



## 1.1.2

### List of Employability/ Entrepreneurship/ Skill Development Courses with Course Contents

Colour Codes		
Employability Contents	Green	
Entrepreneurship Contents	Light Blue	
Skill Development Contents	Pink	
Name of the Subjects/Related to all three Components (Employability/ Entrepreneurship/ Skill Development)	Yellow	



**List of Courses Focus on Employability/ Entrepreneurship/  
Skill Development**

**Department : Civil Engineering**

**Programme Name : B.Tech.**

**Academic Year : 2020-21**

**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.	CE03TBS05	ENGINEERING MATHEMATICS-III
18.	CE03TPC01	STRENGTH OF MATERIALS
19.	CE03TPC02	FLUID MECHANICS-I
20.	CE03TPC03	BUILDING MATERIALS & CONSTRUCTION
21.	CE03TPC04	SURVEYING & GEOMATICS
22.	CE03PPC01	SURVEY LAB
23.	CE03PPC02	FLUID MECHANICS LAB
24.	CE03PES06	COMPUTER AIDED CIVIL ENGG. DRAWING
25.	CE04THS04	ENGINEERING ECONOMICS
26.	CE04TPC05	CONCRETE TECHNOLOGY
27.	CE04THS05	PROFESSIONAL PRACTICE, LAW & ETHICS
28.	CE04TPC06	STRUCTURAL ANALYSIS-I



29.	CE04TPC07	FLUID MECHANICS-II
30.	CE04THS06	EFFECTIVE TECHNICAL COMMUNICATION
31.	CE04PHS01	EFFECTIVE TECHNICAL COMMUNICATION LAB
32.	CE04PPC03	MATERIAL TESTING 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.	CE06TOE01A	METRO SYSTEMS AND ENGINEERING
46.	CE06TOE01B	RURAL TECHNOLOGY AND COMMUNITY DEVELOPMENT
47.	CE06PPC06	ENVIRONMENTAL ENGINEERING LAB
48.	CE06PPC07	COMPUTER APPLICATION IN CIVIL ENGG. LAB
49.	CE7TPC17	WATER RESOURCES ENGINEERING-II
50.	CE7TPE2A	DESIGN OF PRESTRESSED CONCRETE
51.	CE7TPE4A	GROUND WATER HYDROLOGY
52.	CE7TPE5C	RAILWAY ENGINEERING
53.	CE7TOE2D	QUALITY CONTROL ASSURANCE AND SAFETY IN
54.	CE7LPS01	SEMINAR
55.	CE7LPS02	MINOR PROJECT
56.	CE8TPC18	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
57.	CE8TPE6C	BRIDGE ENGINEERING
58.	CE8TPE6E	CONSTRUCTION EQUIPMENT & TECHNIQUES
59.	CE8TPE7A	AIR AND WATER TRANSPORTATION
60.	CE8TOE3A	MANAGEMENT INFORMATION SYSTEM
61.	CE8LPS03	MAJOR PROJECT
62.	CE8LPC07	STRUCTURAL DETAILING LAB



## 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	
<b>THEORY</b>									
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	-	-	-	-	-
<b>TOTAL</b>			<b>17</b>	<b>3</b>	<b>-</b>	<b>150</b>	<b>350</b>	<b>500</b>	<b>18</b>
<b>PRACTICALS</b>									
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
<b>TOTAL</b>			<b>-</b>	<b>-</b>	<b>6</b>	<b>90</b>	<b>60</b>	<b>150</b>	<b>3</b>
<b>GRAND TOTAL</b>			<b>17</b>	<b>3</b>	<b>6</b>	<b>240</b>	<b>410</b>	<b>650</b>	<b>21</b>

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	
<b>THEORY</b>									
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
<b>TOTAL</b>			<b>14</b>	<b>3</b>	<b>-</b>	<b>150</b>	<b>350</b>	<b>500</b>	<b>17</b>
<b>PRACTICALS</b>									
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
<b>TOTAL</b>			<b>2</b>	<b>-</b>	<b>9</b>	<b>120</b>	<b>80</b>	<b>200</b>	<b>7</b>
<b>GRAND TOTAL</b>			<b>16</b>	<b>3</b>	<b>9</b>	<b>270</b>	<b>430</b>	<b>700</b>	<b>24</b>

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.





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			
Subject Code:	MA201TBS01							70	100	04
Subject:	MATHEMATICS-I	3	1	-	15	15	30			

**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, 9<sup>th</sup> 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, 35<sup>th</sup> 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, 9<sup>th</sup> Edition, John Wiley & Sons, 2006.





**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			
<i>Subject Code:</i>	CY201TBS02/ CY202TBS04							70	100	04
<i>Subject:</i>	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  $\lambda_{max}$  of conjugated dienes &  $\alpha, \beta$ -unsaturated carbonyl compound, various shifts in  $\lambda_{max}$  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:**

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



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

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

**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 1 coordinates). Work-kinetic energy, power, potential energy. Impulse-momentum (linear, angular); Ir (Direct and oblique).

**UNIT-5:** Introduction to Kinetics of Rigid Bodies covering, Basic terms, general principles in dyna 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, 4<sup>th</sup> Edition, Prentice Hall
2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I - Statics, Vol II, - Dynamics, 9<sup>th</sup> Ed, Tata McGraw Hill
3. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press
4. Shames 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





**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			
<i>Subject Code:</i>	CS201TES02 / CS202TES04							70	100	03
<i>Subject:</i>	COMPUTER PROGRAMMING	3	0	-	15	15	30			

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

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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.



**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			
<i>Subject Code:</i>	CM201TES03 / CM202TES05							70	100	03
<i>Subject:</i>	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 & 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. Sathesh 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.





**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	IA	MSE	TOTAL			
<i>Subject Code:</i>	CY201PBS01 / CY202PBS02							20	50	01
<i>Subject:</i>	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<sub>4</sub> solution as an intermediate.
3. To determine the concentration of hypo solution (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>.5H<sub>2</sub>O) 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  $\lambda_{max}$  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





**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	IA	MSE	TOTAL			
<i>Subject Code:</i>	CE2011ES01/ CE202PES04							20	50	1
<i>Subject:</i>	ENGG MECHANICS LAB	-	-	2	30	--	30			

**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



**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	IA	MSE	TOTAL			
<i>Subject Code:</i>	CS201PES02 / CS202PES05									
<i>Subject:</i>	COMPUTER PROGRAMMING LAB	-	-	2	30	--	30	20	50	01

**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:

**Lab 1:** 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





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

SYLLABUS	Periods/ Subject Code:	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
	MA202TBS03							70	100	4
<b>Subject:</b>	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, 9<sup>th</sup> 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, differential equations ,oxford publications





**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	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	PH201TBS02 / PH202TBS04							70	100	04
<i>Subject:</i>	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 (1-Dimensional)

**Textbooks/References:**

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





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

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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



**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	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	EC201TES01 / EC202TES04							70	100	04
<i>Subject:</i>	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	3	1	-	15	15	30			

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

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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 Nashlky, "Electronics devices and circuit theory", Pearson 11<sup>th</sup> 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.



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

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

**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 Heasley. 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





**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			
<i>Subject Code:</i>	PH201PBS01/ PH202PBS02							20	50	01
<i>Subject:</i>	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:**

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





**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			
<i>Subject Code:</i>	ME201PES01/ ME202PES03									
<i>Subject:</i>	ENGINEERING GRAPHICS	1	0	3	30	--	30	20	50	3

**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, Involute 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, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kanniah (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.





**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			
<i>Subject Code:</i>	ME201PES02 / ME202PES04									
<i>Subject:</i>	WORKSHOP TECHNOLOGY & PRACTICES	1	0	2	30	--	30	20	50	2

**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 publishers private limited, Mumbai.
2. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4<sup>th</sup> edition, Pearson Education India Edition, 2002.
3. Gowri P. Hariharan and A. Suresh Babu, "Manufacturing Technology - I" Pearson Education, 2008.
4. (iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4<sup>th</sup> 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



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

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

**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





DEPARTMENT OF CIVIL ENGINEERING B.TECH. SECOND YEAR SYLLABUS W.E.F 2019-20

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

**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  $\chi^2$  (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 :-Trapezoidal 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) Higher Engg. Mathematics by Dr. B.S. Grewal- Khanna Publishers,
- 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 Vidyarthi Griha Prakashan, Pune.,
- 9) JAIN & IYNGAR Numerical Methods for Scientific and Engineering Computations.





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- 10) RAO G.S. Numerical Analysis.
- 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, 2<sup>nd</sup> Edition, Reprint 2012.
- 14) S. S. Sastry, Introduction methods of Numerical Analysis, PHI, 4<sup>th</sup> 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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE03TPC01									
<i>Subject:</i>	Strength of Materials	3	1	0	15	15	30	70	100	04

**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: Lamé'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 (Dhanpat Rai Publications)
7. Strength of Materials (Part-I) – Timoshenko (CBS Publishers)

**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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE03TPC02							70	100	03
<i>Subject:</i>	Fluid Mechanics- I	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 and non-Newtonian Fluid Statics: Pressure density height relationship, pressure measurement by Manometer, Pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, metacentric height.

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

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

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

**UNIT -5:** Flow through mouthpieces and orifices: Hydraulic coefficients of orifice, flow through rectangular orifice, mouthpieces, Borda's mouthpieces. Notches and Weirs: Rectangular, triangular, trapezoidal notches and weir, Cipolletti 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 Douglas (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
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE03TPC03							70	100	03
<i>Subject:</i>	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 (Umesh Publication)
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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SYLLAUS	(SEMESTER-III)	Periods / Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE03TPC04							70	100	03
<i>Subject:</i>	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.  
**TACHEOMETRY:** 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





**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
		L	T	P	IA	MSE	TOTAL	
<i>Subject Code:</i>	CE03PPC01							
<i>Subject:</i>	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
- Tacheometry & 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-visible 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 Vidyarthi GrihaPrakashan, 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
		L	T	P	IA	MSE	TOTAL	
<i>Subject Code:</i>	CE03PPC02							
<i>Subject:</i>	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°
9. To determine the coefficient of discharge Cd V Notch - 60°
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	
<i>Subject Code:</i>	CE03PES06							
<i>Subject:</i>	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:**

- Basic drawing for symbols used in building drawing
- Drawing of different Foundation
- Drawing of different masonry wall
- Drawing of masonry bonds
- Drawing of trusses
- Drawing of retaining Wall
- Drawing of Stair case, Doors and Windows
- Plan, elevation and section of Residential Building
- Plan, elevation and section of Public Building like school, college etc.
- Detailing of beam, column and slab

**Text Books / References:**

- N Krishna Raju, Structural Design and Drawing, Second Edition, Universities Press (India), Private Limited, Hyderabad, 2009
- 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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE04THS04									
<i>Subject:</i>	Engineering Economics	3	0	0	15	15	30	70	100	03

**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 Engir Economics – Engineering efficiency, Economic efficiency, Scope of engineering economics- Elerr 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 p 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), 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 EconomicsI, Prentice Hall of India Ltd, New Delhi, 2001.
2. Suma Damodaran, — Managerial economicsI, Oxford university press 2006.

**REFERENCES:**

1. Chan S.Park, —Contemporary Engineering EconomicsI, Prentice Hall of India, 2002.
2. Donald.G. Newman, Jerome.P.Lavelle, —Engineering Economics and analysisI Engg. Press, Texas,
3. Degarmo, E.P., Sullivan, W.G and Canada, J.R, —Engineering EconomyI, Macmillan, New York, 15
4. Grant.E.L., Ireson.W.G., and Leavenworth, R.S. —Principles of Engineering EconomyI, Ronald New York, 1976.
5. Smith, G.W., —Engineering EconomyI, Iowa 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 approachI 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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE04TPC05							70	100	03
<i>Subject:</i>	<b>Concrete Technology</b>	3	0	0	15	15	30			

**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			
<i>Subject Code:</i>	CE04THS05									
<i>Subject:</i>	Professional Practice, Law & Ethics	2	0	0	15	15	30	70	100	02

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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE04TPC06	L	T	P	CT-I	CT-II	TOTAL	70	100	04
<i>Subject:</i>	Structural Analysis-I	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 (Castigliano 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 forces 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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE04TPC07	L	T	P	CT-I	CT-II	TOTAL	70	100	03
<i>Subject:</i>	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. Jagdish Lal (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.



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

#### 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.





**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, Mera 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	
<b>Subject Code:</b>	CE04PHS01							
<b>Subject:</b>	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.)



**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	
<i>Subject Code:</i>	CE04PPC03							
<i>Subject:</i>	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



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

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

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
						CT-I	CT-II	Total			
		<b>Theory</b>	L	T	P						
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
		<b>Practical</b>									
1	CE05PPC04	Highway Engineering Lab	0	0	3	1	1	30	20	50	1.5
2	CE05PPC05	Soil Mechanics Lab	0	0	3	1	1	30	20	50	1.5
										<b>Total Credits</b>	20

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.VI SEMESTER CIVIL ENGINEERING**  
**W.E.F. 2020-21 (EVEN SEMESTER)**

S. No	Subject Code	Subjects	period/Week			Scheme of Evaluation				Grand Total	Credits
						Internal Assessment (IA)			ESE		
						CT-I	CT-II	Total			
		<b>Theory</b>	L	T	P						
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*									
		<b>Practical</b>									
1	CE06PPC06	Environmental Engineering Lab	0	0	3	1	1	30	20	50	1.5
2	CE06PPC07	Computer Applications in Civil Engg. Lab	0	0	3	1	1	30	20	50	1.5
										<b>Total Credits</b>	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.





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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05TPC08									
<i>Subject:</i>	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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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05TPC09									
<i>Subject:</i>	Structural Analysis - II	3	1	0	15	15	30	70	100	04

**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:** Slope 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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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05TPC10									
<i>Subject:</i>	Highway Engineering	3	0	0	15	15	30	70	100	03

**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



**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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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-1	CT-II	TOTAL			
<i>Subject Code:</i>	CE05TPC11									
<i>Subject:</i>	Soil Mechanics - I	3	0	0	15	15	30	70	100	03

**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, Boussinesq 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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05TPC12									
<i>Subject:</i>	Environmental Engineering - I	3	0	0	15	15	30	70	100	03

**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.



**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 Education)

**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 relation to public health.
- To be able to design and evaluate water supply project alternatives on basis of selection criteria.





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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05PPC04									
<i>Subject:</i>	Highway Engineering Lab	0	0	3	-	-	30	20	50	1.5

**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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SYLLABUS	(SEMESTER-V)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE05PPC05							20	50	15
<i>Subject:</i>	Soil Mechanics-Lab	0	0	3	-	-	30			

**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- $\phi$  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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TPC13									
<i>Subject:</i>	Water Resources Engineering -I	3	0	0	15	15	30	70	100	03

**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 its 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 student shall 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 and Flood Control of river.
- To find out capacity of reservoir and use Flood Routing principle for Reservoir Planning.





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SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TPC14									
<i>Subject:</i>	Environmental Engineering - II	3	0	0	15	15	30	70	100	03

**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 Tricking 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.



**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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SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TPC15									
<i>Subject:</i>	Design of Steel Structures	3	1	0	15	15	30	70	100	04

**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. J.

6. Design of Steel Structures- S. Ramamrutham

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

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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SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TPC16									
<i>Subject:</i>	Soil Mechanics - II	3	0	0	15	15	30	70	100	03

**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, Meyerhof'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. Chattopadhyay & 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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SYLLABUS	(SEMESTER-VI)	Periods/ Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	<b>CE06TPE01D</b>									
<i>Subject:</i>	Railway Engineering (Professional Elective -1X)	3	1	0	15	15	30	70	100	04

**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.



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

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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SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TOE01A									
<i>Subject:</i>	Metro Systems and Engineering (Open Elective -IX)	3	0	0	15	15	30	70	100	03

**Course Learning Objectives:**

- To introduce concepts of different types of mode of transportation and associated facilities.
- To familiarize the students with the concepts of 1-D and 2-D signals, design of 1-D and 2-D filters and various aspects of image processing.
- To study town planning concepts and theories.
- To perceive the concept of urbanization and various growth patterns.
- To study the concepts for different area planning for urban PTS.
- To understand the concept of urban transport scenario, traffic characteristics and transport development.
- To get the knowledge of advanced transportation engineering planning and management techniques.
- To understand the approach and utility of Environmental Impact Assessment for the urban infrastructural measures.

**Course Content:**

**Unit 1: Modes of Transportation:** Transportation parameters- Traffic and Transport Problems of a city, Mass transport system, Modes of transportation & characteristics, Public transport system, public private transport system, Advantages and disadvantages of Public transport system. Role of transportation in mass transportation, advanced modes.

Transportation Infrastructure- Green bays, control stations, mitigation buildings, separator lanes and safety islands.

**Unit 2: Urban Public Transport System Rapid transit systems:** BRTS, Bus Lane system, Advantages and limitations in Indian Scenario, Rail System, Types of rail system, advantages and disadvantages of rail system, sky walk and under bridge and its advantages. Advances in infrastructure.

Urban Pedestrian Safety- Skyways, Intersection subways, halt stations, crossing measures, flexibility in accessibility.

**Unit 3: ITS Background and Telemetric systems:** Definitions, features and objectives of ITS, History of ITS and its development over the world, telemetric concept, transport telemetric, telemetric structure, ITS taxonomy, ITS application areas, uses, and application overview, ITS implication through AI, ITS based regression models.

**Unit 4: ITS components, tools and strategies:** Components of user services; advanced traffic management system, advanced traveler information systems, advanced vehicle control





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system, commercial vehicle operational management, advanced public transportation system, electronic payment system, advanced rural transportation, security and safety systems, urban traffic control, benefits and limitations, traffic calming systems, freight management by ITS.

**Unit 5:** Environmental Impact Assessment: Description of proposed activity, structural audits, analysis of site selection procedure, baseline conditions / major concerns, green building and its advantages, description of potential positive and negative environmental, social, economic and cultural impacts including cumulative, regional, temporal and spatial considerations, significance of mitigation plans and monitoring plans (impacts and mitigation efforts)

**Text Books:**

1. Kadialy L.R., "Traffic Engg. and Transport Planning", 8<sup>th</sup> edition, Khanna Publishers, 2011.
2. O. Flaherty C.A., "Traffic Engineering and Transport Planning", 2006.
3. AUSTRROADS, The Implication of Intelligent Transport Systems for Road Safety, Austroads Incorporated, 1999. 2. Bob Williams, Intelligent Transport Systems Standards, Artech House Publishers, 2008.
4. Chowdhury, M. A. and Sadek, A, Fundamentals of Intelligent Transportation Systems Planning, Artech House, 2003.
5. E. Bekiaris and Y.J. Nakanishi, Economic Impacts of Intelligent Transportation Systems: Innovations and Case Studies, Elsevier/JAI, 2004. 5. IET Intelligent Transport Systems and 15th International IEEE Conference on Intelligent Transportation Systems (ITSC), 16-19 September, 2012. (<http://digital-library.theiet.org/content/journals/iet-its>)
6. J.M. Sussman, Perspectives on Intelligent Transportation Systems (ITS), Springer, 2005
7. L. Vlacic, M. Parent, F. Harashima, Intelligent Vehicle Technologies – Theory and Applications, Butterworth-Heinemann, 2010.
8. M.A. Chowdhury and A. Sadek, Fundamentals of Intelligent Transportation Systems Planning, Artech House, 2010.
9. R. Stough, Intelligent Transport Systems: Cases and Policies, Edward Elgar, 2001, Artificial Intelligence and Intelligent Transportation Systems, National Academy Press, 2010.
10. Gonzalez R. C. and Woods R. C., "Digital Image Processing", 2nd Ed., Pearson Education, 2007.
11. Jain A. K., "Fundamentals of Digital Image Processing", Prentice Hall, 2007.
12. R.R. Barthwal "Environmental Impact Assessment" New Age International, January 2012.
13. A.R. Gajbhiye & S.R. Khandeshwar N.S. Raman, "Environmental Impact Assessment", I.K. International, 2014

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

- Concepts of different types of mode of transportation and associated facilities with advanced system.
- Identify and differentiate ITS user services and its components.





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- Select and provide appropriate ITS technology to solve real-life traffic problems.
- Manage the traffic congestion by acquisition of big data using advanced devices.
- Implement the suitable ITS and services for effective transportation.
- Propose the mitigation plan for the EIA for the urban infrastructure.



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SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment (IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06TOE01B									
<i>Subject:</i>	Rural Technology and Community Development (Open Elective -IX)	3	0	0	15	15	30	70	100	03

**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, PHL 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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SYLLABUS	(SEMESTER-VI)	Periods/Week			Internal Assessment ( IA)			ESE	Grand Total	Credits
		L	T	P	CT-I	CT-II	TOTAL			
<b>Subject Code:</b>	CE06PPC06									
<b>Subject:</b>	Environmental Engineering Lab	0	0	3	-	-	30	20	50	1.5

**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:

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

**Course Outcomes**

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





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-I	CT-II	TOTAL			
<i>Subject Code:</i>	CE06PPC07									
<i>Subject:</i>	Computer Applications in Civil Engg. Lab	0	0	3	-	-	30	20	50	1.5

**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



VII SEMESTER B.TECH. (CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme					Grand Total	Credits
						Internal Assessment				E.S.E		
						L <sup>1</sup>	T <sup>2</sup>	P <sup>3</sup>	C.T. <sup>4</sup>			
Theory												
1	CE77PC17	Water Resources Engineering-II	1	0	0	10	20	10	-	60	100	3
2	CE77PE2X	Professional Elective -2X	3	1	0	10	20	10	-	60	100	4
3	CE77PE3X	Professional Elective -3X	3	0	0	10	20	10	-	60	100	3
4	CE77PE4X	Professional Elective -4X	3	0	0	10	20	10	-	60	100	3
5	CE77PE5X	Professional Elective -5X	3	0	0	10	20	10	-	60	100	3
6	CE77OE2X	Open Elective -2X	3	0	0	10	20	10	-	60	100	3
Practical												
1	CE71PS01	Seminar	0	0	1	-	-	-	-	50	50	2
2	CE71PS02	Minor project	0	0	2	-	-	-	-	60	60	4
Total Credits											25	

X\_ indicates the serial alphabet of a subject in the subject group

VIII SEMESTER B.TECH.(CIVIL ENGG.)

Sl No	Subject Code	Subjects	Periods /Week			Evaluation Scheme					Grand Total	Credits		
						Internal Assessment				E.S.E				
						L <sup>1</sup>	T <sup>2</sup>	P <sup>3</sup>	C.T. <sup>4</sup>				M.S.E. <sup>5</sup>	T.A. <sup>6</sup>
Theory														
1	CE81PC18	Earthquake Resistant Design of structure	3	1	0	10	20	10	-	40	60	100	4	
2	CE81PE6X	Professional Elective -6X	3	0	0	10	20	10	-	40	60	100	3	
3	CE81PE7X	Professional Elective -7X	3	1	0	10	20	10	-	40	60	100	4	
4	CE81OE3X	Open Elective -3X	3	0	0	10	20	10	-	40	60	100	3	
Practical														
1	CE81PS03	Major Project	0	0	15	-	-	-	-	120	120	80	200	8
2	CE81PC07	Structural Detailing Lab	0	0	3	-	-	-	-	30	30	20	50	2
Total Credits											24			

X\_ indicates the serial alphabet of a subject in the subject group

<sup>1</sup>Lecturer Hours, <sup>2</sup>Tutorial Hours, <sup>3</sup>Practical Hours, <sup>4</sup>Mid Sem. Exam, <sup>5</sup>Class Tests/Assignments, <sup>6</sup>Lab Work Assessment

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**List of Professional (Core) Electives**

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CEGTPE1X	Professional Elective-1 (PE Group-1)	4	VI
A	CEGTPE1A	Advanced Concrete Technology		
B	CEGTPE1B	Advanced Surveying		
C	CEGTPE1C	Advanced Concrete Design		
D	CEGTPE1D	Highway Safety		
E	CEGTPE1E	Advanced Fluid Mechanics		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE2X	Professional Elective-2 (PE Group-2)	4	VII
A	CE7TPE2A	Design of Prestressed Concrete		
B	CE7TPE2B	Structural Dynamics		
C	CE7TPE2C	Theory of Elasticity & Plasticity		
D	CE7TPE2D	Fracture of Concrete Structures		
E	CE7TPE2E	Advance Structural Analysis		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE3X	Professional Elective-3 (PE Group-3)	3	VII
A	CE7TPE3A	Environmental Geotechnical Engineering		
B	CE7TPE3B	Air Pollution Control Engineering		
C	CE7TPE3C	Industrial Waste Water Management		
D	CE7TPE3D	Water Resources Planning & Management		
E	CE7TPE3E	Environmental Impact Assessment		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE4X	Professional Elective-4 (PE Group-4)	3	VII
A	CE7TPE4A	Ground Water Hydrology		
B	CE7TPE4B	Ground Improvement Techniques		
C	CE7TPE4C	Geo-informatics & GIS Applications		
D	CE7TPE4D	Rock Mechanics		
E	CE7TPE4E	Design of Hydraulic Structures		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TPE5X	Professional Elective-5 (PE Group-5)	3	VII
A	CE7TPE5A	Industrial Structures		
B	CE7TPE5B	Systems Analysis in Civil Engineering		
C	CE7TPE5C	Railway Engineering		
D	CE7TPE5D	Pavement Construction and Maintenance		
E	CE7TPE5E	Planning & Design of Building Services		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE6X	Professional Elective-6 (PE Group-6)	4	VIII
A	CE8TPE6A	Machine Foundation		
B	CE8TPE6B	Earthquake Geotechnical Engineering		
C	CE8TPE6C	Bridge Engineering		
D	CE8TPE6D	Solid and Hazardous Waste Management		
E	CE8TPE6E	Construction Equipment & Techniques		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TPE7X	Professional Elective-7 (PE Group-7)	3	VIII
A	CE8TPE7A	Air and Water transportation		
B	CE8TPE7B	Theory of Plates & Shells		
C	CE8TPE7C	Repair and Rehabilitation of Structures		
D	CE8TPE7D	Finite Element Analysis		
E	CE8TPE7E	Hydropower Engineering		

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List of Open Electives

Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE6TOE1X	Open Elective-1 (OE Group-1)	3	VI
A	CE6TOE1A	Construction Planning and Management		
B	CE6TOE1B	Rural Technology and Community Development		
C	CE6TOE1C	Engineering System Design Optimization		
D	CE6TOE1D	Engineering System Modelling and Simulation		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE7TOE2X	Open Elective-2 (OE Group-2)	3	VII
A	CE7TOE2A	Value Engineering		
B	CE7TOE2B	Supply Chain Management-Planning		
C	CE7TOE2C	Travel Demand Analysis		
D	CE7TOE2D	Quality Control Assurance and Safety in Construction		
Sl. No.	Subject Code	Name of Subject	Credits	SEMESTER
x	CE8TOE3X	Open Elective-3 (OE Group-3)	3	VIII
A	CE8TOE3A	Management Information System		
B	CE8TOE3B	Enterprise Resource Planning		
C	CE8TOE3C	Engineering Risk-Benefit Analysis		
D	CE8TOE3D	Fluid Dynamics		

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SYLLABUS (SEMESTER-VII)									
Subject Code:	CE7TPC17	CREDITS: 3			SESSIONAL - TA				ESE
Subject:	Water Resources Engrg.-II	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60

**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 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.**

**NAME OF TEXT BOOKS:**  
Irrigation Engineering and Hydraulic Structures – S.K. Garg (Khanna Publications)  
Irrigation Engineering – B.C. Punmia (Laxmi Publications)

**Name of Reference Books:**  
Irrigation, Water Resources and Water Power Engineering – Dr. P.N. Modi (Standard Book House)  
Theory and Design of Irrigation Structures (Volume – I & II) – Varshney (Nem Chand Bros.)  
Irrigation Engineering – Asawa G.L. (New Age International Publications)  
Fundamentals of Irrigation Engineering – Bharat Singh (Nem Chand & Bros.)  
Dams and weirs- William G Bligh, Kessinger Publishing

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SYLLABUS								
Subject Code:	CE7TPE2A	CREDITS : 4			SESSIONAL - TA			ESE
Subject:	Design of Prestressed Concrete	L	T	P	CT	MSE	TA	TOTAL
		3	1	-	10	20	10	40
<p>UNIT 1: Introduction: Fundamentals of prestressing - Classification and types of prestressing- Concrete Strength and strain characteristics - Steel mechanical properties - Auxiliary Materials like duct formers.</p> <p>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.</p> <p>UNIT 3: Analysis of Sections: In flexure, simple sections in flexure, kern distance - cable profile - limiting zones - composite sections cracking moment of rectangular sections.</p> <p>UNIT 4: Design of Simply Supported Beams: Allowable stress as per I.S. 1343 - elastic design of rectangular and I-sections.</p> <p>UNIT 5: Shear and Bond: Shear and bond in prestressed concrete beams - conventional design of shear reinforcement - Ultimate shear strength of a section - Prestress transfer in pretensioned beams-Principles of end block design.</p> <p>Reading:</p> <ol style="list-style-type: none"> <li>1. Krishna Raju, N "Prestressed Concrete", Tata Mc Graw Hill.</li> <li>2. Liu.T.Y, "Prestressed concrete", Mc Graw Hill Pub. Co.</li> <li>3. Rajagopalan, "Prestressed concrete", Narosa Publishing House.</li> </ol>								

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Subject Code:	CE7TPE4A	SYLLABUS						ESE
		CREDITS: 3			SESSIONAL - TA			
Subject:	Ground Water Hydrology	L	T	P	CT	MSE	TA	TOTAL
				3	-	-	10	20

UNIT 1: Hydrologic cycle, Water balance, Occurrence of ground water: Origin, geological formations as aquifers, type of aquifers, groundwater basins, springs, Darcy's Law, validity of Darcy's Law permeability,

UNIT 2: Laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow system; Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling, Direct circulation hydraulic rotary method, Down the hole hammer method, well logs- receptivity logging, testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonal and secular variations, fluctuation due to miscellaneous causes;

UNIT 3: Surface and Subsurface Investigations of groundwater: Geophysical exploration, Electrical resistivity method, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling, Artificial recharge by water spreading, through pits and shaft, recharge through other methods,

UNIT 4: Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, Industrial sources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, saline water intrusion in coastal aquifers, methods to control saline water intrusion ;

UNIT 5: Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium, groundwater basin investigations, conjunctive use of surface and groundwater,

TEXT BOOK:  
K. C. Patra, Hydrology and Water Resources Engg., Narosa Publishing house, New Delhi.  
D. K. Todd, Groundwater Hydrology, John Wiley and Sons.

REFERENCES:  
H. M. Raghunath, Ground Water.  
S. P. Garg, Groundwater and Tube Wells, Oxford and IBH Publishing Co., New Delhi.  
V. T. Chow, Hand book of Applied Hydrology, McGraw-Hill Publishing Company, New York.

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Subject Code:	CE7TPESC	SYLLABUS							ISE
		CREDITS: 3				SESSIONAL - TA			
Subject:	Railway Engineering	L	T	P	CT	MSE	TA	TOTAL	
		3	-	-	10	20	10	40	60
<p><b>UNIT 1:</b> Introduction to Railways in India: Role of Indian Railways in National Development - Railways for Urban Transportation Alignment of Railway Lines: Engineering Surveys for Track Alignment - LRT &amp; MRTS Permanent Way: Components and their Functions</p> <p><b>UNIT 2:</b> Rails - Types of Rails, Length of rail, Weight of Rail, Rail Joints, Creep of rail, Buckling of rail, Kinks of Rail Fastenings, Coring of Wheels &amp; tilting of rails. Sleepers - Types, Functions, sleeper density Ballasts: Types, function, advantage &amp; disadvantage of each type.</p> <p><b>UNIT 3:</b> Geometric Design of Railway Tracks: Gradients and Grade Compensation, Super-Elevation, Widening of Gauges in Curves, Transition Curves, Horizontal Curves.</p> <p><b>UNIT 4:</b> Points and Crossings, Turnouts: Working Principles, Cross overs.</p> <p><b>UNIT 5:</b> Signalling: Types and their function. Station and Yards: Types, Requirements, factors for site selection.</p> <p>Reading: 1. Chandra S. and M.M. Agarwal, Railway Engineering, Oxford University Press, New Delhi, India, 2007. 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.</p>									

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SYLLABUS								
Subject Code:	CE7TQE2D	CREDITS: 3			SESSIONAL - TA			ESE
Subject:	Quality Control Assurance and Safety in Construction	L	T	P	CT	MSE	TA	TOTAL
		3	-	-	10	20	10	40
ESE								
60								
<p>UNIT 1: Construction Projects: Agencies involved in Construction Projects, mutual relationship, quality control at site; and whose job is it.</p> <p>UNIT 2: ISO / IS Requirements: IS 9000 (Parts 1 to 4) [Pt 1; 1994, Pt 2; 1993, Pt 3; 1991, Pt 4; 1993] for Total Quality Management. ISO 14000 - 1988 for environment - Impact of large construction projects.</p> <p>UNIT 3: Quality Control on Construction Projects: Inspection of reinforced concrete, masonry and steel works, testing techniques and quality at reports.</p> <p>UNIT 4: Statistical Analysis: Sampling frequencies, statistical and reliability analysis, optimum sample size.</p> <p>UNITS: Quality Assurance: Quality Assurance in construction.</p> <p>Name of Text Books: ISO 9000 in Construction - Nee, Paul A. (Wiley Inter science Publication, 1994) IS: 14000, - Quality System - Guidelines for Selection and Use of Standards on Quality System 1988.</p> <p>NAME OF REFERENCE BOOKS: ISO 9000 in Construction - Wah, L.S., Min., L.C. &amp; Ann, T.W. (McGraw Hill Book Company, 199) Construction Engineering and Management - S. Seetaraman (Jmesh Publication)</p>								

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SYLLABUS	(SEMESTER-VII)					
Subject Code:	CE7LPS01		CREDITS: 2		SESSIONAL - TA	
Subject:	Seminar	L	T	P	IA	ESE
		-	-	2		

SYLLABUS	(SEMESTER-VII)					
Subject Code:	CE7LPS02		CREDITS: 4		SESSIONAL - TA	
Subject:	Minor project	L	T	P	IA	ESE
		-	-	4		

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SYLLABUS Subject Code:	CESTPC18	(SEMESTER-VIII)							ESE
		CREDITS: 4			SESSIONAL - TA				
Subject:	Earthquake Resistant Design of Structures	L	T	P	CT	MSE	TA	TOTAL	
		3	1	+	10	20	10	40	60

**UNIT-I:** Elements of structural dynamics, Sources of vibrations; Types of vibrations; Degrees of freedom; Spring action and damping; Free vibration of undamped system having single degree of freedom; Free vibration of viscous damped system having single degree of freedom; Forced vibration of a viscous damped single degree freedom system subjected to harmonic excitation;

**UNIT-II:** Elements of Earth Quake Ground motion, Earthquake size- intensity and magnitude; Seismic Zoning-Introduction; Analysis of single storey and single bay RCC Plane Frame (Columns vertical) (As per IS-1893(part-II)). Calculation of lateral force due to earthquake using equivalent static method, Analysis for different load combinations.

**UNIT III:** Design forces and moments in beam and columns (As per IS:456 and IS13920). Design of column; Design of beam.

**UNIT-IV:** Ductility factor, Ductility of singly reinforced rectangular beam, Detailing of beam, column, beam-column junction as per relevant IS codes (IS13920). Introduction and basic principle of design of shear wall.

**UNIT-V:**Masonry Structures :House types and damages, cause and location of damage, Making houses earthquake resistant, Earthquake resistant features, summary of earthquake resistant features, Improving housing designs.

**TEXT BOOKS:**  
Elements of Earthquake Engineering by Jal Krishna, A.R.Chandrasekaran and Brijesh Chandra, Second Edition(1994), South Asian Publishers, New Delhi.  
Geotechnical Engineering - S.K.Gulati & Manoj Datta, Tata McGraw-Hill Publishing Company Ltd.  
Earthquake Resistant Design of Structures by Pankaj Agarwal, Manish Shrikhande , First edition(2006), Prentice Hall of India Private Ltd., New Delhi .  
Earthquakes and Buildings – A.S.Arya, A.Revi, Pawan Jain  
CODES: IS:1893(part-I), IS13920, IS:456-2000, SP34

**REFERENCE BOOK**  
Dynamics of Structures by A.K.Chopra, Second edition (2001), Prentice Hall India Private Ltd

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SYLLABUS		(SEMESTER-VIII)						
Subject Code:	CEBTPEGC	CREDITS:			SESSIONAL - TA			ESE
		L	T	P	CT	MSE	TA	TOTAL
Subject:	Bridge Engineering	3	-	-	10	20	10	40
								60

UNIT-I: Brief historical review, Different types of Bridges and span range, Bridge codes, Importance of hydrologic factors in bridge design, Hydraulic geometry, linear water ways, economic span, afflux and scour.

UNIT-II: Design of Reinforced concrete deck slab bridges.

UNIT-III: Design of Reinforced Concrete Tee beam bridges.

UNIT-IV: Design of Box culverts.

UNIT-V: Design of Piers and Abutments.

Text Books:

- 1) Xanthakos, P. P. (1993) Reinforced Concrete Bridges, in Theory and Design of Bridges, John Wiley & Sons, Inc., Hoboken, NJ, USA. doi: 10.1002/9780470172889.ch3
- 2) Design of Bridge Structures by M A Jayaram, Prentice-Hall Of India Pvt. Limited, 01-Aug-2004 - Bridges - 292 pages
- 3) Design of Bridges by N. Krishna raju , Oxford and IBH Publishing, ISBN 8120417410, 9788120417410
- 4) Essentials Of Bridge Engineering, 6/E, Viktor , Oxford and IBH Publishing, 2007, ISBN 8120417178, 9788120417175

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SYLLABUS										
Subject Code:	CEBTPE6E		(SEMESTER-VIII)							
Subject:	Construction Equipment and Techniques		CREDITS: 3			SESSIONAL - TA		ESE		
			L	T	P	CT	MSE		TA	TOTAL
			3	-	-	10	20	10	40	60
<p>UNIT 1: Large and heavy engineering projects- characteristics and complexities, methods statement for major activities like excavation, concreting, steel fabrication and erection for projects like earthen dams, hydropower projects, nuclear power plant, refineries and other industrial projects.</p> <p>Excavation for heavy engineering projects- safety measures in excavation in various types of soils, selection of excavation, drainage in excavation.</p> <p>UNIT 2: Concrete construction for heavy engineering projects-Selection of equipment for batching, mixing, transporting, placing and compacting for various types of jobs, safety measures concrete, Prefabricated construction- Planning for pre-casting, selection of equipment for fabrication, transport and erection, quality measures, safety measures during erection.</p> <p>UNIT 3: Steel construction-Planning for field operations, selection of equipment and erection tools, tools and methods of welding, tools and methods of cutting and joining, bridge erection, quality measures, safety measures during fabrication and erection.</p> <p>UNIT 4: Specific issues related to planning, site layouts, equipment selection and pre-project activities for large size construction projects like earthen dams, concrete dams, thermal power stations, nuclear power stations, light houses, airports and ports, bridges. Information related to special equipments and their applications to off-shore construction, underground utility construction.</p> <p>UNIT 5: New materials and equipment for construction; Case studies of heavy construction projects.</p> <p>Text/Reference Books: 1. Thomas baron, Erection of steel structures 2. Stubbs, handbook of heavy construction 3. Journals of Civil Engineering and Construction Engineering</p>										

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Subject Code:	[SEMESTER-VIII]								
Subject:	CEBTPE7A	CREDITS: 4			SESSIONAL - TA			ESE	
		L	T	P	CT	MSE	TA		TOTAL
Air and water transportation		3	1	-	10	20	10	40	60
<p><b>UNIT 1: Air Transportation:</b> Aircraft Characteristics - Landing gear configurations, aircraft weight, engine types, Aircraft performance characteristics: speed, payload and range, runway performance, declared distances.</p> <p><b>UNIT 2: Geometric Design of the Airfield -</b> Airport classification, Runways, wind rose, estimating runway length, sight distance and longitudinal profile, transverse gradient, Taxiways and taxi lanes: design of taxiway curves and intersections, end-around taxiways, Aprons: holding aprons, terminal aprons and ramps, surface gradients, Control tower visibility requirements.</p> <p><b>UNIT 3: Structural Design of Airport Pavements -</b> Soil investigation and evaluation, FAA pavement design methods, Airport Lighting, Marking, and Signage, Terminal Area - Passenger terminal system and its components, Apron gate system: number of gates, gate size, aircraft parking type, apron layout, apron circulation, passenger conveyance to aircraft.</p> <p><b>UNIT 4: Water Transportation:</b> Ports and Harbours - Types of water transportation, water transportation in India, Ports and harbours: requirements, classification, ship characteristics, Harbour works: breakwaters, jetties, fenders, piers, wharves, dolphins, etc., Navigational aids: types, requirements, light house, beacon lights, buoys, Port facilities: general layout, development, planning, facilities, terminals.</p> <p><b>UNIT 5: Docks and repair facilities:</b> design, dry docks, wet docks, slipways, Locks and lock gates: materials, size, Dredging: classification, dredgers, uses of dredged materials, Coastal erosion and protection: seal wall, revetment, and bulkhead.</p> <p>Reading:</p> <ol style="list-style-type: none"> <li>1. Ashford, N. J., Mumaytz, S. A., and Wright, P. H. Airport Engineering: Planning, Design and Development of 21st Century Airports, Fourth Edition, John Wiley &amp; Sons, New Jersey, USA, 2011.</li> <li>2. Horonjeff, R., McKelvey, F. X., Sproule, W. J., and Young, S. B. Planning and Design of Airports, Fifth Edition, McGraw-Hill, New York, USA, 2010.</li> <li>3. Kazda, A., and Caves, R. E. Airport Design and Operation, Second Edition, Elsevier, Oxford, U.K., 2007.</li> <li>4. Khanna, S. K., Arora, M. G., and Jain, S. S. Airport planning and Design, Sixth Edition, Nem Chand and Bros, Roorkee, India, 2012.</li> <li>5. Kumar, V., and Chandra, S. Air Transportation Planning and Design, Galgotia Publications Pvt. Ltd., New Delhi, India, 1999.</li> <li>6. Neufville, R. D., and Odoni, A. Airport Systems: Planning, Design, and Management, McGraw-Hill, New York, USA, 2003.</li> <li>7. Young, S. B., and Wells, A. T. Airport Planning and Management, Sixth Edition, McGraw-Hill, New York, USA, 2011.</li> <li>8. Bindra, S.P. A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, India, 1992.</li> <li>9. Seetharaman, S. Dock and Harbour Engineering, Umesh Publications, New Delhi, India, 1999.</li> <li>10. Srinivasan, R. Harbour, Dock and Tunnel Engineering, Charotar Publishing House, Anand, India, 1987.</li> </ol>									

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SYLLABUS		(SEMESTER-VIII)							
Subject Code:	CEBTOE3A	CREDITS:			SESSIONAL - TA			ESE	
Subject:	Management Information System	L	T	P	CT	MSE	TA		TOTAL
		3	-	-	10	20	20	40	60
<p>UNIT 1: Management and System- Advance in management, the process of MIS development, MIAS organization, Information dynamics.</p> <p>UNIT 2: Planning, Design and implementation of MIS, Strategic planning, MIS design- Group design concepts, Acquiring information system.</p> <p>UNIT 3: System life cycle-Information flow, Entity relationship modelling, data modelling, detailed process analysis, data flow diagrams.</p> <p>UNIT 4: Decision making system with MIS, System concepts for MIS.</p> <p>UNIT 5: Data information and communication, problem solving and decision making, security, control and failure, Future trends in MIS.</p> <p>TEXT BOOKS: 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</p>									

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SYLLABUS	(SEMESTER-VI)						
Subject Code:	CEBLP503	CREDITS: B			SESSIONAL - TA		ESE
Subject:	Major Project	L	T	P	IA	TOTAL	
		-	-	15	120	120	80

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SYLLABUS	(SEMESTER-VIII)								
Subject Code:	CE8LPC07	CREDITS: 2			SESSIONAL - TA			ESE	
Subject:	Structural Detailing Lab	L	T	P	CT	MSE	TA	TOTAL	ESE
		-	-	3	-	-	30	30	20
<p><b>Part A: (Steel Structures)</b></p> <ol style="list-style-type: none"> <li>1. Detailing of Tension Members.</li> <li>2. Detailing of Built up Compression Members.</li> <li>3. Detailing of Column Bases.</li> <li>4. Detailing of connections.</li> <li>5. Detailing of an Industrial shed.</li> <li>6. Detailing of a Plate girder/Gantry girder.</li> </ol> <p><b>Part B: (Reinforced Concrete Structures)</b></p> <ol style="list-style-type: none"> <li>1. Details of reinforcement in RCC Continuous Beams.</li> <li>2. Details of reinforcement for RCC column with isolated footings.</li> <li>3. Details of reinforcement in a one way/two way slabs.</li> <li>4. Details of reinforcement in stair cases.</li> <li>5. Detailing of Combined footings.</li> <li>6. Detailing of Retaining walls/Water Tanks.</li> </ol>									

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