KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE
(An Autonomous Institute under Kakatiya University , Warangal)
(Approved by AICTE, New Delhi; Recognised by UGC under 2(f) & 12(B); Sponsored by EKASILA EDUCATION SOCIETY)
Opp : Yerragattu Gutta, Hasanparthy (Mandal), WARANGAL - 506 015, Telangana, INDIA.
काकतीय प्रैद्योगिकी एवं विज्ञान संस्थान, वरंगल - ५०६ ०१५
కాకతీయ సాంకేతిక విజ్ఞాన శాస్త్ర విద్యాలయం, వరంగల్ - ౫౦౬ ౦౧౫
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VISION OF THE INSTITUTE

- *To make our students technologically superior and ethically strong by providing quality education with the help of our dedicated faculty and staff and thus improve the quality of human life*

MISSION OF THE INSTITUTE

- *To provide latest technical knowledge, analytical and practical skills, managerial competence and interactive abilities to students, so that their employability is enhanced*
- *To provide a strong human resource base for catering to the changing needs of the Industry and Commerce*
- *To inculcate a sense of brotherhood and national integrity*

DEPARTMENT OF CIVIL ENGINEERING

VISION OF THE DEPARTMENT

- *The Vision of the department is to become a leading centre 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

- *The Mission of Civil Engineering Department is to produce outstanding Civil Engineering graduates with highest ethics.*
- *To impart quality education in civil engineering to raise satisfaction Level of all Stake holders.*
- *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 EDUCATIONAL OBJECTIVES (PEOs)

UG - CIVIL ENGINEERING - CE

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	**Within first few years after graduation**, the**CIVIL ENGINEERING** graduates will be able to …
PEO1: Technical Expertise	*Demonstrate professional competency in varied fields of engineering industry and/or pursue higher education by nourishing mathematical scientific and engineering precepts.*
PEO2: Successful Career	*Investigate, analyze and design solutions to complex civil engineering problems ensuring safety, sustainability and ecological harmony.*

PEO3: Soft Skills and Professionalism	*Exhibit professionalism by transferring latest technology and understanding societal impacts to protect interests of the public at large.*
PEO4: Life Long Learning	*Develop competence by engaging in lifelong learning, in order to integrate ethics, economics and equity.*

PROGRAM OUTCOMES (POs) & PROGRAM SPECIFIC OUTCOMES (PSOs)	
UG - CIVIL ENGINEERING – CE	
PROGRAM OUTCOMES (POs)	**At the time of graduation**, the**CIVIL ENGINEERING** graduates will be able to …
PO1: Engineering knowledge	*apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems*
PO2: Problem analysis	*identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences*
PO3:Design/development of solutions	*design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental Considerations*
PO4: Conduct investigations of complex problems	*use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions*
PO5: Modern tool usage	*create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations*
PO6:The engineer and society	*apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice*
PO7:Environment and sustainability	*understand the impact of the professional engineering solutions in societal and environmental contexts, demonstrate the knowledge of, and need for sustainable development*
PO8:Ethics	*apply ethical principles and commit to professional ethics, responsibilities, and norms of the engineering practice*
PO9:Individual and team work	*function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings*
PO10:Communication	*communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions*
PO11:Project management and finance	*demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments*
PO12:Life-long learning	*recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change*
PROGRAM SPECIFIC OUTCOMES (PSOs):	
PSO1	*Apply fundamental computational methods and elementary analytical techniques in sub-disciplines related to civil engineering*

PSO2	*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*
PSO3	*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*
PSO4	*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

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

III SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	BSC	U18MH301	Engineering Mathematics - III	3	1	-	4	10	30	40	60	100
2	HSMC	U18TP302	Soft & Interpersonal Skills	-	-	2	1	100	-	100	-	100
3	OE	U18OE303	Open Elective-I	3	-	-	3	10	30	40	60	100
4	PCC	U18CE304	Fluid Mechanics	3	-	-	3	10	30	40	60	100
5	PCC	U18CE305	Surveying	3	-	-	3	10	30	40	60	100
6	PCC	U18CE306	Construction Materials	3	-	-	3	10	30	40	60	100
7	PCC	U18CE307	Concrete Technology Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CE308	Surveying Field Work-I	-	-	2	1	40	-	40	60	100
9	OE	U18OE311	Open Elective-I based Laboratory	-	-	2	1	40	-	40	60	100
			Total	**15**	**1**	**8**	**20**	**270**	**150**	**420**	**480**	**900**

[L= Lecture, T = Tutorials, P = Practicals& C = Credits] Stream-I CSE,IT,ME Stream-II EEE, ECE, EIE,CE

Total Contact Periods/Week:24 **Total Credits :20**

Open Elective-I:	**Open Elective-I based Lab:**
U18OE303A: Object Oriented Programming (CSE) U18OE303B: Fluid Mechanics & HydraulicMachines (CE) U18OE303C: Fundamentals of Mechatronics (ME) U18OE303D: Web Programming (IT) U18OE303E: Microprocessors (ECE) U18OE303F: Strength of Materials (CE)	U18OE311A: Object OrientedProgramming Lab (CSE) U18OE311B: Fluid Mechanics &Hydraulic Machines Lab (CE) U18OE311C: Mechatronics Lab (ME) U18OE311D: Web Programming Lab (IT) U18OE311E: Microprocessors Lab (ECE) U18OE311F: Strength of Materials Lab(CE)

U18MH301 ENGINEERING MATHEMATICS- III

Class: B.Tech.III-Semester **Branch:** Common to all branches

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	1	-	4

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

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

***LO2*:** *Fourier series and its application to solve engineering problems*

***LO3*:** F*unctions of complex variables, the property of analyticity of a function of complex variable and their applications*

***LO4*:** *integration of a function of complex variable, 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 [$t^2u(t)$], realexponential [$e^{at}u(t)$], complex exponential [$e^{j\Omega t}u(t)$], sine and cosinefunctions, damped sine and cosine functions, hyperbolic sine and cosine functions, damped hyperbolic sine and cosine functions, rectangular pulse and triangle. Properties of Laplace Transforms- Linearity, First shifting theorem (Frequency shift property), 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 system subjected to impulse, step, periodic, rectangular, square, ramp, triangular and sinusoidalfunctions.

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), Fourier series on an arbitrary period, effects of symmetry of function on FS coefficients, half range series – half range cosine and sine series expansions, exponential FS .

UNIT-III (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 flow, conformal mapping and bilinear transformation.

UNIT-IV (9+3)

Complex Integration: Line integration in complex plane, integral of a non analytic function, dependence on path of integration, *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 semicircle.

Text Books:

1. Grewal, B.S., "Higher Engineering Mathematics", *Khanna Publishers,* Delhi, 43/e, 2014.

Reference Books:

1. Kreyszig E., "Advanced Engineering Mathematics", *John Wiley & Sons, Inc.,* U.K, 9/e,2013.
2. Churchill R.V., "Complex Variable and its Applications", McGraw Hill, New York, 9/e,2013.

Course Learning Outcomes (COs):

Course Learning Outcomes (COs):

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

CO1: *apply Laplace transform to solve certain differential equations whose solutions cannot be computed using classical methods*

CO2: *describe a given function as Fourier series in an interval*

CO3: *construct analytic function; find velocity potential and stream function of a fluid flow using complex analytical methods*

CO4: *represent a given function in Taylor's and Laurent's series, evaluate certain real integrals using integraltheorems*

Course Articulation Matrix: U18MH301 ENGINEERING MATHEMATICS- III

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH 301.1	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.2	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.3	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301.4	2	1	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18MH301	**2**	**1.75**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**2**	**--**	**--**	**1**

U18TP302 SOFT AND INTERPERSONALSKILLS

Class: B.Tech III semester **Branch:** ME, CSE, IT

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on….

LO1: *analyzing self and learning to overcome possible threats*
LO2: *group dynamics to demonstrate respect for the opinions and beliefs of group*
LO3: *effective presentations using visual aids and analyzing the videos*
LO4: *communicating professionally, making resume in line with industry expectations*

LIST OF ACTIVITIES

Introduction

Activity 1	Team interaction
Activity 2	SWOT analysis
Activity 3	Debate
Activity 4	Group Discussion

Activity 5	Presentations through PPTs
Activity 6	Video Synthesis
Activity 7	Resume Writing
Activity 8	Email Etiquette

Activity9 : My interview Plan: Self Introduction &FAQs
Activity10 : "My Career Plan" Oral presentation
} Comprehensive Presentation

Text Books:

- Developing Communications Skills – Krishna Mohan & Meera Benerji, Mcmillan Publications, New Delhi,2005
- Soft Skills - Alex.K, S. Chand Publications, New Delhi,2010
- Soft skills Cornerstone of Professional success – Raman &Meenakshi, Jain Brothers Publications, New Delhi,2009

References:

- https://onlinecourses.nptel.ac.in/noc19_hs20/preview
- https://onlinecourses.nptel.ac.in/noc18_hs30/preview

Course Learning Outcomes (COs):

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

CO1 : *introspect to convert strengths into opportunities, identify weaknesses, bypass threats*

CO2: *present views on various issues confidently in a group*

CO3: *make effective PPT presentations, synthesize videos*

CO4: *prepare a professional resume, communicate effectively to attain better opportunities*

Course Articulation Matrix :U18TP302 SOFT AND INTERPERSONAL SKILLS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18TP302.1	-	-	-	-	-	-	-	-	2	3	-	-	-	-	1	1
U18TP302.2	-	-	-	-	-	-	-	2	3	3	-	-	-	-	1	1
U18TP302.3	-	-	-	-	-	-	-	-	2	3	-	-	-	-	1	1
U18TP302.4	-	-	-	-	-	-	-	1	2	3	-	-	-	-	1	1
U18TP302	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.5**	**2.25**	**3**	**-**	**-**	**-**	**-**	**1**	**1**

U18OE303A OBJECT ORIENTED PROGRAMMING

Class: B. Tech III-Semester **Branch:** Computer Science & Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: fundamentals of object oriented and java programming.
LO2: classes, objects and inheritance for implementing object oriented concepts.
LO3: polymorphism, interfaces and packages for realizing object oriented rogramming.
LO4: manage Exceptional and I/O operations in application developments.

UNIT- I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.

Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variable, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT – II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.

Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this* and *super* keywords.

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.

Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces

Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT – IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.

String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching string, Modifying string, Changing string cases, Joining strings**.**

Using I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465,2014.
2. E.Balgurusamy, "Programming with JAVA a primer", 5e Edition, McGraw-Hill Publication Ltd, ISBN: 9351343200,2014.

References Books:

1. P Radha Krishna, "Object Oriented Programming through JAVA", Universities Press, ISBN: 9788173715723,2011.
2. Herbert Schildt,"JAVA The Complete Reference", McGraw-Hill Education India Pvt.Ltd , 9th Edition, ISBN: 9781259002465,2011.
3. Kathy Sierra, Bert Bates, "Head First Java", O'Reilly Publictions, 2nd Edition, ISBN-13:978-0596009205.
4. UttamK.Roy, "Advanced JAVA Programming", Oxford Publications; First edition, ISBN-13: 978- 0199455508.

Course Learning Outcomes (Cos):

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

CO1: *demonstrate object oriented concepts and java programming features.*
CO2: *solve computing problems using object orientation and inheritance concepts.*
CO3: *use polymorphism, interfaces and Packages for effective object oriented programming*
CO4: *handle Exceptions and I/O operations in application development.*

Course Articulation Matrix : **U18OE303A OBJECT ORIENTED PROGRAMMING**

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE303A.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303A.2	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE303A.3	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE303A.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE303A	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**-**	**-**	**1**

U18OE303B FLUID MECHANICS AND HYDRAULIC MACHINES

Class: B.Tech.III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1*: various Properties of fluids and fluid statics*

LO2*: application of Bernoulli's equation and dimensional analysis*

LO3*: flow through pipes and working principles of hydraulic turbines*

LO4*: performance of reciprocating and centrifugal pumps*

UNIT-I(9)

Fluid fundamentals: Classification of fluids, fluid properties - density, specific weight, specific gravity, specific volume, viscosity, capillarity, vapor pressure, compressibility, surface tension, cohesion and adhesion.

Fluid statics: Pascal's Law, hydrostatic Law, measurement of pressure, manometers, Piezometer, U-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, buoyancy, metacenter, stability of floating and submerged bodies

UNIT-II (9)

Fluid dynamics: Classification of fluid flow, continuity equation in one, two and three dimensional flow, velocity potential and stream function, forces causing motion, Euler's equation of motion, Bernoulli's Equation, applications of Bernoulli'sequation, venturimeter, orificemeter, pitottube, linear momentum equation, application of linear momentum equation to forces on pipe bend.

Dimensional analysis: Dimensional analysis by Rayleigh's method and Buckingham π's theorem, dimensionless numbers and model laws, Reynolds law and Froude's law.

UNIT-III(9)

Flow through pipes: Loss of head in pipes, expression for head loss due to major and minor losses in pipes, HGL and TEL lines, pipes in series and parallel, equivalent pipe.

Hydraulic turbines: Concept of impact jets, classification, head, losses and various efficiencies, Pelton turbines, components, velocity triangles, power and efficiencies, reaction turbines, Francis and Kaplan turbines, efficiencies and characteristics, unit quantities, specific speed, draft tube theory.

UNIT-IV (9)

Reciprocating pumps: Working of single and double acting pumps, work done and efficiencies, slip, negative slip, performance characteristics of pumps, air vessel.

Centrifugal pumps: Principle, components, work done and efficiency, pumps in series and in parallel, multi stage pumps, characteristics, cavitation and priming.

Text Books:

1. P.N.Modi and S.M. Seth, "*Hydraulics and Fluid Mechanics Including Hydraulic Machines*", Standard Book House, Rajsons Publications Private Limited, 21thedn., 2017

Reference Books:

1. R.K.Bansal, "*Fluid Mechanics and Hydraulic Machines*", Periodicals PrivateLtd.,2018
2. Victor Streeter and E. Benjamin Wylie, "*Fluid Mechanics*", McGraw Hill, Singapore, 9th edn., 2017.
3. Frank M. White, "*Fluid Mechanics*", Special Indian Edition, Tata McGraw Hill, New Delhi, 2011.
4. A.K. Jain, "*Fluid Mechanics Including Hydraulic Machines*", Khanna Publications, 12th edn,2018.

Course Learning Outcomes (Cos):

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

CO1: *summarize fluid properties using fundamental laws of fluid statics.*
CO2: *analyse fluid flows using Bernoulli's equation and model laws.*
CO3: *estimate losses in pipes and characterize hydraulic turbines.*
CO4: *discuss the working principle and characteristics of pumps.*

Course Articulation Matrix:U18OE303B Fluid Mechanics and Hydraulic Machines

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303B.1	2	1	-	-	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.2	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.3	2	1	-	1	-	-	-	-	1	1	-	1	2	-	1	1
U18CE303B.4	2	1	-	1	-	1	-	-	1	1	-	1	2	-	1	2
U18CE303B	**2**	**1**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**-**	**1**	**1.25**

U18OE303C MECHATRONICS

Class: B.Tech.III-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 Outcomes (LOs):

This course will develop students' knowledge in /on

LO1: *role of mechatronics based technology, sensors and transducers used in industry*
LO2: *various types of actuation systems, working principles and their applications*
LO3: *mathematical models for various types of systems*
LO4: *various transfer functions and control modes*

UNIT-I (9)

Introduction to Mechatronics: Measuring system, Control systems, Microprocessor based controllers. Mechatronics approach.

Sensors and Transducers: Performance, terminology.displacement, position, proximity, velocity and motion.

UNIT-II (9)

Actuation Systems: working principles of pneumatic and hydraulic systems, directional control valves, pressure control valves, process control valves and rotary actuators.

Electrical Actuation Systems: working principles of electrical system, mechanical switches, solid-state switches solenoids, DC motors, AC motors and stepper motors.

UNIT-III (9)

Basic Models: Mathematical models, mechanical system building blocks, electrical system building blocks, fluid system building blocks and thermal system building blocks.

System Models: Engineering system, rotational-translational system and electro- mechanical systems and hydraulic-mechanical system.

UNIT-IV (9)

System Transfer functions: Transfer function, first order system, second order system, system in series and systems with feedback loops.

Closed Loop Controllers: Continuous and discrete processes. Control modes. Two step mode and proportional mode. Derivative control, integral control, PID controller, digital controllers, velocity controllers and adaptive control.

TEXT BOOK:

1. Bolton W., Mechatronics, *Pearson Publications,* 6/e, ISBN: 9788131732533, 2015.

REFERENCE BOOKS:

1. NitaigourPremchandMahalik, Mechatronics: Principles Concepts and Applications, *Tata McGraw Hill, 2/e,* ISBN-13: 978-0070483743,2017.
2. HMT, Mechatronics, *Tata McGraw-Hill, ISBN*9788415700272 New Delhi,2000.
3. DevdasShetty, Richard and Kilk, Mechatronics System and Design, *Cenage Learning*, Inc. 2/e, ISBN- 13: 978-1439061985,2010.

Course Learning Outcomes (Cos):

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

CO1: *apply the mechatronics approach ad select suitable sensors and transducers for a given application.*

CO2: *explain working principles of mechanical, hydraulic, pneumatic and electrical actuators and their applications.*

CO3: *develop basic building blocks for mechanical, electrical, fluid and thermal systems and build mathematical models and analyze.*

CO4:*. explain various system transfer functions and select an appropriate closed loop controller for a given application*

Course Articulation Matrix : U18OE303C MECHATRONICS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE303C.1	2	2	1	-	2	2	-	-	-	1	-	1	1	-	-	1
U18OE303C.2	2	2	1	-	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C.3	2	2	1	3	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C.4	2	2	1	1	2	-	-	-	-	1	-	1	1	-	-	1
U18OE303C	**2**	**2**	**1**	**2**	**2**	**2**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**-**	**-**	**1**

U18OE303D WEB PROGRAMMING

Class: B.Tech.III-Semester **Branch:** Common to allbranches

Teaching Scheme:

L	T	P	C
3		-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *designing static webpage using HTML Tags, CSS properties, interactivity with JavaScript*

LO2: *creating dynamic webpage using JSP.*

LO3: *developing server-side scripts for web applications using PHP.* ***LO4:*** *building databases applications using PHP, MYSQL and XML.*

UNIT-I (9)

HTML: Document Structure, Basic Tags, Creating Headings, Working with Links, Creating Paragraph, Working with Images, Tables, Frames. Introduction to Forms and Controls: Creating HTML Form, Specifying Action URL and Method to Send the Form, Using HTML Controls.

CSS: *CSS* (Cascading style sheet) rules and properties, Types: Inline, External and Internal Style Sheets, Style Classes, Multiple Styles.

JAVASCRIPT: JavaScript syntax, Embedding JavaScript in HTML Page. Usage of variables, Working with Operators, Control-Flow Statements, Functions and Array, Creating Objects, Handling Events.

UNIT-II (9)

JSP: Syntax and Semantics, JSP Development Model, Components of JSP page: Directives, Comments, Expressions, Scriptlets, Declarations, Implicit Objects, Standard Actions, Tag Extensions, A Complete JSP Example. Session and Thread Management: Session Tracking, Session API, Thread Management. Application Event Listeners.

JDBC: Database access with JDBC, Overview, JDBC drivers, connecting to database with DriverManager, Statement Interfaces: Statement, Prepared statement, Callable statement, Result Sets.

UNIT-III (9)

Introduction to PHP: Overview of PHP, Advantages of PHP over scripting languages, Creating and running a PHP script, handling errors. Working with Variables and Constants: Variables, Data Types and Operators. Controlling Program Flow: Conditional Statements, Looping Statements, Break, Continue and Exit Statements. Working with Functions, Arrays, Files and Directories.

Working with Forms: Web Forms and Form Elements, Processing a Web Form, Validating a Web Form.

UNIT-IV (9)

Database using PHP: Exploring Relational Database Model, Records and Primary Keys. Working with SQL Statements. Using PHP and My SQL: Checking Configuration, Connecting to Database, Selecting a Database, Adding and Altering a Table in a Database, Inserting and modifying Data in a Table, Retrieving Data from a Table.
XML : Introduction to XML, XML Basics: Syntax, Declaration, Elements, Attributes, Valid XML Documents, Viewing XML, XML Parser, XML Technologies, Document Object Model(DOM).

Text Books:

1. Kogent, "Web Technologies HTML, CSS, JavaScript, ASP.NET, Servlets, JSP, PHP, ADO.NET, JDBC and XML", *1st Edition, Dreamtech Press (Black Book),* ISBN-13:9789351192510,2013.
2. Phil Hanna, "JSP: The Complete Reference", *2nd Edition, McGraw-Hill,* ISBN: 007-212768-6, 2001.

Reference Books:

1. Ivan Bayross, "Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP", *4th Edition,BPB Publications,*ISBN-13: 978-8183330084,2009,
2. UttamK.Roy, "Web Technologies", *7th Edition*, *Oxford Higher Education,* ISBN-10: 0-19-806622-8, ISBN-13: 978-0-19-806622-4,2010
3. Luke Welling, Laura Thomson,"PHP and MySQL Web Development", *3rd Edition, SamsPublications,*
   ISBN: 0-672-32672-8, 2005
4. Jayson Falkner, Kevin Jones, "Servlets and Java Server Pages", *1st Edition, Pearson,* ISBN: 0-321-13649-7, 2003

Course Learning Outcomes (Cos):

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

CO1: *create static web pages using HTML Tags, CSS properties and Java scripts*
CO2: *create dynamic web pages using java server page concepts.*
CO3: *develop web server side applications using PHP concepts*
CO4:*. develop enterprise databases for web-based applications using PHP and MySQL.*

Course Articulation Matrix :U18OE303D WEB PROGRAMMING

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	PS O4
U18OE303D.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.2	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.3	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE303D.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE303D	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**-**	**-**	**1**

U18OE303E MICROPROCESSORS

Class: B.Tech., III-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:

This course will develop students' knowledge in/on

LO1: *architectural issues of 8086 Microprocessor*
LO2: *programming concepts of 8086 Microprocessor*
LO3: *interfacing of 8086 microprocessor to various I/O subsystems.*
LO4: *serial data communication types and standards like RS232, IEEE 488 Bus.*

UNIT – I(9)

Review of 8085 MPU Architecture
8086 Family Architecture: Organization of 8086 CPU, Concept of Memory Segmentation, Segment Registers, Physical and Logical Addressing, Addressing Modes and Instruction Formats, Instruction Set**.**

UNIT – II(9)

Assembly Language Programming: Assembler Directives, Simple Programming of 8086, Arithmetic, Logical and Data Processing Programs; Implementation of Control Loops, Structures, Strings, Procedures, Macros.
Pin Configuration, Minimum / Maximum Modes, Timing Diagrams, Delay Subroutines.

UNIT – III(9)

Interfacing with 8086: 8086 Interrupts, Interrupt Service Routines, Programmable Interrupt Controller 8259, Programmable Peripheral Interface 8255, Interfacing of Switches, Keyboards, LEDs, Stepper Motor, ADCs and DACs

UNIT – IV(9)

DMA Controller 8257, Programmable Timer/Counter 8254.
Serial Data Communication through 8086: Types of Serial Communication, Synchronous and Asynchronous Communication, Serial Data Communication through USART 8251, Serial Data Communication Standards, RS- 232, IEEE 488 Bus (GPIB)

Text Books:

1. D.V.Hall, "Microprocessors and Interfacing: Programming & Hardware", 2nd Edition, *Tata McGraw Hill*, New Delhi, 1992. (Chapter 3 to 10)
2. Yuchang Liu, Glen A. Gibson," Microcomputer Systems. The 8086/8088 Family, Architecture, Programming and Design", *2nd Edition, PHI*, New Delhi, 1995. (Chapter 2 to 11)

Reference Books:

1. Kenneth J. Ayala,Ayala Kenneth," The 8086 Microprocessor: Programming and Interfacing The PC", *West Pub*., 1994.
2. Barry B. Brey," The Intel Microprocessors: Architecture, Programming and Interfacing", 2nd Edition, *PHI, New Delhi,* 1998.

Course Learning Outcomes (Cos):

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

CO1: *describe the architecture of 8086 microprocessor and explain instructions with suitable examples*
CO2: *write Assembly Language Programs (ALPs) to perform a given task*
CO3: *design 8086 microprocessor based system for given specifications with memory mapping*
CO4: *explain serial communication modes and discuss it standards*

Course Articulation Matrix:U18OE303E MICRO PROCESSORS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 303E.1	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.2	3	2	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.3	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 303E.4	3	3	2	1	--	--	--	--	--	--	--	1	1	-	-	1
U18OE 303E	**3**	**2.75**	**2**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**1**	**-**	**-**	**1**

U18OE303F STRENGTH OF MATERIALS

Class: B.Tech. III -Semester **Branch:** Common to all branches

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in / on

LO1*: behaviour of bodies subjected to various types of stresses and strains*

LO2*: shear force and bending moment for determinate beams*

LO3*: bending and shearing stresses for beams in flexure*

LO4*: behaviour of circular shafts, springs and thin cylinders*

UNIT-I(9)

Simple stresses and strains: Types of stresses, strains, 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.

Elastic modulii: 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 & K, strain energy, resilience, impact loading.

UNIT-II (9)

Principal stresses: Definition, normal and shear stress, principal stresses, principal planes 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)

Bending stresses in beams: 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.

Shearing stresses in beams: Shearing stress due to bending, variation of flexural shear stress distribution across rectangular, triangular, circular, flanged section, shear resilience.

UNIT-IV (9)

Circular shafts and springs: Theory of pure torsion in solid and hollow circular shafts, shear stresses, angle of twist, power transmitted by shaft, close-coiled and open-coiled helical spring subjected to axial load and axial twist, springs in series and parallel.

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

Text Books:

1. Rajput R.K., "*Strength of Materials*", 7^{th}*Edition,* S Chand and Company.
2. Gunneswara RaoT. D.and Mudimby Andal,"*Strength of Materials*", 1^{st}*edn.2018*, Cambridge UniversityPress.

Reference Books:

1. Timoshenko and Gere, "*Mechanics of Materials*", 1^{st}*Edition* McGraw Hill International.
2. Punmia B.C., Arun K. Jain, Ashok K. Jain, "*Mechanics of Materials*", 2^{nd}*Edition,* Laxmi Publications, New Delhi.
3. Subramanian R., "*Strength of Materials*", *3rd Edition,* Oxford University Press.
4. Ramamrutham S., "*Strength of Materials*", 2^{nd}*Edition,* Dhanpat Rai & Sons, New Delhi.

Course Learning Outcomes (Cos):

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

CO1: *estimate various types of stresses and strains*
CO2: *construct Mohr's circle, shear force and bending moment diagrams for determinate beams*
CO3: *determine the bending and shearing stresses for beams subjected to pure bending*
CO4: *analyze stresses in thin cylinders, circular shafts and springs by theory of pure torsion*

Course Articulation Matrix:U18OE303 Strength of Materials

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE303F.1	2	2	1	1	-	-	-	-	-	1	-	2	2	1	-	1
U18CE303F.2	2	2	1	-	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F.3	2	2	1	1	-	-	-	-	-	-	-	1	2	1	-	1
U18CE303F.4	2	2	1	2	-	-	-	-	-	1	-	1	2	1	-	1
U18CE303F	**2**	**2**	**1**	**1.33**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1.25**	**2**	**1**	**-**	**1**

U18CE304 FLUID MECHANICS

Class: B.Tech. III-Semester **Branch: Civil Engineering**

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1*: various fluid properties, pressure measurement and stability of floating bodies*
LO2*: summarizing various fluid flows and apply Bernoulli's equation*
LO3*: dimensional analysis, similitude studies and model laws*
LO4*: flow through pipes and analysis of laminar flow*

UNIT-I(9)

Fluid fundamentals: Introduction, 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: Pascal's Law, hydrostatic Law, measurement of pressure, atmospheric pressure, gauge pressure, absolute pressure, principle of manometers, piezometer, u-tube differential manometer, inverted differential manometer, hydrostatic forces on submerged plane and curved surfaces, total pressure and centre of pressure, buoyancy and floatation, metacentre, stability of floating and submerged bodies.

UNIT-II (9)

Fluid kinematics: Classification of fluid flow, steady and unsteady flow, uniform and non-uniform flow, one, two and three dimensional flows, laminar and turbulent flow, rotational and irrotational flow, streamline, path line, streak line, stream tube, acceleration of fluid particle, continuity equation in one, two and three dimensional flows, velocity potential and stream function.

Fluid dynamics: Forces causing motion, Euler's equation of motion, Bernoulli's equation, applications of Bernoulli's theorem, venturimeter, orificemeter, orifice, mouthpiece, notches, weirs and Pitot tube, linear momentum equation, application of linear momentum equation to pipe bends.

UNIT-III(9)

Dimensional analysis: Dimension of various physical quantities and dimensional homogeneity, dimensional analysis by Rayleigh's method and Buckingham's πtheorem, dimensionless numbers and their consequences in fluid mechanics.

Model analysis: Forces influencing hydraulic phenomena, types of similarities, model analysis, similitude studies, modeling, classification of models, Reynold's and Froude's model laws.

UNIT-IV (9)

Flow through pipes: Major and minor losses in a pipe, expressions for head loss, hydraulic gradient line, total energy line, 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 Poiseuilleequation.

Text Books:

1. P. N. Modi and S. M. Seth, "*Hydraulics and Fluid Mechanics Including Hydraulic Machines*", Standard Book House, Raj sons Publications Private Limited, 21st edn.,2017
2. A. K. Jain, "*Fluid Mechanics Including Hydraulic Machines*", Khanna Publications, 12th edn.,2018.

Reference Books:

1. L. Victor Streeter and E. Benjamin Wylie, "*Fluid Mechanics*", McGraw Hill, Singapore, 9th edn.,2017.
2. M. Frank White, "*Fluid Mechanics*", Tata McGraw Hill, New Delhi, Special Indian edn.,2011.
3. K. Subramanya,"*Theory and Applications of Fluid Mechanics* "Tata McGraw Hill,1993
4. C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli,"*Fluid Mechanics and Machinery*" Oxford University Press, 2010

Course Learning Outcomes (Cos):

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

CO1: *summarize fluid properties using fundamental laws of fluid statics.*
CO2: *identify various types of fluid flows and determine discharge using Bernoulli's equation.*
CO3: *analyse hydraulic phenomena using model laws with the help of dimensional principles.*
CO4: *estimate the major and minor losses in pipes and summarize laminar flow*

Course Articulation Matrix :U18CE304 Fluid Mechanics

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE304.1	2	1	1	-	1	-	-	-	1	-	-	1	1	-	-	1
U18CE304.2	2	1	2	1	1	1	-	-	2	-	-	1	1	-	-	1
U18CE3043	2	1	2	1	1	-	-	-	2	-	-	1	1	-	-	1
U18CE304.4	2	1	1	1	1	1	-	-	1	-	-	1	1	-	-	2
U18CE304	**2**	**1**	**1.5**	**1**	**1**	**1**	**-**	**-**	**1.5**	**-**	**-**	**1**	**1**	**-**	**-**	**1.25**

U18CE305 SURVEYING

Class: B.Tech. III-Semester **Branch: Civil Engineering**

Teaching Scheme : **Examination Scheme:**

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *basic principles of chain, tape and theodolite*

LO2:*concepts of levelling, contouring, computation of areas and volumes*

LO3: *concepts of tacheometry, trigonometric survey and setting out curves.*

LO4: *interpreting surveying data using photogrammetry, RS and GIS, total station and GPS.*

UNIT-I(9)

Basics of surveying: Principles of surveying, types of chain and tape, tape corrections, chaining, ranging on levelling and sloping ground, types of compass, bearings, magnetic declination, and local attraction.

Theodolite and traverse surveying: Temporary and permanent adjustments, measurement of angles, fundamental lines and relations, traverse methods and computations, balancing traverse.

UNIT-II (9)

Levelling and contouring: Definitions, Terms and Abbreviations, methods of levelling, differential, profile, cross section levelling, characteristics of contours, methods of contouring, interpolation of contours, contour gradient, uses of contour maps.

Areas and volumes: Areas computed by sub division into triangles, from offsets to baseline, calculations of volumes for same level sections, by prismoidal and trapezoidal formula, volume from spot levels, capacity of reservoir.

UNIT-III (9)

Tacheometry and trigonometric surveying: Introduction to tacheometry, types of tacheometric measurements, determination of tacheometric constants, distance and elevation formulae and uses of tacheometric survey, trigonometric survey with accessible and inaccessible bases.

Curves: Theory of simple curves, setting out simple curves by linear methods and Rankine's deflection angle method, setting out compound, transition curves with basic data of chainage radius and deflection angles, necessity and advantages of transitioncurve.

UNIT-IV (9)

Photogrammetry and RS&GIS: Introduction to photogrammetry, types of photographs, scale of vertical photograph, relief displacement, Introduction and process of remote sensing, types of platforms, sensors and applications, GIS introduction, components, data types, functionalities of GIS.

Advanced surveying instruments: Introduction and features of total station, setting up and orienting, capabilities and advantages of total station, GPS Introduction, segments, uses, applications.

Text Books:

1. S.K. Duggal, "*SurveyingVolume1 and II*", McGraw Hill Education (India)Pvt.Ltd,2013.
2. B.C. Punmia& Ashok kumar Jain, "SurveyingVolume I, II and III", Laxmi Publications, 17thedn.,2016.

Reference Books:

1. K.R. Arora, "*SurveyingVolume I and II*", Standard Book House,15thedn.,2015.
2. T.P. Kanetker and S.V. Kulkarni, "*Surveying and LevellingVolume I and II*", PuneVidyarthi Griha Prakashan, 24th edn.,2014.
3. R. Subramanian, "*Surveying and Levelling*", Oxford University Press, New Delhi, 2ndedn. 2007.
4. R.Agor, "*A Textbook of Surveying and Levelling*", Khanna Publisher,12thedn.,2016.

Course Learning Outcomes (Cos):

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

CO1: *summarize the basic principles of chain, tape and theodolite.*
CO2: *apply the concepts of levelling, contouring and estimate the areas, volumes.*
CO3: *Apply tacheometry, trigonometric leveling methods and set out curves..*
CO4: *explain the use of modern surveying tools and instruments.*

Course Articulation Matrix:U18CE305 SURVEYING

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CE305.1	2	1	-	-	-	1	-	-	1	-	-	1	2	-	2	1
CE305.2	2	2	1	-	-	1	-	-	2	-	-	1	2	-	2	1
CE3053	2	2	1	-	-	1	-	-	2	-	-	1	2	-	2	1
CE305.4	2	1	-	-	1	-	-	-	-	-	-	1	2	-	2	1
U18CE305	**2**	**1.5**	**1**	**-**	**1**	**1**	**-**	**-**	**1.7**	**-**	**-**	**1**	**2**	**-**	**2**	**1**

U18CE306 CONSTRUCTION MATERIALS

Class: B.Tech. III-Semester **Branch: Civil Engineering**

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *fundamentals of construction materials, brick and stone masonry.*
LO2: *different concrete making materials and properties of fresh, hardened concrete.*
LO3: *various phases in production of concrete and methods of proportioning concrete.*
LO4: *properties of other important construction materials.*

UNIT-I(9)

Stone masonry: Classification, qualities of good building stone, types of stone masonry constructions, tests on building stones, IS codal provisions of stone masonry.
Building materials and brick masonry: Introduction to construction materials, engineering properties of construction materials, composition and classification of bricks, stretcher and headercourse, bonds in brick work, english, flemish bonds, clay bricks, flyash bricks, CLC bricks, AAC bricks, tests on bricks, IScodal provisions..

UNIT-II (9)

Concrete making materials: Concrete making materials, cement, oxide and compound composition of OPC, types and grades of cements, properties of cement, tests on cement, classification of aggregates, characteristics of aggregates, grading, tests on aggregates, water quality for construction, admixtures for concrete.
Properties of fresh and hardened concrete: Workability of fresh concrete, factors affecting workability, tests on workability, segregation and bleeding, strengths of concrete, factors affecting strength of concrete, stress-strain characteristics, shrinkage and creep, permeability, durability, acid attack, efflorescence, fire resistance, thermal properties.

UNIT-III(9)

Production of concrete: Phases in production of concrete, batching, mixing, transportation, placing, methods of compaction, finishing of concrete, methods of curing.
Proportioning of concrete: Factors influencing concrete mix design, methods of concrete mix design, IS-Code method, ACI method.

UNIT-IV (9)

Timber and plastics: Structure of timber, suitability of timber, defects of timber, commonly used timber in construction, seasoning, preservation, classification of plastics, thermoplastics and thermosetting plastics, moulding compounds, properties of plastics, use of PVC in civil engineering construction, IS codal provisions.

Steel, glass and bitumen: Types of steel, properties, applications, forms of steel, defects, corrosion, preventive measures, composition and properties of glass, types and applications of bitumen, IS codal provisions.

Text Books:

1. B. C. Punmia, "Building construction", Laxmi Publications Pvt., Ltd., New Delhi, 19thEdn. 2005.
2. M. S. Shetty, A. K. Jain "Concrete Technology (Theory of Practice)", S. Chand Company, New Delhi, 08thedn.,2019.

Reference Books:

1. M. L. Gambhir, "Concrete Technology", Tata McGraw-Hill, New Delhi, 05thEdn.2013.
2. S. P. Arora and Bindra, " A Textbook of Building Constructions", DhanpatRai and Sons, 4thEdn.,2010
3. S. K. Duggal, "Building materials", New Age International Pvt., Ltd., NewDelhi
4. S.C.Rangwala, K.S.Rangawala and P.S.Rangwala,"Engineering Materials", Charotar Publishers,feb.2019
5. A. R. Santha Kumar "Concrete Technology", Oxford Publishers,1stEdn.,2010.
6. IS 10262 (2009): Guidelines for concrete mix designproportioning.
7. IS383 (1970): Specification for Coarse and Fine Aggregates from natural sources forconcrete.
8. IS 1077 (1992): Common Burnt Clay BuildingBricks.

Course Learning Outcomes (Cos):

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

CO1: *describe properties of building materials, brick and stone masonry.*
CO2: *summarize constituents of concrete and its properties in fresh, hardened state.*
CO3: *explain various phases in production of concrete and concrete mix designs using IS, ACI method.*
CO4: *illustrate subsidiary materials for civil engineering applications.*

Course Articulation Matrix: **U18CE306 CONSTRUCTION MATERIALS**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE306.1	2	-	-	-	-	1	-	-	-	-	-	2	2	-	2	1
U18CE306.2	2	-	-	-	-	-	-	-	-	-	-	2	2	-	2	1
U18CE306.3	2	2	1	-	-	-	-	-	-	-	-	2	2	2	2	1
U18CE306.4	2	-	-	-	-	1	1	-	-	-	-	2	2	-	2	1
U18CE306	**2**	**2**	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**2**	**1**

U18CE307 CONCRETE TECHNOLOGY LABORATORY

Class: B.Tech.III-Semester **Branch: Civil Engineering**

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

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

LIST OF EXPERIMENTS

1. Determination of compressive strength of bricks (clay and fly ash)
2. Determination of water absorption test on bricks
3. Determination of fineness and specific gravity of cement
4. Determination of standard consistency of cement
5. Determination of initial and final setting times of cement
6. Determination of compressive strength of cement
7. Determination of fineness modulus of fine and coarse aggregates
8. Determination of bulk density, specific gravity, porosity and void ratio of fine and coarse aggregates
9. Determination of bulking of fine aggregate
10. Determination of workability of fresh concrete
11. Determination of compressive strength of concrete
12. Determination of split tensile strength of concrete
13. Determination of modulus of rupture of concrete
14. Demonstration on non- destructive evaluation of concrete

Laboratory manual:

1. "Concrete technology laboratory" manual prepared by the faculty of Civil Engineering, KITSW

Reference **Books:**

1. M. L. Gambhir, "*Concrete Technology*", Tata McGraw-Hill, New Delhi, 5thedn.2013.
2. M. S. Shetty, Ak.Jain "*Concrete Technology (Theory and Practice)*", S. Chand Company, New Delhi, 8thedn., 2019.
3. A. R. Santha Kumar, "*Concrete Technology*", Oxford Publishers, 1stedn.2010.
4. A. M. Neville, "*Properties of Concrete*", McGrawHill Publications, New Delhi, 5thedn.2012.

Course Learning Outcomes (Cos):

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

CO1: *bricks*
CO2: *cement*
CO3: *fine and coarse aggregates*
CO4: *fresh and hardened concrete*

Course Articulation Matrix: **U18CE30 CONCRETE TECHNOLOGY LABORATORY**																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18CE307.1	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307.2	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE3073	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307.4	2	-	-	1	-	1	-	-	1	1	-	2	2	-	1	2
U18CE307	**2**	**-**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**2**	**2**	**-**	**1**	**2**

U18CE308 SURVEYING FIELD WORK – I

Class: B.Tech. III-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *chain surveying*
LO2: *measuring the angles between survey lines*
LO3: *methods of Leveling*
LO4: *Develop contour map of an area and Longitudinal section, Cross section of given project*

LIST OF EXPERIMENTS

1. Chain surveying: use of optical square or cross staff, check line, tie line
2. Horizontal angle measurement by repetition and re-iteration methods
3. Measuring the distance between two inaccessible points using theodolite
4. Theodolite traversing- closed traverse
5. Theodolite traversing for omitted measurements (bearing/ length /both of one side omitted)
6. Levelling – temporary adjustments and recording staffreadings
7. Fly levelling using auto level
8. Profile levelling using autolevel
9. Longitudinal and cross section exercises
10. Block levelling using theodolite
11. Trigonometric levelling – single plane method
12. Trigonometric levelling – double plane method

Laboratory Manual:

1. Survey Field Work – *I Lab manual*, prepared by faculty of Civil Engineering, KITSW

Reference Books:

1. B.C. Punmia and Ashok kumar Jain, "Surveying Volume I and II",Laxmi Publication , Pvt., Ltd16thedn.,2011
2. K.R. Arora, "*Surveying Volume I and II*",Standard BookHouse,15thedn.,2015.

Course Learning Outcomes (Cos):

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

CO1: *conduct chain surveying to measure linear distances and calculate areas*
CO2: *establish the survey lines by measuring angles using theodolite*
CO3: *determine the reduced levels of points using auto level.*
CO4: *prepare contour map of an area and sketch longitudinal, cross sectional details.*

Course Articulation Matrix :U18CE308 Surveying fieldwork–I

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CE308.1	2	1	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.2	2	2	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.3	2	2	1	-	-	1	-	-	2	-	-	1	2	-	1	1
CE308.4	2	2	1	-	-	1	-	-	2	-	-	2	2	-	1	1
U18CE308	**2**	**1.75**	**1**	**-**	**-**	**1**	**-**	**-**	**2**	**-**	**-**	**1.25**	**2**	**-**	**1**	**1**

U18OE311A OBJECT ORIENTED PROGRAMMINGLABORATORY

Class: **B. Tech III-Semester** **Branch:** **Common to all branches**

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

This course will develop students' knowledge in/on…

LO1: *implementing concepts of object oriented programming*
LO2: *debug and test java applications effectively*
LO3: *effective use of exception handling, interfaces and packages during applications development*
LO4: *I/O and applet programming in java*

List of Experiments

Experiment-I

1. Write a program to demonstrate operators of java.
2. Write a program to demonstrate type casting and operator precedence.
3. Write a program to demonstrate different types ofif-statements.
4. Write a program to demonstrate switch-case.

Experiment-II

1. Write a program to demonstrating loop control statements.
2. Write a program to demonstrate for-each control loop.
3. Implement programs using single dimensional arrays.
4. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

1. Write a program to demonstrate creating object to a class for accessing variables and methods.
2. Write a program to demonstrate creating multiple object.
3. Write a program to demonstrate passing objects to methods.
4. Write a program to demonstrate constructors and garbage collector by invoking it explicitly.

Experiment -IV

1. Write a program to demonstrate static members.
2. Write a program to demonstrate command line argument.
3. Write a program to demonstrate variable length argument.
4. Write a program to demonstrate wrapper classes.

Experiment -V

1. Write a program to demonstrate inheritance using extends keyword.
2. Write a program to demonstrate multilevel inheritance.
3. Write a program to demonstrate hierarchical inheritance.

4. Write a program to demonstrate access controls.

Experiment -VI

1. Write program to demonstrate *this* and *supper* keywords.
2. Write program to demonstrate dynamic method dispatch.
3. Write a program to demonstrate final variable and methods.
4. Write a program to demonstrate use of abstract class.

Experiment -VII

1. Write a program to define an Interface and implement it into a class.
2. Write a program to implement multiple interfaces into single class.
3. Write a program to extend interfaces.
4. Write a program to implement nested interfaces.

Experiment -VIII

1. Write a program to create a package, and demonstrate to import a package to a class.
2. Write a program to demonstrate access protection of packages.
3. Write a program to demonstrate static import of package.

Experiment-IX

1. Write a program to demonstrate *try* and *catch* statement for exception handling
2. Handle *Array Index Of Bounds Exception*, *Number Format Exception* and *Divide By Zero Exception* using multiple catch blocks.
3. Write a program to demonstrate user defined exception with *throw keyword*
4. Write a program to demonstrate *finally* block.

Experiment-X

1. Write a program to demonstrate string handling functions.
2. Write a program to demonstrate string searching functions.
3. Write a program to demonstrate string comparison functions.
4. Write a program to demonstrate string modification functions.

Experiment-XI

1. Write a program to demonstrate reading and writing input using byte stream classes
2. Write a program to demonstrate reading and writing input using character stream classes
3. Write a program to demonstrate data input and output streams
4. Write a program to demonstrate array input and output streams

Experiment-XII

1. Write a program to create a file using byte stream classes
2. Write a program to create a file using character stream classes
3. Write a program to open the specific file
4. Write a program to copy the content of one file to another.

Laboratory Manual:

1. Java Programming laboratory manual, *prepared by faculty of Dept. ofCSE.*

Text Book:

1. Herbert Schildt,"JAVA The Complete Reference", 9th Edition, McGraw-Hill Education India Pvt.Ltd , ISBN: 9781259002465, 2014.

Course Learning Outcomes (Cos):

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

CO1: *implement OOP concepts using Java*
CO2: *use the concepts like inheritance, polymorphism, packages and interfaces in application development*
CO3: *handle runtime exceptions in object oriented programming*
CO4: *build effective I/O interfaces for software applications*

Course Articulation Matrix: U18OE311A OBJECT ORIENTED PROGRAMMING LABORATORY

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE311A.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE311A.2	2	2	2	1	2	1	1	-	2	1	2	1	1	-	-	1
U18OE311A.3	2	2	2	1	2	1	-	-	2	1	2	1	1	-	-	1
U18OE311A.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE311A	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**1**	**2**	**1**	**1**	**-**	**-**	**1**

U18OE311B FLUID MECHANICS AND HYDRAULIC MACHINESLABORATORY

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *determining the hydraulic coefficient for various flow measuring devices*
LO2: *implementing Bernoulli's equation and application of Bernoulli's theorem in estimating various losses in pipe*
LO3: *studying the various parameters which effects the impact of jet*
LO4: *studying the characteristics of hydraulic machines*

LIST OF EXPERIMENTS

1. Determination of Coefficient of Discharge for given Orifice meter and Venturi meter.
2. Determination of Coefficient of Discharge for given notches (triangular/rectangular)
3. Determination of Coefficient of Discharge for given orifice and mouth piece.
4. Verification of Bernoulli's theorem.
5. Estimation of coefficients of various head losses in pipes due to major and minor losses (sudden enlargement, sudden contraction and bend).
6. Determine of Reynolds's number using Reynolds's apparatus.
7. Determination of coefficient of impact for a jet on given vane.
8. Determination of performance characteristics of Francis Turbine
9. Determination of performance characteristics of Pelton Wheel.
10. Determination of performance characteristics of Centrifugal Pump.
11. Determination of performance characteristics of Submersible Pump.
12. Determination of performance characteristics of Reciprocating Pump.

Laboratory Manual:

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

Reference 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):

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

CO1: *determine the hydraulic coefficient for various flow measuring devices*
CO2: *apply Bernoulli's equation in estimating head lossin pipes*
CO3: *apply the principles of impact of jet on different vanes*
CO4: *demonstrate the characteristics of hydraulic machines.*

Course Articulation Matrix: **U18OE311B Fluid Mechanics And Hydraulic Machines Laboratory**															
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18OE311B.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	2
U18OE311B.4	2	1	-	1	-	-	-	-	1	1	-	1	2	-	-	2
U18OE311B	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**2**	**-**	**-**	**2**

U18OE311C MECHATRONICS LAB

Class: B.Tech. III-Semester **Branch:** Mechanical Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

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

Course Learning Outcomes (LOs):

This course will develop students' knowledge in /on

LO1: *basic elements underlying mechatronic systems: analog electronics, digital electronics, sensors, transducers, actuators, microcontrollers and embedded software.*

LO2*: interface of various systems to a PLC.*

LO3*: integration of various systems through programming.*

LO4*: design and simulation of hydraulic and pneumatic circuits.*

LIST OF EXPERIMENTS

1. Controlling A.C. Non servomotor clockwise and anti clockwise with time delay.
2. Controlling A.C. Non servo motor using digital inputs proximity sensors.
3. Controlling of Single acting Pneumatic Cylinder with time delay
4. Controlling of double acting Pneumatic Cylinder with time delay and sequencing
5. Control of D.C servomotor (rotating table clockwise and counterclockwise)
6. Integration of AC Non servo motors, single acting pneumatic cylinder and double acting pneumatic cylinder.
7. Integration of AC Non- servomotor and pneumatic cylinders with digital inputs.
8. Controlling of X table and Y table.
9. Controlling of various systems using manual inputs.
10. Controlling of traffic lights with time delay.
11. Controlling of lift operations with time delay.
12. Hydraulic and Pneumatic simulation.

Laboratory Manual:

1. Mechatronics Lab Manual, prepared by faculty of Mechanical Engineering,KITSW

REFERENCE BOOKS:

1. *ATS Manual of L.S. Mechatronics2000*.
2. Bolton W., Mechatronics, *Pearson Publications,* 5/e, ISBN-13: 978-0273742869,2011.

Course Learning Outcomes (Cos):

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

CO1: *Develop PLC program to control AC non servomotors, single acting and double acting pneumatic cylinders with different operation conditions*

CO2: *Develop PLC program to control various systems.*

CO3: *Integrate various mechanical and electrical systems and operate them.*

CO4: *Design and simulate the hydraulic and pneumatic circuits.*

Course Articulation Matrix: U18OE311C MECHATRONICSLAB																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18OE311C.1	1	2	1	2	-	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.2	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.3	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C.4	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1
U18OE311C	1	2	1	2	2	-	-	-	-	1	-	1	1	-	-	1

U18OE311D WEB PROGRAMMING LABORATORY

Class: B.Tech. III Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

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

Course Learning Objectives:

This course will develop students' knowledge in /on

LO1: *implementing HTML Tags, CSS and Java Scripts for creating static web pages.*
LO2*: usage of JSP in designing dynamic web pages.*
LO3*: usage of PHP in designing a web base application.*
LO4*: accessing different web data servers using JSP and PHP*

Experiment-1

1. Design the following static web pages with the following attributes:
   a. Basic Tags.
   b. Heading Tags.
   c. List (Ordered and Un-Ordered).
   d. Textbox, Buttons.

Experiment-2

2. HTML

AIM: Design the following static web pages required for an online book store web site.

a. HOMEPAGE:
b. LOGINPAGE
c. CATALOGEPAGE

DESCRIPTION:

a. HOMEPAGE

The static home page must contain three **frames**.

- ***Top frame*:** Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).
- ***Left frame*:** At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame.
- ***Right frame*:** The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the website.
-

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

b. LOGIN PAGE: This page looks likebelow:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: **Submit** **Reset**			

Experiment-3

c. CATOLOGUEPAGE:

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

- Snap shot of Cover Page.
- Author Name and Publisher.
- Price and Add to cart button.

Logo	Web Site Name				
Home	Login	Registration	Catalogue		Cart
CSE		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5		Add to cart
ECE		Book : AI Author :S.Russel Publication : Princeton hall	$ 63		Add to cart
EEE		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5		Add to cart
CIVIL					

		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Experiment-4

3. VALIDATION

AIM: To do validation for registration page using JavaScript.

DESCRIPTION: Write *JavaScript* to validate the following fields of the above registration page.

a. Name (Name should contains alphabets and the length should not be less than 6 characters).
b. Password (Password should not be less than 6 characters length).
c. E-mailid(shouldnotcontainanyinvalidandmustfollowthestandardpattern ***(name@domain.com)***

d. Phone number (Phone number should contain 10 digits only).
Note: You can also validate the login page with these parameters.

4. CSS

AIM: Write a program illustrating various methods in cascading style sheets.

a. Use different font, styles and set a background image
b. Control the repetition of the image
c. Define styles for links
d. Work with layers and add a customized cursor

DESCRIPTION: Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:

a. Use different font, styles: In the style definition you define how each selector should work (font, color etc.).Then, in the body of your pages, you refer to these selectors to activate the styles.
b. Set a background image for both the page and single elements on the page. You can define the background image for the page likethis:
c. Control the repetition of the image with the background-repeat property. As background-repeat: repeat
d. Define styles for links
e. Work with layers:
f. Add a customized cursor:

Selector {cursor:value}
.xlink {cursor:crosshair}
.hlink{cursor:help}

5. Embedding JavaScript in HTML pages.
6. Design a registration form and validate its field by using Java Script.

Experiment-5

7. To design the scientific calculator and make event for each button using Java Script.
8. WAP to create popup boxes in Java Script.
9. Program to create a class calculator that contains an overloaded method called "add" to calculate the sum of two integers, two float numbers and, one integer and one float.

Experiment-6

10. Print current date &time
11. JSP Program to auto refresh a page
12. JSP Program to count no. of visitors on website
13. JSP program for error handling
14. Demonstrate expression tag
15. Detect locale, language settings & local specific time
16. Demonstrate JSP implicit object
17. JSP Program to display given number in words

Experiment-7

18. Display the contents of Employee table in a neat format.
19. Insert ***N***, no. of records into Employee table using ***Prepared Statement.***
20. EnhancethesalariesofEmployeeby10%whoareearningsalarygreaterthan5000using ***Callable Statement.***
21. Delete all students whose marks are below 50% and also display the count.

Experiment-8

22. Write a HTML file to create a simple form with 5 input fields ***(Name, Password, Email, Pin code, Phone No. and a Submit button)*** and demonstrate required field validations to validate that all input fields are required and display error messages if the above validations do not hold.
23. Create a JSP Page with and run in JSP Engines.
24. Demonstrate Session Tracking in JSP.
25. JSP Program to validate username and password

Experiment-9

26. Create Database Connectivity with JSP page with different JDBC Drivers.
27. JSP Program to Select record from database
28. JSP Program to Insert a record into the database
29. Create a CRUD operation for JSP Page using My SQL
30. JSP Program to upload file into server

Experiment-10

31. Create a form for your college library entering student details for each student in the college. Validate the form using PHP valuators and display error messages.

32. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site by using registration form. Authenticate the user when he submits the login form using the User Name and Password from the database (instead of cookies).

Experiment-11

33. Create tables in the database which contain the details of items (books in our case like Book name, Price, Quantity, Amount) of each category. Modify your catalogue page in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP.

34. Create and delete MYSQL database using PHP.

Experiment-12

35. Create a PHP program to demonstrate opening and closing a file.

36. Create a PHP program to demonstrate reading a file and writing in a file.

Course Learning Outcomes (Cos):

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

CO1: *create the static web pages using HTML Tags and CSS and*
CO2: *design dynamic web page for web applications using JSP*
CO3: *develop server side scripts for web base applications using PHP*
CO4: *design web applications for effective storage and retrieval of data in My SQL using PHP.*

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P1 0	P1 1	P1 2	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 311 D.1	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.2	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.3	2	2	2	1	2	1	-	1	2	1	2	1	1	-	-	1
U18OE 311 D.4	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1
U18OE 311 D	2	2	2	1	2	1	1	1	2	1	2	1	1	-	-	1

U18OE311E MICRO PROCESSORS LABORATORY

Class:B.Tech.III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LO):

This Course will develop student's knowledge on/in

LO1*: programming using 8086 Microprocessor kit*

LO2*: basic arithmetic programs and sorting using 8086 Microprocessor kit*

LO3*: string manipulation and code conversions using MASM*

LO4*: interfacing of subsystems to 8086 microprocessor kit*

List of Experiments

(Based on theory course U18OE303E)

1. Study of 8086 Trainer Board
2. Simple Arithmetic Operations (Addition, Subtraction, Multiplication and Division)
3. Finding Sum, Average.
4. Largest/Smallest Number in a given array
5. Arranging in Ascending/ Descending order
6. Finding Factorial using recursive procedure
7. Transfer of bytes from DS to ES
8. ALPs for String Manipulation
9. ALPs for Code conversions
10. Wave form Generation using DAC modules
    i. Squarewave ii. Sawtoothwave iii. Triangularwave
11. ADC interfacing
12. Stepper motor –interfacing

Laboratory Manual:

1. Microprocessors Laboratory Manual, *prepared by the faculty of department of ECE, KITSW.*

Course Learning Outcomes (Cos):

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

CO1: *write and execute assembly language programs for given tasks on 8086 microprocessor kit*
CO2: *implement code conversions and bit manipulations programs in 8086 using MASM*
CO3: *write waveform generation code using DAC modules*
CO4: *interface stepper motor, keyboard, memory etc. with 8086 microprocessor*

Course Articulation Matrix:U18OE311E MICROPROCESSORS LAB

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE 311E.1	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.2	3	2	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.3	3	2	1	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE 311E.4	3	3	2	1	--	--	--	--	--	--	--	--	1	-	-	1
U18OE311E	**3**	**2.5**	**1.75**	**1**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**1**	**-**	**-**	**1**

U18OE311F STRENGTH OF MATERIALS LABORATORY

Class: B.Tech. III-Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

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

LIST OF EXPERIMENTS

1. Determination of 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 hollowshaft.
5. Determination of the modulus of rigidity by conducting compression test on spring.
6. Determination of the Young's modulus of the given material by conducting flexural test on simply supported beam.
7. Determination of the Young's modulus of the given material by conducting flexural test on continuous beam.
8. Determination of the Young's modulus of the given material by measuring conducting flexural test on propped cantilever beam.
9. Bend and rebend test on steel specimen.
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.
13. Demonstration of measuring strains using strain gauges, LVDTs

Laboratory Manual:

1. *Strength of MaterialsLaboratory Manual*, prepared by faculty ofCivil Engineering, KITSW

Reference Books:

1. Harmer E. DavisandGeorge 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.
3. IS 1786:2008 "*High strength deformed steel bars and wires for concretereinforcement-specification.* Bureau of Indian standards, New Delhi, 2008.

4. IS 432(Part-I):1982 "*Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement*". Bureau of Indian standards, New Delhi,1992.
5. IS 432(Part-II):1982 "*Specification for mild steel and medium tensile steel bars and Hard drawn steel wires for concrete reinforcement*". Bureau of Indian standards, New Delhi,2004.

Course Learning Outcomes (Cos):

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

CO1: *correlate theory with the testing of engineering materials for quality assessment.*
CO2: *evaluate the mechanical properties of civil engineering materials.*
CO3: *appraise the behavior of civil engineering materials when tested under loads.*
CO4: *realize the specifications recommended by codes to civil engineering materials*

Course Articulation Matrix:U18OE311F Strength of Materials Laboratory																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18OE311F.1	1	-	-	1	-	1	-	-	2	1	1	1	1	1	1	1
U18OE311F.2	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.3	1	-	-	1	-	1	-	-	2	-	-	1	1	1	1	-
U18OE311F.4	1	-	-	1	-	1	-	2	1	1	1	1	1	1	1	1
U18OE311F	**1**	**-**	**-**	**1**	**-**	**1**	**-**	**2**	**1.75**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

IV SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

[6Th+3P+1MC]

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE401	Open Elective-II	3	1	-	4	10	30	40	60	100
2	HSMC	U18MH402	Professional English	-	-	2	1	100	-	100	-	100
3	PCC	U18CE403	Mechanics of Materials	3	1	-	4	10	30	40	60	100
4	PCC	U18CE404	Hydraulics Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CE405	Design of Reinforced Concrete Structures	3	1	-	4	10	30	40	60	100
6	PCC	U18CE406	Engineering Geology	3	-	-	3	10	30	40	60	100
7	PCC	U18CE407	Hydraulic and Hydraulic Machinery Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CE408	Engineering Geology Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CE409	Surveying Field Work-II	-	-	2	1	40	-	40	60	100
10	MC	U18MH415	Essence of Indian Traditional Knowledge	2	-	-	-	10	30	40	60	100
			Total:	17	3	8	22	280	180	460	540	900
11	MC	U18CH416	Environmental Studies*	2	-	-	-	10	30	40	60	100

[L= Lecture, T = Tutorials, P = Practicals & C=Credits] **Stream-I: CSE, CSN,IT,ME** **Stream-II: EEE, ECE, EIE,CE,ECI**

Total Contact Periods/Week:28 **TotalCredits:22** ***For Lateral entry students only***

Open Elective-II:

U18OE401A: Applicable Mathematics (MH) U18OE401B: Basic Electronics Engineering (ECE) U18OE401C: Elements of Mechanical Engineering (ME) U18OE401D: Measurements & Instrumentation (EIE) U18OE401E: Computer Networks (IT)

U18OE401A APPLICABLE MATHEMATICS

Class: B.Tech. IV-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):

This course will develop students' knowledge in /on

LO1*: application of Fourier series to solve wave equation, heat conduction equation and Laplace equation*

LO2**:** *the methods of fitting curves by the method of least squares, statistical methods and probability distributions with applications to engineering disciplines.*

LO3**:** *finite difference operators; the concept of interpolation and numerical integration.*

LO4**:** *numerical methods and application to find numerical solutions of differential equations.*

UNIT-I (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-II (9+3)

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. **Probability**: 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: Newton's forward and backward interpolation formulae. Lagrange interpolation **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 $1/3^{rd}$rule and Simpson's $3/8^{th}$ rule.

UNIT-IV (9+3)

Solution to System of Linear Equations: Gaussian elimination method, Jacobi Method and Guass - Siedel Iteration Method.

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,* Delhi, 43/e,2014.

Reference Books:

1. Gupta and Kapoor, "Fundamentals of Mathematical Statistics", *Sulthan Chand and & sons,* New Delhi, 11^{th}edition, 2010.
2. Kreyszig E.," Advanced Engineering Mathematics", Johnwiely*& sons,Inc.,U.K.,* 9^{th} edition,2013.
3. Sastry S.S, "Introduction to numerical Analysis", *Prentice Hall of India Private Limited*,New Delhi.4^{th}edition, 2005.

Course Learning Outcomes (COs):

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

CO1: *solve wave equation, heat conduction equation and Laplace equation using Fourier series*

CO2: *find correlation regression coefficients, fit curves using method of least squares for given data and apply theoretical probability distributions in decision making*

CO3: *estimate value of a function by applying interpolation formulae*

CO4: *apply numerical methods to solve simultaneous algebraic equations, differential equations, find roots of algebraic and transcendental equations*

Course Articulation Matrix :U18OE401A APPLICABLE MATHEMATICS

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401A.	2	2	--	--	--	--	--	--	--	--	--	1	2	--	--	1
U18OE401	**2**	**2**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	1	**2**	**--**	**--**	**1**

U18OE401B BASIC ELECTRONICS ENGINEERING

Class:B.Tech.IVSemester **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:

This course will develop student's knowledge on/in…

LO1: to *introduce the basic concepts of semiconductors and conductivity in semiconductors*
LO2: to *impart the knowledge on working of semiconductor diode as Rectifier*
LO3: to *make the students to understand the basic concepts of BJT &DC biasing concepts*
LO4: to *introduce the fundamental concepts and basic principles of special semiconductor devices.*

UNIT-I(9+3)

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, Drift currents and Diffusion currents, Temperature dependence of conductivity, Hall Effect

UNIT-II(9+3)

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

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

UNIT-III(9+3)

Bipolar Junction Transistor:

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

DC Analysis of BJT Circuits: **DC load line, Need for biasing, Transistor biasing techniques for CE configuration, Basic transistor applications: Switch and Amplifier.**

UNIT-IV(9+3)

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

Special Semi conductor Devices:
Operation and Characteristics- Tunnel Diode, Schottky diode, Photo Diode, Photo Transistor, PIN Diode, LED, LASER, UJT.

TextBooks:

1. Bhargava and Kulashresta, "Basic Electronics and Linear Circuits", *TTTI, TMH,India.*
2. S.Salivahanan and N.Suresh Kumar, "Electronic Devices and Circuits", *Tata McGraw Hill Education (India) Private* Ltd, 2nd Edition,2009.

Reference Books:

1. Jacob Millman, Christos C Halkias, "Electronic Devices and Circuits", 3/e, *TMH,*India.
2. David.A.Bell, "Electronic Devices and Circuits", *Oxford University Press,* New Delhi, India.
3. Neil storey, "Electronics: A systems Approach", *4/e-Pearson Education Publishing company Pvt. Ltd,*India

Course Learning Outcomes (COs)

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

CO1: *Analyze the behavior of semiconductor devices*
CO2: *Design half wave and full wave rectifier circuits with filters*
CO3 : *Characterize BJT configurations with input output characteristics and biasing techniques*
CO4: *Acquire knowledge of new emerging areas of science and technology in differentiating semiconductor devices..*

(Mapping of COs with POs and PSOs)

Course Articulation Matrix : U18EC401B BASIC ELECTRONICSENGINEERING																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18EC401B.1	2	2	1	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.2	2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.3	2	2	2	2	-	-	-	-	-	-	-	-	1	-	-	1
U18EC401B.4	2	2	1	2	-	-	-	-	-	-	-	2	1	-	-	1
U18EC401B	**2**	**2**	**1.5**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**	**-**	**1**

U18OE401C ELEMENTS OF MECHANICAL ENGINEERING

Class:B.Tech.,IV-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):

This course will develop students' knowledge in/on

LO1*: types of materials, design methodology and elements of power transmission*
LO2: *different manufacturing processes and their applications.*
LO3: *laws of thermodynamics and types of systems*
LO4: *principle and applications of SI & CI engines.*

UNIT- I (12)

Engineering Materials: Classification, properties and applications

Design Criterion: Discrete steps in engineering design process

Power Transmission: Classification; flat belt drives - length of open and cross belts, belt tensions and power transmitted; Gears-types and applications; spur gear-nomenclature

Bearings: Types – sliding& rolling contact bearings and applications;

UNIT- II (12)

Manufacturing Processes: Classification; Foundry- steps in sand casting process; pattern-types, materials and allowances, mould cross section, moulding sand-composition and properties; Machining: lathe machine-line diagram and operations; Welding-classification; principle of arc welding- AC and DC welding, principle of gas welding, principle of brazing and soldering; Metal forming process: forging, rolling, extrusion.

UNIT- III (12)

Thermodynamics: System-types, state, property, process and cycle; Energy-property; Zerothlaw, thermodynamic equilibrium, laws of perfect gases.

Law of Thermodynamics: First law- applied to a cycle, change of state, Internal energy, Enthalpy; Work and Heat in closed systems- Isobaric, Isochoric, Isothermal, Adiabatic and Polytropic; PMM-I, limitations of first law of thermodynamics.

UNIT- IV (12)

Second Law of Thermodynamics: Kelvin-Planck and Clausius Statements and their equivalence; Carnot cycle, Carnot theorem, heat engine, heat pump and refrigerator; working principle of domestic air conditioner-line diagram.

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

Text Book:

1. Mathur, Mehta and Tiwari, "Elements of Mechanical Engineering", *Jain Brothers*,

NewDelhi,2017.

Reference Books:

1. HazraChowdary. S. K and Bose, "Basic Mechanical Engineering", *Media Promoters and Publishers Pvt. Ltd,* India,2010.
2. P. K. Nag, "Engineering Thermodynamics", *Tata McGraw Hill*, NewDelhi.
3. HazraChowdary. S. K and Bose, "Workshop Technology, Vol. I & II", *Media Promoters and publishers Pvt Ltd,*India.

Course Learning Outcomes (COs):

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

CO1: *explain mechanical properties of an engineering materials and learn the steps in design methodology.*
CO2: *describe the principles of manufacturing processes*
CO3: *apply first law of thermodynamics to various processes to calculate work andheat for a closed system.*
CO4: *Define second law of thermodynamics and demonstrate the working principle of IC engines.*

Course Articulation Matrix: U18OE401C ELEMENTS OF MECHANICAL ENGINEERING																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C.	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C.	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-	1
U18OE401C	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**

U18OE401D FUNDAMENTALS OF MEASUREMENTS & INSTRUMENTATION

Class: B.Tech. IV–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):

This course will develop students' knowledge on /in

LO1: *working principle of DC measuring instruments; DC, AC bridge circuits and their applications*

LO2: *principle of operation of Q meter, DVM, DMM, CRO, DSO and display devices*

LO3*: working principle of various transducers and their applications*

LO4: *working principle of seismic transducers, piezoelectric accelerometer, sound level meter, level transducer, flow meter and data acquisition system*

UNIT–I (9+3)

DC measuring instruments (principle of operation): Measurement system – block diagram and example; performance characteristics – accuracy, precision, resolution, threshold, span, % error and fidelity; DC meters (working principle) – PMMC mechanism, shunt type ammeter, series type voltmeter, shunt type ohmmeter; DC potentiometers - Crompton's DC potentiometer, calibration of meters (ammeter, voltmeter & wattmeter) using DC potentiometer

DC & AC bridges: General bridge balance equation, bridge calibration, applications of bridges, Wheatstone bridge, Maxwell bridge, Schering bridge, Wien's bridge

UNIT – II (9+3)

Electronic instruments (principle of operation): Q-meter – basic Q-meter circuit; digital meter – characteristics (resolution & count), DC & AC attenuators, block diagram of dual slope type digital voltmeter, block diagram of digital multimeter (DMM); oscilloscopes – working principle of cathode ray tube (CRT), block diagram of cathode ray oscilloscope (CRO) , block diagram of digital storage oscilloscope (DSO); display devices – working principle of LED & LCD types

UNIT – III (9+3)

Transducers (principle of operation): Transducer - classification, examples and ideal requirements; sensors – cantilever beam & proving ring types of load cells, bourdon tube & diaphragm type pressure sensors; resistive transducers – piezo-resistive effect of strain gauge (SG), gauge factor, SG type force transducer, SG type pressure transducer and RTD; thermocouple type temperature transducer, LVDT type inductive transducer, differential type capacitive transducer, piezoelectric type transducer; photoelectric type transducer

UNIT – IV (9+3)

Transducers (principle of operation): Seismic transducers – displacement transducer, velocity pickup and accelerometer, piezoelectric accelerometer, sound level meter (block diagram), capacitive microphone, capacitive type level transducer (double electrode type), ultrasonic flow meter and electromagnetic flow meter; introduction to data acquisition (DAQ)system

Text Books:

1 P. Pruthviraj, B. Bhudaditya, S. Das and K. Chiranjib, "Electrical and Electronic Measurement and Instrumentation", McGraw-Hill Education, 2nd edition, 2013, New Delhi. (*Chapters 1 to 3, 8 to 10 and 13 to 15*)

2 Arun K. Ghosh, "Introduction to Transducers", *PHI*, 4th edition,2015, New Delhi. (*Chapters 1 to7*)

Reference Books:

1 A.K. Sawhney, "Electrical and Electronics Measurements and Instrumentation", *Dhanpatrai*& Co., 2015, New Delhi.

2 Helfrick. A.D and Cooper W.D., "Modern Electronic Instrumentation and Measurement Techniques", *Pearson India Edn.,* 2nd edition, 2016, New Delhi.

3 B.C. Nakra, K.K Choudhry, "Instrumentation Measurement and Analysis", *TMH,* 4th edition, 2008, New Delhi.

4 D.V.S. Murthy, "Transducers and Instrumentation", *Prentice Hall of India,* 2nd edition, 2012, New Delhi.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to…

CO1: *explain about working principle of measurement system, PMMC based meters and applications of DC & AC bridge circuits*

CO2: *describe the principle of operation of Q-meter, DVM, DMM, CRO, DSO and display devices*

CO3: *elaborate on the working principle of resistive, inductive, capacitive and piezoelectric transducers and their applications*

CO4: *explain about seismic transducers, sound level meter, level transducer, flow meters and block diagram of data acquisition system*

Course Articulation Matrix: U18EI401D Fundamentals of Measurements & Instrumentation

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18EI401D.1	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.2	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.3	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D.4	2	1	1	1	-	-	1	-	-	-	-	1	1	-	-	1
U18EI401D	**2**	**1**	**1**	1	-	-	1	-	-	-	-	1	1	-	-	1

U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS

Class: B.Tech. IV- 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 (LO) :

This course will develop students' knowledge in/on

LO1: *network topologies, network reference models, network architecture and data transmission*

LO2: *design issues and protocols of data link layer, error detection and correction, MAC protocols and Ethernet standards*

LO3: *principles and design issues of network layer and internet protocols*

LO4: *transport layer design issues, protocols and application layer services*

UNIT - I (9)

Introduction: History of Computer Networks and The Internet, Principles of Computer Network Design, Network Architecture, Network Types.

Physical Layer: Factors Affecting Data Transmission, Data Transmission, Data Transmission Codes: Non-return to Zero, Manchester Encoding, Digital modulation & Modems, Transmission Media.

UNIT- II (9)

Data Link Layer: Functions of Data Link Layer, Framing Techniques, Error Detection and Correction, Elementary Data Link Layer Protocols for Flow Control.

Local Area Networks: Medium Access Protocols, LAN Protocol Stack, Ethernet Protocols, IEEE 802.11LAN Standard: IEEE 802.11 Protocol Stack, Wireless LAN Topologies, Frames in IEEE 802.11.

UNIT - III (9)

The Network Layer: Network Layer Services, Packet Switching Networks, The Internet Protocol(IP): IP Header in IPv4, IP Addressing in IPv4, Subnet addressing and Classless Inter-Domain Routing (CIDR), Address Resolution Protocol, Dynamic Host Configuration Protocol, Internet Layer Protocols, Fragmentation and Reassembly, IP Version 6: Motivation for IPv6 Development, Features of IPv6, IPv6 Address Representation.

Routing Protocols: Elements of Routing Protocol Performance, Flooding, Distance-Vector and Link State Routing Protocols, Hierarchical Routing.

UNIT - IV (9)

The Transport Layer: User Datagram Protocol, Transmission Control Protocol, TCP State Transition Diagram, Other TCP Timers, TCP Congestion Control.

The Application Layer: World Wide Web, Domain Name System, Electronic Mail.

Network Security: Threats and Vulnerabilities in Computer Networks, Cryptographic Algorithms, Data Encryption Standard.

Text Books:

1. Mayank Dave, "Computer Networks", Second Edition, Cengage Learning, ISBN-13:978- 81-315-0986-9,2014.

Reference Books:

1. Forouzan, "Data Communication and Networking", Fifth Edition, *TMH*, *ISBN*978-0-07- 296775-3, 2012.
2. William Stallings, "Data and Computer Communications", Ninth Edition, *Prentice-Hall India*, ISBN-81-203-1240-6,2011.
3. AndrewS.Tanenbaum,DavidJ.Wetherall,"ComputerNetworks",FifthEdition, *Pearson Education*, ISBN-13: 978-0-13-212695-3, 2011.

Course Learning Outcomes (COs):

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

CO1: *describe various network topologies, architecture and techniques for data transmission modes*

CO2: *outline various design issues in data link layer and develop protocols to handle data link layer operation*

CO3: *describe various design issues and develop protocols for network Layer.*

CO4: *explain various design issues , protocols of transport layer & application layer services*

Course Articulation Matrix:U18OE401E FUNDAMENTALS OF COMPUTER NETWORKS																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18OE401E.1	2	1	-	1	-	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.2	3	3	2	1	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.3	3	3	2	2	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E.4	3	3	2	2	1	1	-	-	-	-	-	1	1	-	-	1
U18OE401E	**2.75**	**2.5**	**2**	**1.5**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**1**

U18OE401F RENEWABLE ENERGY SOURCES

Class: B.Tech, IV 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) :

This course will develop student's knowledge in/on

LO1: *different renewable energy sources and principle of solar energy systems*
LO2:*wind energy, geothermal energy and MHD power generation systems*
LO3: *harnessing energy from oceans and biomass*
LO4: *working of fuel cells and different energy storage systems*

UNIT-I (9)

Introduction: Conventional and non-conventional sources of energy – Brief Description of different Renewable energy sources
Solar Energy: Introduction to prospects of solar photovoltaic (SPV) systems, principle of a PV cell, large scale SPV systems, economic considerations of SPV systems, PV cell technology, merits and limits of SPV systems, applications of SPV systems-street lighting, domestic lighting, Battery charging, SPV pumping systems

UNIT-II (9)

Wind Energy: Principles of wind power- Operation of a wind turbine- Site Characteristics. **Geothermal Energy:** Origin and types of geothermal energy- Operational Difficulties - Vapor dominated systems- Liquid dominated systems- Petro-thermal systems.
Magneto-Hydro Dynamic (Mhd) Power Generation: MHD system- Open and Closed systems- Advantages of MHD systems.

UNIT-III (9)

Energy from Oceans: Ocean temperature differences, ocean waves-Wave motions and tides- Energy from the waves; Introduction of tidal power, basic principle of tidal power, components of tidal power plants, advantages and disadvantages
Bio-Energy: Introduction-bio-mass conversion, technologies-wet process, dry process, photo synthesis; Biogas generation- biogas from power plant wastes, methods of maintaining biogas production, utilization of biogas, biogas gasification, applications of gasifiers

UNIT-IV (9)

Chemical Energy Sources: Introduction of fuel cells, Principle of Operation of fuel cell, Classification of Fuel cells, Advantages and disadvantages of fuel cells.
Types of Energy Storage Systems: Introduction, Different types of Batteries, Ultra Capacitors, Flywheels, Super Conducting Magnetic storage.

Text Books:

1. Rai G.D "*Non-Conventional Energy Sources*", Khanna Publishers, NewDelhi
2. Felix A. Farret, M. Godoy Simoes, —Integration of Alternative Sources of Energy, John Wiley & Sons,2006
3. BansalN.K, Kaleeman and M.Miller, "Renewable *Energy Sources and Conversion Technology*", TATA McGraw-Hill, NewDelhi

Reference Books:

1. EL-Wakil M.M, "Power Plant Technology", McGraw-Hill, NewYork
2. Duffie and Beckman, "Solar Energy Thermal Process", John Wiley & Sons, NewYork

Course Learning Outcomes (COs):

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

CO1: *compare conventional and non-conventional energy resources; explain the working principle of solar energy harnessing and its applications*

CO2: *explain the working principles of wind energy, geothermal energy and MHD power generation systems*

CO3 : *describe the harnessing of electric power from oceans and biomass*

CO4: *explain the principle of operation of fuel cells and different types of energy storage systems*

Course Articulation Matrix: **U18OE401F RENEWABLE ENERGY SOURCES**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18OE401F.1	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.2	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.3	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F.4	3	-	-	-	-	-	1	-	-	-	-	-	1	-	2	1
U18OE401F	**3**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**

U18MH402 PROFESSIONAL ENGLISH

Class: B.Tech IV Semester **Branch:** Common to all branches

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation :	100 marks
End Semester Exam :	-

Course Learning Objectives (LOs):

This course will develop the student's knowledge in/on

LO1: *reading skill and sub skills to comprehend the text*
LO2: *vocabulary and using it appropriately to describe situations*
LO3*: using phrasal verbs in speech and writing*
LO4: *grammar and improve language ability to write effectively*

Week	Topic Name
I	**I. Reading Comprehension-** Significance of Reading Skimming **II. Verbal Ability-**Synonyms **III. Grammar-**Articles
II	**I. Reading Comprehension-** Scanning **II. Verbal Ability-**Antonyms **III. Grammar-**Articles
III	**I. Reading Comprehension-** Critical Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-**Prepositions
IV	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Sentence completion with correct alternative word/group **III. Grammar-** Reported Speech
V	**I. Reading Comprehension-** Intensive Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VI	**I. Reading Comprehension-** Inferential Reading **II. Verbal Ability-** Jumbled Sentences **III. Grammar-** Error Detection
VII	**I. Reading Comprehension-** Lexical Reading **II. Verbal Ability-** Phrasal Verbs **III. Grammar-** Tenses, Structures
VIII	**I. Reading Comprehension-** Read to Interpret **II. Verbal Ability-** Single Word Substitutes **III. Grammar-** Tenses, Uses

IX	**I. Reading Comprehension-** Read to Analyze **II. Verbal Ability-**Collocations **III. Grammar-** Tenses, Uses
X	**I. Reading Comprehension-** Read to Summarize **II. Verbal Ability-**Spellings **III. Grammar,** Agreement between Subject & verb(concord)

Text Books:

1. Professional English *Manual prepared by the faculty of English, KITSW*
2. Arun Sharma &Meenakshi Upadhyay, "Verbal Ability and Reading Comprehension for CAT & Other Management Examinations", 8thEdition *McGraw Hill Education (India) Private Ltd*, Chennai,2018

Reference Books:

1. Nishit K. Sinha, " Verbal Ability and Reading Comprehension for the CAT", 3rdEdition Pearson India Education Services Pvt. Ltd., Chennai
2. Harper Collins, "Collins COBUILD English Grammar" Third Edition, *Harper Collins Publishers Ltd.*
3. Rosemary & Courtney, "Longman-English-Chinese Dictionary of Phrasal Verbs"

Course Learning Outcomes (COs):

Up on completion of this course, the students will be able to…

CO1:*analyze the passage using skill and sub skill to solve different types of questions related to reading comprehension*

CO2: *identify grammatical errors in the given sentences and correct them*

CO3: *select correct synonyms/antonyms/phrasal verbs and complete sentences with suitable words or phrases*

CO4: *keep the given jumbled sentences in proper sequence to make a coherent paragraph*

Course Articulation Matrix: U18MH402 PROFESSIONAL ENGLISH

Course Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH402.1	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.2	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.3	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402.4	-	-	-	-	-	-	-	-	1	2	-	1	1	-	1	1
U18MH402	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**-**	**1**	**1**	**-**	**1**	**1**

U18CE403 MECHANICS OF MATERIALS

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):

This course will develop students' knowledge in /on

LO1*: various methods to evaluate slope and deflection for determinate beams*

LO2*: determining the slope and deflection for trusses and indeterminatebeams*

LO3*: bending stresses and critical load on columns*

LO4*: principles of Castigliano's theorem and failure theories*

UNIT-I(9+3)

Deflection of beams: Application of double integration and Macaulay's method to calculate the slope and deflection of simply supported and cantilever beams.

Conjugate beam and moment area method: Determination of slope and deflection of simply supported and cantilever beams

UNIT-II (9+3)

Strain energy: Strain energy of beams in bending, deflection of beams from strain energy, unit load method, Castigliano's theorem-I, application to deflection of determinate plane truss.

Fixed and continuous beams: Analysis of fixed beams for shear force and bending moment, 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.

UNIT-III(9+3)

Direct and bending stresses: Stresses in a member subjected to axial, uniaxial and biaxial loading, core or kernel of a section, wind pressures on chimneys.

Columns and struts: Euler's theory, Euler's critical load for columns with various end conditions, limitations, Rankine's hypothesis, IS code formula.

UNIT-IV(9+3)

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

Theories of failure: Maximum principal stress theory, maximum principal strain theory, maximum shear stress theory, strain energy theory and shear strain energy theory, applications

Text Books:

1. B. C Punmia, K. Arun Jain, K. Ashok Jain, "*Mechanics of Materials*", Laxmi Publications Pvt., Ltd., New Delhi,15thedn.,2014.
2. GunneswaraRao T. D. and MudimbyAndal"*Strength of Materials", 1stedn*.2018, Cambridge University Press.

Reference Books:

1. H. J. Shah and S. B. Junnarkar, "*Mechanics of Structures Volume - I and Volume - II*", Charotar Publishing House Pvt., Ltd., Anand, 31stedn., 2014.
2. R. K .Bansal, "*A text book of Strength of Materials*",Laxmi Publications, 4thedn,2010.
3. Andrew Pytel and L. Ferdinand Singer, "*Strength of Materials",* Harper and Row Publishers, New York, 4thedn.,2011.

Course Learning Outcomes (COs):

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

CO1: *calculate slope and deflection of determinate beams using integral methods.*

CO2: *assess the slope and deflection for indeterminate beams and trusses.*

CO3: *determine the bending stresses and critical load on columns.*

CO4: *analyze portal frames by Castigliano's theorem and interpret failure theories tobeams.*

Course Articulation Matrix: **U18CE403 MECHANICS OF MATERIALS**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE403.1	2	2	1	-	-	-	-	-	-	1	-	1	2	-	1	1
U18CE403.2	2	2	1	-	-	-	-	-	-	1	-	1	2	-	2	1
U18CE403.3	2	2	1	-	-	-	-	-	-	1	-	1	2	-	1	1
U18CE403.4	2	2	1	-	-	-	-	-	-	1	-	1	2	-	2	1
U18CE403	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2**	**-**	**1.5**	**1**

U18CE404 HYDRAULICS ENGINEERING

Class: B.Tech.IV-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *interpret turbulent flow and water hammer in pipes*

LO2: *boundary layer theory and submerged body flows*

LO3: *open channel flow and analysing hydraulic jump*

LO4: *classification of turbines and pumps*

UNIT-I(9)

Water hammer in pipes: Water hammer phenomenon, gradual and sudden closure of valves, expression for pressure rise considering elasticity of pipe, pressure relieving devices.

Turbulent flow in pipes: Characteristics of turbulent flow, shear stress due to turbulence, Reynolds stresses, Prandtl's mixing length theory, universal velocity distribution laws, Nikuradse's experiment, Karman– Prandtl resistance equation, variation of friction factor with Reynold's number–Moody's chart.

UNIT-II (9)

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.

Flow around submerged bodies: Drag and lift, basic concepts and expressions, drag and lift forces on sphere and cylinder.

UNIT-III(9)

Open channel flow: Distinction between pipe and channel flows, classification and characteristics of open channel flow, Manning's and Chezy's equations, most economical rectangular, triangular, circular and trapezoidal sections, 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, expression for depth of hydraulic jump, loss of energy due to hydraulic jump, channel transitions, equation for gradually varied flow, classification of surface profiles, rapidly variedflow.

UNIT-IV (9)

Hydraulic machines: Impact of jet, force on a stationary, moving flat plate and curved vanes, hydraulic turbines, heads and efficiencies, classification, Pelton Wheel, Francis turbines, specific speed, draft tube, cavitation phenomenon, characteristic curves, 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., 18thedn.,2011.
2. A. K. Jain, "*Fluid Mechanics Including Hydraulic Machines*" Khanna Publications, 12thEdn. 2010.

Reference Books:

1. VenTe Chow, "*Open Channel Hydraulics*", Blackburn Publisher, 2009Edition.
2. Victor L. Streeter, E. Benjamin Wylie and Keith W.Bedford, "*Fluid Mechanics*", McGraw Hill,Singapore,9thedn..
3. K. Subramanya,"*Theory and Applications of Fluid Mechanics*", Tata McGraw Hill, Edition1993.

Course Learning Outcomes (COs):

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

CO1: *calculate stresses due to turbulent flow and infer water hammer in pipes*

CO2: *summarize the concepts of boundary layer theory and flow around submerged bodies*

CO3: *analyse open channel flow and hydraulic jump*

CO4: *discuss the characteristics of turbines and pumps*

Course Articulation Matrix: **U18CE404 HYDRAULICS ENGINEERING**

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE404.1	2	2	1	-	-	-	-	-	1	-	-	1	1	-	-	1
U18CE404.2	2	2	2	-	-	1	-	-	1	-	-	1	1	-	-	1
U18CE404.3	2	2	2	-	-	-	-	-	1	-	-	1	1	-	-	1
U18CE404.4	2	2	1	-	-	1	-	-	1	-	-	1	1	-	-	2
U18CE404	**2**	**2**	**1.5**	**-**	**-**	**1**	**-**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**1.25**

U18CE405 DESIGN OF REINFORCED CONCRETESTRUCTURES

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):

This course will develop students' knowledge in /on

LO1: *concepts of limit state method of design and its application in flexure*
LO2: *estimation of shear, torsion and serviceability of RCC sections*
LO3: *design of slabs and columns using limit state design*
LO4: *design of footings and examine working stress method*

UNIT-I(9+3)

Fundamentals of Limit State Design: Introduction, loads on structures, design philosophies, code of practice, grades of concrete, stress-strain curves of concretes, mild steel and TOR steel, characteristic loads and strengths, partial safety factors, IS codal provisions.

Limit state of collapse in flexure: Analysis and design of beams, singly, doubly reinforced rectangular and T-beams, IS codal provisions.

UNIT-II (9+3)

Shear and torsion: Types of shear, design shear strength of concrete beams, design of beams for shear, torsional shear stress for rectangular sections, reinforcement for torsion, bond, anchorage, development length, IS codal provisions.

Limit state of serviceability: Short term deflection for beams, long term deflection due to creep, differential shrinkage, IS Codal provisions.

UNIT-III(9+3)

Slabs: Loads and their distribution, design of one way simply supported, continuous slabs and two way slabs, IS Codal provisions.

Short columns: Axially loaded rectangular columns, circular columns with lateral ties and helical reinforcement, interaction curves, design for uni-axial bending moment, IS Codal provisions

UNIT-IV (9+3)

Footings: Types of footings, design of isolated footing for axially loaded columns, design of combined footing, IS Codal provisions. **Working stress method of design:** Design principles, under reinforced, balanced and over- reinforced beams, analysis and design of rectangular beams, design for shear, IS Codal provisions.

Text Books:

1. A. K. Jain, "*Limit State Design*", NemChand Brothers, Roorkee,7thedn.,2012.
2. B. C. Punmia, "*Reinforced Concrete Structures*", Laxmi Publishing Company, New Delhi, 8thedn.,2012.

Reference Books:

1. S. UnnikrishnaPillai and DevdasMenon, "*Reinforced Concrete Design*", Tata McGraw Hill Publishing Company Ltd., New Delhi,3rdedn.,2011.
2. Jai Krishna and O. P. Jain, "Plain and Reinforced Concrete", NemChand Brothers, Roorkee, 8thedn.,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, NewDelhi, 1987.
5. SP:16 , "DesignAids for Reinforced Concrete To IS 456: 1978", Bureau of Indian standards, New Delhi,1980.

Course Learning Outcomes (COs):

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

CO1: *compare the design philosophies of limit state method and its application in flexure*
CO2: *determine the capacities of RCC sections in shear, torsion and their serviceability*
CO3: *design of one way, two way slabs and axially loaded columns*
CO4: *analyze footings and review the working stress method*

Course Articulation Matrix: U18CE405 DESIGN OF REINFORCED CONCRETE STRUCTURES

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CE405.1	1	1	1	--	--	--	--	--	--	--	--	1	1	1	--	1
U18CE405.2	2	2	2	--	--	--	--	--	--	--	--	1	2	2	--	1
U18CE405.3	2	2	2	--	--	1	--	--	--	--	--	1	2	2	--	1
U18CE405.4	2	2	2	--	--	1	--	--	--	--	--	1	2	2	--	1
U18CE405	**1.75**	**1.75**	**1.75**	**--**	**--**	**1**	**--**	**--**	**--**	**--**	**--**	**1**	**1.75**	**1.75**	**--**	**1**

U18CE406 ENGINEERING GEOLOGY

Class: B.Tech.IV-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *elements of engineering geology and properties of different minerals*
LO2: *properties of rocks and their laboratory tests*
LO3: *features of structural geology and ground water exploration.*
LO4: *geology of dams, tunnels and natural hazard mitigation*

UNIT-I(9)

General geology: Scope, objectives and branches of Engineering geology, surface features and earth's interior, processes of weathering and end products, susceptibility of rocks to weathering, river as a geological agent.

Mineralogy: Definition of crystal and mineral, physical properties and importance of minerals such as Quartz and its varieties, Feldspar, Graphite, Hornblende, Hematite, Mica, Granite, Kyanite, Calcite, Talc, Bauxite, Corundum, Gypsum, Dolomite, Beryl Apatite and other important minerals.

UNIT-II (9)

Petrology: Definition of rock, rock Cycle formation of different rocks and their classification, Igneous, Sedimentary and Metamorphic, applications to civil engineering.

Texture and Structure of rocks: Physical and engineering properties of rocks for construction granite, pegmatite, dolerite, basalt, sandstone, conglomerate, limestone, shale, laterite, schist, gneiss, quartzite, marble and slate, tests for rocks as building stone, aggregates, foundation stone, roofing and facing stones.

UNIT-III(9)

Structural Geology: Structural features like stratification, lamination, bedding planes, dip, strike, study of common geological structures associated with rocks, faults, folds, joints and their identification, unconformities, overlaps, inliers, outliers, importance of geological structures in civil engineering.

Geological Investigations: Interpretation of geological and aerial maps, hydrogeology, ground water investigation and exploration, geophysical investigations, definition, necessity, electrical resistivity and seismic refraction methods, bore hole drilling.

UNIT-IV (9)

Geology of dams, reservoirs and tunnels: Types of dams, requirements of dam site, reconnaissance, preliminary and detailed geological investigations for a dam site, leakage and silting of reservoirs,

remedial measures, tunnels and their purposes, types of tunnels and geological considerations for tunnelling.

Natural Hazards: Earthquakes, landslides and soil erosion, remedial measures to prevent damage to engineering structures, case study

Text Books:

1. N.ChennaKeshavulu, "*Textbook of Engineering Geology*", Macmillan Publishers, New Delhi, 2nd edition,2009.
2. Parbin Singh, "*Engineering and General Geology*", S.K. Kataria and sons, New Delhi, 8th edition,2013.

Reference Books:

1. K.V.G.K.Gokhale, "principles of engineering geology", BS Publications, Hyderabad, 1st edition , 2013.
2. David George price,"E.G. principles & practice"7th edition,2009.

Course Learning Outcomes (COs):

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

CO1: describe importance of minerals and their properties
CO2: classify different rocks with specific properties
CO3: interpret geological maps and explore ground water investigations
CO4: explain natural hazards and suggest remedial measures for mitigation

Course Articulation Matrix: **U18CE406 ENGINEERING GEOLOGY**																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18CE406.1	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.2	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.3	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406.4	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1
U18CE406	2	--	--	--	-	1	1	-	-	-	-	1	1	-	-	1

U18CE407 HYDRAULIC& HYDRAULIC MACHINERY LABORATORY

Class: B.Tech.IV-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: *determining the hydraulic coefficient for various flow measuring devices*
LO2: *implementing Bernoulli's equation and application of Bernoulli's theorem in estimating various losses in pipes*
LO3: *studying the various parameters which effects the impact of jet*
LO4: *studying the characteristics of hydraulic machines*

LIST OF EXPERIMENTS

1. Determination of coefficient of discharge for given mouthpiece and orifice
2. Determination of coefficient of discharge for given notches(triangular/rectangular)
3. Determination of coefficient of discharge through a given venturi flume.
4. Determination of coefficient of discharge through a given Standing wave flume.
5. Determination of coefficient of discharge for given venture and Orifice meter.
6. Verification of Bernoulli's theorem.
7. Estimation of coefficients of friction and minor losses (sudden enlargement, sudden contraction and bend).
8. Evaluateflow through Reynold's apparatus.
9. Estimate the forces caused due to impact of jet on given vanes.
10. Evaluate the characteristics of Francis Turbine
11. Evaluate the characteristics of Pelton Wheel.
12. Evaluate characteristics of Centrifugal Pump.
13. Evaluate the characteristics of Submersible Pump.
14. Evaluate the characteristics of Reciprocating Pump.

Laboratory manual:

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

Reference 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):

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

CO1: determine the hydraulic coefficient for various flow measuring devices

CO2: apply Bernoulli's equation in estimating head losses in pipes

CO3: Interpret the impact of jet on different vanes to determine the coefficient of impact.

CO4: evaluate the characteristics of hydraulic machines

(Mapping of COs with POs and PSOs):

Course Articulation Matrix: U18CE407 Hydraulic& Hydraulic Machinery Laboratory																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18CE407.1	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.2	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.3	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407.4	2	1	-	1	-	-	-	-	1	-	-	1	2	-	-	1
U18CE407	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	**1**

U18CE408 ENGINEERING GEOLOGY LABORATORY

Class: B.Tech.IV-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

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 CivilEngineering.

Reference Books:

1. N.Chenna Keshavulu, "*Textbook of Engineering Geology*", Macmillan Publishers, New Delhi, 2nd edition,2009.
2. Parbin Singh, "*Engineering and General Geology*", S.K. Kataria and sons, New Delhi, 8th edition,2013.
3. K. V. G. K. Gokhale, "*Principles of Engineering Geology*", BS Publications, Hyderabad, 1st edn.,2013.

Course Learning Outcomes (COs):

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

CO1: identify properties of different minerals

CO2: classify rocks as igneous, sedimentary and metamorphic based on physical, mineral properties

CO3: interpret ifferent geological maps

CO4: demonstrate geophysical techniques for ground water exploration

Course Articulation Matrix :U18CE408 ENGINEERING GEOLOGY LABORATORY																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18CE408.1	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.2	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.3	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408.4	2	-	-	1	-	1	-	-	1	-	-	1	1	-	-	1
U18CE408	**2**	**-**	**-**	**1**	**-**	**1**	**-**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**-**	**1**

U18CE409 SURVEYING FIELD WORK -II

Class: B.Tech. IV-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

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. Determine the horizontal and vertical distances by stadiatacheometry.
3. Determine gradient of given two inaccessible points by tangentialtacheometry.
4. Plot contour maps of a given area usingtacheometer.
5. Setting out of simple curve using chain andtape.
6. Setting out of simple curve by Rankine'smethod.
7. Setting out of compound curve usingtheodolite.
8. Setting out the foundation trench of abuilding.
9. Determine the lengths and directions of consecutive survey lines using totalstation.
10. Determine area of given a terrain using totalstation.
11. Determine the elevation of the remote object using totalstation.
12. Determine the gradient and distance between two inaccessible points using total station.

Laboratory Manual:

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

Reference Books:

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

Course Learning Outcomes (COs):

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

CO1: determine the distances and angles using tacheometry

CO2: develop contour maps by tacheometry

CO3: mark out curves using chain, tape and theodolite

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

Course Articulation Matrix:**U18CE407 SURVEYING FIELD WORK –II**																
CO Code	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
U18CE 409.1	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.2	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.3	2	2	-	-	-	1	-	-	2	1	-	1	2	-	1	1
U18CE 409.4	2	2	-	-	2	1	-	-	2	1	-	1	2	-	1	1
U18CE409	**2**	**2**	**-**	**-**	**2**	**1**	**-**	**-**	**2**	**1**	**-**	**1**	**2**	**-**	**1**	**1**

U18MH415 ESSENCE OF INDIAN TRADITIONALKNOWLEDGE

Class :**B.Tech.IVSemester** Branch :**Common to all branches**

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop the student's knowledge in/on

LO1: *basic structure of Indian knowledge system*
LO2: *Indian perspective of modern science*
LO3:*basic principles of yoga and holistic health care*
LO4: *benefits of yoga practice*

Unit – I (6)

Basic Structure of Indian Knowledge System: Introduction, Vedas – Origin, Classification, Structure, Rig Veda, Sama Veda, Yajur Veda, Atharva Veda; Upavedas – Dhanurveda, Sthapatveda, Gandharvaveda, Ayurveda; Vedang – Shiksha, Chanda, Vyakarna, Nirukta, Kalpa, Jyothisha; Upanga – Dharmashastra, Mimamsa, Tarkashastra,Purvana.

Unit – II (6)

Modern Science and Indian Knowledge System: Introduction – Vedas as Basis for Modern Science – Architectural Developments – Medicine and its relevance – Mathematical Sciences in Vedas – Space and Military related developments – Chemical Sciences

Unit – III (6)

Yoga and Holistic Health Care: Healthy mind in healthy body – Yoga: Definition, types; Yoga to keep fit: Diet, Yoga Asanas – Fundamentals; Breathing techniques in Patanjali Yogatradition – Pranayama; chakras; meditation; Benefits of Yoga – Physical Health, Emotional Health, Prevention of Disease, Reducing or Alleviating Symptoms of Problems

Unit – IV (6)

Case studies – Yoga Practice: Yoga as an effective tool for management of human crisis – Depression, Self – Concept & Mental health, Yoga for stress management; Yoga : A way to cure for Insomnia.

Requisite:
Yoga practice sessions are to be conducted for all the students taking this course by the time they complete Unit 1 and Unit 2.

Text Books:

1. Sathish Chandra Chaterjee, Dhirendramohan Datta, "An Introduction to Indian Philosophy", Rupa Publications Pvt. Ltd. New Delhi. (Chapter 2,3)
2. Priyadaranjan Ray, S.N. Sen, "The Cultural Heritage of India", Vol. 6, Science and Technology, The Ramakrishna Mission Institute of Culture, Calcutta
3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
4. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham Delhi, 2016 (Chapter 4, 5, 6, 7,8)

Reference Books:

1. Swami Jitatmananda, "Holistic Science and Vedanta", Bharatiya Vidya Bhavan Bombay. (Chapter 2,3)

Course Learning Outcomes (COs):

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

CO1: *summarize the basic structure of Vedas, Upavedas, Vedanga, Upanga*

CO2: *explain Vedas as principal source of knowledge for scientific inventions*

CO3: *describe different yogasanas, breathing techniques, chakras, meditation and their benefits*

CO4: *discuss the benefits of yoga as an effective tool for management of humancrisis*

Course Articulation Matrix:U18MH415 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

CO Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	P O 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18MH415.1	-	-	-	-	-	1	-	2	1	1	-	-	-	-	2	1
U18MH415.2	-	-	-	-	-	1	1	2	1	1	-	-	-	-	2	1
U18MH415.3	-	-	-	-	-	1	-	2	2	1	-	2	-	-	2	1
U18MH415.4	-	-	-	-	-	1	1	2	2	1	-	2	-	-	2	1
U18MH415	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**1.5**	**1**	**-**	**2**	**-**	**-**	**2**	**1**

U18CH416 ENVIRONMENTAL STUDIES

Class: B. Tech. IV-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):

This course will develop students' knowledge in/on

LO1*:necessity to use natural resources more equitably*

LO2 *:concepts of ecosystem and the importance of biodiversity conservation*

LO3 **:***causes, effects and control measures of various environmental issues*

LO4 **:***issues involved in enforcement of environmental legislation*

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 - 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, effects of modern agriculture, fertilizer-pesticide problems, water logging and 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, ecological pyramids, energy flow in the ecosystem and 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, effects of global warming, ozone layer depletion; International conventions/protocols - Earth summit, Kyoto protocol and Montreal protocol; 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)

Social Issues and the Environment: **Role of Individual and Society** - Role of individual in prevention of pollution, water conservation, Rain water harvesting and watershed management; **Environmental Protection / Control Acts** - Air (Prevention and control of Pollution) Act- 1981,

water (Prevention and Control of Pollution) Act-1974, water Pollution Cess Act-1977, Forest conservation Act (1980 and 1992), wildlife Protection Act 1972 and environment protection Act 1986, issues involved in enforcement of environmental legislations;

Human Population and Environment - Population growth, family welfare programmes, women and child welfare programmes, role of information technology in environment and human health.

TEXT BOOKS:

1. ErachBharucha, "Text Book of Environmental Studies for Under Graduate Courses (2nd edn.)", *Universities Press (India) Private Limited,*2013.

REFERENCE BOOKS:

1. Y. Anjaneyulu, "Introduction to Environmental Science", *B.S. Publications*,2004.
2. Gilbert M. Masters, "Introduction to Environmental Engineering & Science", *Prentice Hall of India,*Third Edition,1991.
3. AnubhaKaushik, C.P. Kaushik, "Environmental Studies", 4/e, *New AgeInternational Publishers,*2014.
4. R.Rajagopalan, "Environmental Studies from crisis to cure", *Oxford University Press*, Second Edition,2011.

Course Learning Outcomes(COs):

After completion of this Course, the student will be able to…

CO1 : *investigate any environmental issue using an interdisciplinary framework*

CO2 : *formulate an action plan for sustainable alternatives and conserving biodiversity that integrates science, humanist, social and economic perspective*

CO3 : *identify and explain the complexity of issues and processes which contribute to an environmental problem*

CO4 : *participate effectively in analysis and problem-solving through knowledge in environmental legislations*

Course Articulation Matrix : U18CH416 ENVIRONMENTAL STUDIES

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
U18CH416.1	2	1	2	1	-	2	1	-	1	-	-	-	1	-	2	1
U18CH416.2	-	-	2	-	-	1	2	-	1	-	-	-	1	-	2	1
U18CH416.3	1	2	1	-	-	1	2	1	1	-	-	-	1	-	2	1
U18CH416.4	-	-	1	-	-	1	2	-	1	-	-	-	1	-	2	1
U18CH416	**1.5**	**1.5**	**1.5**	**1**	**-**	**1.25**	**1.75**	**1**	**1**	**-**	**-**	**-**	**1**	**-**	**2**	**1**

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

V SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	MC	U18MH501	Universal Human Values - II*	2	-	-	-	10	30	40	60	100
2	PE	U18CE502	Professional Elective – I / MOOC-I	3	-	-	3	10	30	40	60	100
3	PCC	U18CE503	Structural Analysis	3	-	-	3	10	30	40	60	100
4	PCC	U18CE504	Environmental Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CE505	Soil Mechanics	3	-	-	3	10	30	40	60	100
6	PCC	U18CE506	Design of Steel Structures	3	-	-	3	10	30	40	60	100
7	PCC	U18CE507	Environmental Engineering Laboratory	-	-	2	1	40	-	40	60	100
8	PCC	U18CE508	Soil Mechanics Laboratory	-	-	2	1	40	-	40	60	100
9	PCC	U18CE509	Building Planning and Drawing Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CE510	Seminar	-	-	2	1	100	-	100	--	100
Total				**17**	**-**	**8**	**19**	**280**	**180**	**460**	**540**	**1000**
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	**7**	-	-	-	-	-
Total credits for Honours/Minor students:							**19+7**					

- *List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Total Contact Periods/Week: 25

Professional Elective-I/MOOC-I:
U18CE502A: Advanced Concrete Technology
U18CE502B: Advanced Surveying
U18CE502C: Water shed Management
U18CE502M: MOOCs

U18MH501 UNIVERSAL HUMAN VALUES – II

Class: B.Tech. V– Semester

Branch(s): CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
2	-	-	-

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

* Pre-requisite: U18MH111 Universal Human Values - I (*Induction Programme)*

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *self-exploration, happiness and prosperity as the process of value education*
LO2: *harmony in the human being - self & family*
LO3: *co-existence of human being with society & nature*
LO4: *professional ethics, commitment and courage to act*

UNIT – I (6)

Introduction - Need, Basic Guidelines, Content and Process for Value Education:
Purpose and motivation for the course, Recapitulation from Universal Human Values - I(*Induction programme*)
Self-Exploration: Its content and process, Natural acceptance and experiential validation – As the process for self-exploration
Continuous Happiness and Prosperity: A look at basic human aspirations, Right understanding, Relationship and physical facility - The basic requirement for fulfillment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly: A critical appraisal of the current scenario, Method to fulfill the above human aspirations - Understanding and living in harmony at various levels

UNIT – II (6)

Understanding Harmony in the Human Being- Harmony in Myself & Family:
Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Happiness and physical facility; Understanding the 'Body' as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of 'I' with the 'Body' - Sanyam and Health; Correct appraisal of physical needs, Meaning of prosperity in detail, Programs to ensure Sanyam and Health
Harmony in Family: Understanding values in human - Human relationship; Meaning of justice (Nine universal values in relationships), Program for its fulfillment to ensure mutual happiness, Trust and respect as the foundational values of relationship,

Understanding the meaning of trust, Difference between intention and competence; Understanding the meaning of respect, Difference between respect and differentiation, The other salient values in relationship

UNIT – III (6)

Understanding Harmony with Society, Nature & Existence:
Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, Fearlessness (trust) and Co-existence as comprehensive human goals, Visualizing a universal harmonious order in society – Undivided society; Universal order - From family to world family
Understanding the harmony in the nature: Interconnectedness and mutual fulfillment among the four orders of nature - Recyclability and self-regulation in nature
Whole Existence as Co-existence: Understanding existence as co-existence of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – IV (6)

Implications of Holistic Understanding of Harmony on Professional Ethics:
Natural acceptance of human values, Definitiveness of ethical human conduct, Basis for Humanistic education, Humanistic constitution and Humanistic universal order
Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people friendly and eco-friendly production systems and c) Ability to identify and develop appropriate technologies and management patterns for above production systems
Case studies: Case studies of typical holistic technologies, Management models and production systems, Strategy for transition from the present state to Universal human order – a) At the level of individual: As socially and ecologically responsible engineers, technologists and managers b) At the level of society: As mutually enriching institutions and organizations

Text Book:

[1] R .R. Gaur, R. Sangal and G. P. Bagaria, *Human Values and Professional Ethics*, New Delhi: Excel Books, 2010.

Reference Books:

[1] A. Nagaraj, *JeevanVidya: EkParichaya*, Raipur: JeevanVidyaPrakashan, Amarkantak, 2018.
[2] A.N. Tripathi, *Human Values*, 3rd ed. New Delhi: New Age International Publisher, 2019.
[3] M. Govindrajran, S. Natrajan& V.S. Senthil Kumar, *Engineering Ethics (includes Human Values)*, 12th ed. Haryana: PHI Learning Pvt. Ltd., 2011.
[4] Jayshree Suresh, B. S. Raghavan, *Human Values & Professional Ethics*, 4th ed. New Delhi: S. Chand & Co. Ltd., 2012.

Additional Resources:

[1] R.R Gaur, R Sangal, G P Bagaria, *A foundation course in Human Values and professional Ethics (Teacher's Manual)*, New Delhi: Excel books, 2010.
[2] A set of DVDs containing - Video of Teachers' Orientation Program - PPTs of Lectures and Practice Sessions (*Audio-visual material for use in the practice sessions*)

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: interpret the importance of continuous happiness & prosperity through self exploration and imbibe skills to examine harmony

CO2: appraise the concept of sentience, distinguish between intention & competence and prioritize human values in relationships

CO3: build fearlessness & co-existence as comprehensive human goal and agree upon interconnectedness & mutual fulfillment

CO4: assess the understanding of harmony, adapt professional ethics and take part in augmenting universal human order

Course Articulation Matrix (CAM):U18MH501 UNIVERSAL HUMAN VALUES - II

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18MH501.1	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO2	U18MH501.2	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO3	U18MH501.3	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
CO4	U18MH501.4	-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1
U18MH501		-	-	-	-	-	1	-	2	1	1	-	2	-	-	1	1

U18CE502A ADVANCED CONCRETE TECHNOLOGY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in...

LO1: *behaviour of admixtures and aggregates in concrete*

LO2: *methods of proportioning of concrete and special concretes*

LO3: *high-performance concrete, self curing and self compacting concretes*

LO4: quality control and non-destructive testing methods of concrete

UNIT-I (9)

Cement and Admixtures: Chemical composition, Bogue's compounds, Heat of hydration, Influence of compound composition on properties of cement, Mineral and Chemical admixtures, Relevant IS codal specifications

Aggregates: Classification of aggregates, Particle shape, Texture, Gradation, Fineness modulus, Grading curves, Gap graded aggregates, Combined grading, Alkali aggregate reaction, Alkali silica reaction, Soundness of aggregate, Recycled aggregates, Relevant IS codal specifications

UNIT-II (9)

Proportioning of Concrete: EntroyShaklok method, Particle packing theory, Nan-Su method for self compacting concrete

Special Concretes: Self compacting concrete, Light weight concrete, Cellular concrete, Geopolymer concrete, Fibre reinforced concrete, Uses and applications

UNIT-III (9)

High Performance Concrete: High performance concrete in fresh and hardened state, Durability, Carbonation test, Chloride potential test, Half cell potentiometer test, Fire damage assessment

Self Curing and Self Compacting Concrete: Need and development of self curing and self compacting concrete, Admixtures and aggregates, EFNARC specifications for self compacting concrete, Applications of self curing and self compacting concrete, Tests on self compacting concrete

UNIT-IV (9)

Quality Control of Concrete: Quality assurance, Quality control, Quality management and quality audit-statistical quality control, Acceptance criteria, IS codal provisions

Non-Destructive Testing: Strength assessment, Rebound hammer test, Ultra sonic pulse velocity test, Validate with core sampling and testing

Text Books:

[1] A.M. Neville, *Properties of Concrete,* 4th ed. Longman House, United Kingdom: English Language, Book society, 2015. *(Chapters 1, 2, 3, 4, 5, 6 and 12)*

[2] Ken W. Day, James Aldred, Barry Hudson, *Concrete Mix Design, Quality Control and Specifications,* 3rd ed. Florida: CRC Press (Taylor and Francis group), 2016. *(Chapters 2, 3, 4, 6, 7, 8, 10 and 11)*

Reference Books:

[1] M. S. Shetty, *Concrete Technology (Theory and Practice),* 7th ed. New Delhi: S. Chand Company, 2014.

[2] M.L. Ghambir, *Concrete Technology*, 5th ed. New Delhi: Tata McGraw Hill Publishers, 2016.

[3] R.N. Raikar, *Diagnosis and treatment of structures in distress,* 4th ed. Mumbai: R and D Centre of Structural Designers and Consultants Pvt. Ltd., 1994.

[4] BIS, IS 10262: 2019, *Concrete Mix Proportioning Guidelines,* 2nd revision, New Delhi: Bureau of Indian Standards, 2019.

[5] BIS, IS 383: 2019,*Coarse and Fine Aggregate for Concrete*, New Delhi: Bureau of Indian Standards, 2019.

[6] BIS, IS 456: 2000 *Plain and Reinforced Concrete- Code of Practice*, 5th amendment, New Delhi: Bureau of Indian Standards, 2019.

[7] EFNARC, *Specifications and Guidelines for Self Compacting Concrete*, Norfolk, UK: EFNARC, 2002.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: *interpret the behaviour of cement and gradation of aggregates*

CO2: *design concrete mixes using suitable methods and discuss applications of special concretes*

CO3: *categorize high performance, self curing and self compacting concretes*

CO4: **apply quality control and NDT methods for strength assessment**

Course Articulation Matrix(CAM) : U18PE502A										**ADVANCED CONCRETE TECHNOLOGY**							
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE502A.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE502A.2	1	1	1	1	-	-	1	-	-	-	-	1	1	1	-	1
CO3	U18CE502A.3	1	-	-	1	-	-	1	-	-	-	-	1	1	1	-	1
CO4	U18CE502A.4	1	1	1	-	1	-	-	-	-	-	-	1	1	1	-	1
U18CE502A		**1**	**1**	**1**	**1**	**1**	**-**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE502B ADVANCED SURVEYING

Class: B.Tech. V– Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *soundings, stream measurements and tunnel alignment*

LO2: *GIS concepts and representation of data models*

LO3: *concepts, methodologies and applications of Remote Sensing and digital image processing*

LO4: working principles of GPS and DGPS

UNIT-I (9)

Hydrograph Surveying: Introduction, Uses, Shore line survey, Sounding equipment, Methods of locating soundings, Stream measurements

Mine Surveying: Objectives, Equipment for mine survey, Measurement of distance and difference in elevation, Tunnel alignment and setting out

UNIT-II (9)

Geographical Information System(GIS): Introduction, GIS architecture, Components of GIS, Accuracy in GIS, Data exploration and thematic layering, Levels of measurement in GIS, Applications of GIS, Geographic visualization, Query languages, Guidelines for the preparation of GIS

Data Models: GIS - data models, Types, Spatial data models, Vector and raster data structures, Advantages and disadvantages, Attribute data models, Digital Elevation Model (DEM), Applications of DEM, Data structure for continuous surface model, Functions of GIS

UNIT-III (9)

Remote Sensing: Principles of remote sensing, Components, Elements, Characteristics of Electro Magnetic Radiation(EMR), Transmission path, Types of remote sensing, Platforms, Thermal Infrared remote sensing and its applications, Scanners and sensors, Resolution, Elements of visual interpretation

Digital Image Processing: Pre-processing, Image Enhancement, Image transformations, Image classification and analysis, Data integration and analysis, Remote sensing in India

UNIT-IV (9)

Global Positioning System (GPS): Overview, GLONASS system, GALILEO system, Space segment, Operational control segment, User equipment segment, Principle of position determination via satellite generated ranging signals, Error sources

Differential Global Positioning System (DGPS): Principle, working with DGPS, GPS surveying techniques, Indian coordinate system for using GPS, Uses and applications

Text Books:

[1] SatheeshGopi, R. Sathikumar and N. Madhu, *Advanced Surveying*, 2nd ed. New Delhi: Pearson Education, 2017. *(Chapters 1, 2, 3, 7 and 14)*

[2] S. K. Duggal, *Surveying Vol. II,* 4th ed. New Delhi: McGraw Hill Education, 2017. *(Chapters 4 and 9)*

Reference Books:

[1] B.C. Punmia,*Surveying Vol. II,* 17th ed. New Delhi: Laxmi publications, 2016.

[2] R. Subramanian, *Surveying and Levelling*, 2nd ed. New Delhi: Oxford University Press, 2007.

[3] K.R. Arora, *Surveying Vol.II,* 15th ed. New Delhi: Rajsons publications, 2018.

[4] http://civil.iisc.ernet.in/~nagesh/rs_gis.htm.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: interpret soundings, stream measurements and tunnel alignment

CO2: utilise GIS concepts and interpret data using data models

CO3: analyze methodologies of remote sensing, applications of remote sensing and process of digital imaging

CO4: summarize the working principles of GPS and DGPS

Course Articulation Matrix (CAM): U18CE502B ADVANCED SURVEYING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE502B.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE502B.2	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE502B.3	1	-	-	1	1	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE502B.4	1	-	-	-	1	-	-	-	-	-	-	1	1	-	-	1
U18CE502B		**1**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**1**

U18CE502C WATERSHED MANAGEMENT

Class: B.Tech. V– Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *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 (9)

Watershed Concepts: Objectives, 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 (9)

Participatory Rural Appraisal (PRA): Basic principles, Assumptions, Important types, Benefits, Tools, Maps and Models of PRA programmes

Erosion Control Measures: 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 (9)

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 (9)

Ecosystem Management: Role of ecosystem, Crop husbandry, Soil enrichment, Inter mixed and strip-cropping, Cropping pattern, Sustainable agriculture, Bio-mass management, Dry land agriculture, Silvopasture, 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 Book:

[1] J. V. S. Murthy, *Watershed Management*, 5th ed. New Delhi: New Age International Publishers, 2014.

Reference Books:

[1] R. A wurbs and W. P. James, *Water Resource Engineering*, London: Prentice Hall Publishers, 2015..

[2] V. V. N. Murthy, *Land and Water Management*, 6th ed. New Delhi: Kalyani Publications, 2011.

[3] Rajesh Rajora, *Integrated Watershed Management*, 2nd ed. New Delhi: Rawat publications, 2019.

[4] D. K. Majumdar, *Irrigation and Water Management*, 2nd ed. New Delhi: Printice Hall of India, 2005.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify characteristics of watershed & the factors affecting soil erosion

CO2: investigate participatory rural appraisal methods and apply different erosion control measures for agricultural & non-agricultural lands

CO3: summarize water conservation, harvesting & ground water management methods

CO4: develop action plan for ecosystem management & watershed management

Course Articulation Matrix (CAM): U18CE502C WATERSHED MANAGEMENT

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE502C.1	1	-	1	-	-	1	1	-	-	-	-	1	1	1	-	1
CO2	U18CE502C.2	1	-	1	-	-	1	1	-	1	-	-	1	1	1	-	1
CO3	U18CE502C.3	1	-	1	-	-	1	1	-	-	-	1	1	1	1	-	1
CO4	U18CE502C.4	1	-	1	-	-	1	1	-	-	-	1	1	1	1	-	1
U18CE502C		**1**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**-**	**1**	**1**	**1**	**1**	**-**	**1**

U18CE503 STRUCTURAL ANALYSIS

Class: B.Tech. V- Semester
Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *compatibility, equilibrium equations and analysis of indeterminate structures usingslope deflection method*

LO2: *distribution of internal forces at joints using moment distribution method*

LO3: *internal forces using Kani's method & approximate analysis of tall structures*

LO4: *variation of internal forces in a structural member using conventional method and influence line diagram for moving loads*

UNIT-I (9)

Slope Deflection Method for Beams: Development of slope-deflection equations, Sign convention, Analysis of continuous beams with and without sinking of supports, Construction of bending moment diagram and shear force diagrams

Slope Deflection Method for Frames: Rectangular portal frames with and without side sway for single bay single storey

UNIT-II (9)

Moment Distribution Method for Beams: Distribution and carry over factors, Analysis of continuous beams with and without sinking of supports

Moment Distribution Method for Frames: Rectangular portal frames with and without side sway for single bay single storey

UNIT-III (9)

Kani's Method: Analysis of statically indeterminate beams with and without sinking of supports

Approximate Methods: Approximate analysis of frames using portal method and cantilever method

UNIT-IV (9)

Moving Loads: Maximum bending moment and shear force 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 through type bridge trusses

Text Book:

[1] S. Ramamruthamand R. Narayan, *Theory of Structures,* 9th ed. New Delhi: DhanpatRai Publications, 2014.

Reference Books:

[1] B. C. Punmia and A. K. Jain, *Theory of Structures,* 13th ed. New Delhi: Laxmi Publications, 2005.
[2] C.S. Reddy, *Basic Structural Analysis*, 19th ed. New Delhi: Tata McGraw Hill Education, 2017.
[3] C. K. Wang, *Indeterminate Structural Analysis,* 5th ed. New Delhi: McGraw Hill Education, 2017.
[4] Sujit Kumar Roy and SubrataChakrabarty, *Fundamentals of structural analysis with computer analysis and applications*, revised ed. New Delhi: S. Chand and Company Ltd., 2012.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: develop compatibility and equilibrium equations for the analysis of indeterminate structures
CO2:evaluate the distribution of forces at joints, bending moment and shear force diagrams for indeterminate structures
CO3: analyze the structures using Kani's method & tall structures using approximate analysis
CO4: determine the variation of internal forces in structural members for moving loads

Course Articulation Matrix (CAM): U18CE503 STRUCTURAL ANALYSIS

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE503.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE503.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE503.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE503.4	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE503		**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**1**

U18CE504 ENVIRONMENTAL ENGINEERING

Class: B.Tech. V- Semester
Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: quantity and quality aspects of water
LO2: procedures in water treatment and distribution
LO3: sewage analysis and hydraulic design of sewers
LO4: primary and secondary treatment methods of sewage

UNIT – I (9)

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 water demand and its effects on water supply scheme, Design period, Population forecasting methods, Fire demand

Water Quality: Physical, Chemical and biological characteristics of water quality, Waterborne diseases and their control, Quality standards for municipal supplies

UNIT – II (9)

Purification of Water: 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, Appurtenances in distribution system

UNIT – III (9)

Sewage Characteristics: Physical, Chemical and Biological characteristics of sewage, Analysis of sewage, Bio-chemical 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, Materials, Joints, Shapes, Sewer appurtenances

UNIT – IV (9)

Sewage Treatment: Process flow diagram, Primary treatment, Theory and design of screens, Grit chamber, Skimming tanks, Sedimentation tanks

Secondary Treatment of Sewage: Activated sludge process, Sewage filtration, Oxidation ditch, Oxidation ponds, Aerated lagoons, Rotating biological contactors, Treatment and disposal of sludge, On-site disposal methods (land and water body)

Text Books:

[1] P.N. Modi, *Water supply Engineering-Environmental Engineering–I*, 5th ed. New Delhi: Standard Book House, 2016. *(Chapters 1, 2, 6, 8, 9 and 10)*

[2] P.N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*,5th ed. New Delhi: Standard Book House, 2015. *(Chapters 1, 2, 3, 4, 6, 8, 11, 13, 14 and 17)*

Reference Books:

[1] Howard S. Peavy, Donald R. Rower and George Tchobanoglous, *Environmental Engineering*, New Delhi: McGraw-Hill International Edition, 2014.

[2] B.C. Punmia, A.K. Jain, A.K.Jain, *Water supply Engineering-Environmental Engineering–I*, 2nd ed. New Delhi: Laxmi Publications, 2016.

[3] B.C. Punmia, A.K. Jain, A.K.Jain, Waste w*ater Engineering-Environmental Engineering–II*, 2nd ed. New Delhi: Laxmi Publications, 2016.

[4] The Expert Committee, CPHEEO *Manual on Water Supply and Treatment*, 3rd ed. New Delhi: Ministry of Urban Development, Govt. of India, 1999.

[5] The Expert Committee, CPHEEO, *Manual on Sewerage and Sewage Treatment Systems*, 3rd ed. New Delhi: Ministry of Urban Development, Govt. of India, 2013.

[6] Metcalf and Eddy, *Waste Water Engineering: Treatment and Reuse*, New Delhi: McGraw-Hill Edition, 2017.

Course Learning Outcomes (COs):

On completion of this Course, students will be able to…

CO1: analyze problems related to water quality and quantity

CO2: apply methods for purification of water and design water distribution systems

CO3: analyze and design the sewage systems

CO4: apply methods for purification and disposal of sewage

Course Articulation Matrix(CAM):U18CE504 ENVIRONMENTAL ENGINEERING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE504.1	1	1	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO2	U18CE504.2	1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	1
CO3	U18CE504.3	1	1	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO4	U18CE504.4	1	1	1	1	-	1	1	-	-	-	-	1	1	1	-	1
U18CE504		**1**	**1**	**1**	**1**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE505 SOIL MECHANICS

Class: B.Tech. V– Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *soil properties and effective stress principle*
LO2: *permeability and seepage analysis*
LO3: *compaction and consolidation mechanisms*
LO4: *stress distribution methods and shear strength parameters*

UNIT-I (9)

Basic Properties and Classification of Soils: Soil formation, Soil structure, Phase diagrams, Water content, Specific gravity, Void ratio, Porosity, Degree of saturation, Density, Mass, Weight, Volume relationships, Relative density, Sieve analysis, Grain size distribution curves, Atterberg limits, Stoke's law and its limitations, Hydrometer analysis, IS classification, Field identification, Consistency index, Activity, Thixotrophy, Sensitivity

Effective Stress: Soil water classification, Effective stress principle, Total, Effective, Neutral stresses, Hydrostatic condition

UNIT – II (9)

Permeability: 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

Seepage Analysis: Seepage force, Hydrodynamic conditions, Critical hydraulic gradient, Quicksand condition, Characteristics of flow net, Construction of flow net, Uses of flow net, Flow net for anisotropic soils

UNIT –III (9)

Compaction: Introduction, Proctor's compaction test, Zero air voids curve, Saturation line, Factors affecting compaction, Effect of compaction on soil properties, Field compaction, Relative compaction

Consolidation: Mechanism of consolidation, Characteristic compression curves, Consolidation parameters, Normal, Under and over consolidated clays, Terzaghi's one dimensional consolidation theory, Assumptions, Derivation, Determination of coefficient of consolidation, Magnitude and rate of consolidation settlements

UNIT –IV (9)

Stress Distribution: Boussinesq equation for point, Line, Circular and rectangular loads, Westergaard's analysis for point load, Concept and use of pressure bulb, Construction and use of Newmark's influence chart, Approximate methods, Contact pressure distribution under rigid and flexible footings in sand and clay

Shear Strength: Introduction to normal and shear stresses, Mohr's circle, Characteristics of Mohr's circle, Mohr-Coulomb theory, Revised Mohr-Coulomb equation, Direct shear test, Unconfined compression test, Vane shear test, Triaxial test, Consolidated drained, Consolidated undrained and unconsolidated undrained shear tests, Factors affecting the shear strength of clays and sands, Critical void ratio, Liquefaction

Text Book:

[1] K. R. Arora, *Soil Mechanics and Foundation Engineering*, 9th ed. New Delhi: Standard Publishers, 2013.

Reference Books:

[1] GopalRanjan and A.S.R. Rao, *Basic and Applied Soil Mechanics*, Revised 3rd ed. New Delhi: New Age International Publishers, 2016.

[2] B.C. Punmia, Er. Ashok K. Jain, Arun K. Jain, *Soil Mechanics and Foundations,* 17th ed. New Delhi: Laxmi Publications (P) Ltd, 2017.

[3] C. Venkatramaiah, *Geotechnical Engineering,* 6th ed. New Delhi: New Age Publications, 2018.

[4] T. W. Lambe and Whiteman, *Soil Mechanics*, New Delhi: New Age Publications, 2017.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: analyze soils and apply the principle of effective stress

CO2: estimate coefficient of permeability using Darcy's equation and seepage analysis

CO3: analyze compaction and consolidation mechanisms

CO4: evaluate vertical stresses and shear strength parameters of soil

Course Articulation Matrix(CAM):U18CE505 SOIL MECHANICS																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE505.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE505.2	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE505.3	1	1	1	1	-	-	-	-	-	-	-	1	1	1	-	1
CO4	U18CE505.4	1	1	1	1	-	-	-	-	-	-	-	1	1	1	-	1
U18CE505		**1**	**1**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE506 DESIGN OF STEEL STRUCTURES

Class: B.Tech. V– Semester **Branch:** Civil Engineering(CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *philosophies of steel design and bolted connections*

LO2: *design of tension and compression members*

LO3: *behaviour of flexural members and column bases*

LO4: *types of bolted and welded connections*

UNIT–I (9)

Principles of Limit State Design: Types of structural steel, Advantages, Design philosophies-Working stress, Limit state, Ultimate load methods, Ultimate and serviceability limit states, Loads and load combinations, Partial safety factors

Bolted Connections: Types of bolted connections, Lap and butt connection, Assumptions made in analysis, Failure of bolted connections, Efficiency of joints and Strength of plate connections

UNIT – II (9)

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 – III (9)

Flexural Members: Types of sections for beams, Behavior of beams in flexure, Classification of beam cross sections, Plastic moment carrying capacity of section, Stability of beams, Failure modes, Design criteria for beams, Effective span of beams, Design moment and shear strength, Built up beam sections

Column Bases: Design of slab base, Gusseted base and Grillage foundation

UNIT – IV (9)

Eccentric Connections: Beam – Column Connections, Bolted Framed connections, Un-Stiffened and Stiffened seat connections, Bolted bracket connections

Welded Connections: Welding, Methods of welding, Types of welded joints, Specifications for fillet welded joints, Strength of fillet welds, Stresses due to individual forces, Combination of stresses, Design of joint

Text Book:

[1] S. S. Bhavikatti, *Design of Steel Structures: By Limit State Method as Per IS: 800-2007,* 3rd ed. New Delhi: International Publishing House Pvt. Ltd, 2012.

Reference Books:

[1] N. Subramanian, *Design of Steel Structures: By Limit State Method as Per IS: 800-2007*, 5thed. New Delhi:Oxford University Press, 2018.

[2] M.L. Gambhir, *Fundamentals of Structural steel design*, New Delhi: Tata McGraw-Hill Education, 2013.

[3] S.K. Duggal, *Limit state design of steel structures*, 2nd ed. New Delhi: Tata McGraw-Hill Education, 2014.

[4] BIS, *IS 800:2007 General construction in steel - Code of practice*, 3rd ed. New Delhi: Bureau of Indian standards, 2007. (permitted for examination)

[5] BIS, *SP: 6 (1-7) Handbook for structural engineers*, New Delhi: Bureau of Indian standards, 1980.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: distinguish design philosophies in steel structures and analyzebolted connections

CO2: design different types of steel sections subjected to tension & compression

CO3: determine the design capacity of steel flexural members & column bases

CO4: evaluate the strength of eccentric bolted & welded connections

Course Articulation Matrix (CAM): U18CE506 DESIGN OF STEEL STRUCTURES

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE506.1	1	1	2	-	-	-	-	-	-	-	-	1	1	2	-	1
CO2	U18CE506.2	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
CO3	U18CE506.3	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
CO4	U18CE506.4	1	1	2	-	-	1	-	-	-	-	-	1	1	2	-	1
U18CE506		**1**	**1**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**2**	**-**	**1**

U18CE507 ENVIRONMENTAL ENGINEERING LABORATORY

Class: B.Tech.V- Semester
Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *physical analysis of water*
LO2: *chemical analysis of water*
LO3: *optimum coagulant dosage for effective sedimentation*
LO4: *determination of dissolved oxygen of water*

LIST OF EXPERIMENTS

1. Determination of pH and Alkalinity of water sample
2. Determination of Acidity 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 Chloride content of water sample
8. Determination of Dissolved Oxygen of water sample
9. Determination of Biological Oxygen Demand of water sample
10. Determination of Chemical Oxygen Demand of water sample
11. Determination of Break-point Chlorination
12. Determination of Sulphates

Laboratory Manual:

[1] *Environmental Engineering Laboratory Manual,* prepared by the faculty of Civil Engineering Department, KITSW.

Reference Books:

[1] B. Kotaiah and Dr. N. Kumara Swamy, *Environmental Engineering Laboratory Manual,* Anand city: Charotar Publishing House Pvt. Ltd, 2007.

[2] P. N. Modi, *Water supply Engineering- Environmental Engineering –I*, 5th ed. New Delhi: Standard Book House, 2013.

[3] P. N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*, 5th ed. New Delhi: Standard Book House, 2013.

Course Learning Outcomes (COs):

On completion of this Course, students will be able to…

CO1: assess the quality of water for suspended matter

CO2: evaluate hardness and chloride content of the water samples

CO3: estimate dissolved oxygen concentration in water sample

CO4: determine the concentration of degradable organic matter

Course Articulation Matrix(CAM):U18CE507 ENVIRONMENTAL ENGINEERING LABORATORY																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE507.1	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO2	U18CE507.2	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO3	U18CE507.3	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
CO4	U18CE507.4	1	-	-	-	-	1	1	-	1	-	-	1	1	1	-	1
U18CE507		**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE508 SOIL MECHANICS LABORATORY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *IS classification of soils*

LO2: *determination of engineering properties of soils*

LO3: *evaluation of shear strength parameters of soils*

LO4:*field testing for safe bearing capacity and shear strength*

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 In-situ Density by
   a) Core cutter method b) Sand replacement method
4. Determination of OMC and Maximum Dry Density using
   a) IS light compaction test b) IS heavy compaction test
5. Determination of Coefficient of Permeability using
   a) Constant head method b) Falling head method
6. Determination of Coefficient of Consolidation
7. Determination of Shear Strength Parameters using Direct Shear test
8. Determination of undrained cohesion using unconfined compression Test
9. Determination of Specific Gravity of Solids
10. Demonstration of Hydrometer Analysis for Fine Grained Soil
11. Demonstration of Standard penetration test
12. Demonstration of (a) Vane shear test (b)Tri-Axial Shear test
13. Demonstration of Plate load test

Laboratory Manual:

1. *Geotechnical Engineering Laboratory Manual,* prepared by faculty of Civil Engineering Department, KITSW.

Reference Books:

1. B. M. Das, *Soil Mechanics Laboratory Manual*, 9th ed. New Delhi, Oxford University Press, 2015.
2. SP 36 (Part - I): *Compendium of Indian Standards on Soil Engineering*, New Delhi, Bureau of Indian Standards, 1987.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: classify the soil using IS classification system

CO2: determine the engineering properties of soil

CO3: evaluate shear strength parameters

CO4: interpret soils through field tests

Course Articulation Matrix (CAM):U18CE508 SOIL MECHANICS LABORATORY																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE508.1	1	-	-	1	-	1	2	1	2	1	1	1	-	-	1	1
CO2	U18CE508.2	1	-	-	1	-	1	1	-	2	1	1	1	-	-	1	1
CO3	U18CE508.3	1	-	-	1	-	1	-	-	2	1	2	1	-	-	1	1
CO4	U18CE508.4	2	-	-	1	1	1	-	-	2	1	2	1	-	-	1	1
U18CE508		**1.25**	**-**	**-**	**1**	**1**	**1**	**1.5**	**1**	**2**	**1**	**1.5**	**1**	**-**	**-**	**1**	**1**

U18CE509 BUILDING PLANNING AND DRAWING LABORATORY

Class: B.Tech. V- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

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 using AutoCAD*

LO4: *develop a 3D plan from floor plan*

LIST OF EXPERIMENTS

1. Introduction to Building Planning as per NBC recommendations
2. Description of Building components as per NBC recommendation
3. Introduction to AutoCAD, practice drawing and modify commands in AutoCAD
4. Drawing Conventional signs in AutoCAD
5. Planning of space from Line diagram and development of plan, section and elevation
6. Drawings of Various types of doors, windows
7. Plan and Section of Dog-Legged staircase, Open Well Staircase and Spiral Staircase using AutoCAD
8. Plan, section and elevation of a residential building with restricted/unrestricted plinth area
9. Plan, section and elevation of a school building
10. Plan, section and elevation of a primary health centre
11. Development of site layout with restricted area for required amenities
12. Plan of a Dream house/Duplex house
13. Floor plan of a Residential Complex/Apartment
14. Development of a floor plan into 3D building

Laboratory Manual:

[1] *Computer Aided Building Drawing Laboratory Manual,*prepared by faculty of Civil Engineering Department, KITSW.

Reference Books:

[1] Bureau of Indian Standards, *National Building Code of India*, 2nd revision, New Delhi: BIS, 2016.

[2] M. G. Shah, C. M. Kale, S. Y. Patki, *Building Drawing: With an Integrated Approach to Built Environment,* New Delhi: Tata McGraw Hill Book Company Limited, 2002.

[3] T. Jeyapoovan, Engineering Drawing and Graphics Using Autocad, 3rd ed. New Delhi: Vikas Publishing, 2016.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: illustrate conventional signs and functional planning of buildings
CO2: distinguish types of doors, windows and staircases
CO3: create plan, section and elevation of buildings using AutoCAD
CO4: develop floor plan into 3D building plan

Course Articulation Matrix (CAM): U18CE509		**Building Planning And Drawing Laboratory**														
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE509.1	1	-	-	-	1	-	-	1	-	-	-	1	1	-	-	1
CO2	U18CE509.2	1	-	-	-	1	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE509.3	1	-	1	-	1	1	1	1	-	-	-	1	1	1	1	1
CO4	U18CE509.4	1	-	1	-	1	1	1	1	-	-	-	1	1	1	1	1
U18CE509		**1**	**-**	**1**	**-**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**1**

U18CE510 SEMINAR

Class:B.Tech.V- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	100 marks
End Semester Examination	-

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *selecting topic, referring to peer reviewed journals / technical magazines / conference proceedings*

LO2: *literature review and well-documented report writing*

LO3: *creating PPTs and effective technical presentation*

LO4: *preparing a technical paper in scientific journal style & format*

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%
Seminar Paper	20%
DSEC Assessment: *Oral presentation with PPT andviva-voce*	30%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Seminar Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by*DSEC.*

(c) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute.

(d) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DSEC* as per the schedule notified by thedepartment

(e) The student has to register for the Seminar as supplementary examination in the following cases:
   i) he/she is absent for oral presentation and viva-voce
   ii) he/she fails to submit the report in prescribed format
   iii) he/she fails to fulfill the requirements of seminar evaluation as per specified guidelines

(f) i) The CoE shall send a list of students registered for supplementary to the HoD concerned
   ii) The DSEC, duly constituted by the HoD, shall conduct seminar evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: select current topics in their engineering discipline & allied areas from peer reviewed journals / technical magazines/ conference proceedings

CO2: demonstrate the skills for performing literature survey, identify gaps, analyze the technical content and prepare a well-documented seminar report

CO3: create informative PPT and demonstrate communication skills through effective oral presentation showing knowledge on the subject & sensitivity towards social impact of the seminar topic

CO4: write a "seminar paper" in scientific journal style & format from the prepared seminar report

Course Articulation Matrix (CAM):U18CE510SEMINAR

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**U18CE510.1**	1	1	-	1	1	-	1	2	2	2	1	2	1	1	1	1
CO2	**U18CE510.2**	1	1	-	-	-	-	-	2	2	2	-	2	1	1	1	1
CO3	**U18CE510.3**	-	-	-	-	-	-	1	2	2	2	-	2	1	1	1	1
CO4	**U18CE510.4**	-	-	-	-	-	-	-	2	2	2	-	2	1	1	1	1
U18CE510		1	1	-	1	1	-	1	2	2	2	1	2	1	1	1	1

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VI SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	HSMC	U18TP601	Quantitative Aptitude & Logical Reasoning	2	-	-	1	10	30	40	60	100
2	HSMC	U18MH602	Management Economics and Accountancy	3	-	-	3	10	30	40	60	100
3	PE	U18CE603	Professional Elective – II / MOOC -II	3	-	-	3	10	30	40	60	100
4	PCC	U18CE604	Estimation and Valuation	1	2	-	3	10	30	40	60	100
5	PCC	U18CE605	Hydrology and Water Resources Engineering	3	1	-	4	10	30	40	60	100
6	PCC	U18CE606	Construction Management and Equipment	3	-	-	3	10	30	40	60	100
7	ESC	U18IT611	Object Oriented Programming through JAVA	3	-	-	3	10	30	40	60	100
8	PCC	U18CE607	Structural Engineering Detailing Laboratory	-	-	2	1	40	-	40	60	100
9	ESC	U18IT612	JAVA Programming Laboratory	-	-	2	1	40	-	40	60	100
10	PROJ	U18CE608	Mini Project	-	-	2	1	100	-	100	--	100
Total				**18**	**3**	**6**	**23**	**250**	**210**	**460**	**540**	**1000**
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	**7**	-	-	-	-	-
Total credits for Honours/Minor students:				**-**	**-**	**-**	**23+7**	**-**	**-**	**-**	**-**	**-**

[L= Lecture, T = Tutorials, P = Practical's & C = Credits]

Total Contact Periods/Week: 27

Professional Elective-II / MOOC-II:
U18CE603A: Advanced Analysis of Structures
U18CE603B: Ground Improvement Techniques
U18CE603C: Advanced Environmental Engineering
U18CE603M: MOOCs

U18TP601 QUANTITATIVE APTITUDE AND LOGICAL REASONING

Class: B.Tech VI - Semester

Branch(s): CE, EIE, EEE, ECE, ECI

Teaching Scheme:

L	T	P	C
2	-	-	1

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *quantitative aptitude & problem solving skills*

LO2: *computing abstract quantitative information*

LO3: *application of basic mathematics skills & critical thinking to draw conclusions*

LO4: *evaluating the validity & possible biases in arguments presented in authentic contexts*

UNIT - I (6)

Quantitative Aptitude-I: Number system, Averages, Percentages, Ratios & proportions, Time, Speed & distance, Time and work, Data interpretation

UNIT - II (6)

Quantitative Aptitude-II: Simple Interest, Compound Interest, Profit & loss, Ages, Permutations & Combinations, Probability

UNIT - III (6)

Logical Reasoning-I: Series completion, Analogy, Coding and decoding, Blood relations, Number, Ranking & Time sequence test, Linear & Circular arrangements

UNIT - IV (6)

Logical Reasoning-II: Data sufficiency, Logical Venn diagram, Syllogisms, Statement & Arguments, Statement & Assumptions, Direction sense test

Text Books:

[1] R S Agarwal, *Quantitative Aptitude for Competitive Examinations*, 3rd ed. New Delhi: S. Chand Publications, 2019. *(Chapters 1,6,7,8,10,11,12,15,17,21,22,30,31)*

[2] R S Agarwal, *A Modern Approach to Verbal and Non-Verbal Reasoning*, 3rd ed. New Delhi: S. Chand Publications, 2019. *(Chapters Section I: 1,3,4,5,6,8,16, Section II: 2,3)*

Reference Books:

[1] Dinesh Khattar, *Quantitative Aptitude for Competitive Examinations*, New Delhi: Pearson India, 2019.

[2] Nishit K Sinha, *Reasoning for Competitive Examinations*, New Delhi: Pearson India, 2019.

[3] R.N. Thakur ,*General Intelligence and Reasoning*, New Delhi: McGraw Hill Education, 2017.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: solvearithmetic relationships and interpret data using mathematical models

CO2: compute abstract quantitative information

CO3: apply basic mathematics & critical thinking skillsto draw conclusions and solve problems

CO4: evaluate the validity &possible biases in arguments presented in authentic contexts logically & sensibly

Course Articulation Matrix (CAM): U18TP601 Quantitative Aptitude And Logical Reasoning																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18TP601.1	1	2	-	1	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18TP601.2	1	2	-	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18TP601.3	-	1	-	2	-	2	-	-	-	-	-	1	1	-	-	1
CO4	U18TP601.4	-	1	-	2	-	2	-	-	-	-	-	1	1	-	-	1
U18TP601		1	1.5	-	1.5	-	2	-	-	-	-	-	1	1	-	-	1

U18MH602 MANAGEMENT ECONOMICS AND ACCOUNTANCY

Class: B.Tech. VI – Semester

Branch(s): CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *basic concepts of management*

LO2: *concepts of economics and forms of business organizations*

LO3: *fundamentals of accountancy and journalising*

LO4: *preparation of final accounts*

UNIT-I (9)

Management: Meaning and definition, Scientific Management - Definition, Characteristics, Principles of management

Functions of Management: Planning - Definition, Characteristics; Organizing - Definition, Characteristics; Staffing - Meaning, Functions of personnel management; Directing- Leadership, Nature; Motivation – Nature, Types (financial, non-financial, intrinsic and extrinsic); Communication- Process, Types; Co-ordination- Definition, Steps to achieve effective coordination; Controlling- Definition, process

UNIT-II (9)

Economics: Meaning and definition, Scope, Micro and Macro Economics, Methods of Economics, Laws of Economics

Forms of Business Organization: Sole Proprietor ship, Partnership firm - Types of Partners, Cooperative society; Joint stock company - Features, Types, Merits and demerits

UNIT-III (9)

Double Entry System and Book Keeping: Accounting concepts and conventions, Overview of accounting cycle, Journal-meaning, Journalizing, Ledger - Meaning, Ledger posting, Balancing; Cash book (Single column), Preparation of Trial balance

UNIT – IV (9)

Final Accounts: Trading Account, profit and loss account and Balance Sheet with simple adjustments

Text Books:

[1] Y. K .Bhushan, *Fundamentals of Business Organization and Management*, 20th ed. New Delhi: Sultan Chand & Sons, 2017. (*Chapters 1, 2 & 4*)

[2] T. S. Grewal, S.C. Gupta, *Introduction to Accountancy*, 8th ed. New Delhi: S. Chand Publications, 2014. (*Chapters 1, 2, 3, 4, 6 & 8*)

Reference Books:

[1] Harold Koontz and Heinz Weihrich, *Essentials ofManagement*, 6th ed. New Delhi: Tata McGraw Hill Publications, 2006.

[2] L.M. Prasad, *Principles and Practice of Management*, 9th ed. New Delhi: SultanChand, 2016.

[3] R.L. Gupta &V.K.Gupta, *Principles and Practice of Accountancy*, 14th ed. New Delhi: Sultan Chand and Sons, 2018.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: comprehend the basic concepts of management

CO2: distinguish between micro &macro economics& forms of business organizations

CO3: pass journal entries & post them into ledgers

CO4: prepare profit &loss accounts and assess the financial position through the balance sheet

Course Articulation Matrix (CAM):U18MH602 MANAGEMENT ECONOMICS AND ACCOUNTANCY																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18MH602.1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1
CO2	U18MH602.2	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	1
CO3	U18MH602.3	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO4	U18MH602.4	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
U18MH602		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1.25**	**-**	**-**	**-**	**-**	**1**

U18CE603A ADVANCED ANALYSIS OF STRUCTURES

Class: B.Tech. VI - Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

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)

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

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

UNIT – II (9)

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 line 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)

Flexibility Matrix Method for Beams: Determination of internal and external static indeterminacy for different types of structures, Analysis of beams up to second degree of static indeterminacy, Bending moment and shear force diagrams

Flexibility Matrix Method for Frames: Rectangular portal frames – Second degree of static indeterminacy; Bending moment and shear force diagrams, Analysis of statically indeterminate plane trusses upto second degree

UNIT – IV (9)

Stiffness Matrix Method for Beams: 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 for 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] C.S. Reddy, *Basic Structural Analysis*, 3rd ed. New Delhi: Tata McGraw Hill Education Pvt. Ltd.,2017. (*Chapters 2, 8 and 10*)

[2] G.S. Pandit and S.P. Gupta,*Structural Analysis -A Matrix Approach*, 2nd ed. New Delhi: McGraw Hill Education Pvt. Ltd., 2017. (*Chapters 1, 4, 5, 6 and 7)*

Reference Books:

[1] J.S. Przemieniecki,*Theory of Matrix Structural Analysis*, 3rd ed. Columbia: Dover Publications Inc., 2018.

[2] Weaver and Gere, *Matrix analysis of framed structures*, 5th ed. New Delhi: CBS Publishers and distributors Pvt. Ltd., 2018.

[3] Praveen Nagarajan,*Matrix Methods of Structural Analysis*, New Delhi: CRC Press, 2018.

[4] Sujit Kumar Roy and SubrataChakrabarty, *Fundamentals of structural analysis with computer analysis and applications*, revised ed. New Delhi: S. Chand and Company Ltd., 2012.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: analyze three and two hinged arches

CO2: evaluate internal forces for cables and suspension bridges under different loadings

CO3: apply flexibility matrix method to estimate internal forces for beams and frames

CO4: apply stiffness matrix method to determine internal forces for beams and frames

Course Articulation Matrix (CAM): U18CE603A ADVANCED ANALYSIS OF STRUCTURES																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE603A.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE603A.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE603A.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE603A.4	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
U18CE603A		**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**1**

U18CE603B GROUND IMPROVEMENT TECHNIQUES

Class: B.Tech. VI - Semester **Branch**: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *dewatering and grouting techniques*

LO2*: field densification methods*

LO3:*materials and methods of soil stabilization*

LO4: *materials and techniques used for soil reinforcement*

UNIT – I (9)

Dewatering: Definition, Methods of dewatering, Sumps and Interceptor ditches, Single and Multistage 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, Ascending, Descending and Stage grouting methods, Hydraulic fracturing in soils and rocks, Post grout tests

UNIT – II (9)

Compaction: Equipment for shallow compaction, 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 quicksand condition, Damage potential of liquefaction, Factors affecting liquefaction, Methods to prevent liquefaction

UNIT – III (9)

Stabilization: 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

UNIT – IV (9)

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

Text Book:

[1] Purushotham Raj, *Ground Improvement Techniques,* 4th ed. New Delhi: Laxmi Publications, 2006.

Reference Books:

[1] M. R. Hausmann, *Engineering Principles of Ground Modification,* 3rd ed. New Delhi: McGraw Hill International Edition, 2002.

[2] M. P. Moseley, *Ground Improvement,* 2nd ed. Florida, USA: Blackie Academic and Professional, Boca Taton, 2007.

[3] GopalRanjan and A.S.R. Rao, *Basic and Applied Soil Mechanics,* 3rd ed. New Delhi: New Age Publishers, 2016.

[4] M. Braja Das and G. V. Ramana, *Principles of Soil Dynamics,* 2nd ed. Stanford USA: Cengage Learning, 2006.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: apply suitable dewatering and grouting technique for a given field condition

CO2: recommend suitable field densification method considering physical properties of soil

CO3: analyze soil condition and recommend technique for soil stabilization

CO4: propose suitable material& technique for soil reinforcement

Course Articulation Matrix (CAM): U18CE603B GROUND IMPROVEMENT TECHNIQUES

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE603B.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE603B.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE603B.3	1	-	-	-	-	1	1	-	-	-	-	1	1	1	-	1
CO4	U18CE603B.4	1	-	-	-	-	1	1	-	-	-	-	1	1	1	-	1
U18CE603B		**1**	**1**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE603C ADVANCED ENVIRONMENTAL ENGINEERING

Class: B.Tech.VI - Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

UNIT – I (9)

Air Pollution: 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 (9)

Control of Particulate Pollutants: Properties of particulate pollutants, Particle size distribution, Control mechanism of settling chambers, Cyclones, Wet dust scrubbers, Fabric filters and Electrostatic 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 (9)

Stream Sanitation: 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: Nitrogen removal by biological nitrification and de-nitrification, Phosphate removal, Sequential batch reactors, Up flow anaerobic sludge blanket reactor

UNIT – IV (9)

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,* New Delhi: Tata – McGraw Hill Publishing Co., Ltd, 2014. *(Chapters 1, 2, 3, 9, 10, 15 and 19)*

[2] P. N. Modi, *Sewage Treatment and Disposal – Environmental Engineering-II*, 4th ed. New Delhi: Standard Book House, 2013. *(Chapters 8, 15, 18 and 19)*

Reference Books:

[1] S. Howard Peavy, R. Donald Rower and George Tchobanoglous, *Environmental Engineering*, New Delhi: McGraw Hill International Edition, 2014.

[2] G. S. Birdie, J. S. Birdie, *Water Supply and Sanitary Engineering*, New Delhi: DhanpatRai Publications, 2013.

[3] Metcalf and Eddy, *Wastewater Engineering – Treatment and Reuse*, 4th ed. New Delhi: McGraw Hill Education (India) Pvt. Ltd., 2002.
[4] The Noise Pollution (Regulation and Control) Rules, New Delhi: Ministry of Environment and Forests, 2000.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: summarize concepts of air quality and atmospheric stability
CO2: identify methods required for removal of particulate and gaseous pollutants
CO3: analyze stream sanitation using streeterphelps equationand biological waste water treatment
CO4: adapt effluent treatment methods and noise pollution control measures

Course Articulation Matrix (CAM): U18CE603C ADVANCED ENVIRONMENTAL ENGINEERING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE603C.1	1	1	1	-	-	1	1	1	-	-	-	1	1	1	1	1
CO2	U18CE603C.2	1	1	-	-	-	1	1	1	-	-	-	1	1	1	1	1
CO3	U18CE603C.3	2	1	-	1	1	1	1	1	-	-	-	1	2	1	1	1
CO4	U18CE603C.4	2	2	1	1	-	1	1	1	-	-	-	1	1	1	1	1
U18CE603C		**1.5**	**1.25**	**1**	**1**	**1**	**1**	**1**	**1**	**-**	**-**	**-**	**1**	**1.25**	**1**	**1**	**1**

U18CE604 ESTIMATION AND VALUATION

Class: B.Tech. VI – Semester **Branch**: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
1	2	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *measurement and estimation of elements of civil engineering works*

LO2: *detailed estimation of quantities and preparation of tender documents*

LO3: *performing rate analysis and preparation of valuation report for a residential building*

LO4: *types of contract and estimation of miscellaneous engineering works*

UNIT-I (9)

Quantity Surveying: Scope of quantity survey, Units of measurement, Methods of measurement for excavation, Concrete, Brick masonry, Steel, Wood work

Measurements: Essentials of estimation, Advantages, Estimation of isolated, Step foundation, Volume of earth work at same level by mid section, Mean sectional area, Prismoidal methods, Importance, Maintenance of measurement book

UNIT-II (9)

Estimation of Quantities: Different types of estimates, Methods of estimation - Centre line, Individual wall method; Calculation of quantities of brick work, RCC, PCC, Plastering, White washing and painting, Estimate of wood work for doors and frames, Preparation of detailed and abstract estimate for framed structures, 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 (9)

Specifications and Rate analysis: Objectives of specifications, Specifications for earth work excavation, Concrete, Damp proof course(DPC), Form work, Brick masonry, Flooring, Painting and Wood work, Schedule of rates, Rate analysis for cement concrete, DPC, Brick masonry, Plastering, Flooring, Painting

Valuation: Objectives, Market value, Book value, Assessed value, Mortgage value, Replacement value, Capital cost, Cost escalation, Sinking fund, Depreciation methods, Preparation of valuation report for residential building

UNIT-IV (9)

Contracts: General requirements of contract, Types of contracts, Conditions, Termination of contract, Departmental procedures for execution of works

Miscellaneous Estimates: Preparation of detailed and abstract estimate for septic tank with soak pit, Slab culvert, Road project

Text Book:

[1] B. N. Dutta, *Estimating and Costing in Civil Engineering,* 27th ed. New Delhi: UBS Publishers, 2014.

Reference Books:

[1] D.D. Kohli and R.C. Kohli, *A Text Book of Estimating and Costing (Civil),* 13th ed. New Delhi: S. Chand and Company Ltd., 2004.

[2] G.S. Birdie, *A Text Book of Estimating and Costing for Civil Engineering*, 6th ed. New Delhi: DhanpatRai publishing company (P) Ltd., 2014.

[3] M. Chakraborty, *Estimating, Costing, Specification and Valuation in Civil Engineering*, 29th ed. Kolkata: Chakraborty Publishers, 2006.

[4] Bureau of Indian Standards, *SP 27 : 1987 (R2003): Handbook of Method of Measurement of Buildings Works*, New Delhi*:* Reaffirmed 2003.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: measure quantities pertaining to civil engineering works

CO2: estimate quantities and propose tender documents for construction projects

CO3: determine rate analysis and valuation report for a building

CO4: distinguish types of contract and estimate miscellaneous civil engineering works

Course Articulation Matrix (CAM): U18CE604										**ESTIMATION AND VALUATION**							
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE604.1	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
CO2	U18CE604.2	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
CO3	U18CE604.3	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
CO4	U18CE604.4	1	-	-	-	-	1	-	-	-	-	-	1	1	-	1	1
U18CE604		**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**1**	**1**

U18CE605 HYDROLOGY AND WATER RESOURCES ENGINEERING

Class: B. Tech. VI - Semester

Branch: Civil Engineering (CE)

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):

This course will develop students' knowledge on/in…

LO1: *estimation of rainfall, evaporation, evapotranspiration*

LO2: *infiltration, runoff, hydrographs*

LO3: *ground water hydraulics and irrigation methods*

LO4:*design of channels and dams*

UNIT – I (9+3)

Hydrologic Cycle and Precipitation: Definitions, Water budgeting, Types of precipitation, Recording and non-recording type of rain gauges, Errors in measurement, Location of rain gauges, Analysis of rain fall data by mass curves, Hyetograph, Intensity duration analysis, Estimation of missing precipitation data

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

UNIT – II (9+3)

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

Hydrograph Analysis: Characteristics of hydrograph, Separation of base flow, Unit hydrograph, S-curve hydrograph

UNIT – III (9+3)

Groundwater: Types of aquifers, Unconfined and confined aquifers, Well hydraulics, Recuperation test for yield of open well, Introduction to flood routing

Concepts of Irrigation: Duty and delta, Quality of irrigation water, Soil water relationships, Root zone soil water, Infiltration, Consumptive use, Irrigation requirement, Frequency of irrigation, Methods of applying water to the fields - Surface, Sub-surface, Sprinkler and drip irrigation

UNIT – IV (9+3)

Distribution Systems: Canal systems, Alignment of canals, Design of channels, Alluvial channels, Kennedy's and Lacey's theory of regime channels

Dams and Spillways: Classification, Embankment dams, Design considerations, Estimation and control of seepage, Slope protection, Spillways, Components of spillways, Types of gates for spillway crest

Text Books:

[1] P. Jayarami Reddy, *A Textbook of Hydrology*, 4th ed. New Delhi: Laxmi Publishers, 2017. (*Chapters 1, 2,4,5,7 to 11*)

[2] K. R. Arora, *Irrigation, Water Power and Water Resources Engineering,* 5th ed. New Delhi: Standard Publications, 2019. (*Chapters 10, 12, 14, 15, 20 and 22*)

Reference Books:

[1] K. Subramanya, *Engineering Hydrology*, 4th ed. New Delhi: Tata McGraw Hill Book Co, 2017.

[2] Dr.P.N. Modi, *Irrigation Water Resources and Water Power Engineering*, 9th ed. New Delhi: Standard Book House, 2014.

[3] R. S. Varshney, *Engineering Hydrology,* 4th ed. New Delhi: Nemchand Bros, 2012.

[4] S.K. Garg, *Irrigation Engineering and Hydraulic Structures*, 35th ed. New Delhi:Khanna Publishers, 2018.

[5]https://nptel.ac.in/content/storage2/courses/105101010/downloads/Lecture31.pdf.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: estimate rainfall, evaporation and evapotranspiration

CO2: measure infiltration, runoff and analyze hydrographs

CO3: distinguish ground water hydraulics and irrigation methods

CO4: evaluate design parameters of channels and dams

Course Articulation Matrix (CAM): U18CE605 Hydrology And Water Resources Engineering																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE605.1	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18CE605.2	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18CE605.3	1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18CE605.4	1	1	1	-	-	1	-	-	-	-	-	1	1	1	-	1
U18CE605		**1**	**1**	**1**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**-**	**1**

U18CE606 CONSTRUCTION MANAGEMENT AND EQUIPMENT

Class: B.Tech. VI - Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *functions of construction management, processes and project planning*

LO2: *project scheduling and cost management*

LO3: *construction equipment and its management*

LO4: *pre-requisites for implementation of quality and safety measures in construction*

UNIT – I (9)

Construction Management: Stages of construction project, Construction team and their functions, Functions of construction management, Planning, Organizing, Staffing, Directing, Controlling and coordinating, Construction activities, Processes, Workers, Estimating, Schedule, Productivity and mechanized construction, Construction document

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)

Project Scheduling: Methods of scheduling, Bar charts/Gantt chart, Milestone charts, Network analysis, Limitations and advantages, Network and its development, Work breakdown structure, Network techniques, Activity, Event, Network diagram by Critical Path Method (CPM), Program Evaluation and Review Technique (PERT), Time estimates, Floats and Slacks

Cost Management: Direct and Indirect cost of project, Cost slope and Crashing of activities, Resource allocation, Levelling and Smoothing

UNIT – III (9)

Construction Equipment: Classification of equipment, Power shovel, Back hoe, Dragline, Clamshell, Bulldozers, Scrapers, Tractors, Smooth wheel rollers, Sheep foot rollers and Pneumatic rollers, Dump trucks, Dumpers, Derrick cranes, Mobile cranes, Gantry cranes, Belt conveyor, Tunnelling and Rock drilling equipment

Management of Construction Equipment: Need for mechanization, Financing aspects of construction plants and equipment, Factors affecting selection of construction equipment, Planning of construction equipment, Factors affecting the cost of owning and operating the construction equipment

UNIT – IV (9)

Quality Control in Construction: Importance and elements of quality, Organization for quality control, Quality assurance techniques, Documentation, Quality circles

Construction Safety Management: Importance of safety, Causes of accidents, Classification of accidents, Safety measures, Safety benefits to stakeholders, Measuring of safety

Text Books:

[1] SubhajitSaraswati, *Construction Technology,* New Delhi: Oxford University Press, 2008.(*Chapters 1and2)*

[2] S. Seetharaman, *Construction Engineering and Management,* 5th ed. New Delhi: Umesh Publications, 2017. *(Chapters 3, 4, 7, 8 and 9)*

Reference Books:

[1] K. N. Jha, *Construction Project Management: Theory and Practice*, 2nd ed. New Delhi: Pearson Education India,2018.

[2] B. L. Gupta, *Construction Management, machinery and accounts*, 4th ed. New Delhi: Standard Publishers, 2017.

[3] L. S. Srinath, *PERT and CPM principles and applications,* 3rd ed. New Delhi: East West Press, 2015.

[4] K. K. Chitkara, *Construction Project Management: Planning, scheduling and controlling,* 3rd ed. New Delhi: McGraw Hill Education, 2014.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: perceive process of construction management and planning

CO2: estimate project duration and cost

CO3: appraise various construction equipment and their applicability

CO4: recommend norms for implementation of quality and safety aspects

Course Articulation Matrix (CAM): U18CE606 Construction Management and Equipment																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE606.1	1	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1
CO2	U18CE606.2	1	-	-	-	-	-	-	-	-	-	2	1	1	-	1	1
CO3	U18CE606.3	1	-	-	-	-	-	-	-	-	-	1	1	1	-	1	1
CO4	U18CE606.4	1	-	-	-	-	1	-	-	-	-	1	1	1	1	1	1
U18CE606		**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**1.25**	**1**	**1**	**1**	**1**	**1**

U18IT611 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Class: B.Tech.VI – Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: *fundamentals of object oriented and java programming*

LO2: *classes, objects and inheritance for implementing object oriented concepts*

LO3: *concepts of polymorphism, interfaces and packages*

LO4:*exception handling, string handling, input and output operations*

UNIT- I (9)

Fundamentals of Object Oriented Programming: Programming paradigms, Basic concepts of Object Oriented paradigm (OOP), benefits and applications of OOP.

Basics of Java Language: Java language Features, Java Programming Structure, Java Tokens, JVM, Constants, Variables, Data types, Scope of variables, Type Casting, Operators and Expressions, Branching and looping statements, Arrays.

UNIT – II (9)

Classes and Objects: Defining a class, Field declaration, Method declaration, Creating object, Accessing Class Members, Constructors, garbage collection, Static members, Nested and inner classes, Command line arguments, Wrapper classes.

Inheritance: Extending a class, Defining subclasses, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Access controls, *this* and *super* keywords.

UNIT-III (9)

Polymorphism: Overloading methods, Overloading constructors, Overriding Methods, Dynamic method dispatch, Abstract classes, Final Keyword.

Interfaces: Defining an interface, Implementing interfaces, Nested Interfaces, Variables in interfaces, Extending interfaces

Packages: Packages, java API packages, Using System Packages, Naming Conventions, Creating Packages, Accessing Packages, Adding a class to package, Hiding classes, Static Import.

UNIT – IV (9)

Exception handling: Fundamentals, Exception types, Uncaught exceptions, Using try and catch, Multiple catch clauses, Explicit exceptions with *throw, throws* and *finally* keywords.

String Handling: String constructors, String length, String operations, Character extraction, String comparison, Searching strings, Modifying a string, Changing string cases, Joining strings**.**

I/O: I/O Basics, Reading console Input, Writing console output, Reading and writing files.

Text Books:

1. Herbert Schildt, *JAVA The Complete Reference*, 9th ed., McGraw-Hill Education India Pvt.Ltd , 2014.
2. E.Balagurusamy, *Programming with JAVA: A Primer*, 5th ed., McGraw-Hill Publication Ltd, 2014.

References Books:

1. P. Radha Krishna, *Object Oriented Programming through JAVA*, Universities Press, 2011.
2. Herbert Schildt, *JAVA The Complete Reference,* 9th ed., McGraw-Hill Education India Pvt. Ltd., 2011.
3. Kathy Sierra, Bert Bates, *Head First Java*, 2nd ed., O'Reilly Publications, 2005.
4. UttamK.Roy,*Advanced JAVA Programming*, Oxford Publications, 2015.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: illustrate object oriented concepts and java programming features

CO2: solve computing problems using classes, objects and inheritance concepts

CO3: use polymorphism, interfaces and packages for developing objected oriented programs

CO4: develop applications using exception handling, string handling, input and output Operations

Course Articulation Matrix (CAM): U18IT611 Object Oriented Programming Through Java

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3	PSO 4
CO1	U18IT611.1	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	U18IT611.2	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3	U18IT611.3	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO4	U18IT611.4	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
U18IT611		**1.75**	**2**	**1**	**1**	**-**	-	-	-	-	-	-	**1**	**1**	**-**	**-**	**1**

U18CE607 STRUCTURAL ENGINEERING DETAILING LABORATORY

Class: B. Tech. VI - Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: *structural aspects and detailing of different types of beams*

LO2: *detailing of various types of slabs*

LO3: *design detailing various types of columns, footings and stair case*

LO4: *detailing of various types of steel structures*

LIST OF EXPERIMENTS

Preparation of working drawings using AutoCAD for the following structural elements as per SP-34, the elements are to be designed prior to preparation of drawings.

1 Structural detailing of R.C.C Simply Supported Beam
2 Structural detailing of R.C.C Continuous Beam and Cantilever Beam
3 Structural detailing of R.C.C Slabs
4 Structural detailing of R.C.C Tied Column
5 Structural detailing of R.C.C Spirally Reinforced Column
6 Structural detailing of R.C.C Isolated Footings
7 Structural detailing of R.C.C Combined Footings
8 Structural detailing of shear reinforcement in R.C.C beams
9 Structural detailing of R.C.C. stair case
10 Structural detailing of steel beam connections
11 Structural detailing of Built up Column
12 Structural detailing of Grillage Foundation

Laboratory Manual:

[1] BIS, *Hand book on Concrete Reinforcement and Detailing-SP 34 :1987*, New Delhi: Bureau of Indian Standards, 1987.

Reference Books:

[1] S. MahaboobBasha, *Structural Engineering Drawing,* New Delhi: Radiant Publishing House, 2018.

[2] B.C. Punmia, A.K.Jain, *R.C.C Designs*, 10th ed. New Delhi: Laxmi publishers, 2015.

[3] Arya and Ajmani, *Design of steel structures*, 5th ed, Roorkee: Nem Chand and Bros, 1992.

[4] S. Kanthimathinathan, *Manual for Detailing of Steel Steel Structures,* New Delhi: International Publishing House Pvt. Ltd., 2016.

Course Learning Outcomes(COs):

On completion of this course, the student will be able to…

CO1: compile the structural detailing of R.C.C. beams

CO2: develop the detailing plan of various types of slabs

CO3: assess the philosophies in designing various types of columns, footings and stair case

CO4: compose working drawings of various types of steel structures

Course Articulation Matrix (CAM): U18CE607 Structural Engineering Detailing Laboratory																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE607.1	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO2	U18CE607.2	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO3	U18CE607.3	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
CO4	U18CE607.4	1	-	1	-	1	-	-	-	1	-	-	1	1	-	1	1
U18CE607		**1**	**-**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**1**	**-**	**1**	**1**

U18IT612 JAVA PROGRAMMING LABORATORY

Class: B.Tech.VI – Semester **Branch: Civil Engineering (CE)**

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives(LOs):

This course will develop students' knowledge in/on…

LO1: *basic concepts of object oriented programming*
LO2: *classes, objects and inheritance features*
LO3: *concepts of polymorphism, interfaces and packages*
LO4: *exception handling, string handling, input and output operations*

List of Experiments

Experiment-I

1. Write a program to demonstrate operators of java.
2. Write a program to demonstrate type casting and operator precedence.
3. Write a program to demonstrate different types of if-statements.
4. Write a program to demonstrate switch-case.

Experiment-II

5. Write a program to demonstrating loop control statements.
6. Write a program to demonstrate for-each control loop.
7. Implement programs using single dimensional arrays.
8. Write a program to define a two dimensional array where each row contains different number of columns.

Experiment -III

9. Write a program to demonstrate creating object to a class for accessing variables and methods.
10. Write a program to demonstrate creating multiple objects.
11. Write a program to demonstrate passing objects to methods.
12. Write a program to demonstrate constructors and garbage collector by invoking it explicitly.

Experiment -IV

13. Write a program to demonstrate static members.
14. Write a program to demonstrate command line arguments.
15. Write a program to demonstrate variable length argument.
16. Write a program to demonstrate wrapper classes.

Experiment -V

17. Write a program to demonstrate inheritance using extends keyword.
18. Write a program to demonstrate multilevel inheritance.
19. Write a program to demonstrate hierarchical inheritance.
20. Write a program to demonstrate access controls.

Experiment -VI

21. Write a program to demonstrate *this* and *super* keywords.
22. Write a program to demonstrate dynamic method dispatch.
23. Write a program to demonstrate final variable and methods.
24. Write a program to demonstrate use of abstract class.

Experiment -VII

25. Write a program to define an Interface and implement it into a class.
26. Write a program to implement multiple interfaces into a single class.
27. Write a program to extend interfaces.
28. Write a program to implement nested interfaces.

Experiment -VIII

29. Write a program to create a package and demonstrate to import a package into a class.
30. Write a program to demonstrate access protection of packages.
31. Write a program to demonstrate static import of package.

Experiment-IX

32. Write a program to demonstrate *try* and *catch* statements for exception handling.
33. Write a program to handle Array Index Out of Bounds Exception, Number Format Exception and Divide by Zero Exception using multiple catch blocks.
34. Write a program to demonstrate user defined exception with throw keyword.
35. Write a program to demonstrate finally block.

Experiment-X

36. Write a program to demonstrate string searching functions.
37. Write a program to demonstrate string comparison functions.
38. Write a program to demonstrate string modification functions.

Experiment-XI

39. Write a program to demonstrate reading and writing input using byte stream classes.
40. Write a program to demonstrate reading and writing input using character stream classes.
41. Write a program to demonstrate data input and output streams.
42. Write a program to demonstrate array input and output streams.

Experiment-XII

43. Write a program to create a file using byte stream classes.
44. Write a program to create a file using character stream classes.
45. Write a program to copy the content of one file to another.

Laboratory Manual:

1. *Java Programming laboratory Manual*, *Dept. of IT, KITSW.*

Text Books:

1. Herbert Schildt, *JAVA The Complete Reference*, 9th ed., McGraw-Hill Education India Pvt.Ltd , 2014.
2. E.Balagurusamy, *Programming with JAVA: A Primer*, 5th ed., McGraw-Hill Publication Ltd, 2014.

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: develop programs to implement object oriented programming concepts using java
CO2: develop programs using classes, objects and inheritance concepts
CO3: experiment with polymorphism, interfaces and packages
CO4: build applications using exception handling, string handling, input and output operations

Course Articulation Matrix (CAM): U18IT612 JAVA PROGRAMMING LABORATORY

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	**U18IT612.1**	2	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1
CO2	**U18IT612.2**	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO3	**U18IT612.3**	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
CO4	**U18IT612.4**	2	2	1	1	-	-	-	-	-	-	-	1	1	-	-	1
U18IT612		**2**	**2**	**1**	**1**	**-**	-	-	-	-	-	-	**1**	**1**	**-**	**-**	**1**

U18CE608 MINI PROJECT

Class:B.Tech.VI - Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	-	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on /in…

LO1: *implementing a project independently by applying knowledge to practice*

LO2: *literature review and well-documented report writing*

LO3: *creating PPTs and effective technical presentation skills*

LO4: *writing technical paper in scientific journal style & format and creating video pitch*

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. TheHoD 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 seminar is as follows:

Assessment	Weightage
Mini Project Supervisor Assessment	20%
Working model / process / software package / system developed	20%
Mini Project report	20%
Mini Project paper	10%
Video pitch	10%
DMPEC Assessment: *Oral presentation with PPT andviva-voce*	20%
Total Weightage:	100%

Note: It is mandatory for the student to appear for oral presentation and viva-voce to qualify for course evaluation

(a) **Mini Project Topic**: The topic should be interesting and conducive to discussion. Topics may be found by looking through recent issues of peer reviewed Journals / Technical Magazines on the topics of potential interest

(b) **Working Model**: Each student is requested to develop a working model / process / system on the

chosen work and demonstrate before the *DMPEC* as per the dates specified by *DMPEC*

(c) **Report:** Each student is required to submit a well-documented report on the chosen seminar topic as per the format specified by*DMPEC*

(d) **Anti-Plagiarism Check:** The seminar report should clear plagiarism check as per the Anti-Plagiarism policy of the institute

(e) **Presentation:** Each student should prepare PPT with informative slides and make an effective oral presentation before the *DMPEC* as per the schedule notified by thedepartment

(f) **Video Pitch:** Each student should create a pitch video, which is a video presentation on his / her mini project. Video pitch should be no longer than 5 minutes by keeping the pitch concise and to the point, which shall also include key points about his / her business idea / plan (*if any*) and social impact

(g) The student has to register for the Mini project as supplementary examination in the following cases:
   i) he/she is absent for oral presentation and viva-voce
   ii) he/she fails to submit the report in prescribed format
   iii) he/she fails to fulfill the requirements of Mini project evaluation as per specified guidelines

(h) i) The CoE shall send a list of students registered for supplementary to the HoD concerned
   ii) The DSEC, duly constituted by the HoD, shall conduct Mini project evaluation and send the award list to the CoE within the stipulated time

Course Learning Outcomes(COs):

On completion of this course, students will be able to…

CO1: apply knowledge to practice to design & conduct experiments and utilize modern tools for developing working models / process / system leading to innovation & entrepreneurship

CO2: demonstrate the competencies to perform literature survey, identify gaps, analyze the problem and prepare a well-documented Mini project report

CO3: make an effective oral presentation through informative PPTs, showing knowledge on the subject & sensitivity towards social impact of the Mini project

CO4: write a "Mini project paper" in scientific journal style & format from the prepared Mini project report and create a video pitch on Mini project

Course Articulation Matrix (CAM): U18CE608 MINI PROJECT

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE608.1	**1**	**1**	**2**	**2**	**1**	**1**	**1**	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**1**
CO2	U18CE608.2	**1**	**1**	**-**	**2**	**-**	**-**	**-**	**2**	**2**	**2**	**-**	**2**	**1**	**1**	**1**	**1**
CO3	U18CE608.3	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**	**2**	**-**	**2**	**1**	**1**	**1**	**1**
CO4	U18CE608.4	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**-**	**2**	**1**	**1**	**1**	**1**
U18CE608		**1**	**1**	**2**	**2**	**1**	**1**	1	2	2	2	1	**2**	**1**	**1**	**1**	**1**

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	OE	U18OE701	Open Elective- III	3	-	-	3	10	30	40	60	100
2	PE	U18CE702	Professional Elective - III / MOOC -III	3	-	-	3	10	30	40	60	100
3	PE	U18CE703	Professional Elective - IV / MOOC –IV	3	-	-	3	10	30	40	60	100
4	PCC	U18CE704	Highway Engineering	3	-	-	3	10	30	40	60	100
5	PCC	U18CE705	Highway Engineering Laboratory	-	-	2	1	40	-	40	60	100
6	PCC	U18CE706	Civil Engineering Software Applications Laboratory	-	-	2	1	40	-	40	60	100
7	PROJ	U18CE707	Major Project - Phase – I	-	-	6	3	100	-	100	-	100
8	MC	U18CE708	Internship Evaluation*	-	-	2	-	100	-	100	-	100
Total				**12**	**-**	**12**	**17**	**320**	**120**	**440**	**360**	**800**
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	**7**	-	-	-	-	-
Total credits for Honours/Minor students:				**-**	**-**	**-**	**17+7**	**-**	**-**	**-**	**-**	**-**

- *List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practical's & C = Credits] **Total Contact Periods/Week: 24**

Open Elective-III :	**Professional Elective-III / MOOC-III :**	**Professional Elective-IV/MOOC-IV :**
U18OE701A: Disaster Management	U18CE702A: Advanced Structural Design	U18CE703A: Structural Dynamics
U18OE701B: Project Management	U18CE702B: Hydraulic Structures	U18CE703B: Foundation Engineering
U18OE701C: Professional Ethics in Engineering	U18CE702C: Sustainable Materials and Green Buildings	U18CE703C: Repair and Rehabilitation of Structures
U18OE701D: Rural Technology and CommunityDevelopment	U18CE702M: MOOCs	U18CE703M: MOOCs

U18OE602A/ U18OE701A DISASTER MANAGEMENT

Class: B. Tech. VI – Semester
B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):
This course will develop students' knowledge in/on

LO1: disaster types, its impacts & national policy on disaster management
LO2: prevention, preparedness and mitigation measures for different disasters, emergency support functions and relief camps
LO3: different types of vulnerability, macroeconomic, financial management of disaster and its related losses
LO4: disaster management for infrastructure, treatment of plants, geo spatial information in agriculture, multimedia technology in disaster risk management and training

UNIT – I (9)

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 (9)

Prevention Preparedness and Mitigation Measures: Prevention, Preparedness & 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 (9)

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 (9)

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

Textbook:

[1] Rajib shah and R.R Krishnamurthy, *Disaster management – Global Challenges and local solutions,* Hyderabad: Universities Press (India) Pvt. Ltd., 2009.

Reference Books:

[1] Satish Modh, *Introduction to Disaster management,* Bengaluru: Macmillan India Ltd., 2010.

Course Learning Outcomes (COs):
On completion of this course, students will be able to ...

CO1: classify the disasters and discuss natural & non-natural disasters, their implications, the institutional & legal framework for national policy on disaster management in India
CO2: identify mitigation strategies, preparedness & prevention measures and prioritizes the rescue & relief operations to reduce the impact of a disaster
CO3: list the vulnerable groups in disaster; examine the concepts of macroeconomic & sustainability & impact of disaster on development
CO4: discuss disaster management for infrastructure, utilize geospatial information in agriculture and apply multimedia technology for disaster risk management & training

Course Articulation Matrix (CAM): U18OE602A/ U18OE701A DISASTER MANAGEMENT															
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PSO 2**
CO1	**U18OE602A/ U18OE701A.1**	-	-	-	-	-	2	2	1	-	-	1	1	-	-
CO2	**U18OE602A/ U18OE701A.2**	-	-	-	-	-	2	2	1	-	-	1	1	1	1
CO3	**U18OE602A/ U18OE701A.3**	-	-	-	-	-	2	2	1	-	-	1	1	-	-
CO4	**U18OE602A/ U18OE701A.4**	-	-	-	-	-	2	2	1	-	-	1	1	1	1
U18OE602A/ U18OE701A		**-**	**-**	-	-	-	**2**	**2**	**1**	**-**	**-**	**1**	**1**	**1**	1

U18OE602B/ U18OE701B PROJECT MANAGEMENT

Class: B. Tech. VI – Semester
B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

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 &conflict management, ethics & professional responsibilities
LO3: project planning, scheduling and budgeting
LO4: *cost control, risk management and quality control techniques*

UNIT – I (9)

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 (9)

Time and Conflict Management: Understanding time management, Time management forms, Effective time management, Stress and burnout, Conflict environment, Conflict resolution, Management of conflicts, Performance measurement, Financial compensation and rewards, Morality, ethics, Corporate culture, Professional responsibilities, Success variables, Working with executives

UNIT – III (9)

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 (9)

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

Textbook:

[1] Harold Kerzner, *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, 10th ed. Hoboken, NJ: John Wiley & Sons Inc., 2009.

Reference Books:

[1] Jack R Meredith & Samuel J mantel Jr., *Project Management: A Managerial Approach*, 8th ed. Hoboken, NJ: John Wiley & Sons Inc., 2012.
[2] John M Nicholas & Herman Steyn, *Project Management for Business, Engineering and Technology*, 4th ed. Abingdon, UK: Taylor & Francis, 2012.

[3] Adedeji B. Badiru, *Project Management: Systems, Principles and Applications*, Florida, USA: CRC Press, 2012.

Course Learning Outcomes (COs):
On completion of the course, the student will be able to…

CO1: evaluate the desirable characteristics of effective project managers
CO2: plan to resolve issues in conflicting environments
CO3: apply appropriate approaches to plan a new project in-line with project schedule & suitable budget
CO4: estimate the risks to be encountered in a new project and apply appropriate techniques to assess & improve ongoing project performance

Course Articulation Matrix (CAM): U18OE602B/ U18OE701B PROJECT MANAGEMENT														
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	**U18OE602B/ U18OE701B.1**	-	-	-	-	-	1	-	-	-	1	1	-	1	1
CO2	**U18OE602B/ U18OE701B.2**	-	-	-	-	-	1	-	2	-	1	1	-	1	1
CO3	**U18OE602B/ U18OE701B.3**	1	1	-	-	-	1	-	-	-	1	1	-	1	1
CO4	**U18OE602B/ U18OE701B.4**	1	1	-	-	-	1	-	-	-	1	1	-	1	1
U18OE602B/ U18OE701B		**1**	**1**	**-**	**-**	**-**	**1**	**-**	**2**	**-**	**1**	**1**	**-**	**1**	**1**

U18OE602C/ U18OE701C PROFESSIONAL ETHICS IN ENGINEERING

Class: B. Tech. VI – Semester
B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on …

LO1: human values and engineering ethics
LO2: professionalism, theory of virtues and code of ethics
LO3: safety & risk benefit analysis, professional and intellectual property rights
LO4: environmental & computer ethics and various roles of engineers in a company

UNIT – I (9)

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 (9)

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 (9)

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, Professional rights, Employee rights, Intellectual Property Rights (IPR), Discrimination

UNIT – IV (9)

Global Issues: Multinational corporations - Environmental ethics, Computer ethics, Engineers as managers, Consulting engineers, Engineers as expert witnesses and advisors, Moral leadership, Sample code of ethics (*Specific to a particular engineering discipline*)

Textbook:

[1] D.R. Kiran, *Professional Ethics and Human Values*, New York: McGraw Hill, 2013.

Reference Books:

[1] Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Professional Ethics and Human Values,* New Delhi: Prentice Hall of India, 2013.

[2] Mike Martin and Roland Schinzinger, *Ethics in Engineering*, 4th ed. New York: McGraw Hill, 2014.

[3] Charles D. Fleddermann, *Engineering Ethics*, 4th ed. New Delhi: Prentice Hall, 2004.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: identify the need for human values, morals & ethics and apply Gilligan's & Kohlberg's theories for morale development

CO2: identify the desired characteristics of a professional & the need for code of ethics & balanced outlook on law

CO3: estimate the safety margin & threshold level and describe the procedure for obtaining a patent

CO4: analyze the role of engineer in multinational companies as an advisor, consultant & manager

Course Articulation Matrix (CAM): U18OE602C/ U18OE701C PROFESSIONAL ETHICS IN ENGINEERING

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	**U18OE602C/ U18OE701C.1**	-	-	-	-	-	1	-	2	1	-	-	1	-	-
CO2	**U18OE602C/ U18OE701C.2**	-	-	-	-	-	1	-	2	1	-	-	1	-	-
CO3	**U18OE602C/ U18OE701C.3**	-	-	-	-	-	1	-	2	1	-	-	1	1	1
CO4	**U18OE602C/ U18OE701C.4**	-	-	-	-	-	1	-	2	1	-	-	1	1	1
U18OE602C/ U18OE701C		**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**1**	**-**	**-**	**1**	**1**	**1**

U18OE602D/ U18OE701D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT

Class: B. Tech. VI – Semester
B. Tech. VII – Semester

Branch(s): ME, CSE, IT & CSN
CE, EIE, EEE, ECE & ECI

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40
End Semester Examination	60

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: building technologies, modern agricultural implements and food processing methods
LO2: medicinal & aromatic plants to fulfill the needs of pharmaceutical industries and rural energy for eradication of drudgery
LO3: purification of drinking water, rain water harvesting and employment generating technologies in rural areas
LO4: objectives & characteristics of community development, need for community mobilization and approaches for community organization

UNIT – I (9)

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: 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 (9)

Medicinal and Aromatic plants: Plants and its use, Aromatic plants, Cymbopogons, Geranium, Manufacturing of juice, Gel and powder, Rural energy - Cultivation ofjatrophacurcus and production of biodiesel, Low cost briquetted fuel, Solar cookers and oven, Solar drier, Bio-mass 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 (9)

Purification of Drinking water: Slow sand filtration unit, Iron removal plant connected to hand pump, Chlorine tablets, Pot chlorination of wells, Solar still, Fluoride removal, Rain water harvesting 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 - 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 (9)

Community Development: Community organization - Definition, Need, Functions, Principles, Stages; Community development - Definition, Need, Objectives, Characteristics, Elements, Indicators; Differences 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

Textbooks:

[1] M.S. Virdi, *Sustainable Rural Technology*, New Delhi: Daya Publishing House, 2009.
[2] Asha Ramagonda Patil, *Community Organization and Development: An Indian Perspective*, New Delhi: Prentice Hall of India, 2013.

Reference Books:

[1] Punia Rd Roy, *Rural Technology*, New Delhi: Satya Prakashan Publishers, 2009.
[2] S.B. Verma, S.K. Jiloka, Kannaki Das, *Rural Education and Technology*, New Delhi: 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, US: Kumarian Press, 1995.
[5] Heskin, Allen David, *The Struggle for Community*, Colorado, US: West View Press, 1991
[6] Clinard, Marshall Barron, *Slums and Community Development: Experiments in Self- Help*, Mumbai: Free Press, 1970.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: discuss various building technologies, modern agricultural implements and food processing methods which can be implemented in rural areas
CO2: identify major medicinal plants that are required for pharmaceutical companies & alternative fuel that meets substantial oil need in the country and the need and usage of bio- fertilizers
CO3: analyze several cost effective technologies for purification of water, rain water harvesting techniques for collection & storage of rain water and examine the employment generating technologies in tribal/ rural areas
CO4: distinguish between community organization and community development and identify techniques for community mobilization & approaches to community organization for social change

Course Articulation Matrix (CAM): U18OE602D/U18OE701D RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT															
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
CO1	**U18OE602D/ U18OE701D.1**	**-**	**-**	1	**-**	**-**	1	2	**-**	**-**	**-**	**-**	1	1	1
CO2	**U18OE602D/ U18OE701D.2**	**-**	**-**	1	**-**	**-**	1	2	**-**	**-**	**-**	**-**	1	1	1
CO3	**U18OE602D/ U18OE701D.3**	**-**	**-**	1	**-**	**-**	1	2	**-**	**-**	**-**	**-**	1	1	1
CO4	**U18OE602D/ U18OE701D.4**	**-**	**-**	-	**-**	**-**	1	2	**-**	**-**	**-**	**-**	-	-	-
U18OE602D/ U18OE701D		**-**	**-**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	**-**	**-**	**1**	1	1

U18CE702A ADVANCED STRUCTURAL DESIGN

Class: B.Tech. VII- Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on...

LO1: guidelines for design of doglegged staircase & grid slab

LO2: behaviour of retaining walls

LO3: performance of various types of water retaining structures

LO4: design of different types of foundations

UNIT-I (9)

Design of dog legged staircase: Types of staircases, Loads on staircase slabs, Design of dog legged staircase.

Grid Slabs: Proportioning of grid dimensions, Design of grid slabs.

UNIT -II (9)

Cantilever Retaining wall: Types of reinforced walls, Theories of earth pressure, Rankine's earth pressure theory, Coulomb's earth pressure theory, Design of cantilever retaining wall.

Counter-fort Retaining wall: Behavior of counterfort retaining wall, Design of counterfort retaining wall.

UNIT -III (9)

Rectangular Water Tank: Design requirements as per IS 3370–2021 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 (9)

Intz Tank: 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, Effective length of pile, Reinforcement in piles, Under-reamed piles, Pile cap, Grade beams, Design of pile foundation.

Text Book(s):

[1] N. Subramanian, *Design of Reinforced Concrete Structures*, 2nd ed., New Delhi: Oxford Higher Education, 2014.

Reference Book(s):

[1] N. Krishna Raju, *Advanced Reinforced Concrete Design*, 3rd ed., New Delhi: PHI Publications, 2014.

[2] P. C. Varghese, *Advanced Reinforced Concrete Design*, 2nd ed., New Delhi: CBS Publishers and Distributors Pvt. Ltd., 2016.

[3] B. C. Punmia, *Reinforced Concrete Structures*, Volume I, II, III and IV, 7th ed., New Delhi: Laxmi Publishing Company, 2008.

[4] IS 456, *Code of Practice for Plain and Reinforced Concrete*, New Delhi: Bureau of Indian Standards, 2000

[5] IS 875, *Code of Practice for Design Loads – Part 1 to 5*, New Delhi: Bureau of Indian Standards, 2015

[6] IS 3370, *Code for Water Tanks – Part 1 to 4*, New Delhi: Bureau of Indian Standards, 2021.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: recommend guidelines for design of doglegged staircase & grid slab

CO2: appraise the importance of retaining walls and their designs

CO3: design and detail types of water retaining structures

CO4: design and reinforcement detailing of foundations

Course Articulation Matrix: U18CE702A Advanced Structural Design																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE702A.1	2	1	1	1	-	1	-	1	1	1	-	1	1	2	-	-
CO2	U18CE702A.2	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	-
CO3	U18CE702A.3	2	1	1	1	-	1	-	1	1	1	-	1	1	2	-	-
CO4	U18CE702A.4	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	-
U18CE702A		**1.5**	**1.5**	**1**	**1**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1.5**	**1.5**	**-**	**-**

U18CE702B HYDRAULIC STRUCTURES

Class: B.Tech VII-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: diversion head works and design of weirs
LO2: canal fall structure
LO3: regulation work and head regulators
LO4: cross drainage works and siphon aqueducts

UNIT-I (9)

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.

Design of Weir: Vertical Drop Weir – hydraulic calculations for fixing various elevations, design of weir wall, design of impervious aprons, design of inverted filter and downstream talus

UNIT-II (9)

Canal fall: Canal Fall, necessity, location and types of falls, cistern design, design principles of slopping glacis fall.

Design of fall structure: Fall with baffle Wall - baffle platform, baffle wall, cistern, upstream wings, downstream wings, downstream wings, downstream glacis.

UNIT-III (9)

Regulation works: Head regulators and cross regulators, design principles of head regulator and cross regulator.

Design of Head regulators: 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.

UNIT-IV (9)

Cross drainage works: Types of cross drainage works, necessity and selection, design principles of aqueduct and siphon aqueduct, bank connections, bed and bank protection. river meandering -causes, river training works, groynes and guide banks.

Design of Siphon Aqueduct: 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 Book(s):

[1] S. K. Garg, *Irrigation Engineering and Hydraulic Structures*, 33rded. New Delhi: Khanna Publishers, 2019.

Reference Books:

[1] K. R. Arora, *Irrigation, Water Power and Water Resources Engineering,*3rd ed. New Delhi: Standard Publications, 2002.

[2] B. C. Punmia, *Irrigation and Water Power Engineering,* 16th ed. New Delhi: Standard Publishers, 2009.

[3] G. L. Asawa, *Irrigation Engineering,* 4th ed. New Delhi: New Age Publications, 2005.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, students will be able to…
CO1: design of diversion head works
CO2: recommend fall structure
CO3: design of regulatory works
CO4: propose cross drainage works

Course Articulation Matrix: U18CE702BHydraulic Structures																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE702B.1	2	1	1	-	-	1	1	1	1	1	-	1	2	1	1	1
CO2	U18CE702B.2	2	1	1	-	-	1	1	1	1	1	-	1	2	1	1	1
CO3	U18CE702B.3	2	1	1	-	-	1	1	1	1	1	-	1	2	1	1	1
CO4	U18CE702B.4	2	1	1	-	-	1	1	1	1	1	-	1	2	1	1	1
U18CE702B		**2**	**1**	**1**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**1**	**1**

U18CE702CSUSTAINABLE MATERIALS AND GREEN BUILDINGS

Class: B.Tech.VII – Semester **Branch:** Civil Engineering (CE)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	–	–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: concepts of sustainability and governing principles

LO2:green and sustainable building materials

LO3:energy and carbon reduction in buildings

LO4:building performance towards sustainability

UNIT-I(9)

Sustainability concepts: Pillars, circle, need, Engineering principles and systems approach to sustainability.

Environmental concerns: Consumption and depletion of natural resources, Land use patterns, Climate change, Global warming, National and International policies, and regulations of sustainability.

UNIT-II (9)

Sustainable building materials: Materials, qualities, uses, natural building materials, locally available and manufactured materials, biomaterials, salvaged and recycled materials, nontoxic materials: low volatile organic compound (VOC) paints, coating and adhesives.

Selection of sustainable materials: Challenges in selecting green materials, pragmatic view of green materials, priorities in selection process, Life cycle assessment of building materials, Sustainable concrete production.

UNIT-III(9)

Energy and carbon reduction: Building energy issues, High performance building design strategy, goal setting for high performance, Passive design strategy – shape, orientation, and massing, lighting, ventilation, passive cooling, composite beam and panel, funicular shells, filler slabs, reinforced concrete masonry, vaulted roofs, Ferro-cement walls.

Applications in the built environment: Concepts of green buildings, climate responsive building, Indoor Environmental Quality (IEQ), issues, factors, Acoustics transmission, Lighting quality, Thermal comfort conditions, Odours, Volatile Organic compounds, Humidity, Integrated IEQ.

UNIT-IV (9)

Indian green building rating systems: Sustainable Buildings,Green building rating systems: IGBC and GRIHA tools for building assessment, Codes and regulations for green building.

Future of sustainable buildings: Business case of high performance green buildings,Design and construction strategies, Reinventing the construction industry, challenges and opportunities.

Text Books:

[1]. C. J.Kibert,*Sustainable Construction Green Building Design and Delivery*, 3rd ed. Canada: John Wiley & Sons, 2014.*(Chapters 4,6,7,8,9,11, 12, 13&15)*

[2]. S. Goodhew, *Sustainable Construction Processes*, 1st ed. London: John Wiley & Sons, 2016. *(Chapters 1-9)*

Reference Books:

[1]. ISO 15392 Sustainability in Buildings and civil engineering works – General Principles, 2nd ed, 2019

[2]. G. M. Sabnis, *Green Building with concrete – sustainable design and construction*, 1st ed. London: CRC Press, 2016.

[3]. G. S. Kainth, *Climate Change, Sustainable Development and India*, LAP Lambert Academic Publishing, 2011.

[4]. *Sustainable Building - Design Manual* Part 1 & 2, The Energy and Resources Institute, TERI, 2004.

[5]. L. Reeder, *Guide to Green Building Rating Systems: Understanding LEED, Green Globes*, John Wiley & Sons publisher 2010.
[6]. M. Robertson, *Sustainability Principles and Practice*, 2nd ed. London: Routledge publisher, 2014.
[7]. T. R. Rider, S. Glass, J. McNaughton, *Understanding Green Building Materials*, W.W.Norton and Company, 2011.
[8]. C. Cameselle, J. A. Adams, and K. R. Reddy,*Sustainable Engineering: Drivers, Metrics, Tools, and Applications*, 1st ed. US: John Wiley & Sons, 2019.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (Cos):
Upon completion of this course, the student will be able to…
CO1:infer the significance of sustainability in construction engineering
CO2:appraise and select sustainable building materials
CO3:interpret the energy and carbon reduction strategies
CO4:rate and propose sustainable building

Course Articulation Matrix: U18CE702C Sustainable Materials and Green Buildings																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE702C.1	1	-	1	-	-	1	1	1	1	1	-	1	-	2	1	-
CO2	U18CE702C.2	1	-	1	-	-	1	1	1	1	1	-	1	-	2	1	1
CO3	U18CE702C.3	1	-	2	-	-	1	1	1	1	1	-	1	-	2	1	1
CO4	U18CE702C.4	1	-	2	-	2	1	1	1	1	1	-	1	-	2	1	1
U18CE702C		**1**	**-**	**1.5**	**-**	**2**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**-**	**2**	**1**	**1**

U18CE703A STRUCTURAL DYNAMICS

Class: B.Tech. VII Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: theory of vibration related to dynamic motion
LO2: single and multi-degree freedom system
LO3: analysis of forced vibration on discrete and continuous systems
LO4: earthquake effect on structures

UNIT – I (9)

Theory of Vibrations*:* Elements of vibratory system, degrees of freedom, oscillatory motion, simple harmonic motion, free vibrations of single degree of freedom system, un-damped and damped vibrations, critical damping, logarithmic decrement.

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.

UNIT – II (9)

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.

Multi Degree of Freedom Systems: Selection of the degrees of freedom, evaluation of structural property matrices, formulation of the MDOF equations of motion, un-damped free vibrations, solutions of Eigen value problem for natural frequencies and mode shapes, analysis of dynamic response, orthogonal properties of normal modes.

UNIT – III(9)

Vibration Analysis of single degree freedom systems: Stodola's method, fundamental mode analysis.

Vibration Analysis of Multi degree freedom systems: Vibration of two and multi degree of freedom systems, concept of normal mode, free vibration problems and determination of natural frequencies.

UNIT – IV (9)

Application of I.S. Code method: I. S. Code method of analysis, seismic coefficient method.

Continuous Systems: Flexural vibrations of beams, elementary case, derivation of governing differential equation of motion, analysis of un-damped free vibrations of beams in flexure, natural frequencies and mode shapes of simple beams with different end conditions.

Textbook:

[1]. M. Paz, *Structural Dynamics*, 3rd ed., New Delhi: C. B. S Publishers, 2009.

Reference Books:

[1]. R.W. Clough., J. Penzien, *Dynamics of Structures*, 3rd ed., New York: McGraw Hill, 2013.
[2]. K. A. Chopra, *Dynamics of Structures*, 5th ed., New Delhi: Pearson Education (Singapore), 2020.
[3]. I.S: 1893 - 2002, *Code of practice for Earthquake resistant design of Structures*, 5th Rev., New Delhi, Bureau of Indian standards, 2016.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be postedby the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page.Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: apply the theory of vibrations to structural elements
CO2: evaluate the response for single and multi-degree of freedom system
CO3: apply the vibration analysis to beams
CO4: appraise methods of earthquake analysis

Course Articulation Matrix: U18CE703A Structural Dynamics																	
CO		PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE703A.1	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO2	U18CE703A.2	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO3	U18CE703A.3	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
CO4	U18CE703A.4	1	1	1	1	1	1	-	1	1	1	-	1	1	1	1	1
U18CE703A		**1**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**

U18CE703B FOUNDATION ENGINEERING

Class: B.Tech. VII -Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: site investigation andshallow foundations

LO2: deep foundations and caissons

LO3: foundation on expansive soils andanalysis of slope stability

LO4: earth pressures and machine foundations

UNIT – I (9)

Site investigation: Types of exploration, Types of samplers, Standard penetration test, Static and dynamic cone penetration tests, Plate load test, Types of foundations, Types of loads 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)

Deep foundations: Pile Foundations - Classification of piles, Load bearing capacity of piles, Static formulae, Negative skin friction, Dynamic formulae, Engineering News Record(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)

Foundations on expansive soils: Identification and problems, Design considerations, Under reamed piles.

Slope stability analysis: Infinite and finite slopes, Types of slope failures, Factors of safety, Stability analysis of finite slope by Swedish and Friction circle methods, Taylor's stability number, Stability analysis of earthen dams.

UNIT – IV (9)

Earth pressures: 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, Degree of freedom of block foundation, Design parameters for field methods, Cyclic plate load test, Block vibration test, Design criteria and detailing, Vibration analysis.

Text Book:

[1] K. R. Arora, *Soil Mechanics and Foundation Engineering*, 9th ed. New Delhi, Standard Publishers, 2013.

Reference Books:

[1] Srinivasulu and Vaidyanathan, *Handbook of Machine Foundations*, 1st ed. New Delhi, Tata McGraw Hill Publications, 2013.
[2] R. ShenbagaKaniraj, *Design Aids in Soil Mechanics and Foundation Engineering*, 1st ed. New Delhi, Tata McGraw Hill Education Private Ltd., 2017.
[3] K. Shashi Gulhati, Manoj Datta, *Geotechnical Engineering*, 18thed. New Delhi, McGraw hill Publications, 2014.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page.
Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.
Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (Cos):

Upon completion of this course, the student will be able to…
CO1: *appraise site conditions and shallow foundations*
CO2: *estimate the bearing capacity of soils and foundation settlements*
CO3: *interpret expansive soils and examine the stability of slopes*
CO4: *assess earth pressures and design machine foundations*

Course Articulation Matrix: U18CE703B Foundation Engineering																	
CO		PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE702B.1	1	2	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO2	U18CE702B.2	1	2	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO3	U18CE702B.3	1	2	2	1	-	1	-	1	1	1	-	1	1	2	-	1
CO4	U18CE702B.4	1	2	2	1	-	1	-	1	1	1	-	1	1	2	-	1
U18CE702B		**1**	**2**	**2**	**1**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**2**	**-**	**1**

U18CE703C REPAIR AND REHABILITATION OF STRUCTURES

Class: B. Tech. VII-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in /on

LO1: maintenance and deterioration of concrete structures

LO2: evaluation and non-destructive tests on concrete structures

LO3: essential parameters for repair materials and selection of repair materials

LO4: repair techniques and health monitoring of concrete structures

UNIT – I (9)

Maintenance and Inspection: Importance and requirement of maintenance, category of inspection and maintenance, aspects and periods of inspection, preliminary, detailed and rapid visual Inspection, overview of maintenance of buildings.

Deterioration of concrete structures: Site survey ,need for repair and rehabilitation, disintegration of RCC Structures, major causes and signs of deterioration - Accidental loading, chemical reactions, corrosion, freezing and thawing, settlement, movement, shrinkage, temperature changes, durability and permeability aspects, cracks, types, causes and characteristics.

UNIT – II (9)

Evaluation of concrete structures: Condition evaluation of RCC structures**,** objective and stages of condition assessment.

In-situ and Laboratory testing of concrete: Non destructive and semi destructive tests for strength assessment-Rebound hammer test, Ultrasonic Pulse Velocity (UPV), core sampling and testing, chemical tests - carbonation test , chloride content, corrosion potential assessment - cover meter survey, half cell potential test, break off test and Penetration test.

UNIT – III (9)

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, micro concrete.

UNIT – IV (9)

Repair Techniques: Repairs using mortars, shotcrete, concrete replacement, epoxy bonded concrete, silica fume concrete, polymer concrete system, resin modified cement slurry injection, Ferro-cement, plate bonding, fiber wrap technique, RCC Jacketing, repair/strengthening columns, beams and slabs, seismic retrofitting, crack stitching and gravity filling.

Structural Health Monitoring and Demolition of Buildings: System components, classification and process of Structural Health Monitoring**,** dilapidated structures, demolition planning, techniques, sequence and precautionary measures.

Text Books:

[1] P. Modi, C. Patel, *Repair and Rehabilitation of Concrete Structures*, 1st ed., New Delhi, PHI Learning Pvt. Ltd., 2019.

Reference Books:

[1] Central Public Works Department (CPWD), *Handbook on Repair and Rehabilitation of R.C.C Buildings*, New Delhi, Government of India, 2002.

[2] J. Bhattacharjee, *Concrete Structures-Repair, Rehabilitation and Retrofitting*, 1st ed., New Delhi, CBS Publishers and Distributors Pvt. Ltd., 2017.

[3] R. N. Raikar, *Diagnosis and treatment of structures in distress*, 1st ed., Mumbai, R and D Centre of Structural Designers and Consultants Pvt. Ltd., 1994.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

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

CO1: appraise importance and need for rehabilitation and maintenance of structures

CO2: evaluate strength of concrete through non destructive and semi destructive tests

CO3: perceive essential parameters of repair materials and their selection

CO4: develop repair methods and monitor concrete structures

Course Articulation Matrix (CAM): U18CE703C REPAIR AND REHABILITATION STRUCTURES

CO		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	U18CE703C.1	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO2	U18CE703C.2	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO3	U18CE703C.3	2	2	-	2	2	1	1	1	1	1	-	1	2	-	-	1
CO4	U18CE703C.4	2	2	-	2	1	1	1	1	1	1	-	1	2	-	-	1
U18CE703C		**2**	**1**	**-**	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**2**	**-**	**-**	**1**

U18CE704HIGHWAY ENGINEERING

Class: B.Tech.VII – Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: development and geometric design of highways
LO2: traffic flow characteristics and traffic studies
LO3: highway materials, design of flexible, rigid pavements
LO4: maintenance, evaluation and highway drainage

UNIT – I (9)

Highway Development: Development of road construction, development in India, planning surveys and interpretation, alignment, engineering surveys for alignment.

Geometric Design of Highway: Cross section elements, Sight distance – stopping sight distance, overtaking sight distance and intermediate sight distance, Design of horizontal alignment – design speed, horizontal curve, super elevation, radius of horizontal curve, widening of pavement, transition curves, Design of vertical alignment – gradient, vertical curves.

UNIT – II (9)

Traffic Flow: Characteristics- relation between speed, flow and density, traffic capacity, level of service (LOS), factors affecting capacity and LOS, Traffic Control-purpose of traffic signal, signal warrants, Signal design – Webster's method, IRC method.

TrafficStudies:Traffic volume studies, spot speed studies, speed and delay studies, origin and destination studies, parking studies.

UNIT – III (9)

Pavement Materials: Soil-Index properties, classification, CBR, compaction, sub-grade soil strength, Aggregate – desirable properties, tests on road aggregates, Bituminous binders–types, tests on bitumen, grading of bitumen, Bituminous mixes–requirements, constituents, design, Pavement quality concrete-materials and requirements.

Pavement Design: Types, components and functions, factors, design of flexible and rigid pavements using IRC method, water bound macadam, dense bituminous macadam.

UNIT – IV (9)

Pavement Maintenance and Evaluation: Classification of highway maintenance, Distresses in flexible pavements and maintenance measures, Structural evaluation of flexible pavements, Pavement overlay design using benkelman beam deflection method, distresses in rigid pavements and maintenance measures, road safety audit process, principles of road safety.

Highway Drainage: Requirements and importance of highway drainage, Surface and subsurface drainage, Collection of surface water, Design aspects of surface drainage system – hydrologic analysis and hydraulic analysis, sub-surface drainage measures.

Textbook:

[1]. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, *Highway Engineering*, 10thed., Roorkee: Nem Chand & Bros, 2015.

Reference Books:

[1]. E. J. Yoder and M. W. Witezak, *Principles of Pavement Design*, 2nded., New York: John Wiley & Sons, Inc., 2012.
[2]. L. R. Kadiyali, *Principles of Highway Engineering*, 9thed., New Delhi: Khanna Publishers, 2017.
[3]. Yang. H. Huang, *Pavement Analysis and Design*, 2nded., New Jersey: Pearson Prentice Hall, 2008.
[4]. IRC 37 (2018): Guidelines for the Design of Flexible Pavements.
[5]. IRC 58 (2015): Guidelines for the design of plain jointed rigid pavements for highways.
[6]. IRC 81 (1997): Guidelines for Strengthening of Flexible Road Pavements using Benkelman Beam Deflection Technique.
[7]. IRC SP 88 (2019): Manual on Road Safety Audit
[8]. MoRTH code: Fifth revision (2013)

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be postedby the course faculty in CourseWeb page

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty.Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: summarize highway planning and geometric design elements
CO2: design the signal time using traffic flow characteristics
CO3: recommend suitable highway materials & design flexible and rigid pavement
CO4: analyze pavement failures, overlays and highway drainage

Course Articulation Matrix: U18CE704 HIGHWAY ENGINEERING																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE704.1	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO2	U18CE704.2	2	1	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO3	U18CE704.3	2	1	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE704.4	2	1	1	1	-	1	1	1	1	1	-	1	2	1	-	1
U18CE704		**2**	**1**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**-**	**1**

U18CE705 HIGHWAY ENGINEERING LABORATORY

Class: B.Tech. VII-Semester **Branch:** Civil Engineering

Teaching Scheme:

L	T	P	C
-	-	3	2

Examination Scheme:

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: properties of aggregate for pavements
LO2: properties of bitumen
LO3: marshall mix design
LO4: traffic volume and traffic speed

LIST OF EXPERIMENTS

1. Determination of abrasion value for aggregate
2. Determination of impact value for aggregate
3. Determination of shape indices for aggregate
4. Determination of specific gravity of aggregate & bitumen
5. Determination of sand equivalent value test and soundness test on aggregates
6. Determination of ductility value and flash point for bitumen
7. Determination of softening point and penetration value for bitumen
8. Determination of absolute and kinematic viscosity tests for bitumen
9. Determination of bitumen extraction test
10. Determination of flow value through Marshall stability test
11. Determination of peak hour volume through traffic volume studies
12. Demonstration for evaluation of traffic speed
13. Demonstration on Road Safety of Intersection Design
14. Demonstration on Design of 4-legged rotary intersection

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, A.Veeraragavan, *Highway Material Testing*, Roorkee: Nem Chand and Bros Publications, 2014.

Course Learning Outcomes (Cos):

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

CO1: judge the properties of aggregates
CO2: recommend grade of bitumen for pavement construction
CO3: design bituminous mix using Marshal method design
CO4: predict the vehicular traffic behavior

Course Articulation Matrix (CAM): U18CE8705 – HIGHWAY ENGINEERING LABORATORY																	
CO		**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	U18CE705.1	2	-	-	-	-	1	-	1	1	1	-	1	2	-	-	1
CO2	U18CE705.2	2	-	-	-	-	1	-	1	1	1	-	1	2	-	-	1
CO3	U18CE705.3	2	-	1	-	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE705.4	2	1	-	-	-	1	-	1	1	1	-	1	2	1	-	1
U18CE705		**2**	**1**	**1**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**-**	**1**

U18CE706 CIVIL ENGINEERING SOFTWARE APPLICATIONS LABORATORY

Class: B.Tech. VII – Semester
Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
-	–	2	1

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on…

LO1: structural elements using STAAD Pro
LO2: horizontal alignment, rail-tracking placing and flexible and rigid airfield pavements
LO3: water hammer analysis and water distribution system
LO4: soil bearing capacity and pile load capacity

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 MS Excel / MAT LAB and validation by manual method.
4. Analysis and design of Isolated RCC footings using STAAD Foundation Advanced and validation by manual method.
5. Analysis and design of steel beams using STAAD.Pro and validation by manual method.
6. Analysis and design of steel columns using STAAD.Pro and validation by manual method.
7. Analysis and design of roof truss using STAAD.Pro and validation by manual method.
8. Design of horizontal alignment using MX road.
9. Design of rail track- placing and connecting turnouts by using ln-Roads software.
10. Design of flexible and rigid airfield pavements using FAARFIELD.
11. Analysis of water hammer in a pipe using EPANET/BENTLEY (HAMMER)
12. Building a water distribution system using EPANET/BENTLEY (WaterGEMS)
13. Determination of soil bearing capacity using MS Excel/MAT LAB.
14. Determination of pile load capacity using MS Excel/MAT LAB.

Laboratory Manual:

[1]. *Civil Engineering Software Applications Laboratory Manual*, prepared by the faculty of Civil Engineering.

Textbook:

[1]. Manual of STAAD.Pro V8i, Bentley Software.
[2]. Manual of MX Roads, Bentley Software.
[3]. *Manual of In-Roads*, Bentley Software.
[4]. *Manual of FAARFIELD*.
[5]. *Manual of EPANET/* HAMMER, *WaterGEMS*, Bentley Software.
[6]. S. U. Pillai, D. Menon, *Reinforced Concrete Design,* 3rd ed., New Delhi: Tata McGraw-Hill PublishingCompany Limited, 2011.
[7]. S. S. Bhavikatti, *Design of Steel Structures*: *By Limit State Method as Per IS: 800-2007*, 3rd ed., New Delhi: International Publishing House Pvt. Ltd., 2012.
[8]. S. K. Khanna, C. E. G. Justo, A. Veeraraghavan, *"Highway Engineering"*, 10th ed., Roorkee: Nem Chand and Bros., 2014.
[9]. K. R. Arora, "*Soil Mechanics and Foundation Engineering*", 9th ed., New Delhi: Standard Publishers, 2013.
[10]. K. Subramanya, "*Engineering Hydrology*", 3rd ed., New Delhi: Tata Mc Graw Hill Book Co., 2011.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: design structural elements using STAAD Pro
CO2: propose horizontal alignment, rail-tracking placing and flexible and rigid airfield pavements
CO3: demonstrate water hammer and water distribution system
CO4: calculate soil bearing capacity and load capacity of piles

Course Articulation Matrix: U18CE706 Civil Engineering Software Applications Laboratory																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE706.1	1	1	2	-	1	1	-	1	1	1	1	1	1	1	1	1
CO2	U18CE706.2	1	1	2	-	1	1	-	1	1	1	1	1	1	1	1	1
CO3	U18CE706.3	1	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1
CO4	U18CE706.4	1	1	1	-	1	1	-	1	1	1	1	1	1	1	1	1
U18CE706		**1**	**1**	**1.50**	**-**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

KAKATIYA INSTITUTE OF TECHNOLOGY & SCIENCE, WARANGAL

(An Autonomous Institute under Kakatiya University, Warangal)

DEPARTMENT OF CIVIL ENGINEERING

SCHEME OF INSTRUCTION & EVALUATION

VIII SEMESTER OF 4-YEAR B.TECH DEGREE PROGRAMME

Sl. No	Category	Course Code	Course Title	Periods/week			Credits	Evaluation Scheme				
				L	T	P	C	CIE			ESE	Total Marks
								TA	MSE	Total		
1	PE	U18CE801	Professional Elective – V / MOOC-V	3	-	-	3	10	30	40	60	100
2	PE	U18CE802	Professional Elective – VI / MOOC-VI	3	-	-	3	10	30	40	60	100
3	OE	U18OE803	Open Elective - IV / MOOC-VII	3	-	-	3	10	30	40	60	100
4	PROJ	U18CE804	Major Project - Phase – II	-	-	14	7	40	-	40	60	100
Total:				**9**	**-**	**14**	**16**	**70**	**90**	**160**	**240**	**400**
***Additional Learning*:** *Maximum credits allowed for Honours/Minor*				-	-	-	**7**	-	-	-	-	-
Total credits for Honours/Minor students:				**-**	**-**	**-**	**16+7**	**-**	**-**	**-**	**-**	**-**

- *List of courses for additional learning through **MOOCs** towards Honours/Minor in Engineering shall be prescribed by the department under Honours/ Minor Curricula*

[L= Lecture, T = Tutorials, P = Practical's & C = Credits] **Total Contact Periods/Week: 23** **Total Credits : 16**

Professional Elective-V / MOOC-V :	**Professional Elective-VI / MOOC-VI :**	**Open Elective-IV / MOOC-VII :**
U18CE801A: Prestressed Concrete	U18CE802A: Earthquake Resistant Design of Structures	U18OE803A: Operations Research
U18CE801B: Railway and Airport Engineering	U18CE802B: Earth Retaining Structures	U18OE803B: Management Information Systems
U18CE801C: Construction Contracts Management	U18CE802C: Bridge Engineering	U18OE803C: Entrepreneurship Development
U18CE801M: MOOCs	U18CE802M: MOOCs	U18OE803D: Forex and Foreign Trade
		U18OE803M: MOOCs

U18CE801A PRESTRESSED CONCRETE

Class: B.Tech VIII-Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (Los):

This course will develop students' knowledge in/on

LO1: *prestressed concrete and prestressing systems*

LO2: *losses of prestress and analysis of prestressed concrete sections*

LO3: *design of sections in flexure and shear*

LO4: *transfer of prestress and its methods*

UNIT–I (9)

Elements of Prestressed concrete: Historical development, concepts of pre-stressing, terminology, advantages, applications of prestressed concrete, pre-tensioning and post-tensioning.

Prestressing Systems: Hoyer, Freyssinet, Magnelblaton and Lee-Mc call system, material properties, need for high strength steel and high strength concrete.

UNIT–II (9)

Analysis of Sections: Stress, strength, load balancing concepts, 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.

Losses in 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.

UNIT–III (9)

Design for Flexure: Allowable stresses, elastic design of simple beams having rectangular and I-section for flexure, kern lines, cable profile and cable layout.

Design for Shear: Shear and principal stresses, shear improvement techniques, horizontal, sloping and vertical prestressing, analysis of rectangular beam and I–section, design of shear reinforcement, Indian code provisions.

UNIT–IV (9)

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 method, Guyon and Magnel method, anchorage zone reinforcement.

Text Book:

[1]. N. Krishna Raju, *Prestressed concrete,* 6th ed., New Delhi: Tata Mc Graw Hill Education Pvt. Ltd., 2018.

Reference Books:

[1] S. Ramamrutham, *Prestressed concrete*, 5th ed., New Delhi: Dhanpat Rai publications Pvt. Ltd., 2013.

[2] T.Y.Lin, *Design of prestressed concrete structures,* 3rd ed., Mumbai: Wiley India Pvt. Ltd., 2010.

[3] G.S. Ramaswamy, *Modern prestressed concrete design,* New Delhi: Arnold Heinimen, 2007.

[4] N. Rajagopalan, *Prestressed Concrete,* 2nd ed., Narosa publishers, 2010.
[5] S. K. Mallic and A. P. Gupta, *Prestressed concrete,* 4th ed., Oxford and IBH publishing Co. Pvt. Ltd., 1987.
[6] IS 1343: 2012, *Code of Practice for Prestressed Concrete*, 2nd ed., New Delhi: Bureau of Indian Standards, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to ...

CO1: appraise the concept of Prestressing in concrete
CO2: evaluate losses in prestress and analyze the sections
CO3: design prestressed concrete members in flexure and shear
CO4: estimate the transfer stresses in prestressed concrete

Course Articulation Matrix (CAM): U18CE801A PRESTRESSED CONCRETE

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE801A.1	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
CO2	U18CE801A.2	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
CO3	U18CE801A.3	1	2	2	-	-	1	-	1	1	1	-	1	2	2	1	1
CO4	U18CE801A.4	1	2	-	-	-	1	-	1	1	1	-	1	2	-	1	1
U18CE801A		**1**	**2**	**2**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**2**	**1**	1

U18CE801B RAILWAY AND AIRPORT ENGINEERING

Class: B.Tech. VIII- Semester

Branch: Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives (LOs):

This course will develop students' knowledge on/in…

LO1: railway track alignment and its components
LO2: geometric design of railway line and stations layout
LO3: airport planning and geometric design
LO4: airport layout &maintenance, air traffic control

UNIT – I (9)

Railway Track gauge: Classification of railway lines, undertakings of ministry of railways, Gauges-types, choice of gauge, problems caused by change of gauge, importance of good alignment, requirements of an ideal alignment, traffic, reconnaissance, preliminary and final location surveys.

Components of Track: Requirements of a good track, maintenance, coning of wheels, Rails-functions,types, rail wear, failures and flaw detection, Sleepers-functions and requirements, types and density, Ballast-types, functions and requirements, formation, Creep-causes, effects, measurement and adjustments.

UNIT – II (9)

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 and Crossing: Switches, tongue rails, crossing, turnouts, layout of turnout, classification of level crossing, stations and Yards-dimensions, site selection, classification and layout of stations, marshalling yard, locomotive yard, Rolling stock- types of locomotives, coaches and wagons, equipment at railway stations.

UNIT – III (9)

Airport Planning: Aero plane component parts, field length regulations, weight components, classification of flying activity, aircraft characteristics, airport master plan, regional planning, airport site selection, surveys for site selection.

Runway and Taxiway Design: Zoning laws, classification of obstructions, approach zone and turning zone, runway orientation, basic runway length, correction for elevation, temperature and gradient, runway geometric design, factors controlling taxiway layout, geometric design standards, exit taxiways.

UNIT – IV (9)

Airport Capacity and Layout: Airport and runway capacity, runway configuration, terminal and building area, parking area, apron, hangar, typical airport layouts.

Airport Maintenance and Air Traffic Control: Need for maintenance, failures in flexible and rigid pavements, need of air traffic control, air traffic control network, Air traffic control aids – enroute aids and landing aids.

Text Books:

[1] Satish Chandra and M. M. Agarwal, *Railway Engineering*, 2nded., New Delhi: Oxford Publishers, 2013. *(Chapters 1 – 4, 6 – 8, 11 – 14, 26 and 27)*

[2] S. K. Khanna, M. G. Arora and S. S. Jain, *Airport Planning and Design*, 6thed., Roorkee: Nem Chand & Bros, 2014. *(Chapters 3 - 8, 10,11 and 13)*

Reference Books:

[1] J. S. Mundrey, *Railway Track Engineering*, 4th ed., New Delhi: Tata McGraw Hill, 2009.

[2] Rangwala, *Railway Engineering*, 25thed., New Delhi: Charotar Publishing House Pvt. Ltd.,2015.

[3] S. C. Saxena and S. P. Arora, A *Text Book of Railway Engineering*, New Delhi: Dhanpat Rai and Sons, 2015.

[4] G. Venkatapparao, *Airport Engineering*, 2nded., New Delhi: Tata McGraw Hill, Inc., 1992.

[5] Rangwala, *Airport Engineering*, 17thed., New Delhi: Charotar Publishing House Pvt. Ltd., 2018.

[6] Subhash. C. Saxena, *Airport Engineering and Planning*, 1sted., New Delhi: CBS Publishers and Distributors Pvt. Ltd.,2014.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be postedby the course faculty in Course Web page

Course Patents: Patents relevant to the course content will be posted by the course faculty in Course Web page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, students will be able to…

CO1: appraise railway components and track alignment
CO2: design the elements of railway track
CO3: propose the planning process& design the runway and taxiway length
CO4: interpret the airport capacity, airfield pavement failures and air traffic control

Course Articulation Matrix (CAM): U18CE801B – RAILWAY AND AIRPORT ENGINEERING																	
CO		**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	U18CE801B.1	1	2	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO2	U18CE801B.2	1	2	1	1	-	1	1	1	1	1	-	1	2	1	-	1
CO3	U18CE801B.3	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	1
CO4	U18CE801B.4	1	2	1	1	-	1	-	1	1	1	-	1	2	1	-	1
U18CE801B		**1**	**2**	**1**	**1**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**2**	**1**	**-**	**1**

U18CE801C Construction Contracts Management

Class: B.Tech.VIII – Semester **Branch:** Civil Engineering (CE)

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: tenders and construction contracts
LO2: contract documents, measurement and payments
LO3: contract management and their conditions
LO4: dispute Resolution, claims and variations

UNIT – I (9)

Tenders: Invitation, types, modes of invitation tenders, pre-qualification of tender, (Notice Inviting Tenders (NIT), preparation and submission of tenders and irregularities, consideration and scrutiny of tender, acceptance, rejection and correspondence.

Construction contracting: The Indian contract Act 1872, Provisions of the Act, Essentials of a valid contract, contract documents, types of contracts – lumpsum, measurement, cost plus, Public Private Partnership, Build operate and transfer, Engineering procurement construction.

UNIT-II (9)

Contracts documents: Contract forms, form of agreement, bond- performance bond, labour, material payment bond, lein and maintenance; Conditions of contract - standard forms, specifications, drawings, bill of quantities; Bidding procedures - Bid documents, requirements, procedures, receiving and opening bids, bid evaluation award of contract.

Measurement and payment:FIDIC form (International federation of consulting engineers), Ministry of Statistics and Programme Implementation, Government of India (MOS & PI), running bills, final bills, advance payment, secured advance, escalation, interim payment certificate, overpayments and underpayments, Breach of contract.

UNIT-III (9)

Contracts Performance Management: 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 (9)

Claims and variations: Claims, factors affecting, Variations in work and conditions, Liquidated damages. Rights, Responsibilities and duties of client (Owner). Architect, Engineer and Contractor.

Methods of Dispute Resolution: Negotiation, litigation, alternative dispute resolution (ADR) techniques - partnering, mediation, arbitration, disputes review board (DRB), minitrials, importance of documentation.

Text Books:

[1]. Akhtar Surahyo, *UnderstandingConstruction Contracts*, Springer International, 1st edition, Publishing, AG 2018. (Chapters - 7, 8, 12, 15, 17)

[2]. B. S. Patil and S. P. Woolhouse*B.S. Patil's Building and Engineering Contracts*, 7th edition, CRC Press, Taylor & Francis Group,52 Vanderbilt Avenue New York, NY 10017. (Chapters - 1, 2, 7, 10, 5, 13, 14, 16)

Reference Books:

[1]. "CPWD 7/8: General Conditions of Contracts ", Govt of India, Central Public works Department. (old syllabus)
[2]. "Analysis of Rates for Delhi (Volume 1 and 2) and Delhi Schedule of Rates ", Govt of India, Central Public Works Department.
[3]. Jimmie Hinze, "Construction Contracts", McGraw Hill, 2001
[4]. V. K. Raina., "Construction and Contract Management" Shroff Publishers
[5]. B. S Ramaswamy, "Contracts and their Management", LexisNexis India, 2008.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):
On completion of this course, the students will be able to…
CO1: summarize tenders and construction contracts
CO2: develop the documents of construction contracts, measurement and Payments
CO3: review contract management and conditions
CO4: predict claims, variations and recommend resolutions for disputes in contracts.

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Articulation Matrix: U18CE801C Construction Contracts Management																
CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE801C.1	1	-	-	-	-	1	-	1	1	1	-	1	1	-	-	1
CO2	U18CE801C.2	1	2	-	-	-	1	-	1	1	1	-	1	1	2	-	1
CO3	U18CE801C.3	1	2	-	-	-	1	-	1	1	1	-	1	1	2	-	1
CO4	U18CE801C.4	1	2	-	-	-	1	-	1	1	1	-	1	1	2	1	1
U18CE801C		**1**	**2**	**-**	**-**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**1**	**2**	**1**	**1**

U18CE802A EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Class:B.Tech.VIII-Semester
Branch: CivilEngineering (CE)

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

ContinuousInternalEvaluation	40marks
EndSemesterExamination	60marks

Course Learning Objectives (LOs):
This course will develop student's knowledge in/on….
LO1: engineering seismology and disaster mitigation
LO2: single and multi-degree of freedom systems
LO3: estimation of storey shear, torsional moments and seismic design of footings
LO4: retrofitting and restoration of reinforced concrete, masonry buildings

UNIT I (9)

Engineering Seismology:Geologyofearth,configurationoftectonicplatesinaglobe,influenceof Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake andtheir characteristics, earthquake parameters, magnitudes, intensity, scales, seismic zoning of India,seismiccoefficientsfordifferentzones.

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 (9)

Single Degree of Freedom Systems: Vibrations, causes, classifications, Single Degree of Freedom systems (SDOF), free, 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 (9)

SeismicdesignofSymmetricalRCstructures:EffectofearthquakeonRCstructure,ISprovision,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.

UNIT IV (9)

SeismicBaseIsolation: Necessity and typesof base isolationsystems,Configurationandqualitativebehaviorofisolatedbuilding.
AnalysisofStructureswithSeismicIsolationSystems: BehaviorofRCstructureswithisolationsystems,revi ewofbuildingcoderequirements.

Text Book:

[1]. S.K. Duggal, *Earthquake Resistant Design of Structures,* 2nd ed., New Delhi: Oxford University Press, 2013.

Reference Books:

[1]. Pankaj Agarwal and Manish Shrikande, *Earthquake Resistant Design of Structures,* 2nded., PrenticeHallofIndiaPublications, 2014.
[2]. R.W. Clough and J.Penzien,*Dynamics of Structures* 3rded., Mc Graw Hill Civil Engineering Series,

2015.
[3]. Anil Chopra, *Dynamics of Structures,* 3rded., Prentice Hall India Publications, 2015.
[4]. Jaikrishna, Chandarsekaran and Brijesh Chandra, *ElementsofEarthquakeEngineering,* 1sted., New Delhi: SouthAsianPublishers, 1994.
[5]. *Relevant Latest Revisions of IS codes. IS1893, IS4326, IS13920, IS13827, IS13828, IS13935.*

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in Course Web page. Students are encouraged to come up and experiment with the ideas that interest them.

Course LearningOutcomes(COs):

Upon completion of this course the student will be able to…

CO1: review basics of engineering seismology and disaster mitigation
CO2: analyze single and multi-degree of freedom systems
CO3: estimate storey shear and torsional moments for R.C. frames
CO4: elucidate methods of retrofitting and restoration of reinforced concrete, masonry buildings

Course Articulation Matrix: U18CE802A EARTHQUAKE RESISTANT DESIGN OF STRUCTURES																
CO		**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**
CO1	U18CE802A.1	2	2	1	1	-	1	1	1	1	1	-	1	2	2	1	1
CO2	U18CE802A.2	2	2	1	1	-	1	1	1	1	1	-	1	2	2	-	1
CO3	U18CE802A.3	2	2	2	1	-	1	1	1	1	1	-	1	2	2	-	1
CO4	U18CE802A.4	2	2	2	1	-	1	1	1	1	1	-	1	2	2	-	1
U18CE802A		**2**	**2**	**1.50**	**2**	**-**	**1**	**1**	**1**	**1**	**1**	-	**1**	**2**	**2**	**1**	**1**

U18CE802B EARTH RETAINING STRUCTURES

Class:B.TechVIII-Semester **Branch:**CivilEngineering (CE)

TeachingScheme:ExaminationScheme:

L	T	P	C
3	-	-	3

Continuous Internal Evaluation	40marks
End Semester Examination	60marks

Course Learning Objectives (LOs):
This course will develop students' knowledge in /on
LO1: principles of earth and rock fill dams
LO2: stabilization of retaining walls
LO3: design of sheet pile walls and loads on conduits
LO4: components of braced cuts and cofferdams

UNIT–I (9)

Earth Dams: Types, site selection, methods of construction, densities, pore water pressure and its significance, dam failures- hydraulic, seepage and structural failures, design criteria, slope stability, seepage control in earth dams, design of filters, slope protection, advantages and disadvantages of earthen dams.

Rock fill dams: Site selection, types, construction methods, merits and demerits.

UNIT–II (9)

Earth retaining Walls: Types, design principles, gravity and cantilever retaining walls, constructional aspects, expansion and contraction joints.

Mechanically stabilized retaining Walls: Soil reinforcement, design considerations, design with metallic strip reinforcement, retaining wall with geo-textile reinforcement

UNIT–III (9)

Underground Conduits: Types-positive, negative projecting, ditch, imperfect ditch, tunnel conduits, loads and construction of conduits.

Sheet pile Walls: Types, Uses, 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.

UNIT–IV (9)

Braced cuts: 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: Types, uses, relative merits and demerits, design of circular cellular cofferdam by TVA method on rocks and on soil.

Text Books:

[1]. M.BrajaDas,*Principlesoffoundationengineering*, 9thed., United States: Cengage Publications, 2019. *(Chapters 8,9,10)*

[2]. S. K. Garg, *Irrigation Engineering and Hydraulic Structures,* 30thed., New Delhi: Khanna Publishers,2013. *(Chapter 20)*

Reference Books:

[1]. K.R.Arora,*SoilMechanicsandFoundationEngineering,* 9thed., NewDelhi: Standard Publisher Distributors,2013.

[2]. SwamiSaran,*AnalysisandDesignofSubstructuresLimitStateDesign*, 9thed., New Delhi: OxfordandIBH PublishingCompany,Pvt. Ltd., 2013.

[3]. Joesph E. Bowles,*Foundation Analysis and Design*,5th ed., Singapore: McGraw-Hill education,2001.

[4]. Peck,HansonandThornborn,*FoundationEngineering,* 2nd ed., NewYork:JohnWileyPublications,1974.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes(COs):
Upon completion of this course, the student will be able to…
CO1: design earth and rock fill dams
CO2: demonstrate stabilization of retaining walls
CO3: design sheet pile walls and conduits
CO4: illustrate the components of braced cuts and cofferdams

U18CE802B-PROFESSIONAL ELECTIVE- IV: EARTH RETAINING STRUCTURES																	
CO		PO 1	PO 2	PO3	PO4	PO5	PO 6	PO7	PO 8	PO9	PO 10	PO11	PO 12	PSO1	PSO2	PSO3	PSO 4
CO1	U18CE802B.1	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO2	U18CE802B.2	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO3	U18CE802B.3	2	2	2	-	-	1	1	1	1	1	-	1	2	2	1	1
CO4	U18CE802B.4	2	2	2	-	-	1	1	1	1	1		1	2	2	1	1
U18CE802B		**2**	**2**	**2**	**-**	**-**	**1**	**1**	**1**	**1**	**1**	**-**	**1**	**2**	**2**	**1**	**1**

U18CE802C BRIDGE ENGINEERING

Class: B.Tech. VIII – Semester **Branch:** Civil Engineering (CE)

Teaching Scheme: **Examination Scheme:**

L	T	P	C
3	–	–	3

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:
This course will develop students' knowledge in/on
LO1: loads and design considerations of bridges
LO2: design of deck slab and T-Beam bridges
LO3: bridge bearings and bridge appurtenances
LO4: elements of bridge sub-structure

UNIT–I (9)

Bridges and their loading: Types of bridges, materials for construction, codes of practice- railway and highway bridges, design loads and IRC standard loading.
Hydraulic Design: Planning, layout, hydraulic geometry, linear water ways, economic spans, afflux, scour, geological and geotechnical considerations.

UNIT–II (9)

Deck Slab Bridge: Types, functions, design of reinforced cement concrete road bridge as per IRC loading.
T-Beam Bridge: Analysis of beams, Courbon's method, design of T-beam bridge.

UNIT–III (9)

Bearings: Types and functions, forces and materials, design of elastomeric pad bearing.
Bridge Appurtenances: Expansion joints, design of joint railings, drainage systems and lighting.

UNIT–IV (9)

Sub-Structure: Loads acting on substructure, design of pier and pier cap, stability analysis of abutments, retaining and wing walls.
Bridge Foundations: Types, design of shallow and deep foundations.

Text Books:

[1]. T.R. Jagdish and M.A. Jayaram, *Design of Bridge Structures*, 3rd ed. New Delhi: PHI Learning Pvt. Ltd., 2020.

Reference Books:

[1]. N. Krishna Raju, *Design of Bridges*, 5th ed. New Delhi: Oxford and IBH Publishing Co. Pvt. Ltd., 2019.
[2]. D. Johnson Victor, *Essentials of Bridge Engineering*, 6th ed. New Delhi: IBH Publishing Co.Ltd., 2019.
[3]. IRC 5: 2015 *Standard Specifications and Code of Practice for Road Bridges*, 8th revision, New Delhi: The Indian Road Congress, 2015.
[4]. IRC 6: 2017 *Standard Specifications and Code of Practice for Road Bridges*, 7th revision, New Delhi: The Indian Road Congress, 2014.
[5]. IRC 21: 2000 *Standard Specifications and Code of Practice for Road Bridges*, 3rd revision, New Delhi: The Indian Road Congress, 2000.
[6]. IRC 83: 2018 *Standard Specifications and Code of Practice for Road Bridges*, Section IX – Bearings (Elastomeric Bearings), Part II, 2nd revision, New Delhi: The Indian Road Congress, 2018.

[7]. BIS, IS 456:2000, *Code of practice for Plain and reinforced concrete*, 5th revision, New Delhi: Bureau of Indian standards,2000.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page.

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: appraise loads and design specification for bridges
CO2: design deck slab and T-Beam bridge
CO3: recommend types of bearing and appurtenances
CO4: evaluate the behavior of sub-structure elements

Course Articulation Matrix: U18CE802C Bridge Engineering

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	U18CE802C .1	1	1	1	1	-	1	-	1	1	1	-	1	1	1	-	1
CO2	U18CE802C .2	1	2	2	1	-	1	-	1	1	1	-	1	2	2	1	1
CO3	U18CE802C .3	1	1	2	1	-	1	-	1	1	1	-	1	1	2	1	1
CO4	U18CE802C .4	1	2	2	1	-	1	-	1	1	1	-	1	2	2	1	1
U18CE802C		**1**	**1.50**	**1.75**	**1**	**-**	**1**	**-**	**1**	**1**	**1**	**-**	**1**	**2**	**1.75**	**1**	**1**

U18OE803A - OPEARTIONS RESEARCH

Class: B. Tech.VIII – Semester

Branch(s): ME, CSE, IT CE, EEE, ECE, EIE

Teaching Scheme:

L	T	P	C
3	–	–	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives:

This course will develop students' knowledge in/on

LO1: *concepts to solve linear programming problems which arise in real life using various methods and their advantages*

LO2: *applications of linear programming namely transportation and assignment problems which arise in different engineering fields.*

LO3: *non-linearity in optimization problems, direct search techniques and iterative methods.*

LO4: *various queuing systems and their practical relevance.*

UNIT – I(9)

Linear Programming Problem (LPP): Mathematical models and basic concepts of linear programming problem; Solution of linear programming problem - Graphical method, Simplex method, Artificial variable techniques (Big-M and Two-phase method), Duality in linear programming, dual simplex method.

UNIT – II (9)

Special types of LPP: Mathematical model of transportation problem, Methods of finding initial basic feasible solution, optimal solution of transportation problem, Degeneracy in transportation problem; Exceptional cases in transportation problem- Unbalanced transportation problem, Maximization transportation problem; Assignment problem- Mathematical formulation of the problem, Hungarian method to solve an assignment problem, Special cases in assignment problem- Maximization assignment problem.

UNIT – III (9)

Non-linear Programming Problem (NLPP): Classical method of optimization using Hessian matrix; Iterative methods - Random search methods-Random jump method, Random walk method, Steepest decent method and Conjugate gradient method; Direct methods - Lagrange's method, Kuhn-Tucker conditions.

UNIT – IV (9)

Queueing Theory: Queueing system- Elements and operating characteristics of a queuing system; Probability distributions in queueing systems- Distribution of arrivals (Pure Birth Process); Classification of queueing models; Poisson queueing systems- Study of various characteristics of single server queuing model having infinite population $\{(M/M/1):(\infty/FIFO)\}$ and single server queuing model having finite population $\{(M/M/1):(N/FIFO)\}$, Generalized model (Birth-Death process).

Textbook:

[1]. Kanti swarup et.al, *Operations Research*, 16th ed., New Delhi: S. Chand & Sons, 2013. (Unit-I, Unit-II, Unit-IV)

[2]. Singiresu S. Rao, *Engineering Optimization Theory and Practice*, 4th ed., Hoboken, New Jersey: John Wiley & Sons, Inc, 2009 (Unit-III)

Reference Books:

[1]. Hamdy. A. Taha, *Operations Research*, 7th ed., New Delhi: Prentice Hall of India Ltd, 2002.

[2]. J.C. Pant, *Introduction to Optimization*, 7th ed., New Delhi*: Jain* Brothers, 2012.

Course Research Papers: Research papers (Journal/Conference papers) relevant to the course content will be posted by the course faculty in CourseWeb page

Course Patents: Patents relevant to the course content will be posted by the course faculty in CourseWeb page

Course Projects: Course project is an independent project carried out by the student during the course period, under the supervision of course faculty. Course faculty will post few course projects titles in CourseWeb page. Students are encouraged to come up and experiment with the ideas that interest them.

Course Learning Outcomes (COs):

On completion of this course, the students will be able to…

CO1: model engineering real time problems and solve them using various LPP techniques

CO2: obtain the optimal solution of transportation, assignment problems and their real time applications

CO3: optimize the engineering problems using NLPP techniques

CO4: differentiate various queueing models and their practical relevance

Course Articulation Matrix: U18OE803A - OPEARTIONS RESEARCH

CO		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-
CO2	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-
CO3	U18OE803A	2	2	-	-	-	-	-	-	-	1	-	1	-	-
CO4	U18OE803A	2	2	-	-	-	-	-	-	-	1	--	1	-	-
U18OE803A		2	2	-	-	-	-	-	-	-	1		1	-	-

U18OE803B MANAGEMENT INFORMATION SYSTEMS

Class: B.Tech. - Semester **Branch:** CSE & IT

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 Marks
End Semester Exam	60 Marks

Course Learning Objectives (LOs):

This course will develop students' knowledge in/on…

LO1: basic concepts and challenges of management information systems
LO2: e-business and decision support systems techniques
LO3: development process and design of management information systems
LO4: different applications of management information systems

UNIT – I (9)

Management Information Systems: Systems: An Overview : Introduction, Need for management information systems, Management information systems: A concept, MIS: A definition, Management information system and Information technology, Nature and scope of MIS, MIS characteristics, Structure of MIS, Types of MIS, Role of MIS in global business, Challenges of managing information systems, IT Infrastructure and Emerging Technology

UNIT - II (9)

Business Applications of Information Systems:

E-Commerce, E-Business and E-Governance: Introduction, E-commerce, E-commerce sales life cycle, E-commerce infrastructure, E-commerce applications, E-commerce payment systems, Management challenges and opportunities, E-business, E-governance

Decision Support Systems: Introduction, Decision-Making: A concept, Simon's model of decision-making, Types of decisions, Methods for decision-making, Decision support techniques, Decision-making and role of MIS, Decision support systems, Business intelligence, Knowledge management systems

UNIT - III (9)

Development process of MIS : Development of long range plans of the MIS, Ascertaining the class of information, Determining the information requirement, Development and implementation of the MIS, Management of information quality in the MIS, Organisation for development of MIS, MIS: Development process mode

Strategic Design of MIS : Strategic management of the business, Why strategic design of MIS, Balance score card, Score card and Dash board, Strategic design of MIS, Development process steps for strategic design (SD) of MIS, Illustrating SD of MIS for big bazaar, Strategic management of business and SD of MIS, Business strategy determination, Business strategy implementation

UNIT - IV (9)

Management of Global Enterprise : Enterprise management system, Enterprise resource planning (ERP) System, ERP model and modules, Benefits of the ERP, ERP product evaluation, ERP implementation, Supply chain management (SCM), Information management in SCM, Customer relationship management (CRM), Management of global enterprise, EMS and MIS

Applications in Manufacturing Sector: Introduction, Personnel management (PM), Financial management (FM), Production management (PM), Raw materials management (RMM), Marketing management, Corporate overview.

Text Books:

[1] D.P.Goyal, Vikas, *Management Information Systems–Managerial Perspective*, 4th ed. Addison-Wesley, 2014. *(Unit 1)*

[2] Waman S. Jawadekar, *Management Information Systems Text and Cases: a Global Digital Enterprise Perspective,* 5th ed. McGraw Hill, 2014 *(Unit 2,3,4)*

Reference Books:

[1] Kenneth C. Laudon & Jane P. Laudon, *Management Information Systems,12th ed.* Prentice Hall, 2012.

[2] S. Sadagopan, *Management Information Systems,2nd ed.,* PHI Learning, 2014.

Course Learning Outcomes (COs):

On completion of this course, students' will be able to…

CO1: explain the structure and importance of management information systems
CO2: analyze management information systems for decision making
CO3: explain the methodology to design and develop a management information system
CO4: describe different applications of management information systems in various manufacturing sectors

Course Articulation Matrix (CAM): U18OE803B MANAGEMENT INFORMATION SYSTEMS

Course Outcomes		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**U18OE803B**.1	2	2	1	1	1	-	-	-	-	1	-	1	2	1	2
CO2	**U18OE803B**.2	2	2	2	1	1	-	-	-	-	1	-	1	2	1	2
CO3	**U18OE803B**.3	2	2	2	3	1	-	-	-	-	1	-	2	2	1	2
CO4	**U18OE803B**.4	2	2	3	3	1	-	-	-	-	1	-	2	3	1	3
U18OE803B		2	2	2	2	1	-	-	-	-	1	-	1.5	2.25	1	2.25

U18OE 803C ENTREPRENEURSHIP DEVELOPMENT

(Open Elective-IV)

Class: B. Tech. VIII Semester

Branch: M E, C S E, I T, C E, E E E, E C E, E I E

Teaching Scheme:

L	T	P	C
3	-	-	3

Examination Scheme:

Continuous Internal Evaluation	40 marks
End Semester Examination	60 marks

Course Learning Objectives(LOs):
This course will develop students' knowledge in/on
LO1: various characteristics of entrepreneur and his role in development of the nation
LO2: creativity and business plan
LO3: functions of various managements/managers in industry
LO4: legal issues in entrepreneurship and intellectual property rights

UNIT –I (9)

Entrepreneurship: Definition, role of entrepreneurship in economic development, characteristics and types of an entrepreneur, Forms of business organizations; agencies dealing with entrepreneurship and small scale Industries; Case studies of successful entrepreneurs- identification of business opportunities in various branches of engineering

UNIT-II (9)

Creativity and Business Idea: Sources of new ideas, methods of generating ideas and creative problem solving, concepts of innovation and incubation.
Business Plan: definition, scope and value of business plan, market survey and demand survey.
Feasibility studies: Technical feasibility, financial viability and social acceptability; Preparation of preliminary and bankable project reports;

UNIT-III (9)

Project Planning: Product planning and development process, Sequential steps in executing the project.
Plant layout: Principles, types and factors influencing layouts,
Material Management: Purchase procedures, Issues of Materials -LIFO,FIFO,HIFO and Base stock;.
Fundamentals of Production Management: Production Planning and Control (PPC)-Concepts and functions, Long & short run problems.
Marketing Management: Definition, functions and market segmentation.

UNIT-IV (9)

Financial Management: Introduction, Sources of finance-internal and external.
Human Resource Management: Introduction, importance, selection, recruitment, training,placement, development;
Legal Issues in Entrepreneurship: Mechanisms for resolving conflicts; Industrial laws-

Indian Factories Act, Workmen Compensation Act; Intellectual Property Rights (IPR) – patents, trademarks, and copyrights

Text Books:

1) Robert D.Hisrich, Michael P. Peters, "Entrepreneurship", *Tata McGraw-Hill*, 9th Edition 2014 (Chapters 1,2,4,5,6,7,8,11 and13).

Reference Books

1. David H. Holt, "Entrepreneurship New venture creation" *Prentice Hall of India*.2004.
2. Handbook for "New Entrepreneurs", *Entrepreneurship Development Institute of India*, Ahmadabad.
3. T.R. Banga, "Project Planning and Entrepreneurship Development", *CBS Publishers*, New Delhi,1984.
4. Personnel efficiency in Entrepreneurship Development-"A Practical Guide to Industrial Entrepreneurs", *S. Chand & Co.*, New Delhi.

Course Learning Outcomes (COs):

Upon completion of this course, students will be able to…

CO1: *describe characteristics of entrepreneur and his role in economic development*
CO2: *apply creative problem solving methods to real time situations*
CO3: *explain the functions of production and marketing managements*
CO4: *identify the legal issues in entrepreneurship and explain intellectual property rights*

Course Articulation Matrix (Mapping of COs with POs and PSOs):

Course Articulation Matrix (CAM): **U18OE 803C ENTREPRENEURSHIP DEVELOPMENT**														
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
U18OE803C.1														
U18OE803C.2														
U18OE803C.3														
U18OE803C.4														
U18OE803C														

U18OE803D FOREX & FOREIGN TRADE

Class: B.Tech VIII Semester

Teaching Scheme :

L	T	P	C
3	-	-	3

Examination Scheme :

Continuous Internal Evaluation	40 marks
End Semester Exam	60 marks

Course Learning Objectives (LO):

This course will develop students' knowledge in/on…..

- *LO1: business, business system, objectives and types of companies*
- *LO2: fundamentals of foreign trade and EXIM procedure*
- *LO3: foreign exchange rate and methods of payments*
- *LO4: foreign exchange control*

UNIT–I (9)

Business: Nature and scope, Classification of business activities, Functions of commerce and trade.

Business System: Characteristics and components of business system, objectives of business, classification of business objectives; Types of Business.

UNIT-II(9)

Foreign Trade: Introduction of International Trade, Reasons for External Trade, Special problems of Foreign Trade; EXIM-objectives, roles of EXIM in 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 (9)

Foreign Exchange Rate: Meaning and importance of Foreign exchange rate, Methods of foreign payments; Exchange rates- Spot, Forward and Cross Rates; Demand and supply of foreign exchange rate, Equilibrium rate of foreign exchange, Theories of determining foreign exchange rate, International Parity condition - Balance of payments.

Foreign Exchange Markets: Functions of exchange markets, Components and Players in Exchange Markets; FEMA-objectives and its role in Foreign Trade.

UNIT–IV (9)

Foreign Exchange Control: objectives, characteristics, advantages and disadvantages, Methods: intervention, exchange restriction, multiple exchange rates, exchange clearing agreements, method of operation, exchange clearing agreements in practice, payments agreements, transfer moratoria; indirect methods.

Course Learning Outcomes (CO):

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

- *CO1: evaluate the objectives and types of industries and companies.*
- *CO2: assess the procedure in imports and exports*
- *CO3: analyse the foreign exchange rate and methods of foreign payments*
- *CO4: Adapt the methods of exchange control*

Text Books:

1. C.B. Guptha, *Business Organization & Management,* 15th ed. New:SultanChand & Sons,2015(*Units 1,5*)
2. M.L. Seth, *Macro Economics,* 22nd ed. New Delhi; Lakshmi Narayan Agarwal Publishers, 2014.
3. M.C. Vaish, Ratan Prakashan Mandir, *Monetary Theory,* 16th ed. New Delhi: Vikas Publications,2016

Reference Books:

1. Y.K.Bhushan, "Business Organization and Modern Management" *Sultan & Sons Publishers, NewDelhi. 15/e,* 2014.
2. S.A. Sherlekhar "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 Pubnlishers, 1/e, Ludhiana*

Course Articulation Matrix (CAM): U18OE803D FOREX AND FOREIGN TRADE														
CO	**PO 1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO12**	**PSO1**	**PSO2**
U18OE803D 1	-	-	-	-	-	-	-	-	-	2	2			
U18OE803D2	-	-	-	-	-	-	-	-	-	2	2			
U18OE803D3	-	-	-	-	-	-	-	-	-	2	2			
U18OE803D4	-	-	-	-	-	-	-	--	-	2	2			
U18OE803D	-	-	-	-	-	-	-	-	-	2	2			