गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
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Guru Ghasidas Vishwavidyalaya
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Koni, Bilaspur – 495009 (C.G.)

List of Courses Focus on Employability/ Entrepreneurship/ Skill Development

Department	: *Civil Engineering*
Programme Name	: *B.Tech.*

Academic Year : 2021-22

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
01.	MA201TBS01	MATHEMATICS-I
02.	CY201TBS02	CHEMISTRY
03.	CE201TES01	ENGINEERING MECHANICS
04.	CS201TES02	COMPUTER PROGRAMMING
05.	CM201TES03	BASIC CIVIL & MECHANICAL ENGINEERING
06.	CY201PBS01	CHEMISTRY LAB
07.	CE201PES01	ENGINEERING MECHANICS LAB
08.	CS201PES02	COMPUTER PROGRAMMING LAB
09.	MA202TBS03	MATHEMATICS-II
10.	PH202TBS04	PHYSICS
11.	EC202TES04	BASIC ELECTRICAL & ELECTRONICS ENGINEERING
12.	EN202THS01	ENGLISH COMMUNICATION
13.	PH202PBS02	PHYSICS LAB
14.	ME202PES03	ENGINEERING GRAPHICS
15.	ME202PES04	WORKSHOP TECHNOLOGY & PRACTICES
16.	EC202PES05	BEE LAB
17.	CE203TBS05	ENGINEERING MATHEMATICS-III
18.	CE203TPC01	STRENGTH OF MATERIALS
19.	CE203TPC02	FLUID MECHANICS-I
20.	CE203TPC03	BUILDING MATERIALS & CONSTRUCTION
21.	CE203TPC04	SURVEYING & GEOMATICS
22.	CE203THS03	PROFESSIONAL PRACTICE, LAW & ETHICS
23.	CE203PPC01	SURVEY LAB
24.	CE203PPC02	FLUID MECHANICS LAB
25.	CE204TPC05	ENGINEERING ECONOMICS
26.	CE204TPC06	CONCRETE TECHNOLOGY
27.	CE204TPC07	STRUCTURAL ANALYSIS-I
28.	CE204TPC08	FLUID MECHANICS-II

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29.	CE204THS02	EFFECTIVE TECHNICAL COMMUNICATION
30.	CE204PES06	COMPUTER AIDED CIVIL ENGG. DRAWING
31.	CE204PPC03	MATERIAL TESTING LAB
32.	CE204PHS01	EFFECTIVE TECHNICAL COMMUNICATION LAB
33.	CE05TPC08	DESIGN OF CONCRETE STRUCTURES
34.	CE05TPC09	STRUCTURAL ANALYSIS - II
35.	CE05TPC10	HIGHWAY ENGINEERING
36.	CE05TPC11	SOIL MECHANICS - I
37.	CE05TPC12	ENVIRONMENTAL ENGINEERING - I
38.	CE05PPC04	HIGHWAY ENGINEERING LAB
39.	CE05PPC05	SOIL MECHANICS LAB
40.	CE06TPC13	WATER RESOURCES ENGINEERING -I
41.	CE06TPC14	ENVIRONMENTAL ENGINEERING - II
42.	CE06TPC15	DESIGN OF STEEL STRUCTURES
43.	CE06TPC16	SOIL MECHANICS - II
44.	CE06TPE01D	RAILWAY ENGINEERING
45.	CE06TOE01B	RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT
46.	CE06PPC06	ENVIRONMENTAL ENGINEERING LAB
47.	CE06PPC07	COMPUTER APPLICATION IN CIVIL ENGG. LAB
48.	CE07TPC17	WATER RESOURCES ENGINEERING-II
49.	CE07TPE02A	PRE-STRESSED CONCRETE
50.	CE07TPE03B	AIR POLLUTION CONTROL ENGINEERING
51.	CE07TPE04A	ENGINEERING HYDROLOGY
52.	CE07TPE05E	CONSTRUCTION PROJECTS PLANNING & SYSTEMS
53.	CE07TOE01A	ARTIFICIAL NEURAL NETWORK
54.	CE07TPPC08	SEMINAR
55.	CE07TPPC09	MINOR PROJECT
56.	CE07TPPC10	ESTIMATION AND COSTING
57.	CE08TPC18	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
58.	CE08TPE01E	CONSTRUCTION EQUIPMENT & AUTOMATION
59.	CE08TPE07B	TRAFFIC ENGINEERING
60.	CE08TOE01A	MANAGEMENT INFORMATION SYSTEM
61.	CE08PPC11	MAJOR PROJECT
62.	CE08PPC12	STRUCTURAL DETAILING LAB

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Scheme and Syllabus

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)
(A CENTRAL UNIVERSITY)
CBCS-NEW, EVALUATION SCHEME
PROPOSED (W.E.F. SESSION 2020-21)
B. TECH. FIRST YEAR (SEMESTER- I)
(Common for CH, CE, IPE, ME)

| S.No. | COURSE No. | SUBJECT | PERIODS | | | EVALUATION SCHEME | | | CREDITS |
			L	T	P	IA	ESE	SUB-TOTAL	
THEORY									
1.	MA201TBS01	MATHEMATICS-I	3	1	-	30	70	100	4
2.	CY201TBS02	CHEMISTRY	3	1	-	30	70	100	4
3.	CE201TES01	ENGINEERING MECHANICS	3	1	-	30	70	100	4
4.	CS201TES02	COMPUTER PROGRAMMING	3	0	-	30	70	100	3
5.	CM201TES03	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	-	30	70	100	3
6.	LW201TMC01	INDIAN CONSTITUTION	2	0	-	-	-	-	-
		TOTAL	17	3	-	150	350	500	18
PRACTICALS									
1.	CY201PBS01	CHEMISTRY LAB	-	-	2	30	20	50	1
2.	CE201PES01	ENGINEERING MECHANICS LAB	-	-	2	30	20	50	1
3.	CS201PES02	COMPUTER PROGRAMMING LAB	-	-	2	30	20	50	1
		TOTAL	-	-	6	90	60	150	3
		GRAND TOTAL	17	3	6	240	410	650	21

Total Credits :21   Total Contact Hours:26   Total Marks:650

L:LECTURE, T:TUTORIAL, P:PRACTICAL, IA : INTERNAL ASSESSMENT, ESE:END SEMESTER EXAMINATION
*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.

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CBCS-NEW, EVALUATION SCHEME
PROPOSED (W.E.F. SESSION 2020-21)
B. TECH. FIRST YEAR (SEMESTER- II)
(Common for CH, CE, IPE, ME)

S. No.	COURSE No.	SUBJECT	PERIODS			EVALUATION SCHEME			CREDITS
			L	T	P	IA	ESE	SUB-TOTAL	
THEORY									
1.	MA202TBS03	MATHEMATICS-II	3	1	-	30	70	100	4
2.	PH202TBS04	PHYSICS	3	1	-	30	70	100	4
3.	EC202TES04	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	3	1	-	30	70	100	4
4.	IT202TES05	INTRODUCTION TO INFORMATION TECHNOLOGIES	2	0	-	30	70	100	2
5.	EN202THS01	ENGLISH COMMUNICATION	3	0	-	30	70	100	3
		TOTAL	14	3	-	150	350	500	17
PRACTICALS									
1.	PH202PBS02	PHYSICS LAB	-	-	2	30	20	50	1
2.	ME202PES03	ENGINEERING GRAPHICS	1	-	3	30	20	50	3
3.	ME202PES04	WORKSHOP TECHNOLOGY & PRACTICES	1	-	2	30	20	50	2
4.	EC202PES05	BEE LAB	-	-	2	30	20	50	1
		TOTAL	2	-	9	120	80	200	7
		GRAND TOTAL	16	3	9	270	430	700	24

Total Credits:24   Total Contact Hours:28   Total Marks:700

L:LECTURE, T:TUTORIAL, P:PRACTICAL, IA : INTERNAL ASSESSMENT, ESE:END SEMESTER EXAMINATION
*INTERNAL ASSESSMENT- Two Class Test of 15 Marks each will be conducted.

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject Code:	MA201TBS01	3	1	-	15	15	30			
Subject:	MATHEMATICS-I									

Course Content

Calculus (Single Variable)

UNIT 1: Calculus: Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Asymptotes: definition, properties and problems.
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L' Hospital's rule; Maxima and minima.

UNIT 2: Sequences and series: Convergence of sequence and series, tests for convergence, power series, and Taylor's series. Series for exponential, trigonometric and logarithmic functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT-3: (A): Multi variable Calculus (Differentiation): Limit, continuity and partial derivatives, directional Derivatives, total Derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

(B): Multivariable Calculus (Integration): Multiple Integration: double and triple integrals (Cartesian and polar), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes by (double integration) Center of mass and Gravity (constant and variable densities). Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

UNIT – 4 (A): Matrices (in case vector spaces is not to be taught): Algebra of matrices, Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, Orthogonal transformation and quadratic to canonical forms.

(B) Matrices (in case vector spaces is to be taught): Matrices, vectors: addition and scalar multiplication, matrix multiplication; linear systems of Equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

UNIT-5 (A): Vector spaces: Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map.

(B) Vector spaces: Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbasis. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11 Reprint, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

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5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
6. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
7. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
8. Erwin Kreyszig. Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL	70	100	04
Subject Code:	CY201TBS02/ CY202TBS04									
Subject:	CHEMISTRY	3	1	-	15	15	30			

Course Learning Objectives:

The objective of this Course is to:

- To make aware and enrich the the students about the basic concept and understanding of chemical concepts of basic Chemistry and spectroscopic techniques.

Course Content:

UNIT-1: Concept of Quantum Energy and Spectroscopy: Quantization of Energy, Regions of spectrum. Electronic Spectroscopy: Electronic Transition, Woodward Fieser rules for calculating λ_{max} of conjugated dienes & α, β-unsaturated carbonyl compound, various shifts in λ_{max} and intensities. Infra-Red Spectroscopy: Conditions for Infra-Red Spectroscopy, Molecular vibrations & factors affecting Infra-Red frequencies.

UNIT-2: Chemical Bonding in Molecules: Introduction of chemical bonding, VSEPER Theory, V. B. Theory and Molecular Orbital Theory. Energy level diagrams of diatomic molecules and ions.

UNIT-3: Concept of Chirality, Enantiomers, Diastereomers, Meso-compounds and Racemic mixtures. Conformation of Acyclic hydrocarbons (Ethane, Propane & n-Butane) and cyclic hydrocarbon (Cyclohexane), Plane of symmetry, Centre of symmetry, Absolute and Relative Configuration (R &S, D & L and E & Z).

UNIT -4: Reactivity of Organic Molecules, Factors influencing acidity, basicity and nucleophilicity of molecules, kinetic vs thermodynamic control of reactions.

UNIT -5: Strategy for Synthesis of Organic Compounds: Reaction intermediates: Stability of Free Radicle, Carbocation and Carbanion. Introduction to reaction involving Addition, Elimination, Substitution and Ring opening and Cyclization.

Textbooks/References:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publication Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.
3. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
4. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
5. A textbook of Engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
6. Applied Chemistry by H.D. Gesser, Springer Publishers
7. Textbook of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM
8. B. Siva Shankar, "Engineering Chemistry", Tata Mc Graw Hill Publishing Limited, 3rd Edition, 2015.
9. S. S. Dara, Mukkanti, "Text of Engineering Chemistry", S. Chand & Co, New Delhi, 12th Edition, 2006.
10. C. V. Agarwal, C. P. Murthy, A. Naidu, "Chemistry of Engineering Materials", Wiley India, 5th Edition, 2013.

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11. R. P. Mani, K. N. Mishra, "Chemistry of Engineering Materials", Cengage Learning, 3rd Edition, 2015.

Course Outcomes- At the end of the course the students will be able to understand and solve the practical problems of their higher Engineering classes on the basis of understanding of Chemistry developed in their B. Tech. I sem classes.

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SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Cred
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE201TES01 / CE202TES03	3	1	-	15	15	30	70	100	0
Subject:	ENGINEERING MECHANICS									

Course Learning Objectives:

To learn about

- The concepts Force systems, free body diagrams, resultant of forces and equations of equilibrium. Supports and support reactions and calculation of Centroid
- The Concept of moment of inertia of plane figures, Laws and applications of friction
- The Analysis of the truss and determination of axial forces by Method of Joints
- Motion of a body and their relationships and application of D Alembert's principle in rectilinear a curvilinear motions

Course Content:

UNIT- 1: Introduction to Engineering Mechanics covering, Force Systems Basic concepts, Pa equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Fo Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of F System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Sys and Spatial Systems

UNIT-2: Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dyn Friction; Motion of Bodies.
Basic Structural Analysis covering, Equilibrium in three dimensions; Method of Sections; Method of Jo Simple Trusses; Zero force members.

UNIT 3: Centroid and Centre of Gravity covering, Centroid of simple figures from first principle, centro composite sections; Centre of Gravity and its implications; Area moment of inertia- Definition, Mome inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of stan sections and composite sections.

UNIT-4: Virtual Work and Energy Method-Virtual displacements, principle of virtual work for particle ideal system of rigid bodies, degrees of freedom. Active force diagram, systems with friction, mecha efficiency.
Review of particle dynamics- Rectilinear motion; Newton's 2nd law (rectangular, path, and coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); In (Direct and oblique).

UNIT-5: Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dynar Types of motion, Instantaneous centre of rotation in plane motion and simple problems; D'Alemb principle and its applications in plane motion and connected bodies; Work energy principle and its applic in plane motion of connected bodies; Kinetics of rigid body rotation;

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Textbooks/References:

1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, – Dynamics, 9th Ed, Tata McGraw Hill
3. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
4. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
5. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
6. Bansal R.K. (2010), A Text Book of Engineering Mechanics, Laxmi Publications
7. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.
8. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

Course Outcomes- On successful completion of teaching-learning and evaluation activities, a student would be able to

- Identify and analyze the problems by applying the fundamental principles of engineering mechanics and to proceed to research, design and development of the mechanical systems.
- Construct free body diagrams and use appropriate equilibrium equations, Calculate unknown forces in a plane by resolution of force and equilibrium equations
- Locate Centroid of composite figures and determine moment of plane figures
- Analyze the systems with friction
- Determine the axial forces in the members of determinate truss.
- Calculation of acceleration, velocity and displacement and forces
- Calculation of angular displacement, velocity and angular acceleration of rotational bodies

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SYLLABUS	(SEMESTER-I)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CS201TES02 / CS202TES04	3	0	-	15	15	30	70	100	03
Subject:	COMPUTER PROGRAMMING									

Course Learning Objectives:

- To understand the basic of Idea of Algorithm.
- To understand the programing concept of Arithmetic expressions and Basic Algorithms
- To learn the Functions and Structure of array.

Course Content:

UNIT-1: Introduction to Programming
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) -
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

UNIT-2: Arithmetic expressions and precedence
Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching Iteration and loops, **Arrays** (1-D, 2-D), Character arrays and strings

UNIT-3: Basic Algorithms
Searching, concept of binary search etc, Basic Sorting Algorithms Bubble sort etc, Finding roots of equations, introduction of Algorithm complexity

UNIT-4: Function
Functions (including using built in libraries), Parameter passing in functions, call by value, passing arrays to functions; idea of call by reference binary search etc.
Recursion functions Recursion, as a different way of solving problems. Example programs, such as, Finding Factorial, Fibonacci series, etc.

UNIT -5: Structure
Structures, Defining structures and Array of Structures
Pointers Idea of pointers, defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

Textbooks/References:
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

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3. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India

Course Outcomes- At the end of the course students will be able to
• Develop the algorithm and programmers for various applications using Arithmetic expressions, arrays, pointers and Functions.

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SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CM201TES03 / CM202TES05	L	T	P	CT-I	CT-II	TOTAL	70	100	03
Subject:	BASIC CIVIL & MECHANICAL ENGINEERING	3	0	-	15	15	30			

Course Learning Objectives:

- To study the properties and uses of basic civil engineering materials.
- To study the importance of NBC, IS Codes (materials), types of buildings and foundations, basic requirements of foundations.
- To study the basic types of surveys, linear and angular measurements, and GPS measurements
- To familiarize with the fundamentals of heat and work interactions, heat transfer mechanisms and energy conversion processes.
- To provide exposure to various engineering materials and processes of manufacturing.
- To impart basic knowledge of the interdisciplinary nature of engineering systems.

Course Content:

UNIT 1: Civil Engineering Materials: Properties & Uses of Stones, Bricks, Cement, Aggregates, Steel, Concrete-quality of good concrete, strength, curing and grade of concrete, standard tests on concrete. IS Codes and classification

UNIT 2: National Building Code (NBC), Salient features, Classification of Building as per NBC(India), Site selection for buildings - Components of building, Foundations-Introduction, Types of Foundations & its Suitability, Basic requirements and purpose of foundation on different soils.
Brief description about: Brick & stone masonry, Plastering, Lintels; Doors & Windows, Beams & columns, Formwork, Roofs.

UNIT 3: Surveying: Objects, uses, Basic principle, Classification, Plans & Maps, Scales, Units of measurement, Conventional symbols, Different survey equipment.
Measurements – Linear & Angular, levelling, Determination of Area & Volume, Introduction to Triangulation and GPS–

UNIT 4: Materials and Manufacturing, Introduction to engineering materials – metals, alloys, composites, smart materials, phase-change materials; Introduction to various processes of manufacturing – conventional machine tools – lathe and its types, shaping, milling and related operations – turning, threading, knurling, etc., unconventional methods.

UNIT 5: Automobile and Refrigeration and Air conditioning, Theoretical thermodynamic cycles and working principle of Petrol and Diesel Engines – Hybrid and Electric Vehicle - Turbines, Pumps, Compressors. Principle of vapour compression and absorption refrigeration system–Layout of typical domestic refrigerator–Window and Split type room Air conditioner. Introduction to renewable energy utilization and technology.

Textbooks/References:
1. Punmia, B.C, Ashok Kumar Jain, Arun Kumar Jain, Basic Civil Engineering, Lakshmi Publishers, 2012.
2. Satheesh Gopi, Basic Civil Engineering, Pearson Publishers, 2009.
3. Rangwala, S.C, Building materials, Charotar Publishing House, Pvt. Limited, Edition 27, 2009.
4. Palanichamy, M.S, Basic Civil Engineering, Tata McGraw Hill, 2000.

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5. Elements of Workshop Technology Vol. 1 – S.K. Hajra Choudhary, A.K. Hajra Choudhary – Media promoters & Publishers Pvt. Ltd.
6. Basic Automobile Engineering – R.B. Gupta, Satya Prakashan.
7. Shanmugam, G and Palanichamy, M S, Basic Civil and Mechanical Engineering, Tata McGraw Hill
8. National Building Code (NBC) – Bureau of Indian Standards
9. Bureau of Indian Standard Codes for Civil Engineering Materials

Course outcome

At the end of the course, the students will be

1. able to gain the knowledge on the basic civil engineering materials
2. able to know the importance of NBC and relevance of IS Codes to Civil engineering materials, site selection of a building and its components and materials
3. exposed to various types of surveys, linear and angular measurements and GPS measurements
4. Be able to relate with processes in various energy conversion devices involving heat and work.
5. Be able to identify and suggest various processes of manufacturing and materials involved.
6. Be able to appreciate the interdisciplinary existence between heat, work, fluid flow and manufacturing processes.

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SYLLABUS	(SEMESTER-I)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL	20	50	01
Subject Code:	CY201PBS01 / CY202PBS02									
Subject:	CHEMISTRY LAB	0	0	2	30	-	30			

Course Learning Objectives:

The Lab sessions would help in learning:
- Application of iodometrically & titration in lab.
- Recognition of different chemical reaction.
- Advanced lab methods like Spectro photometry and chromatography.

Course Content:

Group – A:

1. Standardization of sodium thiosulphate solution by standard potassium dichromate solution.
2. To determine the Normality and Strength (g/L) of given Ferrous Ammonium Sulphate solution 'A' using standard Ferrous Ammonium Sulphate (N/30) solution 'B' taking $KMnO_4$ solution as an intermediate.
3. To determine the concentration of hypo solution ($Na_2S_2O_3.5H_2O$) iodometrically with given Iodine (N/50) solution.
4. Find out the Temporary hardness of given water sample using 0.01M EDTA solution, buffer solution (pH-10) and EBT as an indicator.
5. To determine chloride ion in a given water sample by Argentometric method (Mohr's method)

Group – B:

6. Preparation of Urea Formaldehyde resin.
7. Acetylation of Primary Amine: Preparation of Acetanilide.
8. Base Catalyzed Aldol Condensation: Synthesis of dibenzalpropanone.
9. [4+2] Cycloaddition Reaction: Diels-Alder reaction.
10. Preparation of aspirin and calculate its yield.

Group – C:

11. To calculate the λ_{max} of a given compound using UV-visible spectrophotometer.
12. To separate the metallic ions by paper chromatography.
13. To determine the surface tension of a liquid by stalagmometer.
14. To determine the percentage composition of the given mixture consisting of two liquids A and B (non- interacting system) by viscosity method.
15. To determine the relative viscosity of given liquids by Ostwald's viscometer.

Note: At least two Experiments from each group must be performed.

Course Outcomes- On completion of the course, the students will be able to handle the chemicals of synthesis as well as titration that will ultimately make them efficient and develop their future chemistry laboratory skills

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SYLLABUS	(SEMESTER-I)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL	20	50	1
Subject Code:	CE2011ES01/ CE202PES04	-	-	2	30	--	30			
Subject:	ENGG MECHANICS LAB									

Course Learning objectives:

- To perform the practical giving basic understanding to fundamental principles of mechanics like parallelogram of forces, triangle of forces and polygon of forces by universal force table
- To perform the practical giving basic understanding to fundamental application of mechanics like screw jack, winch crab and simple wheel and axle

Course Content:
List of Experiments
1. Verification of law of parallelogram of forces.
2. Verification of law of triangle of forces.
3. Verification of law of polygon of forces by universal force table.
4. Verification of law of moment by parallel forces apparatus.
5. Practical verification of forces in the member of jib crane.
6. Practical verification of forces in the member of the truss.
7. Determination of coefficient of friction between two given surfaces by inclined plane method.
8. Determination of efficiency of simple screw jack.
9. Determination of efficiency of single purchase winch crab.
10. Determination of efficiency of double purchase winch crab.
11. Determination of efficiency of simple wheel and axle.

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

- Verify the fundamental principles of mechanics like parallelogram of forces, triangle of forces and polygon of forces by universal force table
- Analyze the friction coefficient between two surfaces
- Calculate the efficiency of screw jack, winch crab and wheel and axle

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SYLLABUS	(SEMESTER-I)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	CS201PES02 / CS202PES05	-	-	2	30	--	30	20	50	01
Subject:	COMPUTER PROGRAMMING LAB									

Course Learning Objectives:

- To learn the Branching and logical expressions and Loops
- To learn the Arrays and Function
- To understand the Numerical methods and Recursion

Course Content:
The laboratory should be preceded or followed by a tutorial to explain the approach or Algorithm to be implemented for the problem given.]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical Integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Course Outcomes- At the end of the course students will be able to
- Utilization of Branching and logical expressions and Loops, Arrays and Function and Numerical methods and Recursion for writing the programmes for various engineering applications

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SYLLABUS	Periods/	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	4
Subject Code:	MA202TBS03									
Subject:	MATHEMATICS-II	3	1	-	15	15	30			

Course Content:

UNIT 1: First order ordinary differential equations: Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT 2: Ordinary differential equations of higher orders (Prerequisite 2c, 4a) second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT 3: Partial Differential Equations – First order (Prerequisite 5a-b): First order partial differential equations, solutions of first order linear and non-linear PDEs.

UNIT 4: Partial Differential Equations– Higher order (Prerequisite 5b-c) Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method. Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems).

UNIT 5: D'Alembert's solution of the wave equation; Duhamel's principle for one dimensional wave equation. Separation of variables method to simple problems in Cartesian coordinates. The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. One dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary- value problems for various linear PDEs in various geometries.

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &Sons, 2006.
2. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edition, Wiley India, 2009.
3. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
4. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
5. E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
6. G.F. Simmons and S.G. Krantz, Differential Equations, Tata McGraw Hill, 2007.
7. S. J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
8. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.
9. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.
10. Manish Goyal and N.P. Bali, Transforms and Partial Differential Equations, University Science Press, Second Edition, 2010
11. Denian murry,defferential equations ,oxford publications

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	PH201TBS02 / PH202TBS04							70	100	04
Subject:	PHYSICS	3	1	-	15	15	30			

Course Learning Objectives:

- To know the basic principles, effects and applications such as physical, optical parameters used for engineering applications.
- To learn about various laws and applications of electromagnetic theory.
- To know the basic structure, working principles and applications of lasers and optical fibre communication.
- To know the basics of semiconductor physics, semiconductor materials and devices and its characterization for advance technological applications
- To familiarize the basis of quantum theory and to make students to solve the physical problems for advancement of the technology.

Course Content:

UNIT 1: Optics: Interference and Diffraction
Introduction, Young's experiment theory of interference, Coherent and non-coherent sources, Fresnel's Bi- prism and Newton's ring experiment.
Diffraction of light, Fresnel and Fraunhofer's diffraction, diffraction due to plane diffraction grating.

UNIT 2: Electromagnetic Theory
Coulomb's law electrostatics field and potential, electric flux, Gauss' law, Poisson's and Laplace's equation. Equation of continuity for charge conservation, Ampere's and Faraday's laws, Maxwell's Electromagnetic equations.

UNIT 3: Laser and Fiber optics
Introduction, elementary idea of spontaneous and stimulated emission, active medium population inversion, Einstein's coefficients, Types of lasers and important applications of lasers.
Introduction to optical fibers, basic principles of optical fiber, critical angle numerical aperture, maximum acceptance angle, classification of optical fiber.

UNIT 4: Semiconductor physics and Devices
Formation of energy in solids, Energy band gap of metals, insulators and semiconductors, classification of semiconductor: Intrinsic and Extrinsic semiconductors, Fermi levels in intrinsic and extrinsic semiconductors, Electrical conductivity in conductors and semiconductors, working of P-N junction diodes and bipolar junction transistor.

UNIT 5: Introduction to Quantum Mechanics
Introduction to Quantum Mechanics, photoelectric effect, Compton effect, wave-particle duality, uncertainty principle, wave function, De-Broglie waves, phase and Group velocity, Davisson and Germer experiment, Schrodinger wave equation, particle in a box (I-Dimensional)

Textbooks/References:
1. Applied physics-I and II By Navneet Gupta, Dhanpat Rai & Co.

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2. Engg. Physics by S. K. Srivastava and R.A. Yadav, New Age Pub. New Delhi

3. Engg. Physics by Uma Mukherjee, Narosa Publication.

4. Engg. Physics by M.N. Avadhanulu, S. Chand Pub.

5. Electricity and Magnetism by Rangwala and Mahajan, Tata McGraw Hill. 1998

6. Concepts of Physics Part-II by H. C. Verma, Bharati Bhawan (P&D), 1998

7. Modern physics by Beiser, McGraw Hill Inc. New York, Publication 1995

8. Modern physics by Mani and Mehta, East-West Press Pvt.Ltd.1998

9. Introduction to Electrodynamics, David Griffith

10. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc.(1995).

11. B.E.A. Saleh and M.C. Teich, Fundamentals of Photonics, John Wiley & Sons. Inc.2007).

12. S.M. Sze, Semiconductor Devices: physics and Technology, Wiley (2008)

13. Yariv and p.yeh, Photonics Optical Electronics in Modern Communications, Oxford University press, New York (2007)

14. P. Bhattacharya, Semiconductor Optoelectronic Devices, prentice Hall of India (1997)

15. Online course: "Semiconductor Optoelectronics" by M. R. Shenoy on NPTEL.

16. Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak on NPTEL.

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

- Student's ability to understand the basic principles and applications of physical optics for physical parameters measurements such as length, thickness, aperture size etc.

- Student's will be able to design, characterized the lasers and optical fibers and their effective utilization in optical communications, imaging etc.

- Students demonstrate appropriate competence and working knowledge of laws of electromagnetic theory and semiconductor physics and devices for their advance applications

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		L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject Code:	EC201TES01 / EC202TES04	3	1	-	15	15	30			
Subject:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING									

Course Learning Objectives:

- To impart a basic knowledge of electrical quantities such as current, voltage, power, energy and. To provide working knowledge for the analysis of basic DC circuits used in electrical and electronic devices.
- To provide working knowledge for the analysis of basic AC circuits used in electrical and electronic devices and measuring instruments
- To explain the working principle, construction, applications of Transformer, DC machines and AC machines.
- To make students understand basics of Diodes and Transistors.
- To impart knowledge about basics of Digital Electronics

Course Content:

UNIT-1: DC circuits (8 hours)
Electrical circuit elements (R, L and C), voltage and current sources, Ohm's Law, Kirchoff's current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits. Mesh & nodal analysis, Star-Delta transformation and circuits.

UNIT-2: AC circuits (8 hours)
Representation of sinusoidal waveforms, average and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections. Three-phase power measurement- Two-Wattmeter method.
Construction and working principle of single-phase wattmeter and energy meter. Introduction to Sensors and Transducers.

UNIT-3: Electrical machines (8 hours)
Construction, classification, ideal and practical transformer, equivalent circuit, losses in transformers, tests, voltage regulation and efficiency.
Construction, Working Principle, losses and efficiency of DC Machines and three phase Induction Machine, DC motor.

UNIT-4: Semiconductor devices And application (8 hours)
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics.

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UNIT 5: Digital Electronics (8 hours)
Binary Number System, Logic Gates, Combinational circuits, Boolean Algebra, De Morgan's Theorem, Half and Full Adders, Flip- Flops. Sequential circuits-Registers and Counters, A/D and D/A Conversion.

Suggested Text / Reference Books:

(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(iii)B L Theraja and AK Theraja," A Textbook of Electrical Technology- Vol-I & II, S. CHAND &Co ltd, 2013.
(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
(v) Jacob Millman, Christos Halkias,, Chetan Parikh, "Millman's Integrated Electronics - Analog and Digital Circuit and Systems", 2nd Edition 2017
(vi) Robert L Boylestad, Louis Nashlsky," Electronics devices and circuit theory", Pearson 11th edition 2013
(vii) M. Morris Mano ," Digital Logic and Computer Design", Pearson, 2004.

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

- To understand and revise concepts of DC circuits.
- To learn to solve single and three phase AC circuits and basics of sensors and measurements.
- To understand the theory, working principle and applications of Transformer and basic machines and analyse their parameters.
- To understand characteristics of diodes and transistors and to analyze basic circuits using diodes.
- To learn the basics of digital circuits and its importance.

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SYLLAUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	EN202THS01	3	0	-	15	15	30			
Subject:	ENGLISH COMMUNICATION									

Course Learning Objectives

- To build up word power, to brush up the knowledge of English grammar, to develop good writing and speaking skills in the students

Course Content:

UNIT 1: Vocabulary Building
The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.

UNIT 2: Basic Writing Skills
Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

UNIT 3: Identifying Common Errors in Writing
Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

Unit 4: Nature and Style of sensible Writing
Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion.

UNIT 5: Writing Practices
Comprehension, Précis Writing, Essay Writing.

Oral Communication (This unit involves interactive practice sessions in Language Lab)
Listening Comprehension
Pronunciation, Intonation, Stress and Rhythm
Common Everyday Situations: Conversations and Dialogues
Communication at Workplace
Interviews
Formal Presentations

Textbooks/References:

1. Practical English Usage. Michael Swan. OUP, 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007 (iii)On Writing Well. William Zinsser. Harper Resource Book. 2001
3. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
4. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcome:

At the end of the course students will be able learn a lot of new words. They also learnt the particularities and peculiarities of English grammar. As a result, they could speak and write English with the least possible error

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	PH201PBS01/ PH202PBS02							20	50	01
Subject:	PHYSICS LAB	-	-	2	30	--	30			

Course Learning Objectives:

- To learn and perform the various practical related to optical components characterization, semiconductor material and devices characterization and know their applications in advance areas such as communication, industries, defence, navigation etc.

Course Content:

LIST OF PRACTICALS:

1. To determine the wavelength of sodium light with help of Fresnel's Bi-prism.
2. To determine the refractive index and dispersive power of the material of prism with the help of spectrometer.
3. To determine the sodium light by Newton's ring method.
4. To determine the wavelength of sodium light by plane diffraction grating using spectrometer.
5. To demonstrate the diffraction pattern and determine the wavelength of different colours of mercury (white) light using plane diffraction grating and spectrometer.
6. To determine the wavelength and number of line per cm on a diffraction grating using semiconductor laser diode.
7. To determine the specific rotation of sugar solution with the help of polarimeter.
8. Determine the width of the single slit and diameter of circular aperture using Fraunhofer diffraction pattern produced by semiconductor laser diode.
9. To determine the energy band gap (E_g) of a semiconductor material using P-N junction diode.
10. To determine the e/m ratio by the Thomson's method.
11. To study the P-N junction diode characteristics, in forwarded and reverse bias conditions.
12. To study the Zener diode characteristics.
13. To study the characteristics and gain of Transistor in C-B and C-E mode.
14. Determine the Planck's constant.

Course Outcomes: On completion of the course, the students would be able to:

- Know about basic optical facts and phenomenon, characterization of optical components and devices
- To know the basic semiconductor materials and devices and their applications
- To know how the performance of semiconductor devices can be improves.

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	ME201PES01/ ME202PES03							20	50	3
Subject:	ENGINEERING GRAPHICS	1	0	3	30	--	30			

Course Learning Objectives:
- To learn the basic of Engineering Drawing and Orthographic Projections
- To learn the Sections and Sectional Views of Right Angular Solids
- To learn the Isometric Projections covering and overview of Computer Graphics

UNIT 1: Introduction Engineering Graphics and Engineering Curves: Principles of engineering graphics and their significance – drawing instruments and their use – conventions in drawing – lettering – BIS conventions. Dimensioning rules, geometrical construction. Engineering Curves - Conic Sections, Special Curves-Cycloids, Epicycloids, Hypocycloids, Involutes and trochoid.

UNIT 2: Projection of Points, Straight lines and Planes: Principles of orthographic projections – conventions – first and third angle projections. Projections of points and lines inclined to both the planes. Projections of regular planes, inclined to both planes

UNIT 3: Projections Solids: Introduction, Type of solid, Projections of solids in simple position, Projection of solids with axes inclined to one of the reference planes and parallel to the other, Projections of solids with axes inclined to both H.P. and the V.P.

UNIT 4: Section of Solids and Development of Surfaces: Sectioning of regular solids - Section planes perpendicular to one plane and parallel or inclined to other plane - Development of surfaces of right, regular solids – development of prisms, cylinders, pyramids, cones and their parts.

UNIT 5: Isometric Projections and Orthographic Views: Principles of Isometric Projections-Isometric Scale- Isometric Views Conventions-Plane Figures, Simple and Compound Solids. Conversion of isometric views to orthographic views. Conversion of orthographic views to isometric projections, vice-versa. Introduction to perspective projection.

Computer Aided Drafting: Introduction to computer aided drafting package to make 2-D drawings. Demonstration purpose only - not to be included in examinations.

Textbooks/References:

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

Course Outcomes:

1. At the end of the course, the student shall be able to
2. Draw engineering curves, orthographic projections of lines, planes and solids.
3. Draw sections of solids including cylinders, cones, prisms and pyramids.
4. Make development of surfaces, Orthographic and Isometric projections
5. Overview of Computer Graphics.

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	ME201PES02 / ME202PES04							20	50	2
Subject:	WORKSHOP TECHNOLOGY & PRACTICES	1	0	2	30	--	30			

Course Learning Objectives:

- To impart student knowledge on various hand tools for usage in engineering applications.
- Be able to use analytical skills for the production of components.
- Design and model different prototypes using carpentry, sheet metal and welding.
- Make electrical connections for daily applications.
- To make student aware of safety rules in working environments.

Course Content:
Lectures & videos:
1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3 lectures)
2. CNC machining, Additive manufacturing
3. Fitting operations & power tools
4. Electrical &Electronics
5. Carpentry
6. Plastic moulding, glass cutting
7. Metal casting
8. Welding (arc welding & gas welding), brazing

Textbooks/References:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishersprivate limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology – I" Pearson Education, 2008. (iv)Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
4. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata Mc-Graw Hill House, 2017.

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

- Make half lap joint, Dovetail joint and Mortise &Tenon joint
- Produce Lap joint, Tee joint and Butt joint using Gas welding
- Prepare trapezoidal tray, Funnel and T-joint using sheet metal tools
- Make connections for controlling one lamp by a single switch, controlling two lamps by a single switch and stair case wiring

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B. TECH. FIRST YEAR SYLLABUS (W.E.F SESSION 2020-21)

SYLLABUS	(SEMESTER-II)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE	Grand total	Credits
		L	T	P	IA	MSE	TOTAL			
Subject Code:	EC201PES03/ EC202PES05							20	50	1
Subject:	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	-	-	2	30	--	30			

Course Learning Objectives:
- To understand basic electrical wiring, measurements, errors and method.
- To practically provide the concept of different theorems.
- To have actually hands-on on machines like transformers, DC and AC machines to get better understanding.
- To get experimental knowledge of Diodes and Transistors
- To make students learn Digital logic design.

Course Content:
List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope).
3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and Verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
4. Transformers: Polarity test, OC & SC tests. Loading of a transformer: measurement of primary and secondary voltages and currents and power.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), and single-phase induction machine.
6. Study of Diodes and transistors characteristics.
7. Study of full-wave and half-wave rectifier.
8. Verification of De Morgan's theorems.
9. Study of Logic gates.
10. Study of half and full adder.

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

- Acquire knowledge about different types of meters and take readings and Construct circuits and measure different electrical quantities.
- Analyze Single Phase and Three phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
- Work on machines like transformers
- Acquire knowledge about different types of diodes and transistors
- Design and understand digital logic circuits

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Scheme and Syllabus

CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH, III SEMESTER CIVIL ENGINEERING
W.E.F. 2019-20 (ODD SEMESTER)

S. No	Subject Code	Subjects	Period/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE03TBS05	Engineering Mathematics-III	3	1	0	15	15	30	70	100	4
2	CE03TPC01	Strength of Materials	3	1	0	15	15	30	70	100	4
3	CE03TPC02	Fluid Mechanics-I	3	0	0	15	15	30	70	100	3
4	CE03TPC03	Building Materials &Construction	3	0	0	15	15	30	70	100	3
5	CE03TPC04	Surveying & Geomatics	3	0	0	15	15	30	70	100	3
6	CE03THS03	Indian Constitution*	2	0	0	-	-	-	-	-	0
		Practical									
1	CE03PPC01	Survey Lab	0	0	3	-	-	30	20	50	1.5
2	CE03PPC02	Fluid Mechanics Lab	0	0	3	-	-	30	20	50	1.5
3	CE03PES06	Computer Aided Civil Engg Drawing	0	0	3	-	-	30	20	50	1.5
										Total Credits	21.5

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Mandatory Course

CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH IV SEMESTER CIVIL ENGINEERING
W.E.F. 2019-20 (EVEN SEMESTER)

S. No	Subject Code	Subjects	period/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE04THS04	Engineering Economics	3	0	0	15	15	30	70	100	3
2	CE04TPC05	Concrete Technology	3	0	0	15	15	30	70	100	3
3	CE04THS05	Professional Practice, Law & Ethics	2	0	0	15	15	30	70	100	2
4	CE04TPC06	Structural Analysis-I	3	1	0	15	15	30	70	100	4
5	CE04TPC07	Fluid Mechanics-II	3	0	0	15	15	30	70	100	3
6	CE04THS06	Effective Technical Communication	3	0	0	15	15	30	70	100	3
		Practical									
1	CE04PHS01	Effective Technical communication lab	0	0	2	-	-	30	20	50	1
2	CE04PPC03	Material Testing Lab	0	0	3	-	-	30	20	50	1.5
										Total Credits	20.5

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam;

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SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	4
Subject Code:	CE03TBS05				15	15	30			
Subject:	Engineering Mathematics-III	3	1	0						

Course Learning Objectives:

Course Learning Objectives:

The students will be able to use of the concepts of correlation, Regression and various types of distributions. To provide students with the skills, knowledge and attitudes required to determine approximate numerical solutions to mathematical problems which cannot always be solved by conventional analytical techniques, and to demonstrate the importance of selecting the right numerical technique for a particular application, and carefully analysing and interpreting the results obtained.

Course Content:

UNIT-1 Correlation & Regression: Scatter diagram, Linear Correlation, Measures of Correlation. Karl Pearson's Coefficient of correlation, Limits for correlation coefficients, Coefficient of correlation for vicariate frequency distribution, Rank correlation, Linear Regression, Equations to the line of Regression. Regression coefficient. Angle between two lines of Regression.

UNIT–2 Theoretical Distributions: Discrete and Continuous probability distribution's .Mathematical expectation, Mean and Variance, Moments, Moments generating function, probability distribution ,Binomial, Poisson and Normal distribution ,Test of significance based on chi-square , T,F, and Z distribution, degree of freedom , conditions for applying X2 (chi-square) test , student's test.

UNIT-3 Introduction of Errors and their Analysis, types of errors, numerical problems on error analysis, curve fitting: method of least squares; Numerical Solution of Algebraic and Transcendental Equations: Graphical method bisection Method, Secant Method, Regula-falsi Method, Newton Raphson Method.

UNIT- 4 The Calculus of Finite Differences: Finite differences, Difference formula, operators and relation between operators. Inverse Operator, Interpolation with equal intervals: - Newton's forward and backward interpolation formula. Interpolation with Unequal intervals: - Lagrange's interpolation Newton's difference formula, inverse interpolation.

UNIT- 5 Numerical Differentiation and Integration: - Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of a Tabulated function, Numerical Integration :-Trapezoidol rule, simpson's (1/3) rd and (3/8) th rule, Boole's rule, weddle rule.

Text Books:
1) Prasad C "Advanced Engineering mathematics",
3) Dass H.K. "Advanced Engineering mathematics",
4) Ray M. "Mathematics statistics",
5) HigherEngg. Mathematics by Dr. B.S. Grewal– KhannaPublishers.,
6) Advanced Engg. Mathematics by Erwin Kreyszig – John Wiley & Sons,
7) Advanced Engg.Mathematics by R.K. Jain and S.R.K. Iyengar – Narosa Publishing House.,
8) Applied Mathematics by P.N.Wartikar& J.N. Wartikar. Vol- II– Pune VidyarthiGrihaPrakashan,Pune.,
9) JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.

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10) RAO G.S. Numerical Anlysis.
11) Grewal B S Numerical Methods In Engineering and Science.
12) Rajaraman V Computer Oriented Numerical Methods
13) P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
14) S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Course Outcomes-
After successful completion of this course, the students will be able to
- Understand the statistical concept of correlation regression and distribution, theory with special reforms to engineering problems.
- Analyse the errors obtained in the numerical solution of problems.
- Using appropriate numerical methods, determine the solutions to given non-linear equations.
- Using appropriate numerical methods, determine approximate solutions to systems of linear equations.
- Using appropriate numerical methods, determine approximate solutions to ordinary differential equations.

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject Code:	CE03TPC01									
Subject:	Strength of Materials	3	1	0	15	15	30			

Course Learning Objectives:

The objective of this Course is to

- To determine the Mechanical behavior of the body by determining the stresses, strains produced by the application of load.
- To apply the fundamentals of simple stresses and strains.
- To facilitate the concept of bending and its theoretical analysis.
- To apply fundamental concepts related to deformation, moment of inertia, load carrying capacity, shear forces, bending moments, torsional moments, column, principal stresses and strains.

Course Content:

UNIT-1: Simple Stresses -Strain and compound stresses: Types of stresses and strains, Mechanicals properties, Hooke's law, stress– strain curve for mild & Cast iron, hardness, impact strength, Poisson's ratio, Relation between the elastic moduli & Poisson's ratio, Bars subjected to varying loads, Temperature stresses in composite bars, Elongation of bars of constant and varying sections. Stress at a point. Components of stress in rectangular coordinates, stresses on an inclined plane, Principal stresses & principle plane, Mohr's circle of stresses.

UNIT-2: Shear Force - Bending Moment: Shear Force & Bending Moment diagrams in statically determinate beams loaded with different load combination, Relationship between Load intensity- Shear Force - Bending Moment, Thrust diagram, Point of contra flexure, loading diagram & Bending moment diagram from shear force diagram, beam with internal hinge. Bending Stress

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UNIT-3: Shear Stresses in Beams Derivation of Shear Stress formula, assumptions, and Shear stresses in symmetrical elastic beam with different sections.
Slope and Deflections of simple Beams: Derivation of differential equation for deflection, Slope & Deflection of Beams by Double integration method, Macaulay's method & Moment area method.

UNIT -4: Torsion: Equation of Pure Torsion, Assumptions, and Power transmitted, Stiffness of Shafts, Comparison of Solid & Hollow shaft, Strain energy in Torsion.
Columns: Stable and unstable equilibrium, Short columns, Euler's formula for long columns, Equivalent length, Limitation of Euler's formula, Rankine's formula.

UNIT -5: Thin-walled pressure vessels: Cylindrical pressure vessels, Spherical vessels. Thick Cylindrical vessels: Lame's theory, Graphical method for determining stresses Spherical shells.

Text Books:
1. Strength of Materials – R.K. Rajput (S. Chand & Co.)
2. Mechanics of Structures (Vol. – I) – Junarkar (Charotar Publications)
3. Strength of Materials – Timoshenko, S. & Gere (CBS Publishers)
4. Introductions to Solid Mechanics –Shames & Pitarresi (Prentice Hall of India)
5. Engineering Mechanics of Solid – Popov (Pearson Publication)
6. Strength of Materials–S. Ramamurtham (DhanpatRai Publications)
7. Strength of Materials (Part-I) – Timoshenko (CBS Pubishers)

Course Outcomes- At the end of the course the students will be able
- Describe the concepts and principles of stress and strain, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations of stress and strain due to axial load and temperature.
- To calculate the stresses on an inclined plane, principle stresses and also using Mohr's circle
- To analyse the determinate beams for internal stress resultants (SF, BM and AF) and plot the shear force and bending moment diagrams
- Analyse various situations involving structural members subjected to bending, shear and torsion.
- Calculate the deflection at any point on a beam subjected to a combination of loads.
- Differentiate the types of columns and their analysis
- Analyse the stresses in thin and thick shells

SYLLAUS	(SEMESTER-III)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	CE03TPC02									
Subject:	Fluid Mechanics- 1	3	0	0	15	15	30			

Course Learning Objectives:

- To understand the basic fluid properties and its buoyancy characteristics.
- To understand the kinematics of fluid.
- To learn the dynamics of fluid and discharge and velocity measuring equipment.
- To learn the characteristics of fluid in pipes and its losses.
- To learn the discharge measurement in open channel and pipes.

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Course Content:

UNIT-1: Introduction: Fluid, physical properties of fluids ideal and real fluid, Newtonian a
Newtonian Fluid Statics: Pressure density height relationship, pressure measurement by Mar
Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and
bodies, metacentric height.

UNIT-2: Kinematics of fluid flow : Steady and unsteady flow, uniform and non-uniform flow, lan
turbulent flow, one, two and three dimensional flow, streamlines and path lines, rotational and in
flow, continuity equation, three dimensional continuity equation. Velocity potential and stream functi

UNIT-3: Dynamics of fluid flow: Euler's equation of motion along a streamline and its in
Bernoulli's equation and its applications – Pitot tube, Venturimeter, orificemeter, and problems i
application of momentum equations.

UNIT-4: Flow in Pipes: Major and minor losses in pipe lines, loss due to sudden contraction & e
Pipes in series and parallel Flow in open Channel: Comparison between open channel and p
definition of uniform and non-uniform flow, Chezy's and Manning's Formula, Hydraulically efficien
section of rectangular, trapezoidal.

UNIT -5: Flow through mouthpieces and orifices: Hydraulic coefficients of orifice, flow throu
rectangular orifice, mouthpieces, Borda's mouthpieces. Notches and Weirs: Rectangular, triang
trapezoidal notches and weir, cippoletti and broad crested weir.

Name of Text Books:
1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics & Hydraulic Machines – Dr.P.N.Modi & S.M.Seth, (Narosa Publishing House)

Name of Reference Books:
1. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
2. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)
3. Fluid Mechanics – R.J. Garde (New Age International Publication)
4. Fluid Mechanics – Streeter V.L. & Wylie E.B. (Tata McGraw Hills)
5. Fluid Mechanics – John F Dougles (Pearson Publication)
6. Introduction to Fluid Mechanics Fox, R.W. and Mc Donald, A.T., John Wiley & Sons.
7. Fluid Mechanics", Streeter, V.L. and Benjamin, W.E., "McGraw-Hill.
8. Fluid Mechanics and Fluid Mechanics Som, S.K. and Biswas, G., Tata McGraw Hill.
9. Introduction to Fluid Mechanics, Fox, R. W. and A. T. McDonald, 6th ed., John Wiley, New York,

Course Outcomes- At the end of the course students will be able to
• To understand the broad principles of fluid statics, kinematics and dynamics
• To understand definitions of the basic terms used in fluid mechanics
• To apply the discharge measurement methods in open channel and pipes.

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SYLLAUS	(SEMESTER-III)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE03TPC03	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Building Materials & Construction	3	0	0	15	15	30			

Course Learning Objectives:

- To introduce the basic engineering properties of building materials like brick, stones, timber, ceramics, plastics, etc.
- To understand the elementary characteristics of construction materials like cement aggregates, concrete, steel, etc.
- To understand the types of foundations, functions, types of masonry, lintels, etc.
- To learn the structure supporting method like Shoring, Underpinning, and other advanced construction materials & Techniques.

Course Content:

UNIT- 1: Stones, Bricks, Tiles, Timber; Properties, Classification &Uses
UNIT-2: Miscellaneous Engineering Materials; Ceramics & glass; Plastics & Rubber; Paints, Varnishes and distempers; Composite materials; Adhesives; Thermal, Electrical & Sound Insulators.
UNIT 3: Cement, Aggregate, Concrete and Steel; classification, properties & uses.
UNIT-4: Foundations, Masonry, Arches & Lintels; Classification, Requirements & Uses.
UNIT-5: Shoring, Underpinning, Formwork, Advanced construction materials & Techniques.

Name of Text Books:
1. Building Materials – S.K. Duggal (New Age Publication)
2. Building Materials – S. C. Rangwala (Charotar Publication)
3. Building Construction by S.G. Rangwala, Charter Publishing House, Anand, India.
4. Building Construction by Sushil Kumar, Standard Publ. and Distributors, New Delhi
5. Building Construction by Punmia B.C., Lakshmi Publications, New Delhi.
6. Advanced Building Materials and Construction by Mohan Rai and Jai Sing, CBRI Publications, Roorkee
7. Concrete Technology – A.M. Neville & J.J. Brooks (Pearson Education)
8. Concrete Technology – M.S. Shetty (S. Chand & Co.)
9. Engineering Materials – Surendra Singh (Laxmi Publication)
10. Construction Engineering and Management – S. Seetharaman (UmeshPublication)
11. Building Materials – Gurucharan Singh (Standard Publishers, Delhi

Course Outcomes- At the end of the course students will be able

- To compare the properties of most common and advanced building materials.
- To understand the typical and potential applications of these materials
- To select the appropriate building material for building construction
- To identify the different components of a building and differentiate various types of foundations, masonry, arches and lintels
- To select the appropriate supporting structure for strengthening of the building

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		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	CE03TPC04									
Subject:	Surveying & Geomatics	3	0	0	15	15	30			

Course Learning Objectives:

- To understand the basic principles of surveying of linear & elevated measurements i.e. chain survey, levelling etc.
- To expertise in surveying instrument like Compasses, theodolite & Total station etc.
- To learn the subsidiary surveying like photographic & hydrographic surveying
- To learn the advanced application of surveying like Remote sensing, EDM

Course Content:

Unit 1: Introduction to Surveying : Definition - Principles - Classification - Scales - Ranging and chaining - Reciprocal ranging .COMPASS SURVEYING: Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction – Magnetic declination - Dip .
LEVELLING: Principle of levelling, Different methods of determining elevations. Temporary and permanent adjustment of levels. Sensitivity of bubble tube, Levelling staff, Types of levelling: - Reciprocal, Profile, Differential, Plotting of profiles Correction: - Curvature and refraction.

Unit 2: Theodolite and Traversing: Vernier theodolites, Temporary and permanent adjustments, Requirements of nonadjustable parts, Measurement of horizontal angle by repetition and reiteration method, Measurement of vertical angles.
TACHEOMETERY: Definitions, Principles of stadia systems. Instrument constants, Substance and Tangential Systems. Construction and use of Reduction Tacheometers.
CONTOURING: Introduction to contouring.

Unit 3:.Triangulation: Principle and classification of Triangulation System, Strength of Figures, Station marks and Signals, Satellite station, intersected and Resected points.

Plane Table Surveying: Principles, Advantages and disadvantages, Plane table equipment, Use of Telescopic Alidade, Different methods of Plane Table Surveying.

Unit 4: PHOTOGRAPHIC SURVEYING: Photo theodolite, principle of the method of terrestrial photogrammetry, scale and distortion of the vertical and tilted photograph. **HYDROGRAPHIC SURVEYING:** Introduction, shore line survey, soundings methods

Unit 5: (A) Principle of Electronic Distance Measurement: Principle, Type, Use ,Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications.
(B) Remote Sensing: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors.

Text/Reference Books:
1 Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
2 Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3 Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010

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Course Outcomes- At the end of the course students will be able to:
- To apply the knowledge, techniques, basics, and instruments of the discipline to engineering and surveying activities
- Explain different methods and their procedure for levelling
- Explain the working principles of various surveying instruments
- To relate the knowledge on Surveying to the new frontiers of science like Hydrographic surveying, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.

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SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE03PPC01	L	T	P	IA	MSE	TOTAL	
Subject:	Surveying Lab	0	0	3	30	-	30	20

Course Learning Objectives:

The Lab sessions would help in learning:
- Application of chains & compass in surveying.
- Various Applications of levelling process.
- Use of Plane table surveying in preparing of maps of a location
- Tacheometery & its Application.
- Relative adjustment of non- accessible stations
- Principle & operation of Total Station.

Course Content:

List of experiments
1. Linear measurement, offsetting & Determination of the area of the given field by cross staff survey & metric chain.
2. Compass open & closed traversing using prismatic compass and elimination of local attraction.
3. To find the difference in elevation between the two non-invisible stations by the method of differential levelling.
4. To draw longitudinal & cross-sectional profile of the road by the method of profile levelling.
5. Measurement of horizontal angle by repetition & reiteration method.
6. Traversing of the given area by radiation & intersection method using plane table survey.
7. Find the plane table instrument station using Resection method (Two point problem & three point problem)
8. Determination of Tacheometric constants (K & C).
9. Determination of elevation and height by tangential method when both angles are angles of elevation.
10. Determination of elevation and distance when line of sight inclined Upward & Downward
11. To perform the experiment for reduction to center from different positions of a satellite station when: (i) Satellite station in north position, (ii) Satellite station in left position
12. To perform the experiment for reduction to centre from different positions of a satellite station when: (i) Satellite station in south position, (ii) Satellite station in right position
13. Study of total station

Text Book:
1. Surveying and Leveling. N.N.Basak, 1st Edition, Tata McGraw Hill
2. Surveying (Vol. I & II) – Punmia, B.C. (Laxmi Publications, New Delhi, 1996)
3. Surveying (Vol. I & II) – Kanetkar (Pune VidyarthiGrihaPrakashan, Pune)

Name of Reference Books:
1. Surveying (Vol. II & III) – Agor, R (Khanna publications, Delhi, 1995)
2. Surveying (Vol. II & III) – Arora, K.R. (Standard Book House, Delhi, 1993)
3. Fundamentals of Surveying – S.K. Roy (Prentice Hall of India)
4. Surveying (Vol. I & II) – S.K. Duggal (Tata McGraw Hill)

Course Outcomes- On completion of the course, the students will be able to:
- Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling.
- Apply the procedures involved in field work and to work as a surveying team.
- Plan a survey appropriately with the skill to understand the surroundings.

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- Take accurate measurements, field booking, plotting and adjustment of errors can be understood.

SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
Subject Code:	CE03PPC02	L	T	P	IA	MSE	TOTAL	
Subject:	Fluid Mechanics Lab	0	0	3	30	-	30	20

Course Learning Objectives:

- To learn the calibration of discharge measuring, velocity measuring devices in pipes and an open channels.
- To learn the calculation of losses in pipe flow.
- To understand the verification of bernoulli's equation.

Course Content:

List of experiments

1. To calculate the total energy at different points and plot the graph between total energy vs. distance. (Verification of Bernoulli's equation)
2. To determine the Meta centric height with angle of ship model.
3. To determine the co-efficient of Discharge Cd for Venturimeter
4. To determine the co-efficient of Discharge Cd for Orificemeter.
5. To determine the co-efficient of discharge and the co-efficient of velocity for Orifice.
6. To determine the co-efficient of discharge and the co-efficient of velocity for Mouthpiece.
7. To determine the coefficient of discharge Cd of Rectangular Notch.
8. To determine the coefficient of discharge Cd V Notch - 45^0
9. To determine the coefficient of discharge Cd V Notch - 60^0
10. To determine the friction factor for Darcy-Weisbach equation
11. Experimental determination of critical velocity in pipe.
12. To determine the coefficient of impact for vanes
13. To find the co-efficient of pitot tube
14. To plot velocity profile across the cross section of pipe
15. To determine the Reynold's Number in pipe
16. Calibration of rectangular sharp cornered weir and to study the pressure distribution on the upstream face of the weir.
17. Calibration of rectangular streamlined weir and to study the pressure distribution on the upstream face of the weir.

Course Outcomes- At the end of the course students will be able to
- Utilization of basic measurement techniques of fluid mechanics
- Understand the differences among measurement techniques.

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SYLLAUS	(SEMESTER-III)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
		L	T	P	IA	MSE	TOTAL	
Subject Code:	CE03PES06							
Subject:	Computer Aided Civil Engg.Drawing	0	0	3	30	0	30	20

Course objectives:
- To develop the capability to draw the basic detailed elements of structures like truss, beam, column etc. using Auto CAD
- To develop the capability to draw plan, section of residential building using Auto CAD
- To develop the capability to draw plan, section of public building using Auto CAD

Course Content:
List of Experiments:
1. Basic drawing for symbols used in building drawing
2. Drawing of different Foundation
3. Drawing of different masonry wall
4. Drawing of masonry bonds
5. Drawing of trusses
6. Drawing of retaining Wall
7. Drawing of Stair case, Doors and Windows
8. Plan, elevation and section of Residential Building
9. Plan, elevation and section of Public Building like school, college etc.
10. Detailing of beam, column and slab

Text Books / References:
1. N Krishna Raju, Structural Design and Drawing, Second Edition, Universities Press (India), Private Limited, Hyderabad, 2009
2. AutoCAD Essentials, Autodesk official Press, John Wiley & Sons, US, 2015

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

- To draw planning and detailing of residential building with the help of Auto CAD software
- To draw other Civil Engineering structures with the help of Auto CAD software

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE04THS04	3	0	0	15	15	30	70	100	03
Subject:	Engineering Economics									

Course Learning Objectives:
To learn about the basics of economics and cost analysis related to engineering so as to take economically sound decisions

Course Content:
UNIT 1: Introduction to Economics

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Introduction to Economics- Flow in an economy, Law of supply and demand, Concept of Engin
Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Elem
costs, Marginal cost, Marginal Revenue, Sunk cost, Opportunity cost, Break-even analysis- V
Elementary economic Analysis – Material selection for product Design selection for a product, I
planning.

UNIT 2: Value Engineering
Make or buy decision, Value engineering – Function, aims, Value engineering procedure. Interest fo
and their applications –Time value of money, Single payment compound amount factor, Single pa
present worth factor, Equal payment series sinking fund factor, Equal payment series payment Present
factorequal payment series capital recovery factor-Uniform gradient series annual equivalent factor, Ef
interest rate, Examples in all the methods.

UNIT 3: Cash Flow
Methods of comparison of alternatives – present worth method (Revenue dominated cash flow dia
Future worth method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), A
equivalent method (Revenue dominated cash flow diagram, cost dominated cash flow diagram), rate of
method, Examples in all the methods.

UNIT 4: Replacement and Maintenance Analysis
Replacement and Maintenance analysis – Types of maintenance, types of replacement problem, determ
of economic life of an asset, Replacement of an asset with a new asset – capital recovery with retu
concept of challenger and defender, Simple probabilistic model for items which fail completely.

UNIT 5: Depreciation
Depreciation- Introduction, Straight line method of depreciation, declining balance method of deprec
Sum of the years digits method of depreciation, sinking fund method of depreciation/ Annuity met
depreciation, service output method of depreciation-Evaluation of public alternatives- introduction, Exa
Inflation adjusted decisions – procedure to adjust inflation, Examples on comparison of alternativ
determination of economic life of asset.

TEXT BOOKS:
1. Panneer Selvam, R, —Engineering Economicsl, Prentice Hall of India Ltd, New Delhi, 2001.
2. Suma Damodaran, — Managerial economicsl, Oxford university press 2006.
REFERENCES:
1. Chan S.Park, —Contemporary Engineering Economicsl, Prentice Hall of India, 2002.
2. Donald.G. Newman, Jerome.P.Lavelle, —Engineering Economics and analysisl Engg. Press, Texas,
3. Degarmo, E.P., Sullivan, W.G and Canada, J.R, —Engineering Economyl, Macmillan, New York, 19
4. Grant.E.L., Ireson.W.G., and Leavenworth, R.S, —Principles of Engineering Economyl, Ronald
New York,1976.
5. Smith, G.W., —Engineering Economyl, Lowa State Press, Iowa, 1973.
6. Truett & Truett, — Managerial economics- Analysis, problems & cases — Wiley India 8 Th edition
7. Luke M Froeb / Brian T Mccann, — Managerail Economics – A problem solving approachl Th
learning 2007.

Outcome: At the end of the course students will be able
- To understand the basic economic principles of wants, scarcity, choice, opportunity cost; etc has app
  business organizations and engineering firms. Understand the time value of money and how to ske
  cash flow diagram.

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		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	CE04TPC05	3	0	0	15	15	30			
Subject:	Concrete Technology									

Course Learning Objectives:
- To learn about various ingredients materials of concrete, like cement aggregates, water, etc
- To learn about various admixtures that enhances the properties of concrete.
- To learn about various properties of concrete, its design mix
- To study about various types of special concrete

Course Content:

Unit 1: Constituent Material
Cement-Different types-Chemical composition and Properties -Tests on cement-IS Specifications- Aggregates-Classification-Mechanical properties and tests as per BIS grading requirements- Water- Quality of water for use in concrete.

Unit 2: Chemical and Mineral Admixtures
Accelerators-Retarders- Plasticisers- Super plasticizers- Water proofers – Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaolin -Their effects on concrete properties

Unit 3: Proportioning of Concrete Mix
Principles of Mix Proportioning-Properties of concrete related to Mix Design Physical properties of materials required for Mix Design – Design Mix and Nominal Mix-BIS Method of Mix Design – Mix Design Examples

Unit 4: Fresh and Hardened Properties of Concrete:
Workability-Tests for workability of concrete-Slump Test and Compacting factor Test-Segregation and Bleeding-Determination of Compressive and Flexural strength as per BIS – Properties of Hardened concrete-Determination of Compressive and Flexural strength-Stress-strain curve for concrete Determination of Young's Modulus.

Unit 5: Special Concretes:
Light weight concretes – High strength concrete – Fibre reinforced concrete – Ferrocement – Ready mix concrete – Slurry infiltrated fibrous concrete (IFCON) - Shotcrete – Polymer concrete – High performance concrete- Geopolymer Concrete.

Text Books:
1. Gupta. B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
2. Shetty, M.S, "Concrete Technology", S.Chand and Company Ltd, New Delhi, 2003
3. Santhakumar, A.R; "Concrete Technology", Oxford University Press, New Delhi, 2007
4. Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
5. Gambir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi, 2007
6. IS10262-1982 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998

Outcomes: At the end of the course students will be able to:
- Understand properties and role of ingredients like cement, aggregate, admixtures etc. to produce better quality concrete
- Select the appropriate admixture for better performance of the concrete

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- Design the concrete mix by IS Method
- Perform destructive, semi-destructive and non-destructive tests for concrete
- Differentiate between normal concrete and other special concretes
- Demonstrate advancements in concreting materials and techniques

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE04THS05	2	0	0	15	15	30	70	100	02
Subject:	Professional Practice, Law & Ethics									

Course Learning Objectives
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop some ideas of the legal and practical aspects of their profession.

Course Content

UNIT 1: Professional Practice – Respective roles of various stakeholders: Government (constituting regulatory bodies and standardization organizations, prescribing norms to ensure safety of the citizens); Standardization Bodies (ex. BIS, IRC)(formulating standards of practice); professional bodies (ex. Institution of Engineers(India), Indian Roads Congress, IIA/ COA, ECI, Local Bodies/ Planning Authorities) (certifying professionals and offering platforms for interaction); Clients/ owners (role governed by contracts); Developers (role governed by regulations such as RERA); Consultants (role governed by bodies such as CEAI); Contractors (role governed by contracts and regulatory Acts and Standards); Manufacturers/ Vendors/ Service agencies (role governed by contracts and regulatory Acts and Standards). Professional Ethics – Definition of Ethics, Professional Ethics, Business Ethics, Corporate Ethics, Engineering Ethics, Personal Ethics; Code of Ethics as defined in the website of Institution of Engineers (India); Profession, Professionalism, Professional Responsibility, Professional Ethics; Conflict of Interest, Gift Vs Bribery, Environmental breaches, Negligence, Deficiencies in state-of-the-art; Vigil Mechanism, Whistleblowing, protected disclosures.

UNIT 2: General Principles of Contracts Management: Indian Contract Act, 1972 and amendments covering General principles of contracting; Contract Formation & Law; Privacy of contract; Various types of contract and their features; Valid & Voidable Contracts; Prime and sub-contracts; Joint Ventures & Consortium; Complex contract terminology; Tenders, Request For Proposals, Bids & Proposals; Bid Evaluation; Contract Conditions & Specifications; Critical /"Red Flag" conditions; Contract award & Notice To Proceed; Variations & Changes in Contracts; Differing site conditions; Cost escalation; Delays, Suspensions & Terminations; Time extensions & Force Majeure; Delay Analysis; Liquidated damages & Penalties; Insurance & Taxation; Performance and Excusable Non-performance; Contract documentation; Contract Notices; Wrong practices in contracting (Bid shopping, Bid fixing, Cartels); Reverse auction; Case Studies; Build-Own-Operate & variations; Public- Private Partnerships; International Commercial Term.

UNIT 3: Arbitration, Conciliation and ADR (Alternative Dispute Resolution) system: Arbitration – meaning, scope and types – distinction between laws of 1940 and 1996; UNCITRAL model law – Arbitration and expert determination; Extent of judicial intervention; International commercial arbitration; Arbitration agreements – essential and kinds, validity, reference and interim measures by court; Arbitration tribunal – appointment, challenge, jurisdiction of arbitral tribunal, powers, grounds of challenge, procedure and court

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assistance; Award including Form and content, Grounds for setting aside an award, Enforcement, Appeal and Revision; Enforcement of foreign awards – New York and Geneva Convention Awards; Distinction between conciliation, negotiation, mediation and arbitration, confidentiality, resort to judicial proceedings, costs; Dispute Resolution Boards; Lok Adalats.

UNIT 4: Engagement of Labour and Labour & other construction-related Laws: Role of Labour in Civil Engineering; Methods of engaging labour- on rolls, labour sub-contract, piece rate work; Industrial Disputes Act, 1947; Collective bargaining; Industrial Employment (Standing Orders) Act, 1946; Workmen's Compensation Act, 1923; Building & Other Construction Workers (regulation of employment and conditions of service) Act (1996) and Rules (1998); RERA Act 2017, NBC 2017

UNIT 5: Law relating to Intellectual property: Introduction – meaning of intellectual property, main forms of IP, Copyright, Trademarks, Patents and Designs, Secrets; Law relating to Copyright in India including Historical evolution of Copy Rights Act, 1957, Meaning of copyright – computer programs, Ownership of copyrights and assignment, Criteria of infringement, Piracy in Internet – Remedies and procedures in India; Law relating to Patents under Patents Act, 1970 including Concept and historical perspective of patents law in India, Patentable inventions with special reference to biotechnology products, Patent protection for computer programs, Process of obtaining patent – application, examination, opposition and sealing of patents, Patent cooperation treaty and grounds for opposition, Rights and obligations of patentee, Duration of patents – law and policy considerations, Infringement and related remedies.

1. B.S. Patil, Legal Aspects of Building and Engineering Contracts, 1974.
2. The National Building Code, BIS, 2017
3. RERA Act, 2017
4. Meena Rao (2006), Fundamental concepts in Law of Contract, 3rd Edn. Professional Offset
5. Neelima Chandiramani (2000), The Law of Contract: An Outline, 2nd Edn. Avinash Publications Mumbai
6. Avtarsingh (2002), Law of Contract, Eastern Book Co.
7. Dutt (1994), Indian Contract Act, Eastern Law House
8. Anson W.R. (1979), Law of Contract, Oxford University Press
9. Kwatra G.K. (2005), The Arbitration & Conciliation of Law in India with case law on UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
10. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
11. T. Ramappa (2010), Intellectual Property Rights Law in India, Asia Law House
12. Bare text (2005), Right to Information Act
13. O.P. Malhotra, Law of Industrial Disputes, N.M. Tripathi Publishers
14. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act
15. Rustamji R.F., Introduction to the Law of Industrial Disputes, Asia Publishing House
16. Vee, Charles & Skitmore, Martin (2003) Professional Ethics in the Construction Industry, Engineering Construction and Architectural management, Vol.10, Iss2,pp 117-127, MCB UP Ltd
17. American Society of Civil Engineers (2011) ASCE Code of Ethics – Principles Study and Application
18. Ethics in Engineering- M.W.Martin& R.Schinzinger, McGraw-Hill
19. Engineering Ethics, National Institute for Engineering Ethics, USA
20. www.ieindia.org
21. Engineering ethics: concepts and cases – C. E. Harris, M.S. Pritchard, M.J.Rabins
22. CONSTRUCTION CONTRACTS, http://www.jnormanstark.com/contract.htm
23. Internet and Business Handbook, Chap 4, CONTRACTS LAW, http://www.laderapress.com/laderapress/contractslaw1.html
24. Contract&Agreements

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http://www.tco.ac.ir/law/English/agreements/General/Contract%20Law/C.htm
25. Contracts, http://206.127.69.152/jgretch/crj/211/ch7.ppt
26. Business & Personal Law. Chapter 7. "How Contracts Arise",
http://yucaipahigh.com/schristensen/lawweb/lawch7.ppt
27. Types of Contracts, http://cmsu2.cmsu.edu/public/classes/rahm/meiners.con.ppt
28. IV. TYPES OF CONTRACTS AND IMPORTANT PROVISIONS,
http://www.worldbank.org/html/opr/consult/guidetxt/types.html
29. Contract Types/Pricing Arrangements Guideline- 1.4.G (11/04/02),
http://www.sandia.gov/policy/14g.pdf

Course Outcome
At the end of the course student will be able to
- To familiarise the students to what constitutes professional practice, introduction of various stakeholders and their respective roles; understanding the fundamental ethics governing the profession
- To give a good insight into contracts and contracts management in civil engineering, dispute resolution mechanisms; laws governing engagement of labour
- To give an understanding of Intellectual Property Rights, Patents.
- To make the students understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
- To develop good ideas of the legal and practical aspects of their profession

SYLLAUS	(SEMESTER-IV)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	04
Subject Code:	CE04TPC06									
Subject:	Structural Analysis-1	3	1	0	15	15	30			

Course Learning Objectives
- To study about the strain energy principles and their applications to beams and pin joint plane frames
- To learn about analysis of arches &cables.
- To learn how to draw influence line diagrams for beams and arches
- To study about the maximum SF, BM and absolute max BM
- To learn about the static and kinematic indeterminacy of structures and methods of analysis, analysis of fixed and continuous beams

Course Content:

UNIT-1: Principle of superposition, virtual work principle, Maxwell reciprocal theorem, deflection of beams using conjugate beam method. Deflection of beams and truss using energy method (Castigiliano theorem), Analysis of plane truss using tension coefficient method (determinate)

UNIT-2: Three-hinged Arches: Bending Moment, Shear force, axial force for three-hinged arches, Analysis of Suspension Bridge without stiffening girders.

UNIT-3: Influence Lines: Basic concept of moving load and influence line; influence lines for reactions, Shearing for.es and bending moments for determinate beams; absolute maximum shearing force and bending moment.

UNIT-4: Influence lines for three-hinged arches and stresses in simply supported plane determinate trusses

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UNIT-5: Static and kinematic indeterminacy of structure, Method of structural analysis, Analysis of fixed beam, continuous beam using Theorem of three moments Effect of yielding of supports.

Reference Book:
1. Elementary structural Analysis by A.K. Jain
2. Advanced Structural Analysis by A. K. Jain

Outcome: At the end of the course students will be able
- To explain the concept of strain energy and analyse the determinate beams and trusses
- To able to analysis three hinged arches.
- To apply and analyse the concept of influence lines for deciding the critical forces and sections while designing
- Classify & discuss statically determinate & indeterminate structures, to find out the static and kinematic indeterminacy of the structure,
- To differentiate the force and displacement methods.
- To analysis the fixed and continuous beams by using theorem of three moments
- To understand the effect of temperature, yielding of supports in indeterminate structures

SYLLAUS	(SEMESTER-IV)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject Code:	CE04TPC07									
Subject:	Fluid Mechanics-II	3	0	0	15	15	30			

Course Learning Objectives:
- To study the different flows in pipe like turbulent, and non-uniform flow in open channel.
- To study the effect of boundary layer against the flow.
- To understand the dimensional analysis in model and prototype.
- To study the hydraulic machines like turbine and pumps.

Course Content:
UNIT-1: Turbulent flow in pipe: Nature of turbulence, free and wall turbulence, turbulent flow in pipes, equation for velocity distribution over smooth and rough surfaces, Colebrook-White equation, Moody's diagram, Explicit equation for friction factors.

UNIT -2: Boundary layer Analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, turbulent boundary layer, and laminar sub layer, Application of momentum equation, local and average friction coefficient. Fluid flow past submerged bodies. Drag and lift, drag on sphere and cylinder Magnus effect.

UNIT-3: Non-uniform flow in open channel: Specific energy, critical flow, analysis of flow over hump and transition, equation of gradually varied flow, hydraulic jump and evaluation of its elements in rectangular channel.

UNIT-4: Compressibility effect in pipe flow: Transmission of pressure waves in rigid and elastic pipes, water hammer Dimensional analysis and Hydraulic similitude. Dimensional analysis, Buckingham's theorem, important dimensionless numbers and their significances, geometric, kinematics and dynamic similarity, model study.

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UNIT-5: Hydraulic Machines: Turbines: Classification of turbines, draft tube, specific speed, unit quantities, and characteristics curves of turbines, and governing of turbine. Pump: Introduction, Centrifugal pumps, efficiencies, specific speed, cavitations, slip, percentage slip.

Name of Text Books:

1. Fluid Mechanics and Machines – Dr. A.K. Jain (Khanna Publications)
2. Fluid Mechanics and Machines – Dr. R.K. Bansal (Laxmi Publications)
3. Fluid Mechanics – Dr. P.N. Modi (Standard Book House)
4. Mechanics of Fluid – Irving H. Shames (McGraw Hill)
5. Introduction to Fluid Mechanics – James A. Fay (Prentice Hall India)

Name of Reference Books:

1. Fluid Machines – Dr.JagdishLal (Metropolitan Book Company Private Ltd.)
2. Fluid Machines – John P. Douglas (Pearson Publication)

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

- To understand the difference between broad principles of flow of fluid, for instance laminar and turbulent flow.
- To understand boundary layer effect and importance of dimensional analysis in design of stream lined object.
- To understand the functioning of turbines and pipes.

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SYLLAUS	(SEMESTER-IV)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE04THS06	3	0	0	15	15	30	70	100	03
Subject:	Effective Technical Communication									

Course Learning Objectives:

Effective Technical communication is critical in today's world. Most problems in an organization arise as a result of poor communication. Effective communication ensures a smooth flow of ideas, facts, decisions, and advice. This way, employees eliminate hindrances in achieving the organization's target.

Course Content:

Unit-1 Fundamentals of Communication Technical Communication: features: Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communications; the flow of Communication: Downward, Upward, Lateral of Horizontal (Peer group): Importance of technical communication; Barriers to Communication.

Unit-2 Constituents of Technical Written Communication Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Correct Usage: all Parts of Speech; Modals; Concord; Articles; Infinitives; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods- Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation-various steps.

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Unit-3 Business Communication Principles, Sales & Credit letters; Claim and Adjustment Letters; Job application and Resumes. Reports: Types; Significance; Structure, Style & Writing of Reports. Technical Proposal; Parts; Types; Writing of Proposal; Significance. Negotiation & Business Presentation skills.

Unit-4 Presentation Strategies and Listening Skills. Defining Purpose; Audience & Local; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Dimensions of Speech: Syllable; Accent; Pitch; Rhythm; Intonation; Paralinguistic features of voice; Listening Skills: Active Listening, Passive Listening. methods for improving Listening Skills.

Unit-5 Value-Based Text Readings Following essays form the suggested text book with emphasis on Mechanics of writing. (i) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior (ii) The Language of Literature and Science by A. Huxley (iii) Man and Nature by J.Bronowski (iv) The Social Function of Literature by Ian Watt (v) Science and Survival by Barry Commoner (vi) The Mother of the Sciences by A.J.Bahm (vii) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Book :
1. Improve Your Writing ed. V.N.Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi..
2. Technical Communication: A Practical Approach: Madhu Rani and Seema Verma- Acme Learning, New Delhi-2011
3. Technical Communication- Principles and Practices by Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press,2007, New Delhi.

Reference Books:
1. Communication Skills for Engineers and Scientists, Sangeeta Sharma et.al. PHI Learning Pvt.Ltd,2011, New Delhi.
2. Business Correspondence and Report Writing by Prof. R.C.Sharma & Krishna Mohan, Tata McGraw Hill & Co.Ltd.,2001, New Delhi.
3. Word Power Made Easy by Norman Lewis, W.R.Goyal Pub. &Distributors, 2009,Delhi.
4. Developing Communication Skills by Krishna Mohan, Meera Bannerji- Macmillan India Ltd. 1990, Delhi.
5. Manual of Practical Communication by L.U.B.Pandey: A.I.T.B.S. Publications India Ltd.; Krishan Nagar, 2013, Delhi.
6. English Grammar and Usage by R.P.Sinha,

Course Outcomes:
- At the end of the semester, employability skills of the students will develop.
- Students will improve their Vocabulary and their Accent.

SYLLAUS	(SEMESTER-IV)	CREDITS: 1			INTERNAL ASSESSMENT (IA)			ESE
		L	T	P	IA	MSE	TOTAL	
Subject Code:	CE04PHS01							
Subject:	Effective Technical Communication Lab	0	0	2	30	-	30	20

Course Learning Objectives:

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A.)

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Course Content:

LIST OF PRACTICALS:

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/ Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio-Visual Usage.

Reference Books:
1. Bansal R.K. & Harrison: Phonetics in English, Orient Longman, New Delhi.
2. Sethi & Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.
3. L.U.B.Pandey & R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd. Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

Course Outcomes: On completion of the course, the students would be able to:
- Improve interpersonal communication
- Overcome stage fright and enhance confidence
- Participate in GDs
- Master presentation Skills and Interview Skills
- Learn and practice Listening, Reading, Writing and Speaking Skills

SYLLAUS	(SEMESTER-IV)	CREDITS: 3			INTERNAL ASSESSMENT (IA)			ESE
		L	T	P	IA	MSE	TOTAL	
Subject Code:	CE04PPC03							
Subject	Material testing lab	0	0	3	30	0	30	20

Course Learning Objectives:

- To learn to perform various experiments related to properties of Cement.
- To learn to perform various experiments related to properties of Aggregates.
- To learn to perform various experiments related to properties of Bricks.
- To learn to perform various Destructive & non –destructive tests on concrete.

Course Content:

List of experiments

Testing of cement

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1. Normal Consistency, Fineness of Cement, Setting times of Cement
2. Specific Gravity of Cement
3. Soundness of Cement
4. Compressive strength of cement

Testing of aggregate
5. Fineness modulus of Fine and Coarse aggregate
6. Bulk density of aggregate
7. Specific Gravity and Water Absorption of Aggregate
8. Bulking of Sand

Testing of bricks
9. Compressive strength, Water Absorption &Efflorescence of Bricks

Testing of concrete
10. Workability of Concrete
11. Compressive strength
12. Modulus of Elasticity
13. Tensile Strength of Concrete
14. NDT Test of Concrete

Outcomes: At the end of the course students will be able
- The students will have acquired the knowledge in the area of testing of construction materials.
- By knowing the properties of materials, it will be possible to design concrete mix that will be of desired properties

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SCHEME OF B.TECH.V SEMESTER CIVIL ENGINEERING
W.E.F. 2020-21 (ODD SEMESTER)

S. No	Subject Code	Subjects	period/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE05TPC08	Design of Concrete Structures	3	1	0	15	15	30	70	100	4
2	CE05TPC09	Structural Analysis - II	3	1	0	15	15	30	70	100	4
3	CE05TPC10	Highway Engineering	3	0	0	15	15	30	70	100	3
4	CE05TPC11	Soil Mechanics - I	3	0	0	15	15	30	70	100	3
5	CE05TPC12	Environmental Engineering - I	3	0	0	15	15	30	70	100	3
6	CE05THS07*	Management (Organizational Behaviour)	3	0	0	-	-	-	-	-	0
		Practical									
1	CE05PPC04	Highway Engineering Lab	0	0	3	-	-	30	20	50	1.5
2	CE05PPC05	Soil Mechanics Lab	0	0	3	-	-	30	20	50	1.5
										Total Credits	20

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Mandatory Course

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SCHEME OF B.TECH.VI SEMESTER CIVIL ENGINEERING
W.E.F. 2020-21 (EVEN SEMESTER)

S. No	Subject Code	Subjects	period/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE06TPC13	Water Resources Engineering -I	3	0	0	15	15	30	70	100	3
2	CE06TPC14	Environmental Engineering - II	3	0	0	15	15	30	70	100	3
3	CE06TPC15	Design of Steel Structures	3	1	0	15	15	30	70	100	4
4	CE06TPC16	Soil Mechanics - II	3	0	0	15	15	30	70	100	3
5	CE06TPE01	Professional Elective -IX	3	1	0	15	15	30	70	100	4
6	CE06TOE01	Open Elective -IX	3	0	0	15	15	30	70	100	3
		Internship/Industrial Training*									
		Practical									
1	CE06PPC06	Environmental Engineering Lab	0	0	3	-	-	30	20	50	1.5
2	CE06PPC07	Computer Applications in Civil Engg. Lab	0	0	3	-	-	30	20	50	1.5
										Total Credits	23

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Students have to undergo internship/industrial training for a period of 04 weeks during the summer vacation and shall submit a report signed by the concerned organization to the Department in the 7th Semester.

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List of Professional (Core) Electives

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TPE01X	Professional Elective-1 (PE Group-1)	4	VI
A	CE06TPE01A	Structural Analysis by Matrix Methods		
B	CE06TPE01B	Advanced Surveying		
C	CE06TPE01C	Advanced Concrete Design		
D	CE06TPE01D	Railway Engineering		
E	CE06TPE01E	Basics of Computational Hydraulics		

List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TOE01X	Open Elective-1 (OE Group-1)	3	VI
A	CE06TOE01A	Metro Systems and Engineering		
B	CE06TOE01B	Rural Technology and Community Development		
C	CE06TOE01C	Remote Sensing and GIS		
D	CE06TOE01D	ICT for Development		

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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05TPC08									
Subject:	Design of Concrete Structures	3	1	0	15	15	30	70	100	04

Course Learning Objectives:

The objective of this Course is

- To understand the various philosophies of design of concrete structures, related IS Codes
- To understand the design beam for flexure, shear, bond and torsion
- To know the design of slabs and staircase and their detailing
- To learn the design of columns and isolated footings and their detailing

Course Content:

UNIT–1: Introduction to design of concrete structures-limit state analysis and design of beams for flexure, bond

UNIT-2: Shear and torsion

UNIT-3: One way slabs, staircases, Two-way slabs

UNIT-4: Axially and eccentrically loaded columns. (uniaxial only)

UNIT-5: Footings – different types of isolated footings, synthesis of limit state and working Stress methods.

Text Books:

1. Reinforced Concrete Design by S Unnikrishna Pillai & Devadas Menon
2. Limit State Design of Reinforced Concrete by P.C. Verghese
3. Design of Reinforced Concrete Structures by N Krishna Raju

Course Outcomes

At the end of the course the students shall be able

- To recognise the design philosophy of concrete structures
- To understand the difference between the structural behavior of different reinforced concrete structural elements
- To analyze and design the reinforced concrete structural elements subjected to gravity loads

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05TPC09	3	1	0	15	15	30	70	100	04
Subject:	Structural Analysis - II									

Course Learning Objectives:

- The objective of this Course is
- To understand the principles of energy methods and their applications to indeterminate beams and plane frames
- To know the principles of different slope-deflection and moment distribution methods and their applications to indeterminate beams and plane frames
- To study the principles of matrix methods and their applications to beams and frames
- To know the influence lines for indeterminate structures and two-hinged arches

Course Content:

UNIT-1: Analysis of indeterminate beams by Consistent Deformation methods, Analysis of indeterminate rigid plane frames and truss using energy method.

UNIT-2: Slop Deflection Method: Continuous beams and portals by moment distribution due to load and yielding of supports.

UNIT-3: Moment-distribution method. Continuous beams and portals by moment distribution due to load and yielding of supports.

UNIT-4: Introduction to Flexibility matrix and Stiffness Matrix methods: Applications of the methods to simple indeterminate beams.

UNIT-5: Analysis of symmetrical two hinge arches (parabolic and circular). Influence lines for propped cantilevers, continuous beams using Muller-Breslau's principle.

Text Books:

1. Structural Analysis by Devdas Meenon
2. Indeterminate Structural Analysis by C. K. Wang
3. Fundamental of Structural Analysis by Lee.
4. Advanced Structural Analysis by A. K. Jain
5. Structural Analysis (SI units) by R C hibbeler
6. Structural Analysis by L S nagi & R S Jangid

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Course Outcomes

At the end of the course the students shall be able

- To identify the suitable method of analysis for the analysis of indeterminate structures.

- To analyse the indeterminate beams and rigid and pin joint plane frames for gravity and wind loads

- To analyse the indeterminate structures and two-hinged arches for moving loads by constructing the influence lines

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05TPC10	3	0	0	15	15	30	70	100	03
Subject:	Highway Engineering									

Course Learning Objectives:

The objective of this Course is

- To provide a coherent development to the students for the courses in sector of Engineering like Transportation & Traffic Engineering etc.
- To present the foundations of many basic Engineering tools and concepts related Highway Engineering.
- To give an experience in the implementation of engineering concepts which are applied in field of Transportation Engineering.
- To involve the application of scientific and technological principles of planning, analysis, design and management to highway engineering

Course Content:

UNIT-1: Introduction: Importance of highway transportation, Modes of transportation, characteristics of highway transport. Historical development & planning: Historical development of roads, Road development and planning in India, Necessity of planning, Roads classification, patterns, Planning surveys. Highway alignment and surveys: Engineering Surveys for highway location Maps and Drawing. Highway drainage: Importance, Surface and subsurface drainage.

UNIT- 2: Geometric Design: Cross Section elements, Sight Distance, Design of horizontal and vertical Alignment.

UNIT -3: Traffic Engineering: Traffic characteristics, studies such as volume, density, Speed, 'O' and 'D' and their uses, Traffic control devices and road accidents.

UNIT- 4: Highway Materials: Behavior of highway materials, properties of Subgrade materials and pavement component materials. Tests on subgrade soil, aggregate and bitumen.

UNIT- 5: Pavement Design: Types of pavements, Factors affecting design of flexible and rigid pavements, Design of flexible pavements: Group index, I.R.C. recommended method, California highway department method, U. S. Corp method. Design of Rigid pavement: Westergard's stress analysis of wheel loads for design of pavement, effect of temperature and warping stress in design.

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Text Books:

1. Principle and Practices of Highway Engineering – Kadiyali & Lab (Khanna Publishers, Delhi).

2. Highway Engineering – S. K. Khanna & C.E.G. Justo (Khanna Publishers, Delhi).

3. Highway Engineering – Rangawala S.C. (Charotar Publishers).

4. A textbook of Transportation Engineering – S.P. Chandola (S. Chand) Transportation Engineering – A.K. Upadhyay (S.K. Kataria & Sons).

5. Subramanian K.P., "Highways, Railways, Airport and Harbour Engineering", Scitech Publications (India), Chennai, 2010.

6. Khanna, S.K. & Justo, C.E.G., Highway Engineering, NemChand & Bros, Roorkee (U.A).

7. Kadiyali, L.R., Traffic Engineering & Transport Planning, Khanna Publishers, New Delhi.

8. Sharma, S.K., Principles, Practice and Design of Highway Engineering, S. Chand & Co., New Delhi.

9. IRC – 37 "Guidelines for Design of flexible Pavements", IRC, New Delhi, 2001.

10. IRC – 67 "Code of Practice for Road Signs", IRC, New Delhi – 2001. 30

11. IRC: 58, 2002: "Guidelines for the Design of Plain Jointed Rigid Pavements for Highways", IRC, N. Delhi, December, 2002.

12. IRC:70, 1977: "Guidelines on Regulation and Control of Mixed Traffic in Urban Areas"

13. IRC:106, 1990: "Guidelines for Capacity of Urban Roads in Plain Areas"

14. IRC-73

15. IRC-12

16. Specifications for Road and Bridge Works – MOST (IRC Publishers) Manual for Survey, Investigation and Preparation of Road Projects – IRC Publication 2001.

Course Outcomes

At the end of the course the students shall be able

- To gain an experience in the implementation of Transportation Engineering on engineering concepts which are applied in field Highway Engineering.
- To get a diverse knowledge of highway engineering practices applied to real life problems.
- To learn to understand the theoretical and practical aspects of highway engineering along with the design and management applications.

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05TPC11	3	0	0	15	15	30	70	100	03
Subject:	Soil Mechanics - I									

Course Learning Objectives:

The objective of this Course is

- To understand the engineering properties of soil.
- To develop the basic understanding of characteristics of soil like permeability, seepage.
- To learn the effective stress and vertical stress in soil.
- To learn the significance of compaction and consolidation on the stability of soil.
- To learn shear strength of different type of soils.

Course Content:

Unit 1: Introduction to Soil Mechanics and Geotechnical Engineering, Complexity of Soil Nature, Soil Formation and Soil Types.
Index Properties of Soil: Basic Definitions, Phase Relationships, Classification of Soils-The Unified Soil Classification System and Indian Standard Soil Classification System, Soil Structure and Clay Minerals.

Unit 2: Soil Compaction: Definition and Compaction Theory, Laboratory Compaction Tests-Standard Proctor Compaction Test & Modified Compaction Test, Factors Affecting Compaction, Effect of Compaction on Engineering Properties of Soil , Field Compaction and Controls.
Principle of Effective Stress, Capillarity and Permeability:Principle of Effective Stress, Capillarity in Soils, Effective Stress under Different Field Conditions, Seepage Pressure, Quick Sand Condition, Permeability, Darcy's Law, Determination of Permeability, Permeability of Stratified Soils, Absolute Co-efficient of Permeability, Factors Affecting Permeability , Seepage through Soils- Laplace's Equation, Flow Nets.

Unit 3: Vertical Stresses below Applied Loads: Stresses due to Applied Loads, Boussinessq and Westergaard Theories for Vertical Stresses under Concentrated Loads, Uniformly Loaded Circular and Rectangular Areas, Pressure Bulb, Variation of Vertical Stress under Point Load along the Vertical and Horizontal Planes, Newmark's influence chart.
Stability of Soil Slopes: Introduction, Types of Slope Failures, Slip Circle Method, Determination of Centre of Most Critical Slip Circle, Taylor's Stability Charts, Stabilization of Soil Slopes.

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Unit 4: Shear Strength: Introduction, Stress at a Point and Mohr's Stress Circle, Normal and Shear Stresses on a Plane, Mohr-Coulomb Failure Criterion, Laboratory Tests for Shear Strength Determination, Shear Strength Parameters, Direct shear test, Triaxial shear test, Unconfined Compression Test and Vane Shear test, Shear Strength Characteristics of Normally Consolidated and Reconsolidated Clays, Factors Affecting Shear Strength.

Unit 5: Compressibility: Introduction to Compressibility, Consolidation, Effects of Soil Type, Stress History and Effective Stress on Compressibility , Factors Affecting Consolidation and Compressibility Parameters, Normally Consolidated and Over Consolidated Soils, Types of Consolidation, Terzaghi's Theory of 1-D Consolidation and Time Rate of Consolidation.

Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.

2. Textbook of Soil Mechanics and Foundation Engineering Geotechnical Engineering Series (PB 2018) by V. N. S. Murthy , CBS Publication, New Delhi.

3. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002.

4. Soil Mechanics by Robert V. Whitman & T. William Lambe, Wiley India Pvt Ltd. New Delhi.

5. Soil Mechanics and Foundation Engineering by Purushotama Raj, Pearson Publications, New Delhi.

6. Soil Mechanics and Foundation Engineering (Geotechnical Engineering) by Dr. P. N. Modi, Standard Book House (Rajsons Publications Pvt Ltd) New Delhi-110002

Course Outcomes

At the end of the course the students shall be able

- To have an understanding of soil capable to behaving in different practical conditions.
- To have an idea of engineering properties of soil suitable for foundation.

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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05TPC12	3	0	0	15	15	30	70	100	03
Subject:	Environmental Engineering - I									

Course Learning Objectives:

The objective of this Course is

- To learn about various sources of water supply & population forecasting method
- To learn the principles and design of water treatment and distribution.
- To learn about the aspects of air & noise pollution

Course Content:

UNIT 1: Introduction: Necessity and importance of water supply schemes. Water demand: Classification of water demands, Estimation of quantity of water required by a town, per capita demand, factors affecting per capita demand, design period and population forecasting, variation in water demand. Sources of water supply. Surface sources and underground sources, Intake works, site selection, type of intake works.

UNIT 2: Quality of water: Common impurities, physical, chemical and biological characteristics of water, water quality standards for municipal and domestic supplies. Water Processing: Object of water processing, flow diagrams of typical ground water system and surface water systems. Sedimentation Theory of sedimentation, sedimentation tanks and its types, design parameters related with sedimentation tanks, sedimentation with coagulations, coagulants and coagulant aids, Jar test for determining coagulant dosage.

UNIT 3: Filtration; Theory of filtration, slow sand and rapid sand filters, Construction and operation. Disinfection, Methods of disinfection, Chlorination, Types of chlorination, Break Point chlorination.

UNIT 4: Softening: Methods of Softening, Iron Removal, Fluoridisation. Distribution System: Methods of distribution, layout of distribution system, methods of analysis, pressure in the distribution system, distribution reservoirs, functions and its types, storage capacity of distribution reservoir.

UNIT 5: Air Pollution: Introduction, causes, sources, characteristics, effects of air pollution on plants, humans, animals and materials and atmosphere, air pollution control methods and equipment. Noise Pollution: Definition, sources, effects of noise pollution on humans, animals and non-living things, methods of noise control.

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Text Books:

1. Water Supply Engineering – S.K. Garg (Khanna Publication).
2. Water Supply Engineering – B.C. Punmia (Laxmi Publication, New Delhi)
3. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
4. Water Supply and Sanitary Engineering – G.S. Birdi (DhanpatRai Publications)
5. Introduction to Environmental Science – Y. Anjaneyulu (B.S. Publications)
6. Environmental Science and Engineering – Henry and Heinke (Pearson Educatic

Course Outcomes

At the end of the course the students shall be able

- To get an insight into the structure of drinking water supply systems, including transport, treatment and distribution
- To get an understanding of water quality criteria and standards, and their rela public health.
- To be able to design and evaluate water supply project alternatives on basis of selection criteria.

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE05PPC04	0	0	3	-	-	30	20	50	1.5
Subject:	Highway Engineering Lab									

Course Learning Objectives:

The objective of this Course is

- To introduce Bitumen and & its engineering behavior.
- To introduce Aggregate & its engineering behavior.
- To introduce Concept of traffic behavior.

Course Content:

Minimum 10 experiments to be performed

1. To determine the crushing value of the given aggregate sample.
2. To determine 10% finer value of the given aggregate sample.
3. To determine the abrasion value of the given aggregate sample by los angles apparatus.
4. To determine the impact value of the given aggregate sample.
5. To determine the elongation index of the given aggregate sample.
6. To determine the flakiness index of the given aggregate sample.
7. To determine the water absorption of the given coarse aggregate.
8. To determine the specific gravity of the given coarse aggregate.
9. To determine the penetration value of the given bitumen material.
10. To determine the softening point of the given bitumen material.
11. To determine the ductility of the given bitumen material.
12. To determine the viscosity of the given bitumen material
13. CBR Test

Course Outcomes

At the end of the course the students shall be able

- To identify engineering properties of aggregate.
- To identify the grade & properties of bitumen.
- To find out peak hour traffic & peak time for a given location on the road.
- To calculate design speed, maximum speed & minimum speed limits of a location through spot speed.
- To draw parking accumulation curve and find out parking duration & turnover of parking lot/stretch

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE05PPC05	0	0	3	-	-	30	20	50	1.5
Subject:	Soil Mechanics-Lab									

Course Learning Objectives:

The objective of this Course is

- To learn the basic tests analysing engineering properties of soil,
- To learn the practical tests computing bearing capacity of soil.
- To learn the sampling of soil.

Course Content:

Minimum 10 experiments to be performed

1. To determine the water content of soil (%) by Oven dry method.
2. To determine the specific gravity of soil sample by
   a) Pycnometer Bottle Method.
   b) Density Bottle Method.
3. To determine the particle size distribution of a soil by Mechanical Analysis.
4. To determine the grain size distribution by Hydrometer apparatus
5. To determine the liquid limit and Plastic limit of a soil sample and Shrinkage limit of a soil sample.
6. To determine in situ dry density of soil by
   a) Core cutter method.
   b) Sand replacement method.
7. To determine the permeability of soil by
   a) Falling Head Methods.
   b) Constant Head Methods.
8. To determine the shear strength of a coarse grained soil (Direct Shear Test).
9. To determine the compressive shear strength of Clay (Unconfined Compression Test/UCS test).
10. To determine the shear strength of c-φ Soil   (Triaxial Test).
11. To determine the consolidation of soil/Clay sample.

Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002

Course Outcomes

At the end of the course the students shall be able

- To have an understanding of performing various tests on soil accurately giving them practical exposure.

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SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE06TPC13	3	0	0	15	15	30	70	100	03
Subject:	Water Resources Engineering -I									

Course Learning Objectives:

The objective of this Course is

- To understand the need of Irrigation, types of irrigation systems and Methods of Irrigation.
- To understand the Canal Irrigation systems and design of stable channels in alluvium.
- To understand Water Logging and its Control.
- To know the River behaviour, control and training.
- To know the Reservoir Planning, Hydrograph and Flood Routing and it principle.

Course Content:

UNIT 1: Introduction: Need for Irrigation, advantages and disadvantages of irrigation, types of irrigation systems – Flow irrigation, Lift irrigation. Methods of Irrigation: Introduction, requirement of irrigation methods, surface and sub-surface irrigation. Water Requirement of crops: Introduction, water requirement of crop, crop season and crops of India, crop period and base period, delta, duty of water, relationship between delta, duty and base period, factors affecting duty.

UNIT 2: Canal Irrigation: Classification of canal, parts of canal irrigation system, canal alignment, typical canal cross section, command areas, losses in irrigation systems. Design of stable channels in alluvium. Introduction, Kennedy's silt theory, Lacey's Theory, Lacey's regime equations, Lacey's shock theory, Design of channels by Kennedy's and Lacey's theories, maintenance of irrigation channels.

UNIT 3: Water Logging and its Control. Causes and ill effects of water logging, prevention and control, reclamation of water logged lands, surface drainage. Design of Lined Channels. Introduction, benefits of lining, types of lining, economics of lining, procedure and design of lined canals.

UNIT 4: River behaviour, control and training. Objects, river characteristics, classification of river training works, methods of river training embankments, bank protection, cut-offs, meandering causes and parameters. Flood Control; Introduction, channel improvement, flood ways evacuation and flood plain zoning.

UNIT 5: Reservoir Planning: Introduction, type of reservoirs, investigation for reservoir planning, site selection criteria for reservoir, basic terms and definitions of reservoir, storage zones of a reservoir, mass curve and demand curve, determination of reservoir capacity,

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reservoir losses, reservoir sedimentation, factors affecting sedimentation, type of sediment load, life of reservoir, safe field.

TEXT BOOKS:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)
3. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)
4. Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand & Bros.)
5. Irrigation and Water resources Engineering – Asawa G.L. (New Age International Publications)
6. Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros)
7. Water Resources Engineering Larry -W. Mays (Wiley, John & Sons)

Course Outcomes

At the end of the course the studentsshall be able

- To describe about the types of Irrigation systems, and methods of irrigation.
- To design irrigation canals and canal network
- To illustrate about the solution regarding water logging and drainage.
- To illustrate river training work sand Flood Control of river.
- To find out capacity of reservoir and use Flood Routing principle for Reservoir Planning.

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE06TPC14	3	0	0	15	15	30	70	100	03
Subject:	Environmental Engineering - II									

Course Learning Objectives:

The objective of this Course is

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena in the sewage
- To understand the concept successful design, operation and maintenance of sewage treatment plant

Course Content:

UNIT 1: Objective, design period, Physical, Chemical and Biological characteristics. Waste water sampling, self-purification of natural streams, effluents Standards, Oxygen Sag Curve, sources of sewage. Design of sanitary sewers, minimum size of sewer, velocities in sewers and gradient of sewers. Sewer appurtenances viz. manholes, street inlets, flushing devices, Vent pipes etc.

UNIT 2: Waste Water primary Treatment: characteristics of wastewater. Effluent discharge standards, Primary, secondary and tertiary treatment of wastewater. Types of screens, design of screen chamber, sources of grit, design of grit chamber, disposal of grit, oil and grease removing skimming tanks, design of PST with inlet and outlet details, primary sludge and its disposal

UNIT 3: Aerobic Treatment UNITs: Biological principle of ASP, SVI, sludge bulking and control; biological principle of Trickling filter, re-circulation, operational troubles; Rotating biological contactor. Low cost treatment methods: Principle of Oxidation pond, symbiosis, principle of Aerated Lagoons, aeration method, Principle of Oxidation Ditches, sewage farming, ground water recharge.

UNIT- 4: Anaerobic Treatment UNITs: Septic tanks, biological Principle, method of treatment and disposal of tank effluent. Anaerobic digester, principle of anaerobic digestion, Stages of digestion, bio-gas production. Sludge disposal methods, advantages and disadvantages, Design of STP.

UNIT 5: Municipal Solid Wastes: Characteristics, generation, collection & transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment & disposal), environmental & health implications, disposal of solid waste by land filling, composting and incineration methods. Hazardous waste management, environmental and health implications due to Exposure, incineration, landfill disposal, site remediation, disposal of refuse by Composting.

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TEXT BOOKS:

1. Environmental Engineering – Peavy & Rowe (Tata McGraw Hill, New Delhi).
2. Waste Water Engineering – S.K. Garg (Khanna Publication).
3. Manual on sewerage & sewage Treatment published by Ministry of UrbanDev. GOI,Ministry of Urban development
4. Waste Water Engineering – Metcalf Eddy (Tata McGraw Hill, New Delhi).
5. Hazardous Waste management: M.D. LaGrega, P.L. Buckingham, J.C.Evans
6. Manual on Municipal Solid Waste Management: CPHEEO (Ministry of Urban Dev.)
7. Environmental Engineering-II.P.Venugopala Rao Tata McGraw Hill
8. Water and Wastewater Technology ,Hammer (PHI)

Course Outcomes

At the end of the course the students shall be able

- To estimate sewage generation and design sewer system including sewage pumping stations
- To understand the characteristics and composition of sewage, self-purification of streams
- To perform basic design of the unit operations and processes that are used in sewage treatment

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE06TPC15	3	1	0	15	15	30	70	100	04
Subject:	Design of Steel Structures									

Course Learning Objectives:

The objective of this Course is

- To introduce steel structures and its basic components
- To introduce structural steel fasteners like welding and bolting
- To design tension members, compression members, beams and beam-columns.
- To design column splices and bases Course outcomes
- To introduce the design of eccentric connections, plate girders.

Course Content:

UNIT 1: Introduction: General, types of Steel, mechanical behaviour of steel, measures of Yielding, measures of Ductility, types of Structures, Structural Steel Sections. Methods of Structural design: Introduction- Design Philosophies-Working Stress method-Ultimate Strength method-Load and Resistant factor- Limit State Method-Partial safety factor-Load-Load combinations-Classification of Cross sections- General aspects in the design.

UNIT 2: Design of Steel fasteners: Types of fasteners – Riveted connections- Bolted connections- Assumptions- Failure of bolted joints – Strength of bolted joints – Design examples – Design of Welded connections – Butt weld- fillet weld – Design examples.

UNIT 3: Design of Tension Members: General – Modes of Failure of Tension member-Analysis of Tension members- Example - Design steps – Design examples – Lug angles – Design.

Design of Compression Members: General – Strength of Compression members- Design Compressive strength- Example on analysis of Compression members – Design of Angle struts – Design Examples- Built up Columns- Design of Lacing – Design of Battens- Design Examples- Design of Roof members.

UNIT 4: Design of Beams: General- Lateral Stability of Beams- Bending Strength of Beams – Plastic Section Modulus - Design Examples. Design of Beam Columns: Behaviour of members under combined loading – Modes of Failures – Design Examples. Design of Column Splices and Column Base: Design of Column Splice-Design Examples- Design of Column Base- Slab Base- Gusseted Base- Design Examples.

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UNIT 5: Design of Eccentric Connections: Design of Brackets- Type-1 and Type 2 Moment Resistant connections - Design Examples. Design of Plate Girder; General Components of Plate Girder- Optimum depth – Bending Strength – Shear Strength – Shear Buckling- Simple Post critical method- Tension Field method- Stiffeners-Bearing Transverse stiffeners - Design Examples.

Text Books:

Limit state Design of Steel Structures – S K Duggal.

2. Design of Steel structures: By Limit State Method– S. S. Bhavikatti.

3. Design of Steel Structures- K. S. Sai Ram

4. Design of Steel Structures-Limit States Method-N. Subramanian

5. Comprehensive Design of Steel Structures – Dr B.C.Punmia, Ashok Kr.Jain, Arun Kr. Jain

6. Design of Steel Structures- S. Ramamrutham

7. Steel Structures (Design & Drawing) – A. K. Upadhayay

8. Fundamentals of Structural Steel Design – M. L. Gambhir

9. Limit state Design of Steel Structures – S Kanthimathinathan

10. Design of Steel Structure Volume-I- Ramchandra

11. Design of Steel Structure Volume-II- Ramchandra

12. Design and Analysis of Connections in Steel Structures-Fundamentals and examples-Alfredo Boracchini

13. IS-800:2007- Indian Standard- General Construction in Steel-Code of Pr., & Steel Table

Course Outcomes

At the end of the course the students shall be able

- To understand design philosophies and behaviour of structural steel
- To analyze and design of tension members
- To analyze and design of columns
- To analyze and design of beams
- To analyze and design of beam-columns
- To analyze and design of simple bolted and welded connections
- To design plate girders

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE06TPC16	3	0	0	15	15	30	70	100	03
Subject:	Soil Mechanics - II									

Course Learning Objectives:

The objective of this Course is

- To understand the effect of backfill on retaining wall.
- To learn the bearing capacity of soil and methods to calculate it.
- To learn the analysis of stability of shallow and deep foundation for superstructure loading.
- To learn about exploration and sampling of soil.

Course Content:

Unit 1: Soil Exploration: Introduction, Different Phases of Soil Explorations, Methods of Subsurface Exploration- Trail Pits, Boring Methods, Sounding Test and Geophysical Explorations, Samples and Samplers, Soil Exploration Reports and Bore Log.

Unit 2: Earth Pressures: Introduction, Effect of Wall Movement on Earth Pressure, Earth Pressure at Rest, Rankine's Earth Pressure Theory and its Limitations, Coulomb's Theory of Earth Pressure, Culmann's Graphical Method, Additional Earth Pressure due to Surcharge.

Unit 3: Shallow foundations: Types of shallow foundations and choice, basic requirements, significance of these foundations

Bearing capacity of foundation: Introduction, Bearing Capacity and its Different Forms, Modes of Shear Failure, Evaluation of Bearing Capacity- Prandtl's Method, Terzaghi's Bearing Capacity, Skempton's Method, Meyhof's Method, Hansen's and Vesic's Assumptions and IS Code Recommendations, Estimation of Bearing Capacity Based on Field Methods-Standard Penetration Test, Static Penetrations Test and Plate Load Test, Settlement of Shallow Foundations.

Unit 4: Pile Foundations: Introduction, Classifications of Piles, Cast in Situ Pile Construction, Selection of Pile Type, and Pile Load Capacity in Compression- Static Pile Load Formulae, Pile Load Test, Dynamic Pile Formulae, Group Action of Piles, Negative Skin Friction, Group Efficiency of Piles and Settlements.

Unit 5: Well Foundation: Introduction, Types of Well or Caissons, Components of Well Foundation, Shapes of Wells, Depth of Well Foundation, Forces Acting on Well Foundation, Construction and Sinking of a Well.

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Text Books:

1. Basic and Applied Soil Mechanics by Gopal Ranjan and A.S.R. Rao, New Age International (P) Limited, Publishers, New Delhi-110002.
2. Textbook of Soil Mechanics and Foundation Engineering Geotechnical Engineering Series (PB 2018) by V. N. S. Murthy , CBS Publication, New Delhi.
3. Soil Mechanics and Foundations by Dr. B. C. Punmia, Ashok Kr. Jain & Arun Kr. Jain, Laxmi Publications (P) Ltd, New Delhi-110002.
4. Foundation Engineering by B. C. Chattopadhay & Joyanata Maity,PHI Learning Private Limited, Delhi-110092.
5. Soil Mechanics by Robert V. Whitman & T. William Lambe, Wiley India Pvt Ltd. New Delhi.
6. Soil Mechanics And Foundation Engineering by P.Purushotama Raj, Pearson Publications, New Delhi.
7. Geotechnical Engineering by B. M. Das, Bharat Singh, SamsherAlam.
8. Soil Mechanics and Foundation Engineering (Geotechnical Engineering) by Dr. P. N. Modi, Standard Book House (Rajsons Publications Pvt Ltd) New Delhi-110002 .

Course Outcomes

At the end of the course the students shall be able

- To have an understanding of suitable foundation for different practical conditions.
- To have an idea about sampling of soil for various tests.

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		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE06TPE01D							70	100	04
Subject:	Railway Engineering (Professional Elective -1X)	3	1	0	15	15	30			

Course Learning Objectives:

The objective of this Course is

- Comprehend different parts of the rail track, their functions and its operation system with respect to construction and engineering applications.
- Comprehensive understanding of the main factors involved in constructing, maintaining and operating railway networks.
- Explain essential features and requirements of different types of crossings and signal system, maintenance of tracks and required procedures.
- Provides scope and opportunities to the students of civil engineering for acquiring appropriate knowledge, skills and abilities in order to perform their job effectively related to construction and management of railway

Course Content:

UNIT 1: Introduction to Railways in India: Role of Indian Railways in National Development Railways for Urban Transportation –LRT & MRTS. Alignment of Railway Lines: Engineering Surveys for Track Alignment. Permanent Way: Components and their Functions

UNIT 2: Rails - Types of Rails, Length of rail, Weight of Rail, Rail Joints, Creep of rail, Buckling of rail, Kinks of Rail Fastenings, Coning of Wheels& tilting of rails.
Sleepers –Types, Functions, sleeper density
Ballasts- Types, function, advantage & disadvantage of each type.

UNIT 3: Geometric Design of Railway Tracks: Gradients and Grade Compensation; Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal Curves.

UNIT 4: Points and Crossings, Turnouts: Working Principles, Cross overs.

UNIT 5: Signalling: Types and their function. Station and Yards: Types, Requirements, factors for site selection.

Text Books:

1. Chandra S. and M.M. Agarwal, Railway Engineering, Oxford University Press, New Delhi, India, 2007.

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2. Saxena, S.C. and S.P. Arora, Railway Engineering, Dhanpat Rai and Sons, New Delhi, India, 1997.
3. Agarwal, M.M., Indian Railway Track, Prabha and Co., New Delhi, India, 1988.
4. Rangwala, S.C., Principles of Railway Engineering, Charotar Publishing House, Anand, India, 1988.
5. J. S. Mundrey, "Railway Track Engineering", McGraw Hill Publishing Co., 2009

Course Outcomes

At the end of the course the students shall be able to:

- The Students are expected to handle the design, construction, and operation of railroads and mass transit systems that use a fixed guide way.

- The Students are expected to handle the tasks that include determining horizontal and vertical alignment design, station location and design, and construction cost estimating.

- Explain various aspects related to construction and maintenance of Railway.

- Describe various procedures for construction activities related to Railway.

- Supervise Railway

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE06TOE01B							70	100	03
Subject:	Rural Technology and Community Development (Open Elective -1X)	3	0	0	15	15	30			

Course Learning Objectives:

The objective of this Course is

- To understand theories and practices in the rural development model.
- To learn and analyse rural life and rural economy.
- To understand different measures in rural development.
- To learn different technologies used in upliftment of rural life.

Course Content:

UNIT 1: INTRODUCTION: RURAL DEVELOPMENT - Concepts and connotations, Basic Elements, Growth vs. Development, Why rural development, Rising expectations and development, Development and Change, Human beings as cause and consequences of development. RURAL ECONOMY OF INDIA - Introduction, size and structure, The characteristics of rural sector, The role of agricultural sub-sector, The role of non-agricultural sub-sector, Challenges and opportunities

UNIT 2: RURAL DEVELOPMENT - MEASURES AND PARADIGMS: MEASURES OF DEVELOPMENT - Introduction, Measures of level of rural development, Measures of income distribution, Measures of development simplified, Concepts and measures of rural poverty. PARADIGMS OF RURAL DEVELOPMENT - Introduction, The modernization theory, The dependency theory of Marxist School, Rosenstein- Rodan's theory of 'Big Push', Lewis' model of economic development, The human capital model of development, The Gandhian Concept of Rural Development theories from other social sciences.

UNIT 3: TECHNOLOGIES FOR RURAL DEVELOPMENT Using Water Resources - The water cycle, Drinking Water, Water quality testing, Water filtering ,Extraction from Groundwater ,Pumps Rope and washer pump ,Manuel pumps, Treadle pump, Irrigation for agriculture, Channel systems, Sprinkler systems, Drip systems Water diversion ,Water storage Building Infrastructures and Creating Energy - Basic energy uses , Energy Sources - Firewood, Solar Energy, Hydro-electricity, Hydro-mechanical, Wind Energy, Energy Storage, Connecting to the Electrical Network, Environmental Use of ICT in Rural and agricultural development - Education, Healthcare, Agriculture, Business, Resource Mapping, Digital and Social Media Marketing Decision Support Systems for soil conservation and farm management Waste Management and Sanitation.

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UNIT 4: COMMUNITY DEVELOPMENT: Introduction, Service Learning and community development, Theory and practice of community development, Community development issues. The diverse meaning of community development, the knowledge base of community development, International community development.

UNIT 5: COMMUNITY DEVELOPMENT - RURAL ENTREPRENEURSHIP: Different forms of Rural Entrepreneurship, Significance , Business planning for a new venture: the concept of planning paradigm, Forms of business enterprises-Sole proprietorship, partnership and corporations, Product and Process development, Marketing analysis and competitive analysis, strategies; Financial resources; debt financing, banks and financial institutions and other non-bank financial sources; Government programmes : direct loan assistance and subsidies; Industrial and legal issues for rural enterprises.

Text Books:

1. Rural Development: Principles, Policies and Management" - Katar Singh , Sage Publications.

2. Introduction to Community Development - Theory, Practice and Service Learning", Edited by J W Robinson, Sage Publications.

3. G. N. Tiwari, Solar Energy: Fundamentals, Design, Modelling and Applications, Narosa, 2002.

4. "Fundamentals of Entrepreneurship", H. Nandan, Third Edition, PHI Learning Pvt. Ltd.,

5. Monetary Economics-Institutions, Theory and Policy", First Edition, S B Gupta, S Chand Publications, ISBN – 9788121904346.

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

* Understand rural development model.
* Learn different measures in rural development and its impact on overall economy.
* Understand and learn importance of technologies in rural and community development.
* Understand challenges and opportunities in rural development.

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		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE06PPC06	0	0	3	-	-	30	20	50	1.5
Subject:	Environmental Engineering Lab									

Course Learning Objectives:

The objective of this Course is

- To determine the physical, chemical and biological characteristics of water and wastewater through practical tests.

- To determine optimum dosage of coagulant and other critical tests to find the quality of water.

Course Content:

Determination of the following Parameters in the given Water Sample:

1. Turbidity by Nephelometer.
2. TDS and fixed solids by Gravimetric method.
3. pH using pH-meter.
4. Carbonate, Bi-Carbonate & Hydroxide Alkalinity.
5. Dissolved Oxygen [DO] using DO meter.
6. Concentration of Chlorides.
7. Optimum coagulant dose for coagulation by Jar test apparatus.
8. Chlorine Demand of Water.
9. Total Hardness and Calcium Hardness.
10. Study of Weather Monitoring Station.
11. Study of Sound Level Meter.

Course Outcomes

- Students will be able to know the procedure for quantifying quality parameters for water and sewage

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DEPARTMENT OF CIVIL ENGINEERING B.TECH. THIRD YEAR SYLLABUS W.E.F 2020-21

SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE06PPC07	0	0	3	-	-	30	20	50	1.5
Subject:	Computer Applications in Civil Engg. Lab									

Course Learning Objectives:

The objective of this Course is

- To understand the need for software tools for analysis and design of Civil Engineering Structures.
- To use the software tools for Modelling, Analysis and Design of Civil Engineering Structures

Course Content:

Minimum 10 problems to be solved either by using STAAD Pro/Excel Programming

USING MS EXCEL Programs

1. Analysis of simple beams
2. Design of simply supported RCC beams
3. Design of columns
4. Design of isolated footing (Flat, stepped and sloped)
5. Design of combined footings
6. Design of cantilever retaining walls
7. Design of slabs (one way and Two way)

USING STAAD Pro

8. Analysis of simple beams and Frames (2-D)
9. Analysis of multi storey frames for DL and LL
10. Analysis of multi storey frames for DL, LL, WL/EQL
11. Design of structural elements
12. Analysis and design of combined footing
13. Analysis and design of roof truss
14. Analysis of simple beams for rolling loads

Course Outcomes

At the end of the course the students shall be able

- The students shall be able to analyse, determinate and Indeterminate Civil Engineering Structures.
- To design various RCC components of buildings and other Civil Engineering Structures

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CIVIL ENGINEERING DEPARTMENT, SOS, ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR
SCHEME OF B.TECH.VII SEMESTER CIVIL ENGINEERING (New CBCS)
W.E.F. 2021-22 (ODD SEMESTER)

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
		Theory	L	T	P	CT-I	CT-II	Total			
1	CE07TPC17	Water Resources Engineering-II	3	0	0	15	15	30	70	100	3
2	CE07TPE02	Professional Elective -02X	3	0	0	15	15	30	70	100	3
3	CE07TPE03	Professional Elective -03X	3	0	0	15	15	30	70	100	3
4	CE07TPE04	Professional Elective -04X	3	0	0	15	15	30	70	· 100	3
5	CE07TPE05	Professional Elective -05X	3	0	0	15	15	30	70	100	3
6	CE07TOE02	Open Elective -02X	3	0	0	15	15	30	70	100	3
		Practical									
1	CE07PPC08	Seminar*	-	-	3	-	-	50	-	50	1.5
2	CE07PPC09	Minor project	0	0	6	-	-	60	40	100	3
3	CE07PPC10	Estimation and Costing	0	0	3	-	-	30	20	50	1.5
										Total Credits	24

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam; * Seminar on Industrial Training/Internship undergone during summer vacation of 6th Semester

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GURU GHASIDAS VISHWAVIDYALAYA (A CENTRAL UNIVERSITY), BILASPUR

SCHEME OF B.TECH.VIII SEMESTER CIVIL ENGINEERING
W.E.F. 2021-22 (EVEN SEMESTER)

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
			L	T	P	CT-I	CT-II	Total			
		Theory									
1	CE08TPC18	Earthquake Resistant Design of structure	3	0	0	15	15	30	70	100	3
2	CE08TPE06	Professional Elective -06X	3	0	0	15	15	30	70	100	3
3	CE08TPE07	Professional Elective -07X	3	0	0	15	15	30	70	100	3
4	CE08TOE03	Open Elective -03X	3	0	0	15	15	30	70	100	3
		Practical									
1	CE08PPC11	Major Project	0	0	14	-	-	120	80	200	7
2	CE08PPC12	Structural Detailing Lab	0	0	3	-	-	30	20	50	1.5
										Total Credits	20.5

L - Lecture Hours, T-Tutorial Hours, P - Practical Hours, CT - Class Test, ESE – End Semester Exam

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List of Professional (Core) Electives

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TPE01X	Professional Elective-1 (PE Group-1)	4	VI
A	CE06TPE01A	Structural Analysis by Matrix Methods		
B	CE06TPE01B	Advanced Surveying		
C	CE061PE01C	Advanced Concrete Design		
D	CE06TPE01D	Railway Engineering		
E	CE06TPE01E	Basics of Computational Hydraulics		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE02X	Professional Elective-2 (PE Group-2)	3	VII
A	CE07TPE02A	Pre-stressed Concrete		
B	CE07TPE02B	Construction Engineering Materials		
C	CE07TPE02C	Disaster Preparedness and Planning		
D	CE07TPE02D	Advanced Structural Analysis		
E	CE07TPE02E	Low Cost Housing Techniques		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE03X	Professional Elective-3 (PE Group-3)	3	VII
A	CE07TPE03A	Environmental Geo-technology		
B	CE07TPE03B	Air Pollution and Control Engineering		
C	CE07TPE03C	Solid and Hazardous Waste Management		
D	CE07TPE03D	Design of Hydraulic Structures		
E	CE07TPE03E	Environmental Impact Assessment and Life Cycle Analysis		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE04X	Professional Elective-4 (PE Group-4)	3	VII
A	CE07TPE04A	Engineering Hydrology		
B	CE07TPE04B	Structural Dynamics		
C	CE07TPE04C	Foundation Engineering		
D	CE07TPE04D	Rock Mechanics		
E	CE07TPE04E	Water Resources Planning & Management		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TPE05X	Professional Elective-5 (PE Group-5)	3	VII
A	CE07TPE05A	Industrial Structures		
B	CE07TPE05B	Airport Planning and Design		
C	CE07TPE05C	Highway Construction and Management		
D	CE07TPE05D	Contracts Management		
E	CE07TPE05E	Construction Projects Planning & Systems		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE08TPE06X	Professional Elective-6 (PE Group-6)	3	VIII
A	CE08TPE06A	Offshore Engineering		
B	CE08TPE06B	Surface Hydrology		
C	CE08TPE06C	Bridge Engineering		
D	CE08TPE06D	Water and Air Quality Modelling		
E	CE08TPE06E	Construction Equipment & Automation		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE08TPE07X	Professional Elective-7 (PE Group-7)	3	VIII
A	CE08TPE07A	Infrastructure Planning and Design		
B	CE08TPE07B	Traffic Engineering		
C	CE08TPE07C	Repair and Rehabilitation of Structures		
D	CE08TPE07D	Finite Element Analysis		
E	CE08TPE07E	Urban Hydrology and Hydraulics		

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List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE06TOE01X	Open Elective-1 (OE Group-1)	3	VI
A	CE06TOE01A	Metro Systems and Engineering		
B	CE06TOE01B	Rural Technology and Community Development		
C	CE06TOE01C	Remote Sensing and GIS		
D	CE06TOE01D	ICT for Development		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE07TOE02X	Open Elective-2 (OE Group-2)	3	VII
A	CE07TOE02A	Artificial Neural Network		
B	CE07TOE02B	Economic Policies in India		
C	CE07TOE02C	History of Science and Engineering		
D	CE07TOE02D	Engineering Risk-Benefit Analysis		

Sl. No.	Subject Code	Name of Subject	Credits	Semester
x	CE08TOE03X	Open Elective-3 (OE Group-3)	3	VIII
A	CE08TOE03A	Management Information System		
B	CE08TOE03B	Enterprise Resource Planning		
C	CE08TOE03C	Cyber Law and Ethics		
D	CE08TOE03D	Human Resources Development and Organizational Behaviour		

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DEPARTMENT OF CIVIL ENGINEERING B. TECH. FOURTH YEAR SYLLABUS - W.E.F 2021-22

SEMESTER VII

SYLLABUS (SEMESTER VII)		Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credit
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	C80TPC17	3	0	0	15	15	30	70	100	3
Subject:	Water Resources Engineering-II									

Course Learning Objectives:

- Introduce the types of dams and its failure criteria for structural stability
- Introduce the concepts of spillways and energy dissipaters
- Discuss the concept of diversion Head-works and understand design theory of seepage flow
- Introduce the concepts of regulation works, falls and hydraulic gates of spillways
- Know the concepts and design principles of Cross Drainage Works

Course Content:

UNIT 1: Dams: Types of Dams, Forces, failure of dams and criteria for structural stability, principle and shear stress, stability analysis, Elementary profile of a gravity dam, Profile from practical considerations, Openings in dams.

UNIT 2: Spillways and Energy Dissipaters: Introduction, essential requirements of a spillway, spillway capacity, components, Types of spillways, Ogee Spillway, Energy Dissipation below spillways, Types of Energy dissipater, USBR and Indian stilling basins.

UNIT 3: Diversion Head-works: Introduction, Types of diversion works, location and components, Weir and Barrage, Effect of construction of weir on the river regime, Bligh's creep theory, Theory of seepage flow, Khosla's theory, Vertical drop Weir.

UNIT 4: Regulation Works: Introduction, Definition of falls, necessity and location of falls, comparative study of the main types of falls, Hydraulic Gates: Spillway gates, types, tainter gates, Roller gates.

UNIT 5: Cross Drainage Works: Introduction, suitability, various types of C-D Works, Design principles of C-D Works

Text Books:

1. Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)
2. Irrigation Engineering – B.C. Punmia (Laxmi Publications)
3. Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)

Course Outcome

- Explain the various forces acting on gravity dam and its stability analysis
- Design of ogee spillway and getting concept of energy dissipation
- Explain the diversion head-works and the theory of seepage flow
- Demonstrate the concept of regulation works, falls and spillways gates
- Apply the basic design principles of Cross Drainage Works

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SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE07TPE02A							70	100	3
Subject:	Pre-stressed Concrete	3	0	0	15	15	30			

Course Learning Objectives:

- To Introduce fundamental of pre stressing and develop understanding of pre stressing system.
- To determine loss of pre stress in pre tensioned and post tensioned members as per IS Code provision.
- To analyze simple and composite section in flexure.
- To evaluate deflection in beam and design simply supported beams as per IS Code provision.
- To design the members for shear reinforcement, Ultimate Shear Strength and end block design.

Course Content:

UNIT 1: Introduction: Fundamentals of prestressing – Classification and types of prestressing– Concrete Strength and strain characteristics – Steel mechanical properties – Auxiliary Materials like duct formers.

UNIT 2: Prestressing Systems: Principles of pretensioning and post tensioning – study of common systems of prestressing for wires strands and bars. Losses of Prestress: Losses of prestress in pre tensioned and post tensioned members – I.S. code provisions.

UNIT 3: Analysis of Sections: In flexure, simple sections in flexure, kern distance – cable profile – limiting zones – composite sections cracking moment of rectangular sections.

UNIT 4: Deflection of Beams: Long term and Short term deflection and Design of Simply Supported Beams, Allowable stress as per I.S. 1343 – elastic design of rectangular and I-sections.

UNIT 5: Shear and Bond: Shear and bond is prestressed concrete beams – conventional design of shear reinforcement – Ultimate shear strength of a section – Prestress transfer in pretensioned beams– Principles of end block design.

Text Books:

1. Krishna Raju. N "Prestressed Concrete", Tata Mc Graw Hill.
2. Lin.T.Y, "Prestressed concrete", Mc Graw Hill Pub. Co.
3. Rajagopalan, "Prestressed concrete", Narosa Publishing House.

Course Outcomes-

- *Describe* mechanical properties of pre stressed concrete, types of pre stressing and its system.
- *Calculate* losses in pre-tensioned and post tensioned members.
- *Analyze* pre-stressed concrete members for flexure, shear and cracking moment.
- *Design* pre stressed concrete beams of rectangular and I section and compute deflection.
- *Explain* principle of end block design, pre stress transfer, shear and bond.

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[B.TECH SEMESTER CIVIL ENGINEERING B.TECH FINAL YEAR SYLLABUS B.E. FINAL 2021-22]

SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credit
Subject Code	CE0/ITP030	L	T	P	CT-I	CT-II	TOTAL	70	100	3
Subject	Air Pollution Control Engineering	3	0	0	15	15	30			

Course Learning Objectives.

The objective of this course is to

- Comprehend the essential concepts of ambient air pollution and pollution control.
- Make aware of techniques and instrumentation of ambient air monitoring, establishment of ambient air monitoring stations; stack monitoring.
- Explore the experimental analysis of air gaseous and particulate air pollutants; standards and limits.

Course Content:

UNIT-1: Introduction: Sources and classification of Air pollutants: Natural contaminants, Aerosols, Gases & Vapours; Primary & Secondary Air pollutants; Stationary & Mobile Sources.

Meteorology and Air pollution: Factors influencing Air pollution; Atmospheric stability & temperature inversions; Mixing height; Plume behaviour; Wind rose; Stack effluent dispersion theories; Stack height.

UNIT-2: Sampling procedures: Sampling Methods, Difficulties in sampling, Stages & considerations of air sampling, Instruments for sampling waste gases & atmosphere, sampling period & methods, High volume sampler, Stack sampling techniques, selection of sampling location, procedure for collection & sampling of particulate matter, Gaseous sampling, recent trends in sampling of stack effluents.

UNIT-3: Control of Particulates / aerosols: Objectives & types of Collection equipment; Principle, application, working, advantages & disadvantages of: i) Settling chambers, ii) Inertial separators, iii) Cyclones, iv) Filters, v) Electrostatic Precipitators & vi) Scrubbers; Choice of equipment.

UNIT-4: Control of Smoke -Gaseous Contaminants & Odour: Smoke: Sources, measurement by Ringelmann chart, miniature chart & other method; Prevention & control of smoke. Control of exhaust emissions. Gaseous Contaminants: Methods of control viz. combustion, absorption, adsorption, closed collection & masking. Odour Control.

UNIT-5: Control measures for Industrial Applications: Introduction to control of air pollution by process changes. Control measures for industries such as Cement Industry, Concrete batching plant, Asphaltic concrete plant, Glass manufacture, Asbestos processing. Thermal Power plant and Coal tar industry.

Books and References

1. Air Pollution Control Engineering by Noel de Nevers, McGraw-Hill, New York, 1995.

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2. Air Pollution Its Origin and Control by Wark K, Warner C F and Davis W., Harper and Row, New York.

3. Air Pollution by Rao M N, Tata McGraw Hill, New Delhi.

4. Principles of Air Quality Management by Griffin R D, CRC Press, Boca Raton, USA.

5. Richard W. Boubel et.al "Fundamentals of Air pollution", Academic Press, New York, 1994.

Course Outcomes-

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

- CO1: Understand & attribute air pollution, its driving forces, meteorological influence, impacts and control options.
- CO2: Identify sampling techniques and analyze the air pollutants in ambient air & chimney.
- CO3: Determine the stack height, assess the plume behaviour and apply dispersion model for Computing pollutant concentration.
- CO4: Understand the sources, measurements and control techniques for smoke and Odour nuisance.
- CO5: Apply different control measures in Industrial air pollutant emissions.

Syllabus	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	3
Subject Code:	CE07TPE03C									
Subject:	Solid and Hazardous Waste Management	3	0	0	15	15	30			

Course Learning Objectives:

- To define and characterize municipal solid wastes from technical and regulatory points of view.
- To provide comprehensive ways of collection, transportation and management of different types of solid wastes.
- To classify the waste and remove hazardous wastes; apply different methods of management.
- To introduce the most common techniques for hazardous waste disposal.
- To use laboratorial tests in sampling & characterization of solid wastes.

Course Content:

UNIT-1: Municipal Solid Waste Management: Legal and Organizational foundation: Definition of Solid Waste, Waste Generation Technological Society, Major Legislation, Monitoring Responsibilities, Sources and Types of Solid Waste, Sampling and Characterization – Determination of Composition of MSW, Storage and Handling of Solid Waste ,Future Changes in Waste Composition.

UNIT-2: Collection and Transport of Solid Waste: Collection of Solid Waste: Type of Waste Collection Systems, Analysis of Collection System, Alternative Techniques for Collection System, Separation, Processing and Transformation of Solid Waste: UNIT Operations User for Separation and Processing, Materials Recovery Facilities, Waste Transformation through Combustion and Aerobic Composting, Anaerobic Methods for Materials Recovery and Treatment, Energy Recovery.

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SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE07TPE04A	3	0	0	15	15	30	70	100	3
Subject:	Engineering Hydrology									

Course Learning Objectives:

1) To develop the fundamentals of hydrology.
2) To study the various forms of precipitation, evaporation and infiltration
3) To know the types of Hydrograph and Rainfall-Runoff correlations
4) To learn the Flood forecasting and Flood routing methods
5) To understand the fundamentals of ground water hydrology

Course Content:

UNIT-1 Introduction- Description of Hydrologic Cycle, Overview of application of hydrology in engineering: Precipitation, Infiltration and Evapotranspiration Runoff and Hydrographs,

UNIT-2 Forms of precipitation, measurement, depth-area-duration and intensity-duration frequency relations, Evaporation - process, measurement, and estimation, Infiltration process, measurement, and estimation, Evapotranspiration measurement and estimation

UNIT-3 Rainfall Runoff correlations, Flow duration curve, Mass curve, Factors affecting flow hydrograph, Unit hydrograph, its analysis, and S-curve hydrograph, Synthetic and instantaneous unit hydrographs.

UNIT- 4 Statistical analysis, Flood frequency studies, Flood forecasting, rational method, Time Area curves, Risk, reliability, and safety factor, Flood control measures. Introduction to basic routing equations, Design flood, Channel and flood routing. Introduction to HEC-RAS software.

UNIT- 5 Occurrence of groundwater, types of aquifers, aquifer properties, Darcy's law, Conductivity and Transmissivity, yield from a well under steady state conditions, Laboratory and field measurement of permeability

Text Books:

1. Engineering Hydrology K.Subramanya, Tata McGraw-Hill Education
2. Hydrology Principles, Analysis and Design H.M.Raghunath, New Age International
3. Hand Book of Applied hydrology V.T.Chow, McGraw-Hill, Inc
4. Viessmann W and Lewis G Lt (2008) "Introduction to Hydrology". Prentice Hall of India
5. Ojha,C.S.P. , Bhunya, P. and Berndtsson, R.- Engineering Hydrology, Oxford University Press Canada.
6. K. C. Patra, Hydrology and Water Resources Engg., Narosa Publishing house, New Delhi.
7. D. K. Todd, Groundwater Hydrology, John Wiley and Sons

Course Outcomes- Upon completion of this course students shall be able to
1) Describe the basic concepts of hydrology and integrate the physical hydrological processes.
2) Explain the various process, measurement, and estimation of hydrological components
3) Formulate the runoff and hydrograph's estimation and apply into engineering practices.
4) Examine the various statistical methods for Flood studies and can investigate historical datasets.

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SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Cr
		L	T	P	CT-1	CT-II	TOTAL			
Subject Code:	CE07TPE05E	3	0	0	15	15	30	70	100	3
Subject:	Construction Projects Planning & Systems									

Course Learning Objectives:

- To understand the project management and different scheduling techniques.
- To expertise in PERT network analysis.
- To learn CPM network analysis and compared with PERT.
- To understand time-cost analysis and resource scheduling.
- To understand the factor for equipment selection and cost of owing and operating and expertise in evaluation and analysis of different equipment life.

Course Content:

UNIT 1: Introduction: Objectives and functions of project management, project feasibility reports, Planning for construction projects: Steps, factors, advantages and disadvantages for different stake holder.

Scheduling: Scheduling Job layout and Line of balance, project management through networking, Bar Chart, Linked bar chart, Work-break down structures, Activity-on-arrow diagrams.

UNIT 2: PERT: Network analysis, critical path, probability of project.

UNIT3: CPM: Network analysis, Critical Path, Difference between CPM and PERT.

UNIT 4: Time-Cost Trade-off, Resource Scheduling

UNIT 5: Time and motion studies, Standard and special equipment, factors affecting selection of construction equipment, cost of owning and operating the construction Equipment, Equipment Life and Replacement Analysis

Text Books:

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.
2. Srinath,L.S., "PERT and CPM Priniples and Applications ", Affiliated East West Press, 2001
3. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
4. Moder J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.
5. Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi Willis., E.M., "Scheduling Construction projects", John Wiley and Sons 1986.
6. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985.

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

- To apply the knowledge in managing and handling of different civil engineering project and also able to schedule the project.

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- To do PERT analysis and able to find the project completion time and its probability.
- To do CPM analysis and able to find the project completion time and compare with PERT analysis.
- To do cost and time analysis and also resource allocation, scheduling and crashing for different activities of the network.
- To apply the knowledge in equipment selection and able to find cost of owing and operating and able to find the equipment life, which help in comparisons of different equipments.

SYLLABUS
(SEMESTER-VII)

Subject Code:	CE07TOE02X	CREDITS:3			SESSIONAL - TA			ESE
Subject:	Open Elective -2X	L	T	P	CT 1	CT 2	TOTAL	70
		3	-	-	15	15	30	

Open Elective-2A or Open Elective-2B or Open Elective-2C or Open Elective 2D-	Any one subject to be Selected from the Professional Electives

Open Elective-2 (OE Group-2)

CE07TOE02A	Artificial Neural Network
CE07TOE02B	Economic Policies in India
CE07TOE02C	History of Science and Engineering
CE07TOE02D	Engineering Risk-Benefit Analysis

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SYLLABUS	(SEMESTER VIII)	Periods Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL	70	100	3
Subject Code:	CE0/TOE02A	3	0	0	15	15	30			
Subject:	Artificial Neural Network									

Course Learning Objectives:

1. To provide an introduction to the field of artificial neural networks
2. To Study Basic learning algorithms: the back propagation algorithm, self-organization learning etc.
3. Model a Neuron and Express both Artificial Intelligence and Neural Network
4. To promote further independent learning on the topics of artificial neural networks
5. To learn Supervised and unsupervised Learning and Self-organization Feature Map.

Course Content:

UNIT-1 Introduction: Biological Neuron – Artificial Neural Model - Types of activation functions – Architecture: Feedforward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem. XOR Problem, Multilayer Networks, Learning, Learning Algorithms, Error correction, and Gradient Descent Rule Learning objective of TLNs, Perceptron Learning Algorithm, Perceptron Convergence Theorem.

UNIT–2 Supervised Learning: Perceptron learning and Non Separable sets, α-Least Mean Square Learning, MSE Error surface, Steepest Descent Search, μ-LMS approximate to gradient descent, Application of LMS to Noise Cancelling, Multi-layered Network Architecture, Backpropagation Learning Algorithm, Practical consideration of BP algorithm.

UNIT-3 Support Vector Machines and Radial Basis Function: Learning from Examples, Statistical Learning Theory, Support Vector Machines, SVM application to Image Classification, Radial Basis Function Regularization theory, Generalized RBF Networks, Learning in RBFNs, RBF application to face recognition.

UNIT- 4 Attractor Neural Networks: Associative Learning Attractor Associative Memory, Linear Associative memory, Hopfield Network, application of Hopfield Network, Brain State in a Box neural Network, Simulated Annealing, Boltzmann Machine, Bidirectional Associative Memory.

UNIT- 5 Self-organization Feature Map: Maximal Eigenvector Filtering, Extracting Principal Components, Generalized Learning Laws, Vector Quantization, Self-organization Feature Maps, Application of SOM, Growing Neural Gas.

Text Books:

1. .E.Rich and K.Knight ,Artificial Intelligence ,Forty Sixth Edition Tata McGrawHill,2007
2. D.W. Patterson,Introduction to Artificial Intelligence and Expert Systems, Tenth Edition ,Prentice Hall of India,2001
3. Klaus Obermayer and Terrence J. Sejnowski, Self-Organizing Map Formation, October 2001
4. Daniel J. Amit , Modeling Brain Function, 1989, Cambridge University Press.

Course Outcomes- The students would have learnt:

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CO1: Model Neuron and Neural Network, and to analyse ANN learning, and its applications.
CO2: Able to solve the problem of Supervised Learning.
CO3: can able to apply SVM for image classification .
CO4: Evaluate a practical solution obtained using neural networks.
CO5: Can able to use Self-organization Feature Map.

SYLLABUS	(SEMESTER VII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE07TOE02B	L	T	P	CT-I	CT-II	TOTAL	70	100	3
Subject:	Economic Policies in India	3	0	0	15	15	30			

Course Learning Objectives: The course seeks to equip students with sector-specific knowledge and skills to analyze key economic issues and policy documents. It will also enable them to relate theoretical frameworks of macroeconomics and microeconomics to the Indian context.

Course Content:

UNIT-1 Macroeconomic policies and their impact: fiscal policy; financial and monetary policies.

UNIT-2 Agriculture: policies and performance; production and productivity; credit; labor markets and pricing; land reforms; regional variations.

UNIT-3 Industry: policies and performance; production trends; small scale industries; public sector; foreign investment, labor regulation

UNIT- 4 Services and trade: trends and performance, trade and investment policy

UNIT- 5 Indian development experience: a critical evaluation of growth, inequality, poverty and competitiveness, pre-and post-reform eras

Text Books:
1. Dutt Rudder and K.P.M Sunderam (2001): Indian Economy, S Chand & Co. Ltd. New Delhi.
2. Mishra S.K & V.K Puri (2001) "Indian Economy and –Its development experience", Himalaya Publishing House.
3. KapilaUma: Indian Economy: Policies and Performances, Academic Foundation
4. Bardhan, P.K. (9th Edition) (1999), The Political Economy of Development in India, Oxford University Press, New Delhi.

Course Outcomes-
Students will have the capability to understand government policies and will enable informed participation in economic decision making, thus improving their employment prospects and career advancement.

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5. Accident Precursor Analysis and Management - Reducing Technological Risk Through Diligence, National Academy of Engineering, the National Academies Press, Washington, DC, 2004.

Course Outcomes:
On the completion of this course, the student will be able to:
1. Understand and apply engineering risk analysis in several fields.
2. Evaluate the Reliability Analysis of Systems.
3. Formulate a decision analysis for models and systems.

Propose the data requirements for risk analysis in simulation models.

SYLLABUS		(SEMESTER VII)				
Subject Code:	CE07PPC08	CREDITS: 2			Internal Assessment (IA)	ESE
		L	T	P	IA	
Subject:	Seminar	-	-	3	50	-

SYLLABUS		(SEMESTER VII)				
Subject Code:	CE07PPC09	CREDITS:4			Internal Assessment (IA)	ESE
		L	T	P	IA	
Subject:	Minor project	-	-	6	60	40

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SYLLABUS		(SEMESTER VII)				
Subject Code:	CE07PPC10	CREDITS:4			Internal Assessment (IA)	ESE
Subject:	Estimation and Costing	L	T	P	IA	
		-	-	3	30	20

Course Objective

1. IImpart the knowledge of estimating and costing for civil engineering structures
2. Prepare and Evaluate the

1. Estimation of building (long wall and short wall method)
2. Estimation of building (center line method)
3. Analysis of rate for concrete work
4. Analysis of rate for brick work
5. Analysis of rate for plaster work
6. Estimate quantity of reinforcement
7. Preparation for approximate estimate for road project
8. Estimating cost of building on plinth area method

Course Outcome

1. Prepare quantity estimates for buildings, Roads as per specification
2. Draft detailed specifications and work out rate analysis for all the works related to civil engineering projects
3. Ascertain the quantity of material required for civil engineering work as per specifications
4. Prepare cost estimatefor civil engineering work.

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SEMESTER VIII

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE08TPC15	L	T	P	CT-I	CT-II	TOTAL	70	100	03
Subject:	Earthquake Resistant Design of Structures	3	0	0	15	15	30			

Course Learning Objectives:

i. To introduce Engineering seismology and functional planning and the effects of configurations of buildings for earthquakes.

ii. To introduce the requirements for conceptual design for earthquake safety and the analysis methods.

iii. To acquaint with IS code-based design lateral forces for earthquake resistant design of structures.

iv. To identify the behavior of structural and nonstructural elements for seismic resistance and impart design of shear walls.

v. Introduce Capacity Design as per IS 13920: 2016, Capacity Design for Beams, Columns, beam column joints and structure as a whole.

Course Content:

UNIT 1: Engineering Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics- Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales-Energy released-Earthquake measuring instruments-Seismoscope, Seismograph, accelerograph-Characteristics of strong ground motions- Seismic zones of India. Introduction-Functional Planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength - Seismic design requirements-regular and irregular configurations-basic assumptions.

UNIT 2: Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. Twisting of Buildings – Flexible Building and Rigid Building Systems. Strength and Stiffness – Ductility – Definition – Ductility Relationships – Choice of construction Materials – Unconfined Concrete & Confined Concrete – Masonry, Steel Structures. Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method – Modal Analysis Torsion.

UNIT 3: Introduction to Earthquake Resistant Design Seismic Design Requirements and Methods. RC Buildings – IS Code based Method. - Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear–.

UNIT 4: Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements – Failure Mechanism of Nonstructural Elements – Effects of Nonstructural Elements on Structural System – Analysis – Prevention of Damage to Nonstructural Elements – Isolation of Non-Structures, Design of Shear walls. Classification according to Behavior, Loads in Shear walls, Design of Rectangular and Flanged Shear walls.

UNIT 5: Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting Ductility-

Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting, Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns-Case studies.

Text Books/References:

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons.
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.
3. Earthquake Resistant Design for Engineers & Architects by Dowrick, D. J., John Willey & Sons, 2nd Edition, 1987.
4. Earthquake Resistant Design of structures by S. K. Duggal, Oxford University Press.
5. Concrete Structures in Earthquake Regions by Booth, E., Longman Higher Education, 1994.
6. Reinforced Concrete Structures by Park, R. & Paulay, T., John Willey & Sons, 2nd Edition, 1975.
7. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nem chand & Bros.
8. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial College Press.
9. Design of Reinforced Concrete Structures by N. Subramanian, Oxford University Press.
10. Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd.
11. Handbook on Seismic Analysis and Design of Structures by Farzad Naeim, Kluwer Academic Publisher, 2001.

Reference Codes:

1. IS 1893 (Part-1): 2016, "Criteria for Earthquake Resistant – Design of structures." B.I.S., New Delhi.
2. IS 4326: 2013, "Earthquake Resistant Design and Construction of Building", Code of Practice, B.I.S., New Delhi.
3. IS 13920: 2016, "Ductile design and detailing of reinforced concrete structures subjected to seismic forces" – Code of practice, B.I.S., New Delhi.

Course Outcomes:

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

a. Identify the causes of earthquakes, its propagation, and measurement and can quantify the hazard at the location of the structure and quantify the forces based on the source.
b. Adopt a suitable structural system to resist earthquake forces considering safe behavior of structural and nonstructural elements with different material properties and load combinations.
c. Design seismically safe structures in accordance with the provisions of Indian code IS 1893.
d. Implement design of shear wall elements for earthquake safety of structures.
e. Design or retrofitting of structures by detailing the elements, beams, columns, beam-column joints as per capacity-based design adopting ductility provisions as per IS 1893, IS 13920, to mitigate the vulnerability of earthquake damages of elements and structures.

5. Hadlock, C.R., Mathematical Modelling in the Environment. The Mathematical Association of America.
6. J.L. Schnoor, Environmental Modeling Fate and Transport of Pollutants in Water, Air and Soil, John Wiley & Sons Inc., New York, 1996.
7. Lohani B. N. and North A. M. Environmental Quality Management, South Asian Publishers Pvt. Ltd., New Delhi, 1984.
8. Rastogi A.K. (2008) Numerical Groundwater Hydrology, Penram International Publishing Pvt. Ltd., Bombay.
9. Steven C. Chapra, Surface Water Quality Modeling, Tata McGraw-Hill Companies, Inc., New Delhi, 1997.
10. Thomann, R.V. and Mueller, J.A. (1987) Principles of Surface Water Quality Modelling and Control, Harper &
11. Wainwright, J and Mulligan, M., Environmental Modelling Finding simplicity in complexity, John Wiley and Sons Inc., New York, 2013.

Course outcomes:

CO1: To provide basic knowledge on mathematical and statistical concepts required for mode development.
CO2: To Develop models based on the mass-balance approach
CO3: To Perform data exploration and visualization
CO4: To Predict the impact of the of external waste loading on different water bodies
CO5: To Design and model of air & water quality and its applicability in the Control of pollution
CO6: To Determine and evaluate the water quality index

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE08TPE06E							70	100	03
Subject:	Construction Equipment & Automation	3	0	0	15	15	30			

Course Learning Objectives:

- To understand the factor for equipment selection and cost of owning and operating.
- To expertise in evaluation and analysis of different equipment life.
- To learn the engineering fundamentals of excavating equipments.
- To learn fundamentals of the pile driving and lifting equipments.
- To understand the concreting equipments and techniques and the advanced instruments like GIS etc. In construction.

Course Content:

UNIT 1: Introduction to course & Planning Process of Equipment Factors affecting equipment selection. Cost of Owning and Operating Construction Equipment Elements of ownership cost, Depreciation accounting methods, Cost Estimation using Average Annual Investment method. Use of compounding factors in Equipment cost estimation based on time value method. Operating cost components, Caterpillar method and Peurifoy method.

UNIT 2: Equipment life and replacement analysis determination of economic life of equipment. Minimum cost method, Maximum profit method, Time value concept

UNIT 3: Engineering Fundamentals of Moving Earth Machine Performance-Required power. Available power, Usable power, Performance chart.

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Earthmoving and Excavating equipment Bull Dozers, Scrapers, Front end loaders, Excavators, Trucks, Productivity estimation and balancing of interdependent machines

UNIT 4 Piles and Pile driving equipment Pile types, pile hammers, principle of pile hammer, factors affecting pile hammer selection. Types of pile hammer: Drop hammer, Single acting and double acting steam hammers, Diesel hammers, Vibratory pile drivers.

Lifting equipment Cranes, Principles of lifting mechanism of crane, types of cranes-lattice boom crawler crane, lattice boom truck mounted cranes, telescopic boom crane, Tower cranes, Factors affecting lifting capacity of crane, Range diagram.

UNIT 5 Concreting equipment Steps in concrete making process, types of concrete mixer machines, Methods of handling and transporting concrete, Consolidation of concrete, Methods of finishing and curing of concrete.

Aerial and Satellite Surveying: GIS and GPS in Construction; use of Drones for spread out sites; Use of robots for repetitive activities.

Reference Books:
1. Construction Planning and Equipment - R.L.Peurifoy - Tata McGraw Hill, New Delhi
2. Construction Equipment & Planning and Application. - Mahesh VermaArtec Publication.
3. GPS satellite surveying- Alfred Leick, Wiley

Course Outcomes- At the end of the course students will be able to:
• To apply the knowledge in equipment selection and able to find cost of owning and operating.
• To find the equipment life, which help in comparisons of different equipments.
• To select the earth excavating equipment on the basis of output and different selection factors.
• To decide the pile driving equipment and lifting equipment based on safe working load determination
• To decide the concreting equipment based on the construction project and relate the knowledge on Surveying to the new frontiers of science like GIS, GPS and Remote Sensing.

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Text Books/References:

1. Grigg, Neil, Infrastructure engineering and management, Wiley, (1988).
2. Haas, Hudson, Zaniewski, Modern Pavement Management, Krieger, Malabar, (1994).
3. Hudson, Haas, Uddin, Infrastructure management: integrating design, construction, maintenance, rehabilitation, and renovation, McGraw Hill, (1997).
4. Munnell, Alicia, Editor, Is There a Shortfall in Public Capital Investment Proceedings of a Conference Held in June (1990).
5. World Development Report 1994: Infrastructure for Development (1994).
6. Zimmerman, K. and F. Botelho, "Pavement Management Trends in the United States," 1st European Pavement Management Systems Conference, Budapest, September (2000).

Course Outcomes:

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

a. Design an integrated framework for infrastructure planning and management.
b. Analyse the strategies for Infrastructure Project implementation.
c. Perform Infrastructure modelling and Life Cycle Analysis Techniques.

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE08TPE07B	3	0	0	15	15	30	70	100	03
Subject:	Traffic Engineering									

Course Objectives:

1. To develop the basic knowledge of Traffic Engineering.
2. To define Traffic flow characteristic.
3. To develop knowledge about traffic control system.
4. To understand the parking and highway lighting.
5. To develop the knowledge of different pollution occurring and its remedial measures.

Course Content:

UNIT 1: Introduction To Traffic Engineering-Definition and Scope of Traffic Engineering. Functions, Organization and Importance of Traffic Engineering. Elements of Traffic Engineering. Vehicular, Driver and Road Characteristics.

UNIT 2: Traffic Flow Parameters -Traffic flow parameters: volume, density, speed and related terms. Relationship between various parameters, Study and analysis of vehicle arrivals, headways, and gap acceptance in traffic flow. Highway Capacity and Level of Service.

UNIT 3: Traffic Control-Definition, functions and importance of traffic control. Methods of traffic control. Traffic signs, Road Markings, and other traffic controls aids. Traffic Regulation. Intersection control and design of traffic signals.

UNIT 4: Parking- Parking survey, types of parking, design of parking places. Lighting-Lantern arrangement, Types of lamp.

UNIT 5: Traffic and Environment- Pollution problems of cities, Detrimental effects of traffic on environment, Noise pollution, Air pollution, Vibration, Environmental Impact Assessment.

Text Books:
1. Kadialy L.R., "Traffic Engg. and Transport Planning", 8th edition, Khanna Publishers.
2. Partha chakrobarty & Animesh Das, "Principles of Transportation Engineering", PHI.
3. C. Jotin Khisty, B. Kent Lal, "Transportation Engineering – An Introduction", PHI.

Course Outcomes:
At the end of this course the student will be able to
1. estimate the basic characteristics of traffic stream
2. conduct traffic flow studies and analyze traffic data
3. design traffic signal systems
4. analyse the parking and highway lighting
5. manage controlling the different pollution occurring in road.

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE08TPE07C	L	T	P	CT-1	CT-II	TOTAL	70	100	03
Subject:	Repair and Rehabilitation of Structures	3	0	0	15	15	30			

Course learning objectives:
- To learn about various distress and damages in concrete and steel structures.
- To learn about assess the damage to structures using various methods.
- To study the various methods of rehabilitation.
- To study the various methods of repairs of structures.
- To learn importance of repair and maintenance of structures.

Course Content:

UNIT 1: Aging of structures – performance of structures – need for rehabilitation.
Distress in concrete / steel structures – damage – source – cause – effects – case studies.

UNIT 2: Damage assessment and Evaluation models – Damage testing methods – NDT – Core samples.

UNIT 3: Rehabilitation methods – grouting – detailing – imbalance of structural stability – case studies.

UNIT 4: Methods of repairs – shotcreting – guniting – epoxy – cement mortar injection – crack ceiling.

UNIT 5: Repair and maintenance of buildings – IS standards – Bridge repairs – Seismic strengthening.

Reading/Textbooks:
1. Diagnosis and treatment of Structures in Distress – R N Raikar.
2. Bridge Rehabilitation – V K Raina.
3. Building Failures – Diagnosis and Avoidance – W H Ranson.
4. Forensic Engineering – Kennethe and Carper.

Course outcomes:
Upon completion of this course students will be able to:

- Analyze distress and damages in concrete and steel structures.
- Understand about assess the damage to structures using various methods.

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Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

DEPARTMENT OF CIVIL ENGINEERING B. TECH. FOURTH YEAR SYLLABUS W.E.F 2021-22

SYLLABUS	(SEMESTER-VIII)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
Subject Code:	CE08TOE03A	3	0	0	15	15	30	70	100	03
Subject:	Management Information System									

Course objectives:

- To study about the role of management information technology in organizations.
- To study about the fundamental principles of computer-based information system analysis.
- To learn about the design and develop an understanding of the principles and techniques used.
- To study about concept of data moulding and data flow diagrams of information system.
- To learn about the fundamental principles and concept of decision-making process and security system.

Course Content:

UNIT 1: Management and System- Advance in management, the process of MIS development, MIAS organization, Information dynamics.

UNIT 2: Planning, Design and implementation of MIS, Strategic planning, MIS design- Group design concepts, Acquiring information system.

UNIT 3: System life cycle-Information flow, Entity relationship modelling, data modelling, detailed process analysis, data flow diagrams.

UNIT 4: Decision making system with MIS, System concepts for MIS.

UNIT 5: Data information and communication, problem solving and decision making, security, control and failure, Future trends in MIS.

TEXT BOOKS:

1. Management Information Systems, by S. Sadagopan, PHI Learning Pvt. Ltd
Management Information Systems By. Chatterjee, PHI Learning Pvt. Ltd
Management Information Systems (11th Edition), by Ken Laudon and Jane Laudon

Course outcomes:

Upon completion of this course students will be able to:

- To understand the role of management information technology in organizations.
- To understand the fundamental principles of computer-based information system analysis.
- To design and develop an understanding of the principles and techniques used.
- To understand the concept of data moulding and data flow diagrams of information system.
- To understand the fundamental principles and concept of decision-making process and security system.

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE08PPC11	L	T	P	CT-1	CT-II	TOTAL	80	200	07
Subject:	Major Project	0	0	14			120			

SYLLABUS (SEMESTER-VIII)		Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
Subject Code:	CE08PPC12	L	T	P	CT-1	CT-II	TOTAL	20	50	1.5
Subject:	Structural Detailing Lab	0	0	3			30			

Course Learning Objective:
- To learn detailing of structural steel members (tension & compression member, steel connection)
- To study in detail and draw components of industrial building.
- To understand reinforcement detailing of RCC beams and column footings.
- To know about distribution of reinforcement in slab, stair case, water tank and retaining wall.

Course Content:

Part A: (Steel Structures)
1. Detailing of Tension Members.
2. Detailing of Built-up Compression Members.
3. Detailing of Column Bases.   4. Detailing of connections.
5. Detailing of an Industrial shed.
6. Detailing of a Plate girder/Gantry girder.

Part B: (Reinforced Concrete Structures)
1. Details of reinforcement in RCC Continuous Beams.
2. Details of reinforcement for RCC column with isolated footings.
3. Details of reinforcement in a one way/two-way slabs.
4. Details of reinforcement in stair cases.
5. Detailing of Combined footings.
6. Detailing of Retaining walls/Water Tanks.

Course Outcome:
- To sketch detailed drawing of structural steel beams, columns and connections.
- To understand design components of industrial shed and gantry girder.
- To sketch reinforcement detailing of RCC member as per IS code provision.
- To draw accurate arrangement of reinforcement in slab, stair case, water tank and retaining wall.