Substrate, Compatible Coefficient of thermal Expansion, Compatible Mechanical Properties & Strength, Minimal or no curing Requirement, Alkalinity, Low air & water permeability, Aesthetics, Cost, Durability, Non-Hazardous/Non-Polluting.

Materials for Repair:Premixed cement concrete/mortars, Polymer Modified Mortars and Concrete (PMM/PMC), Epoxies and Epoxy Systems including Epoxy Mortars/Concretes, Polyester Resins, Surface Coatings.

UNIT - IV (12)

Repair Methods: Repairs using Mortars, Shotcrete, Concrete Replacement, Epoxy Bonded Concrete, Silica Fume Concrete, Polymer Concrete System, Resin modified Cement Slurry injection, Protective Seal Coats, Ferro-cement, Plate bonding, RCC Jacketing, Propping and Supporting, Fibre Wrap Technique, Foundation Rehabilitation Methods.

Repair and Rehabilitation Strategies:Stress Reduction, Repair/Strengthening Columns, Beams and slabs, Compressive Strength of Concrete, Cracks/Joints, Masonry Protection, Foundation Base Isolation

Text Books:

1. R. N. Raikar, "Diagnosis and treatment of structures in distress", R and D Centre of Structural Designers and Consultants Pvt. Ltd., Mumbai, 1994.
2. M. L .Gambhir, "Concrete Technology", 5th edn., Tata McGraw-Hill Education, 2013.

Reference Books:

1. "Handbook on Repair and Rehabilitation of R.C.C Buildings", Central Public Works Department (CPWD), Government of India, New Delhi, 2002.
2. M. S. Shetty, "Concrete Technology - Theory and Practice", S. Chand and Company, 7th edn.,
3. Dov Kaminetzky "Design and Construction Failures" Galgotia Publications Pvt. Ltd., 2001.
4. K. Ravishankar, T. S. Krishnamoorthy, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.

Course Learning Outcomes (COs):

CO1: appraise importance of Repair, Rehabilitation and Maintenance

CO2: develop familiarity with various non-destructive evaluation tests

CO3: list out properties to be considered to choose from available repair materials

CO4: develop familiarity with various repair methods and rehabilitation strategies

U14CE803D - PROFESSIONAL ELECTIVE - IV : REPAIR AND REHABILITATION STRUCTURES												
U14CE803D	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE803D.1			1	3	2	2	1	2	2			3
U14CE803D.2	1	2	2	2	2	1	2	2	1		1	3
U14CE803D.3	3	2	3	3	1	1	2	3	1	1	2	3
U14CE803D.4	2	3	3	3	2	1	1	2	3	1		2
	2.00	2.33	2.25	2.75	1.75	1.25	1.50	2.25	1.75	1.00	1.50	2.75

03D - PROFESSIONAL ELECTIVE - IV : REPAIR AND REHABILITATION STRU				
U14CE803D	PSO1	PSO2	PSO3	PSO4
U14CE803D.1		1	2	3
U14CE803D.2	1	2	2	2
U14CE803D.3	3	2	2	1
U14CE803D.4	3	2	1	3
	2.33	1.75	1.75	2.25

U14CE804A EARTHQUAKE ENGINEERING

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: basics of Earthquake engineering and terminology involved

LO2: analysis of Single and Multi Degree Of Freedom systems

LO3: estimation of Storey shear and Torsional moments & seismic design of footings

LO4: restoration and retrofitting of RC and masonry buildings

UNIT I (12)

Fundamentals of earthquakes: Geology of earth, configuration of tectonic plates in a globe, influence of Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake and their characteristics, Earthquake parameters, magnitudes, intensity, scales, seismic zoning of India, seismic coefficients for different zones, Liquefaction, causes and its remedial measures.

Disaster Mitigation: Natural disasters, mitigation and social aspects. Lessons from past earthquake: - Study of damages caused due to past, earthquakes in/ outside India and remedial measures.

UNIT II (12)

Single Degree of Freedom Systems: Vibrations, Definition, Causes, classifications. Single Degree of Freedom systems (SDOF), free, forced, damped, un-damped vibrations.

Multi Degree of Freedom systems: Introduction to Multi-degrees of Freedom systems (MDOF), Derivations of related equations and solutions to two degree of freedom systems.

UNIT III (12)

Seismic design of Symmetrical RC structures: Effect of earthquake on RC structure, IS provision, Seismic coefficient method. Basic requirements, Estimation of story shear.

Seismic design of Unsymmetrical RC structures: Effect of unsymmetrical geometry and masses, mass center and stiffness center, Estimation of story shear and torsional moments for unsymmetrical buildings, IS 1893 provisions to response spectrum, Concept of ductile detailing, IS 13920 provisions for RC frame.

UNIT IV (12)

Seismic Base Isolation: Necessity of Base Isolation Systems, Types of Seismic Isolation Systems, Configuration and Qualitative Behavior of Isolated Building.

Analysis of Structures with Seismic Isolation Systems: Behaviour of RC structures with Isolation Systems, Review of Building code requirements.

Text Books:

1. Jaikrishna, Chandarsekaran and Brijesh Chandra "Elements of Earthquake Engineering", South Asian Publishers, New Delhi, 1st edn., 1994.
2. S. K .Duggal "Earthquake Resistant Design of Structures", Oxford University Press, New Delhi, 1st edn., 2007.

Reference Books:

1. Anil Chopra, "Dynamics of Structures", Prentice Hall India Publications, 3rd edn., 1995.
2. R. W. Clough and J. Penzien "Dynamics of Structures" McGraw Hill Civil Engineering Series, 3rd edn., 2003.
3. Pankaj Agarwal and Manish Shrikande, "Earthquake Resistant Design of Structures", Prentice Hall of India Publications, 1st edn., 2006.
4. Relevant Latest Revisions of IS codes. IS 1893, IS 4326, IS 13920, IS 13827, IS 13828, IS 13935

Course Learning Outcomes (COs):

CO1: illustrate basics of Earthquake engineering viz., causes, characteristics, remedial measures

CO2: evaluate Single and Multi Degree of Freedom systems

CO3: evaluate storey shear and torsional moments for R.C. frames.

CO4: explain methodologies of Restoration and retrofitting of RC and masonry buildings

U14CE804A - PROFESSIONAL ELECTIVE - V : EARTHQUAKE ENGINEERING

U14CE804A	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE804A.1	1	1	1	1	1	2	2	3		1	1	1
U14CE804A.2	3	3	2	2								
U14CE804A.3	3	3	3	3			2	2		2		
U14CE804A.4	3	2	2	2		2	2	3	1	1	1	1
	2.50	2.25	2.00	2.00	1.00	2.00	2.00	2.67	1.00	1.33	1.00	1.00

U14CE804A - PROFESSIONAL ELECTIVE - V : EARTHQUAKE ENGINEERING

U14CE804A	PSO1	PSO2	PSO3	PSO4
U14CE804A.1	2	2	2	2
U14CE804A.2	2	2	2	2
U14CE804A.3	2	2	2	2
U14CE804A.4	1	2	2	3
	1.75	2.00	2.00	2.25

U14CE804B CONSTRUCTION CONTRACTS MANAGEMENT

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs)

LO1: project cost estimate and rate analysis

LO2: stages of pre-tendering and standard forms of contract

LO3: contractual conditions and contract administration

LO4: Indian Contract Act, Arbitration and Conciliation Act

UNIT - I (12)

Quantity Surveying: Basic principles of estimating, Project cost estimation-preliminary and detailed estimation. Bill of Quantities (BOQ) and specification.

Rate Analysis: Principles of rate analysis, Direct, Indirect cost and overhead charges. Standard methods followed by government and contractors organization.

UNIT - II (12)

Pre- Tendering and Procurement: Pre-tending process and stages, Pre-Qualification of bidders, Overview of Procurement Management, Basic Steps in Procurement Process, Public Procurement in India, E-Procurement, Indian Contract Act 1872, Definition of Contract and its applicability.

Construction contracts: Understanding project contracts, Types of construction contracts, Standard conditions in construction contracts, Contractual documents, Conditions and specifications of contract.

UNIT - III (12)

Contracts Performance Management: Control and flexibility in contracts, Monitoring and controlling, Technical and operational performance of contracts, Controlling risks, Incentives and penalties, Change order management.

Contract Conditions: Important contract clauses, Terms of payments, Retention, Acceptance and final payment, Time of completion, Extension of time, Maintenance period, Termination of contract and condition for termination.

UNIT - IV (12)

Claims and Arbitration: Indian contract act and arbitration act, Variations in work and conditions, Claims and disputes, Liquidated damages. Rights, Responsibilities and duties of client (Owner). Architect, Engineer and Contractor.

Dispute Resolution: Cause of disputes and importance of role of various stakeholders in prevention of disputes, Alternate Dispute Resolution methods- mediation, conciliation and arbitration.

Text Books:

1. G. T. Gajaria, "Laws Relating to Building and Engineering Contracts in India", M. M. Tripathi Private Ltd., Bombay, 1982 Tamilnadu PWD Code, 1986
2. K. S. Kharb, "A Guide to Quantity Surveyors, Engineers Architects and Builders (Volume-I: Taking off quantities, Abstracting and Billing; Volume-II: Analysis of Prices)" Sushila Publications.

Reference Books:

1. Jimmie Hinze, "Construction Contracts", McGraw Hill, 2001.
2. V. K. Raina., "Construction and Contract Management" Shroff Publishers
3. B. S Ramaswamy, "Contracts and their Management", LexisNexis India, 2008.
4. B. S. Patil, "Building and Engineering Contracts" Mrs. S.B. Patil, Pune
5. "Analysis of Rates for Delhi (Volume 1 and 2). and Delhi Schedule of Rates", Govt of India, Central Public Works Department.
6. "CPWD 7/8: General Conditions of Contracts", Govt of India, Central Public Works Department.

Course Learning Outcomes (COs):*CO1: identify and describe the procedure for calculating project cost**CO2: explain the pre-tendering stages and standard forms of contract**CO3: appraise the performance of contract and contract administration**CO4: expedite the importance of Contract Act, Arbitration and Conciliation Act***U14CE804B - PROFESSIONAL ELECTIVE - V : CONSTRUCTION CONTRACTS MANAGEMENT**

U14CE804B	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE804B.1	3	2	1								2	1
U14CE804B.2								2			2	1
U14CE804B.3								1	1	1	2	2
U14CE804B.4											1	1
	3.00	2.00	1.00	0.00	0.00	0.00	0.00	1.50	1.00	1.00	1.75	1.25

U14CE804B - PROFESSIONAL ELECTIVE - V : CONSTRUCTION CONTRACTS MANAGEMENT

U14CE804B	PSO1	PSO2	PSO3	PSO4
U14CE804B.1	2	1	1	1
U14CE804B.2		2		
U14CE804B.3			2	
U14CE804B.4			2	
	2.00	1.50	1.67	1.00

U14CE804C TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

Class: B.Tech. VIII -Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: elements, characteristics and measures of traffic flow system

LO2: various types of traffic studies and surveys, causes and preventive measures for traffic accidents

LO3: concepts of traffic signaling, rotaries and interchanges in highways

LO4: traffic control devices, transportation planning and warrants for sign provision

UNIT - I (12)

Traffic Characteristics: Road user characteristics, Perception reaction time, Driver strategy, Characteristics of vehicle, Kinematics and dynamics of vehicle.

Traffic Flow and Capacity: Nature of traffic flow, Relation between speed, Flow and density, Traffic capacity, Level of service (LOS), Basic definitions, Factors affecting capacity and LOS, Capacity of urban/rural highway with or without access control.

UNIT -II (12)

Traffic Studies and Surveys: Traffic volume studies, Methods and presentation of data, Origination-destination surveys, Methods and uses, Speed studies, Methods and presentation of data, Time and delay studies, Methods, Merits and demerits.

Accident Investigations: Traffic accident terminology, Accident studies- causative factors of road accidents, Accident analysis, Accident prevention.

UNIT- III (12)

Traffic Signals: Purpose of traffic signalling, Signal warrants, Signal design, Webster's method and IRC method, Signal coordination, Terminology, Principles of coordinated operations.

Rotary and Interchanges: Channelization, Design of intersection, Capacity of rotary, Interchanges at grade and grade separated.

UNIT - IV (12)

Traffic Operations and Control Devices: Traffic regulations, One way streets, Conflict points, Traffic signs, Traffic markings.

Transportation Planning: Introduction, Objectives and policies, Urban transport planning process, Travel demand forecasting, Trip generation, Trip distribution and traffic assignment.

Text books:

1. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, "Highway Engineering", Nem Chand and Bros, 10th edn., 2014.
2. L. R. Kadiyali, "Traffic Engineering and Transportation Planning" Khanna Publishers, 7th edn., 2014.

Reference Books:

1. Relevant IRC Codes IRC-53, IRC-65, IRC-64, IRC-67, IRC-66.
2. Fred Mannering and Walter Kilareski., "Principles of Highways Engineering and Traffic Analysis" - John Wiley and Sons Publication, 2012.
3. "Highway Capacity Manual", 2000.

Course Learning Outcomes (COs):

CO1: explain the elements of traffic engineering, their characteristics and effects on traffic system

CO2: discuss the different traffic studies and surveys, causes and measures for traffic accidents

CO3: determine the signal time and state the different types of rotaries and interchanges

CO4: explain the different traffic control devices and stages of transportation planning

U14CE804C - PROFESSIONAL ELECTIVE - V : TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

U14CE804C	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE804C.1	3	3	2	1			1		1	1		
U14CE804C.2	2	3	3	1			2		1	2	1	1
U14CE804C.3	3	3	3	3		2	2		1	1		2
U14CE804C.4	2	3	2	1		2	1				2	1
	2.50	3.00	2.50	1.50	0.00	2.00	1.50	0.00	1.00	1.33	1.50	1.33

PROFESSIONAL ELECTIVE - V : TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING

U14CE804C	PSO1	PSO2	PSO3	PSO4
U14CE804C.1	3	3	1	3
U14CE804C.2	3	2		2
U14CE804C.3	2	2		3
U14CE804C.4	3	3		2
	2.75	2.50	1.00	2.50

U14CE804D ENVIRONMENTAL IMPACT ASSESSMENT

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme:

L	T	P	C
4	-	-	4

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: basic concepts of environmental impact assessment

LO2: prediction, assessment of impacts on air and water environment

LO3: prediction, assessment of impacts on noise, soil and biological environment

LO4: environmental management plan and case studies of different projects

UNIT - I (12+0)

Basic Concept of Environmental Impact Assessment: Introduction, Definition, Scope, Objectives, Basic principles, Classification, Project Cycle, Grouping of environmental impacts - Direct impacts, Indirect impacts, Cumulative impacts and Induced impacts. Criteria/Methodology to determine the significance of the identified impacts.

Methods for Impact Identification: Background information, Interaction-Matrix methodologies - simple matrices, Stepped matrices, Development of a simple matrix, Other types of matrices, Summary observations on matrices, Network methodologies - Checklist methodologies, Simple checklists, Descriptive Checklists, Summary observations on simple and descriptive checklists.

UNIT - II (12+0)

Prediction of Impacts - Air Environment: Basic information on air quality, Sources of Pollutants, Effects of pollutants, Conceptual approach for addressing air environment impacts, Air quality standards, Impact prediction, Impact significance.

Prediction of Impacts - Water Environment: Basic information on surface water quantity and quality, Conceptual approach for addressing surface water environment impacts, Identification of surface water quantity or quality impacts, Impact predictions, Assessment of impact significance.

UNIT - III (12+0)

Prediction of Impacts - Noise and Soil: Basic information on noise key federal legislation and guidelines, Conceptual approach for addressing noise environment impacts, Identification of noise impacts, Procurement of relevant noise standards and guidelines, Impact prediction, Assessment of impact significance. Soil environment, Human health and society

Prediction of Impacts - Biological and Socio-economic: Basic information on biological systems, Conceptual approach for addressing biological impacts, Identification of biological impacts, Description of existing biological environment conditions, Procurement of relevant legislation and regulations, Socio-economic impacts, Impact prediction, Assessment of impact significance.

UNIT - IV (12+0)

Environmental Management Plan (EMP): EMP for air environment - Dust control plan, Procedural changes, Diesel generator set emission control measures, Vehicle emission controls and alternatives, Greenbelt development, EMP for water environment - Water source development, Minimizing water consumption, Domestic and commercial usage, Horticulture, Storm water management, EMP for land environment - Construction debris, Hazardous waste, Waste from temporary labour settlements.

Case studies: Case studies and preparation of Environmental impact assessment statement for Water resources project, Thermal power plant, Municipal solid waste processing plant.

Text Books:

1. .Y. Anjaneyulu and V. Manickam, "*Environmental Impact Assessment Methodologies*", Tata Mc Graw Hill Publishing Co. Ltd., 2nd edn., 2014.
2. R. R. Barthwal, "*Environmental Impact Assessment*", New Age International Publishers, New Delhi, 1st edn., 2013.

Reference Books:

1. L. W. Canter, "Environmental Impact Assessment", Mc Graw Hill, 2nd edn., 1996.
2. "Technological guidance Manuals of EIA", Ministry of Environment and Forest, Govt. of India.

Course Learning Outcomes (COs):

CO1: appraise the importance of environmental impact assessment studies

CO2: predict, assess the impacts on air and water environment

CO3: predict, assess the impacts on noise, soil and biological environment

CO4: prepare environmental management plan and appraise case studies of EIA

U14CE804D - PROFESSIONAL ELECTIVE - V : ENVIRONMENTAL IMPACT ASSESSMENT												
U14CE804D	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE804D.1	2	1	1	1		2	2	1	1	1	1	1
U14CE804D.2	1	2	1	1		2	1	1	1	1	1	1
U14CE804D.3	2	2	1	1	1	2	1	1	1	1	1	1
U14CE804D.4	1	1	1				1	1	1		1	1
	1.50	1.50	1.00	1.00	1.00	2.00	1.25	1.00	1.00	1.00	1.00	1.00

U14CE804D - PROFESSIONAL ELECTIVE - V : ENVIRONMENTAL IMPACT ASSESSMENT				
U14CE804D	PSO1	PSO2	PSO3	PSO4
U14CE804D.1	2	2	1	1
U14CE804D.2	2	1	1	1
U14CE804D.3	2	2	1	1
U14CE804D.4	1	2	1	
	1.75	1.75	1.00	1.00

U14CE805 CIVIL ENGINEERING SOFTWARE APPLICATIONS LABORATORY

Class: B.Tech. VIII –Semester

Teaching Scheme:

L	T	P	C
-	-	3	2

Branch: Civil Engineering

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: analysis and design of beams using STAAD PRO and validation by manual method

LO2: analysis and design of columns, footings and slabs using STAAD PRO

LO3: analysis and design of portal frame using STAAD PRO and validation by manual method

LO4: analysis of beams and slabs using ANSYS and validation by manual method

LIST OF EXPERIMENTS

1. Analysis and design of RCC beams using STAAD PRO and validation by manual method
2. Analysis and design of RCC columns using STAAD PRO and validation by manual method
3. Analysis and design of RCC slabs using STAAD PRO and validation by manual method.
4. Analysis and design of one storey RCC portal frame using STAAD PRO and validation by manual method
5. Analysis and design of two storey RCC portal frame using STAAD PRO and validation by manual method
6. Analysis and design of isolated RCC footings using STAAD PRO and validation by manual method
7. Analysis and design of combined RCC footings using STAAD PRO and validation by manual method
8. Analysis and design of steel beams using STAAD PRO and validation by manual method
9. Analysis and design of steel columns using STAAD PRO and validation by manual method
10. Analysis and design of roof truss using STAAD PRO and validation by manual method
11. Analysis of beams using ANSYS and validation by manual method
12. Analysis of slabs using ANSYS and validation by manual method

Laboratory Manual:

1. "Civil Engineering Software Applications Laboratory Manual", prepared by the faculty of Civil Engineering.

Text Books:

1. "Manual of STAAD. Pro V8i", Bentley software.
2. "Manual of ANSYS".
3. S. Unnikrishna Pillai and Devdas Menon, "Reinforced Concrete Design", Tata Mc.Graw-Hill Publishing Company Limited, New Delhi, 3rd edn., 2011.
4. A. K. Jain, "Limit State Design", Nem Chand Brothers, Roorkee, 7th edn., 2012.

Course Learning Outcomes (COs):

CO1: analyze and design of beams using STAAD PRO and validate by manual method

CO2: analyze and design of columns, footings and slabs using STAAD PRO

CO3: analyze and design of portal frame using STAAD PRO and validate by manual method

CO4: analyze of beams and slabs using ANSYS and validate by manual method

U14CE805 - CIVIL ENGINEERING SOFTWARE APPLICATIONS LABORATORY												
U14CE805	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE805.1	3	3	3	2	3	1		1	2			1
U14CE805.2	3	3	3	3	3	1			1			1
U14CE805.3	3	3	3	3	2	1	1		1		1	1
U14CE805.4	2	3	2	2	2	1			1		1	
	2.75	3.00	2.75	2.50	2.50	1.00	1.00	1.00	1.25	0.00	1.00	1.00

U14CE805 - CIVIL ENGINEERING SOFTWARE APPLICATIONS LABORATORY				
U14CE805	PSO1	PSO2	PSO3	PSO4
U14CE805.1	2	3	1	1
U14CE805.2	2	3	1	1
U14CE805.3	3	3		1
U14CE805.4	2	3		
	2.25	3.00	1.00	1.00

U14CE806 ENGINEERING GEOLOGY LABORATORY

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	3	2

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: identification of different minerals

LO2: identification of igneous, sedimentary and metamorphic rocks

LO3: geological maps

LO4: geophysical exploration technique

LIST OF EXPERIMENTS

1. Identification of Quartz and Feldspar minerals
2. Identification of rock forming and ceramic minerals
3. Identification of ore forming minerals
4. Identification of Igneous rocks
5. Identification of Sedimentary rocks
6. Identification of Metamorphic rocks
7. Study of geological maps: Out crop completion
8. Study of geological maps: Profile drawing
9. Study of geological maps: Bed thickness determination and structural features
10. Visual Interpretation of Aerial photographs
11. Visual Interpretation of Remote sensing imagery
12. Demonstration of working model for geophysical exploration technique

Laboratory Manual:

1. "Engineering Geology Laboratory Manual", prepared by the faculty of Civil Engineering.

Reference Books:

1. D. Venkat Reddy, "Engineering Geology", Vikas publishing house, New Delhi, 2009.
2. K. V. G. K. Gokhale, "Principles of Engineering Geology", BS Publications, Hyderabad, 1st edn., 2013.

Course Learning Outcomes (COs):

CO1: identify properties of different minerals

CO2: classify rocks as igneous, sedimentary and metamorphic

CO3: interpret different geological maps

CO4: apply geophysical exploration technique

CE806 - ENGINEERING GEOLOGY LABORATORY

U14CE806	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE806.1	1	1		2		3	3	3	3	3	2	3
U14CE806.2	2	2		2		2	3	3	3	3	1	3
U14CE806.3	1	1	3	2	2	2	3	3	2	2	2	2
U14CE806.4	2	2	1	2	2	2	3	3	2	1	2	2
	1.50	1.50	2.00	2.00	2.00	2.25	3.00	3.00	2.50	2.25	1.75	2.50

CE806 - ENGINEERING GEOLOGY LABORATORY

U14CE806	PSO1	PSO2	PSO3	PSO4
U14CE806.1	1		2	3
U14CE806.2	1		3	3
U14CE806.3	1		2	3
U14CE806.4	2	2	2	2
	1.25	2.00	2.25	2.75

U14CE807 MAJOR PROJECT WORK PHASE-II

Class: B.Tech. VIII-Semester

Branch: Civil Engineering

Teaching Scheme :

L	T	P	C
-	-	13	7

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

LO1: *problem based and project based learning*

LO2: *major project design in one of the selected areas of specialization with substantial multi-disciplinary component*

LO3: *analytical and research skills*

LO4: *team work, leadership and interpersonal skills*

Student has to continue the major project work in eighth semester as Major Project Work Phase-II.

The evaluation for Major project work *Phase-II* is as follows:

Assessment	Weightage
Project Supervisor Assessment	20%
DPEC Assessment : <i>Progress presentation-II, Final presentation & Viva-voce and Final Project Report</i>	20%
End Semester Examination: <i>Oral (PPT) Presentation & Viva Voce</i>	60%
Total Weightage:	100%

DPEC shall decide the course of action on the students, who fail to complete the Major project work *Phase-II*, submit final project report and give oral (PPT) presentation.

Course Learning Outcomes (COs):

CO1: *demonstrate creativity in the design of components, systems or processes of their program of study*

CO2: *design an innovative product by applying current knowledge and adopt to emerging applications of engineering & technology*

CO2: *work cooperatively with others to achieve shared goal by motivating team-mates with a clear sense of direction, values and ethics,*

CO4: *write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic*

CE 807 - MAJOR PROJECT WORK - PHASE - II

U14CE807	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
U14CE807.1	2	2	3	3	2	2	2	2	2	2	2	2
U14CE807.2	2	3	2	3	2	3	2	3	2	2	2	3
U14CE807.3	2	2	3	2	2	2	3	2	3	2	3	2
U14CE807.4	3	3	2	3	2	3	2	2	3	2	2	2
	2.25	2.50	2.50	2.75	2.00	2.50	2.25	2.25	2.50	2.00	2.25	2.25

CE 807 - MAJOR PROJECT WORK - PHASE - II

U14CE807	PSO1	PSO2	PSO3	PSO4
U14CE807.1	3	3	3	3
U14CE807.2	2	3	2	2
U14CE807.3	2	2	2	2
U14CE807.4	3	2	3	2
	2.50	2.50	2.50	2.25