

**Course Structure & Syllabus of B.Tech – Civil Engineering  
Applicable for Batch: 2017-2021**

**DIT UNIVERSITY  
Dehradun**



**Detailed Course Structure & Syllabus  
of  
B.Tech – Civil Engineering**

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Year: 1st

Semester: I

Course Category	Course Code	Course Title	L	T	P	Credit
UC	MA101	Engineering Mathematics-I	3	1	0	3.5
UC	PY101	Engineering Physics	3	1	2	4.5
UC	HS101	Professional Communication	2	1	1	3
UC	CS101	Computer Fundamental & C Programming	3	0	2	4
UC	ME104	Workshop Practice	0	0	2	1
UC	EE101	Introduction to Electrical and Electronics Engineering	3	1	2	4.5
UC	EE102	Electrical & Electronics Measurements	1	0	2	2
		<b>Total</b>				<b>22.5</b>

Year: 1st

Semester: II

Course Category	Course Code	Course Title	L	T	P	Credit
UC	MA102	Engineering Mathematics-II	3	1	0	3.5
UC	HS102	Corporate Communication and Soft Skills	2	1	1	3
UC	CS102	Computer Programming in C++	3	0	2	4
UC	ME101	Engineering Mechanics	3	1	0	3.5
UC	ME102	Mechanical Measurements	1	0	2	2
UC	ME103	Engineering Graphics	0	0	3	1.5
UC	CH101	Engineering Chemistry	3	1	2	4.5
		<b>Total</b>				<b>22</b>

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Year: 2<sup>nd</sup>

Semester: III

Course Category	Course Code	Course Title	L	T	P	Credit
AC	CH201/ HS244	Environmental Science / Indian Constitution	2	0	0	0
SC	MA201	Engineering Mathematics - III	3	1	0	4
DC	CE201	Fluid Mechanics	3	1	2	5
	CE202	Solid Mechanics	3	1	0	4
	CE203	Basic Surveying	3	0	2	4
	CE204	Water Supply Engineering	3	1	2	5
	CE205	Building Materials and Construction	2	0	0	2
<b>Total</b>						<b>24</b>

Year: 2<sup>nd</sup>

Semester: IV

Course Category	Course Code	Course Title	L	T	P	Credit
HE	HS24*	Humanities Elective-1	2	0	0	2
AC	CH201/ HS244	Environmental Science / Indian Constitution	2	0	0	0
DC	CE206	Structural Analysis	3	1	0	4
	CE207	Concrete Technology	3	0	2	4
	CE208	Engineering Geology	3	0	2	4
	CE209	Transportation Engineering -I	3	1	2	5
	CE211	Soil Mechanics	3	1	2	5
<b>Total</b>						<b>24</b>

### Humanities Elective 1

Course Code	Course Title
HS241	Education and Social Change
HS242	Introduction to Psychology
HS243	Science, Technology and Society
HS245	Ethics and Self-Awareness

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## Applicable for Batch: 2017-2021

Year: 3<sup>rd</sup>

Semester: V

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CE301	Waste Water Engineering	2	0	0	2
	CE302	Transportation Engineering II	3	1	0	4
	CE303	Design of Reinforced Concrete Elements	3	1	0	4
	CE304	Foundation Engineering	3	1	0	4
	CE305	Structural Analysis Lab	0	0	2	1
DE		Department Elective-1				3
		Department Elective-2				3
PRJT	CE306	Study Project	0	0	4	2
ST	CE307	Summer Training Evaluation	0	0	0	0
AC	CE308	Value Added Training	0	0	2	0
AC	HS301	Aptitude & Soft Skills- 3	3	0	0	0
<b>Total</b>						<b>23</b>

### Department Elective - 1 and 2

Course code	Course Title	L	T	P
CE341	Advanced Highway Engineering	2	1	0
CE342	Environmental Risk Assessment and Disaster Management	2	1	0
CE343	Advanced Surveying	2	0	2
CE344	Building Planning & Drawing	1	0	4
CE345	Photogrammetry & Remote Sensing	2	0	2

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## Applicable for Batch: 2017-2021

Year: 3<sup>rd</sup>

Semester: VI

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CE309	Design of Steel Structure	3	2	0	5
	CE311	Hydraulics and Hydraulic Machines	2	0	2	3
	CE312	Design of Reinforced Concrete Structures	3	1	0	4
DE	CE34*	Department Elective-3				3
	CE34*	Department Elective-4				3
PRJT	CE313	Design/LAB Project - I	0	0	10	5
AC	CE314	Industrial Tour	0	0	0	0
AC	HS304	Aptitude & Soft Skills- 4	3	0	0	0
<b>Total</b>						<b>23</b>

### Department Elective - 3 and 4

Course code	Course Title	L	T	P
CE346	Traffic Engineering and Management	2	0	2
CE347	Rock Mechanics	2	1	0
CE348	Water and Land management	2	1	0
CE349	Water Resource Engineering	2	1	0
CE351	Ground Improvement Technique	2	1	0
CE352	Air and Water Pollution	2	1	0

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## Applicable for Batch: 2017-2021

Year: 4<sup>th</sup>

Semester: VII

Course Category	Course Code	Course Title	L	T	P	Credit
DC	CE401	Estimation and Costing	2	1	0	3
	CE402	Bridge Engineering	3	1	0	4
DE	CE44*	Department Elective-5				3
OE		Open Elective-1	3	0	0	3
PRJT	CE403	Design/LAB Project - II	0	0	16	8
AC	HS311	Employment Enhancement Program	2	0	0	0
UC	ME381	Entrepreneurship & Start Up	2	0	2	3
<b>Total</b>						<b>24</b>

### Department Elective – 5

Course code	Course Title	L	T	P
CE441	Pavement Evaluation and Rehabilitation	2	1	0
CE442	Ground Water Engineering	2	1	0
CE443	Principles of GPS and GIS	2	0	2
CE444	Construction Planning and Management	3	0	0
CE445	River Pollution and Control	3	0	0
CE446	Soil dynamics and Machine Foundation	2	1	0
CE447	Hydraulic Structures	2	1	0

### Open Elective- 1

Course code	Course Title	L	T	P
CS481	Software Quality Engineering	3	0	0
IT353	Basics of Data Science	3	0	0
IT356	Multimedia	3	0	0
EC383	Consumer Electronics	3	0	0
EC385	Analog Electronics	3	0	0
EE481	New and Renewable Energy Sources	3	0	0
ME342	Composites Materials	3	0	0
ME445	Total Quality Management	3	0	0
PE481	Fuel Technology	3	0	0
PE482	Health Safety and Environment in Industry	3	0	0
MA451	Statistical Techniques & their application	3	0	0
AR481	Graphics & Product Design	3	0	0

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## Applicable for Batch: 2017-2021

Year: 4<sup>th</sup>

Semester: VIII

Course Category	Course Code	Course Title	L	T	P	Credit
IP/THESIS	CE407	Industrial Project/Thesis				16
<b>OR</b>						
DC	CE405	Earthquake Engineering	2	1	0	3
	CE406	Hydrology	2	0	0	2
DE & OE	CE44*	Department Elective-6				3
		Open Elective-2	3	0	0	3
		Open Elective-3	3	0	0	3
HE	HS44*	Humanities Electives 2	2	0	0	2
<b>Total</b>						<b>16</b>

### Department Elective – 6

Course code	Course Title	L	T	P
CE448	Pre-stressed Concrete	2	1	0
CE449	Environmental Management & Sustainable Development	3	0	0
CE451	River Engineering	2	1	0
CE452	Hydro Power Engineering	2	1	0
CE453	Port & Harbour Engineering	2	1	0
CE454	Structural Geology	2	0	2
CE455	Statistical Approach to Environmental Data Analysis	2	0	2
CE456	Advanced Structural Design	2	1	0
CE457	Finite Element Analysis	2	1	0

### Humanities Elective 2

Course Code	Course Title
HS493	Indian Culture & Tradition
HS483	Indian Philosophy
HS491	Industrial Sociology
HS485	Sustainable Development

### Open Elective- 2 & 3

Course code	Course Title	L	T	P
CS482	Human Computer Interaction	3	0	0
IT357	Internet of Things	3	0	0
IT359	Mobile Computing and Services	3	0	0
EC386	Fundamental of communication & Networks	3	0	0
EC382	Biomedical Instrumentation	3	0	0

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EE485	Basic Instrumentation & Process Control	3	0	0
ME382	Ergonomics and Value Engineering	3	0	0
ME366	Product Design and Development	3	0	0
ME452	Renewable Energy Sources	3	0	0
PE491	Carbon Capture and Sequestration Technology	3	0	0
MA452	Optimization Techniques	3	0	0
AR485	Art Appreciation	3	0	0
PY481	Nano scale science and technology	3	0	0

### Summary of the Credits

Year	Semester	Credit
1	1	22
	2	22.5
2	3	24
	4	24
3	5	23
	6	23
4	7	24
	8	16
Total		178.5

### Category wise classification of the Credits

Category	Credits	No. of Subjects
AC	0	7
DC	81	22
DE	18	6
HE	4	2
OE	9	3
PRJT	15	3
SC	4	1
IP/THESIS	16	1
ST	0	1
UC	47.5	15
Total	178.5	61



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	MA101	<b>Subject Title</b>	Engineering Mathematics-I						
<b>LTP</b>	3-1-0	<b>Credit</b>	3.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

**OBJECTIVE:** To introduce the fundamentals in Differential, Integral and Vector Calculus relevant to engineering applications.

### Unit I: Differential Calculus I

Functions of one variable, Definitions of Limit, Continuity and Differentiation. Basic Theorems for each of these concepts, Successive Differentiation, Leibnitz Theorem, Taylor's Theorem with remainder, Rolle's Theorem, Mean Value Theorem and their applications. Critical points, Local Maxima & Minima, Increasing & Decreasing, Concavity, Points of inflection, Asymptotes of functions and their use in drawing neat sketch of its graph.

### Unit II: Differential Calculus II

Functions of two or more variables, concept of Limit and Continuity, .Partial Differentiation, Euler's theorem for Homogeneous functions, Chain rule, Total differential, Local Maxima, minima, Lagrange's Multiplier method, Taylor Series.

### Unit III: Integral Calculus

Indefinite integrals, Fundamental theorem of Integral Calculus. Definite integral and its applications. Improper Integrals, Gamma and Beta functions, Double & Triple integration, Change of order of integration, Change of Variables. Dirichlet's Integral. Applications of multiple integrals.

### Unit IV Vector Calculus

Scalar & Vector functions, Scalar & Vector fields, Gradient of a scalar function and its applications, Directional derivative. Divergence & Curl of a Vector function and their applications. Line integral, Surface integral. Statements of Green's Theorem, Stokes Theorem and Divergence Theorem and their applications

**LEARNING OUTCOME:** Familiarity with fundamental tools of Differential, Integral and Vector Calculus relevant to engineering applications

### Text Books:

1. G. B. Thomas Jr. & R. L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson Education

### Reference Books:

1. E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, U.K., 2006.
2. R. K. Jain and S.R.K. Iyenger, Advanced Engineering Mathematics, 2nd edition, Narosa Publishing House, New Delhi, India, 2006

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	PY101	<b>Subject Title</b>	Engineering Physics						
<b>LTP</b>	3-1-2	<b>Credit</b>	4.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVES

- The student will acquire a strong background in Applied Physics that will serve as a basis for engineering problem solving.
- The student will learn the basic concepts found in Oscillations and Waves, Optics, Quantum Mechanics, Nanotechnology and Lasers.
- The students will acquire problem-solving and analytical skills that will help in preparation for areas of engineering chosen.
- The students will learn how to demonstrate the application of the scientific methods through laboratory experiments thereby verifying the concepts related to theory content knowledge.
- The students will learn to demonstrate the ability to communicate scientific information effectively in written and oral formats.

### UNIT I:

**Oscillations and Waves:** Oscillations, Simple Harmonic Motion: Equation of Simple Harmonic Motion, Characteristics of SHM, Energy, Free Oscillations, Damped Oscillations, Forced Oscillations, Resonance, Coupled Oscillations, Waves: Travelling waves, wave equation, types of waves, Reflections and Transmission of Waves at a boundary. (6) L

### UNIT II:

**Interference:** Fringes with white light, Interference in plane parallel thin film (reflected and transmitted case), Wedge shape film (reflected case), Newton's Rings and its application to determine wavelength of monochromatic light and refractive index of a liquid. **Diffraction:** Difference between Interference and Diffraction, Fraunhofer diffraction due to a single slit: resultant intensity, conditions of maxima and minima, angular and linear width of central maximum, N slit diffraction: resultant intensity, conditions of maxima and minima, missing orders, angular width of principal maxima. (10) L

### UNIT III:

**Polarization:** Polarized and unpolarized light and its pictorial representation, plane of polarization and plane of vibration, Phenomenon of Double Refraction, positive and negative double refracting crystals, properties of ordinary and extra-ordinary rays, Nicol Prism and its applications as a polarizer and analyzer, Mathematical analysis of superposition of two linearly polarized light vectors, retardation plates-half and quarter wave plates, Production and detection of Plane, Circularly and Elliptically Polarized light. (8) L

### UNIT IV:

**Quantum Mechanics:** Concept of wave packet, group and phase velocity, Heisenberg Uncertainty Principle and its applications viz. non-existence of electron in nucleus, radius and energy of Bohr's first orbit, Schrödinger time independent and time dependent wave equation, Physical interpretation of wave function, normalization condition of the wave function, Application of Schrodinger wave equation: Particle in a one dimensional box (eigen function and eigen values) and rectangular potential barrier. (8) L

### UNIT V:

**Nanotechnology:** Introduction to Nanomaterial, Classification of nanomaterials, application of nanotechnology. **Lasers:** Spontaneous and Stimulated emission, Stimulated Absorption, Einstein's A & B Coefficient, metastable states, population inversion, basic principle of laser (three level and four level), optical cavity and resonator, He-Ne laser. (8) L

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **List of Experiments**

1. To determine the wavelength of monochromatic light by Newton's Ring.
2. To determine the specific rotation of cane sugar solution using bi-quartz polarimeter.
3. To determine the wavelength of spectral lines using plane transmission grating.
4. To study the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of coil.
5. To Study the nature of polarization of Laser light and verify Malus Law
6. To Measure the acceleration due to gravity 'Value of g' using bar pendulum
7. To measure the frequency of ac mains using sonometer.
8. To measure the numerical aperture (NA) of an optical fibre.
9. Measurement of thickness of wire using LASER beam.
10. To study the characteristics of a Photovoltaic cell.

### **LEARNING OUTCOMES:**

- Demonstrate a detailed knowledge of Oscillations, Optics, Quantum Mechanics, Lasers and Nanotechnology.
- Discuss how laws of Physics can be applied in the understanding and development of engineering systems.
- An ability to communicate scientific information effectively in written and oral formats.
- Skills to perform experiments in the physics laboratory with ability to work independently and an ability to analyze and interpret data in the physics laboratory.

### **Text Books:**

- Ajoy Ghatak; Optics; Tata Mc-Graw Hill Education, 2009.
- Arthur Beiser; Concepts of Modern Physics; Tata Mc-Graw Hill Education, 2003

### **Reference Books:**

- Jenkins and White; Fundamentals of Optics; Fourth; McGraw-Hill, 2000
- Young and Freedman; Sears and Zemansky's University Physics, Tenth; Addison-Wesley, 2000.

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## Applicable for Batch: 2017-2021

Subject Code	HS101	Subject Title	Professional Communication						
LTP	2-1-1	Credit	3.0	Subject Category	UC	Year	1 <sup>st</sup>	Semester	I/II

### OBJECTIVES

- To promote efficiency in English Language with the development of the four skills of communication i.e., LSRW (Listening, Speaking, Reading & Writing).
- To help students perform better in all academic subjects through greater command over the English language.
- To develop technical writing skills with a focus on critical thinking, rhetorical analysis, effective writing & effective document design.

### Unit-I

**Communication** 6 hrs

Communication: Meaning, Types of Communication: General & Technical Communication

Barriers to Communication, Overcoming strategies.

### Unit II

**Non Verbal Communication** 3 hrs

Knowledge and adoption of Non Verbal cues of communication: Kinesics, Proxemics, Chronemics, Oculistics, Haptics, Paralinguistics

### Unit III

**Listening & Speaking Skills** 6hrs

Listening Comprehension: identifying General & Specific information, Note taking and drawing inferences

Introduction to Phonetics : Articulation of consonants and vowel sounds.

Public Speaking

Discussion Techniques

### Unit IV

**Reading Skills** 4 hrs

Reading Strategies and Vocabulary Building

Reading Comprehension

### Unit V

**Technical Writing Skills** 7 hrs

Paragraph development

Technical Articles, Research Articles, Plagiarism

Intra office Correspondence: Notice, Agenda, Minutes and Memorandum,

Technical Proposal & Report

### LEARNING OUTCOMES

- Build confidants of the students through practice of the basic skills of the basic skills of communication.
- The students will be equipped to comprehend a variety of content & develop deeper insight.
- Enable the students to effectively create standard formats used to construct meaningful documents.

### TEXT BOOKS

1. Rizvi, Ashraf. Effective Technical Communication, McGraw Hill, New Delhi. 2005.
2. Lata, Pushp and Sanjay Kumar, Communication Skills, Oxford University Press, New Delhi. 2011.

### REFERENCE BOOKS

1. Aslam, Mohammad. Introduction to English Phonetics and Phonology Cambridge.2003.
2. Ford A, Ruther. Basic Communication Skills; Pearson Education, New Delhi.2013.
3. Gupta, Ruby. Basic Technical Communication, Cambridge University Press, New Delhi.2012.
4. Kameswari, Y. Successful Career Soft Skills and Business English, BS Publications, Hyderabad.2010.
5. Tyagi, Kavita& Padma Misra. Basic Technical Communication, PHI, New Delhi. 2011.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CS101	<b>Subject Title</b>	Computer Fundamental & C Programming						
<b>LTP</b>	3-0-2	<b>Credit</b>	4.0	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVES

The objective of the course is to make the students to understand the key hardware components in a modern computer system and as to how the software is mapped to the hardware. The student shall also be able to learn make the computer programs using C language by exploring the various features of C.

#### Unit-1

8L

**Basics of Computer:** Introduction to digital computer, basic operations of computer, functional components of computer, Classification of computers.

**Introduction to operating system: [DOS, Windows, Linux and Android]** purpose, function, services & types.

**Number System:** Binary, octal and hexadecimal number systems, their mutual conversions, **Binary arithmetic.**

**Basics of programming:** Approaches to Problem Solving, Concept of algorithm and flow charts, **Types of computer languages:- Machine Language, Assembly Language and High Level Language,** Concept of Assembler, Compiler, Loader and Linker.

#### Unit-2

8L

Standard I/O in C, Fundamental data types- Character type, integer, short, long, unsigned, single and double floating point, Storage classes- automatic, register, static and external, Operators and expression using numeric and relational operators, mixed operands, type conversion, logical operators, bit operations, assignment operator, operator precedence and associativity.

**Fundamentals of C programming:** Structure of C program, writing and executing the first C program, components of C language. Standard I/O

#### Unit-3

8L

**Conditional program execution:** Applying if and switch statements, nesting if and else, use of break and default with switch, program loops and iterations: use of while, do while and for loops, multiple loop variables, use of break, continue and goto statements.

**Functions:** Introduction, types of functions, functions with array, passing values to functions, recursive functions.

#### Unit -4

8L

**Arrays:** Array notation and representation, manipulating array elements using one and two dimensional arrays, linear searching, sorting (bubble sort), strings, matrix manipulation (transpose, addition, multiplication).

**Structures:** Purpose and uses of structures, declaring structures, array of structures, union, enumerated data types

#### Unit -5

8L

**Pointers:** Pointers: pointer variables, pointer operator, pointer expression, array of pointers, multiple indirection, pointers to functions, dynamic memory allocation functions.

File handling, standard C preprocessors, defining and calling macros, conditional compilation.

### LEARNING OUTCOMES

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

- The basics of computer components & computer software.
- The basic terminology used in computer programming.
- To write, compile and debug programs in C language.
- Use different data types in a computer program.
- To design programs involving decision structures, loops and functions.
- To explain the difference between call by value and call by reference
- The dynamics of memory by the use of pointer.
- To use & understanding of file handling

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## **Applicable for Batch: 2017-2021**

### **Text Books:**

1. YashwantKanetkar, "Let us C", BPB Publications, 2<sup>nd</sup> Edition, 2001.
2. Stephen Prata "C Primer Plus" Addison-Wesley/Pearson 6<sup>th</sup> Edition 2014
3. P.K. Sinha "Computer Fundamentals" B.P.B Publication.

### **Reference Books:**

1. Kernighan & Ritchie, "C Programming Language", (Ansi C Version), PHI, 2<sup>nd</sup> Edition.
2. Byron Gottfreid "Schaum's Outline of Programming with C".

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## Applicable for Batch: 2017-2021

Subject Code	ME104	Subject Title	Workshop Practice						
LTP	0-0-2	Credit	1.0	Subject Category	UC	Year	1 <sup>st</sup>	Semester	I/II

### Course Objective:

To identify hand tools and instruments for machining and other workshop practices. To obtain basic skills in the trades of fitting, carpentry, welding, sheet metal and machining. Introduction to Foundry, Forging shop, Gas & Spot Welding Acquire measuring skills, using standard workshop instruments & tools.

### List of Experiments

1. **Carpentry:** To make a wooden joint with soft wood as per the drawing provided in the manual. (One of the following jobs)  
**Jobs:** T-Lap joint, Dove tail joint, Mortise & Tendon joint, bridle joint. (4 Hrs)
2. **Arc Welding:** To make a welding joint with mild steel flat using Manual Metal Arc Welding Machine according to the drawing provided in the manual. (One of the following jobs)  
**Jobs:** Lap joint, Butt joint, Fillet/Corner joint. (4 Hrs)
3. **Fitting:** To make a joint using fitting tools with mild steel flats, round bars or square bars as per the drawing provided in the manual. (One of the following jobs)  
**Jobs:** Plug and socket joint with MS Plate, Square key with MS bar, External threads on GI pipes, Internal threading on MS flats. (4 Hrs)
4. **Machining:** To make a machine- component using lathe with mild steel round bar or hexagonal bar comprising common turning operations with reference to the drawing given in the manual. (One of the following jobs)  
**Jobs:** Hex Bolt, Axle for cycle wheel, Jig Bush, a typical turning specimen. (4 Hrs)
5. **Sheet metal:** To make a sheet metal component with galvanized iron sheet as per the drawing provided in the manual having spot welded joint. (One of the following jobs)  
**Jobs:** Square tray, Scoop, Funnel. (4 Hrs)
6. **Foundry & Forging shop:** To observe the demonstration of making a square key using hand forging tools & study the concept and application of Foundry. (2 Hrs)
7. **Gas & Spot Welding:** To observe the demonstration of making a Lap joint/Butt joint with mild steel sheet using Oxyacetylene flame as per the drawing provided in the manual & to perform the spot welding operation on G.I. sheet. (2 Hrs)
8. **Minor Project:** To make a minor project by the students in batches. (2 Hrs)

### Learning Outcomes:

- Capability to identify hand tools and instruments for machining and other workshop practices.
- Obtain basic skills in the trades of fitting, carpentry, welding and machining.
- Acquire measuring skills, using standard workshop instruments & tools.
- Gain eye hand coordination, enhance psycho motor skills and attitude.

### Text Book:

1. H. Chaudhary, "Elements of Workshop Technology Volume 1 & 2", Media promoters & Publishers Pvt. Ltd. 14ed. (2017)

### Reference Books:

1. B.S. Raghuwanshi, "A course in Workshop technology Volume 1 & 2", Dhanpat Rai & Co, 10<sup>th</sup> ed
2. W.A.J. Chapman, "Workshop Technology Part 1, Part 2 & Part 3", CBS Publishers & Distributers Pvt. Ltd.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	EE101	<b>Subject Title</b>	Introduction to Electrical and Electronics Engineering						
<b>LTP</b>	3-1-2	<b>Credit</b>	4.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVES

- To acknowledge students about charge, current, voltage and various circuit laws involved in analysis.
- To get acquaints students with the basic idea of Generation, Transmission and Distribution of Electrical energy.
- To provide students with the basic knowledge of operation and working different types of electrical machines and their application
- To provides knowledge regarding use of multiphase system and their possible interconnections with different loads.

To get acquaints student with fundamental knowledge of semiconductor devices their characteristics and modelling in different applications.

### UNIT I – DC NETWORK THEOREM

Review of basic circuit theory concepts, Mesh and Nodal analysis, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Star – Delta transformation

### UNIT II – AC CIRCUIT'S FUNDAMENTAL AND TRANSFORMERS

Single Phase AC: Phasor representation of voltage and current, AC circuit behaviour of Resistive, Inductive and Capacitive Load and their combination in series and parallel, Power triangle, Power factor

Three Phase AC: Delta and Star connections, Relation between Line and Phase values, three phase power and its measurement

Transformers: Principle of power Generation (single line diagram), Principle of Operation, Types of construction

### UNIT III – ELECTRICAL MACHINES

DC Machines: Construction, working principle & characteristics

Three Phase Induction Machines: Principle of operation of 3  $\phi$  Induction Motor, Types of Induction Motor, need for starter in 3  $\phi$  IM, Slip- Torque characteristics.

Single Phase Induction Motor: Principle of operation of 1  $\phi$  IM, Methods of starting of 1  $\phi$  IM

Synchronous Machines: Construction and Principle of operation of Alternator and Synchronous Motor

### UNIT IV: FUNDAMENTAL OF SEMICONDUCTOR:

Energy bands in semiconductors, intrinsic and extrinsic semiconductors, Fermi level.

Diode circuits: Construction, Junction diode characteristics, Half and full wave rectifiers - Expression for efficiency and ripple factor, Filter circuits. Zener Diode Characteristics and its application as voltage regulator in Regulated power supply.

### UNIT V: TRANSISTOR FUNDAMENTAL:

Transistor circuits: Construction and characteristics of a transistor in CB, CE and CC modes - Relative merits. Load Line and operating point concept (both AC and DC). Biasing of Transistors and stability analysis. Construction and characteristics of JFET and MOSFET.

Communication Systems, Communication Channels, Need of modulation, Types of modulations (Wave shapes and final expression only),

### Text Books

1. Vincent Del Toro, "Principles of Electrical Engineering", Prentice Hall Publication.
2. I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill Publication.
3. Electronics Devices and Circuits, Millman and Halkias, Tata McGraw Hill, 4th ed.
4. Electronic Communication Systems, John Kennedy, Tata McGraw Hill, 4th ed.



# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **Electrical and Electronics Lab:**

1. Verification of Network Theorems.
2. Measurement of efficiency of a single phase transformer by load test.
3. Determination of parameters and losses in a single phase transformer by OC and SC test.
4. Perform the polarity test on Transformer.
5. Study of characteristic of AC Motor.
6. Study of DC shunt and series generator characteristics.
7. Study the Speed control of dc shunt motor.
8. Study running and reversing of a three phase induction motor.
9. To identify and Study of the various component and Devices of electronics with their specification (CRO, Function Generator, Multimeter, Power Supply, resistor, capacitor, inductor, ICs, LED, potentiometer etc.)
10. To study the V-I characteristics of PN diode and Zener diode.
11. To find the efficiency of rectifiers and ripple factor of capacitive and non-capacitive half wave and full wave rectifier.
12. To Study and verify clipper and clamper with biased circuits.
13. To find the characteristics of CB and CE amplifiers.
14. Determine the characteristics of FET.
15. To find out the power energy of various periodic and non-periodic signals.

### **LEARNING OUTCOMES**

1. Acknowledge students about charge, current, voltage and various basic electric circuit laws.
2. Acquaint students about DC circuit analysis and methods.
3. Advanced approach for solving series parallel network of resistors by star delta transformation.
4. Basics of AC circuits elements and various methods involved. Understanding the concepts of rms, average and peak values of AC waveforms and their power factor.
5. Acquaint students about the three phase loads, star delta connections and power. Relation between there phase and line values.
6. Acknowledge students with the use of transformers and its working.
7. To build an ability amongst students regarding the functioning of DC machines and its characteristics.
8. To recognise the need for synchronous machine in our electrical systems, its basic functioning and various advantages over other types of machines.
9. Provide students' knowledge regarding construction and working of three phase and single phase induction motors their application in various practical applications.
10. Provides information regarding the fundamental theory of semiconductor devices, fermi level and concept of doping.
11. Acquaints students with the knowledge of different types diode circuit configuration.
12. Provide students with the capability of analysing the different types of waveforms and to calculate various associated parameters.
13. Basics of different types of transistor configuration, modelling and their application.
14. Basics of communication system, modulation and their types

### **Text Books**

5. Vincent Del Toro, "Principles of Electrical Engineering", Prentice Hall Publication.
6. I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill Publication.
7. Electronics Devices and Circuits, Millman and Halkias, Tata McGraw Hill, 4th ed.
8. Electronic Communication Systems, John Kennedy, Tata McGraw Hill, 4th ed.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	EE102	<b>Subject Title</b>	Electrical & Electronics Measurements						
<b>LTP</b>	1-0-2	<b>Credit</b>	2.0	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVES

- To get Acquaints students with the basic idea of measurement system, its classification and characteristics.
- To acknowledge students about different types of measuring instruments based on the fundamental principle.
- To provide students with knowledge of methods of measuring resistances, inductance and capacitance.
- To provides knowledge regarding the basics of digital Measurement

### Philosophy of Measurement:

Methods of Measurement, Measurement System, Classification of instrument system, Characteristics of instruments & measurement system, Errors in measurement & its analysis, Standards.

### Analog Measurement of Electrical Quantities:

Permanent Magnet Moving Coil, Moving Iron type of Ammeters & Voltmeters, Electrodynamic Wattmeter,

**Measurement of Parameters:** Different methods of measuring low, medium and high Resistances, measurement of Inductance & Capacitance with the help of AC Bridges.

### Digital Measurement:

Concept of digital measurement, Block diagram.

### LEARNING OUTCOMES

1. Acknowledge students with the methods of measurement, classification of instruments system.
2. Acquaint students about characteristics of instruments and their operation.
3. Provides knowledge about basics of error measurement and methods of reducing it.
4. Basics of different types of measuring instruments based on the fundamental theory of operation.
5. Acknowledge students with the methods of measuring low, medium and high resistance.
6. Acknowledge students with the methods of measuring inductance and capacitance using different bridge configuration.
7. Provides knowledge regarding the fundamental of digital measurement, techniques and its application.

### Text Book:

1. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler & Co. Pvt. Ltd. India.
2. A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India.

### Electrical and Electronics Measurement (Labs)

1. Calibration of ac voltmeter and ac ammeter.
2. Measurement of form factor of a rectified sine wave and determine source of error if r.m.s. value is measured by a multi-meter.
3. Measurement of phase difference and frequency of a sinusoidal ac voltage using C.R.O.
4. Measurement of power and power factor of a single phase inductive load and to study the effect of capacitance connected across the load on the power factor.
5. Measurement of low resistance by Kelvin's double bridge.
6. Measurement of voltage, current and resistance using dc potentiometer.
7. Measurement of inductance by Maxwell's bridge.
8. Measurement of inductance by Hay's bridge.
9. Measurement of inductance by Anderson's bridge.
10. Measurement of capacitance by Owen's bridge.
11. Measurement of capacitance by De Sauty Bridge.
12. Measurement of capacitance by Schering Bridge.
13. Study of A to D convertor and its realization.
14. Study of D to A convertor and its realization.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	MA102	<b>Subject Title</b>	Engineering Mathematics-II						
<b>LTP</b>	3-1-0	<b>Credit</b>	3.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

**OBJECTIVE:** To introduce the fundamentals in Matrices and Linear Algebra, Ordinary Differential Equations, Infinite Series, Laplace Transform and Fourier Series relevant to engineering applications.

### UNIT I: Linear Algebra

Matrices, Elementary row and column operations, row reduced echelon form, rank of a matrix, invertible matrices. Consistency and solution of a system of linear equations. Properties of  $R^n$  as a vector space, Linear Dependence and Independence of elements in  $R^n$ , Basis of a Vector Space, Vector Space of polynomials over  $R$  and its basis, Matrix transformation, Rank-Nullity Theorem, Similar Matrices, Eigen-values and Eigen-vectors, Cayley–Hamilton theorem and its applications. Diagonalization of Matrices.

### UNIT II: Differential Equations

Methods of solving differential equations of first order and first degree, Bernoulli equation, Solutions of linear differential Equations of second and higher orders with constant & variable coefficients, Euler-Cauchy linear differential equation, method of variation of parameters. Solution of simultaneous linear differential equations.

### UNIT III: Infinite Series

Introduction; Sequences; Series; Convergence; Series of positive terms; Comparison test; Integral test; D’Alembert’s Ratio test; Cauchy’s root test; Alternating series; Leibnitz rule.

### UNIT IV: Fourier Series

Periodic functions; Fourier series of Periodic functions; Euler’s formulae; Functions having arbitrary period; Change of intervals; Even and Odd functions; Half range sine and cosine series.

### UNIT V: Laplace Transform

Laplace Transform; Existence theorem; Properties of Laplace Transform ; Laplace Transform of derivatives and integrals; Laplace Transform of Periodic functions; Unit Step function and Error Function; Dirac- Delta function. Inverse Laplace Transform and their properties, Convolution theorem; Applications of Laplace Transform to solve linear and simultaneous differential equations pertaining to engineering problems.

**Outcome:** Familiarity with fundamental tools of Matrices and Linear Algebra, Ordinary Differential Equations, Infinite Series, Laplace Transforms and Fourier Series relevant to engineering applications

#### Text Books:

- 1.R. K. Jain & S. R. K. Iyenger, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House, New Delhi, India, 2006.

#### Reference Books:

- 1.W. E. Boyce and R. Di Prima, Elementary Differential Equations, (8th Edition), John Wiley & Sons, U.K., (2005).
- 2.B. S. Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publication, New Delhi, India, 2012
- 3.E. Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, U.K., 2006.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	HS102	<b>Subject Title</b>	Corporate Communication and Soft Skills						
<b>LTP</b>	2-1-1	<b>Credit</b>	3.0	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVES

- To introduce to students to the business & corporate environment and its expectations.
- To help students to identify and sharpen their personal and professional skills.
- To ensure employability of students through a perfect blend of hard & soft skills.

### Unit I-Business Communication 10 hrs

Importance & Features of Business Communication, Flow of Communication: Channels & Networks  
 Communication: E mails & E- Tools  
 Business Presentation  
 Business Etiquette, Telephonic Etiquette  
 Business Letter Writing  
 Job Application Letter & Resume  
 Interview Skills, Impression Management:

### Unit II-Personal Skills for Corporate Communication

**10 hrs**

SWOT Analysis: Self-Assessment, Identifying Strength & Weakness  
 Self-Awareness, Self-Disclosure & Self-Management (Stress, Anger)  
 Goal Setting: Personal & Professional Goals, SMART-ER Goals  
 Human Perception: Understanding People, Perceptions, Attitudes  
 Personality (Personality Test)

### Unit III-Professional Skills for Corporate Communication

**10 hrs**

Decision Making: Techniques, Six Thinking Hats  
 Creative Thinking, Lateral Thinking  
 Team Building & Leadership Skills  
 Time Management: Planning Organizing, Time Wasters  
 Conflict Resolution Skills  
 Negotiation Skills

### LEARNING OUTCOMES

- Students identify their goals and through enhanced soft skills work towards achieving them.
- Greater self-confidence and knowledge of life skills helps them to develop healthier interpersonal relationships.
- Prepares the students to face future challenges and excel in their personal and professional lives.

### TEXT BOOKS

1. Rizvi, Ashraf. Effective Technical Communication, McGraw Hill, New Delhi. 2005.

### REFERENCE BOOKS

1. The Seven Habits of Highly Effective People by Steven R. Covey. 2007.
2. How to win Friends and influence People by Dale Carnegie. 2009.
3. Soft Skills: Know Yourself & Know the World by Dr. Alex . S. Chand Publications 2001.
4. The ACE of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalswamy Ramesh. 2008.
5. Managing Soft skills for Personality development by B. N Ghosh. 2006.
6. Personality Development by Elizabeth B. Hurlock. TMH Publication. 2010.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CS102	<b>Subject Title</b>	Computer Programming in C++						
<b>LTP</b>	3-0-2	<b>Credit</b>	4.0	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### OBJECTIVE

To introduce object oriented programming concepts and implement them in C++.

#### Unit -1

**8L**

Introduction to Object Oriented Programming, including methodologies, programming techniques, Object Oriented languages.

Overview of C++ basic structures, including the main () function, C++ data types, different type of operators expressions and statements, standard Input/output, Simple flow of control, Defining user defined Functions.

#### Unit -2

**8L**

General overview of objects and classes, Object and classes in C++, including class definition, Defining members inside or outside, accessing of members, constructors, types of constructors, destructors and Pointer to class object.

#### Unit-3

**8L**

Polymorphism: function overloading, methods of overloading, constructor overloading, Operator overloading.

General overview of inheritance: Introduction, Categories of inheritance, public/protected/private inheritance, constructors and destructors in derived classes, and Virtual Base class.

#### Unit-4

**8L**

Function overriding and virtual functions, Abstract class and abstract base class, Friend functions, Templates in C++, function templates, class templates, templates and inheritances, templates and static members.

#### Unit-5

**8L**

File handing in C++: opening of file, closing of file, text files, binary files, Reading and writing into a file. Exception Handling in C++, including usage, try, throw and catch.

### LEARNING OUTCOMES

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

- Differentiate between procedure oriented programming and object oriented programming.
- Understand the three key features of the object-oriented programming language: encapsulation (abstraction), inheritance, and polymorphism.
- Know the benefits of object oriented programming.
- Identify the differences between private, public and protected members of a class.
- Declare and use static data members and static methods.
- Design and use friend functions and friend classes.
- Use constructor and destructor functions to initialize and destroy class objects.
- Use inheritance to build class hierarchies.
- Overload operators to work with user-defined classes.
- Implement programs for file Handling.
- Identify benefits of using virtual functions.

#### Text Books-

1. Kip R. Irvine, C++ and Object Oriented Programming, Prentice hall, 1997
2. R. Lafore, Object Oriented Programming using C++, BPB publications, 2004
3. E Balaguruswamy, Object Oriented Programming with C++, TMH 2<sup>nd</sup> edition

#### Reference Books-

1. Schildt Herbert, C++ Programming, 2<sup>nd</sup> edition, Wiley
2. Yashwant Kanethkar, Object Oriented Programming using C++, BPB, 2004

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME101	<b>Subject Title</b>	Engineering Mechanics						
<b>LTP</b>	3-1-0	<b>Credit</b>	3.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

### Course Objective:

The objective of this course is to make students to learn basic engineering mechanics concepts and will help in solving problems involving forces, loads and moments and to know their applications in allied subjects. The course will develop engineering aptitude in field of application of science and technology.

### Unit 1: Introduction to Engineering Mechanics

**Introduction:** Idealization of bodies, physical quantities- units and dimensions, Scalars and vectors, Laws of mechanics, system of forces and its classification, Principle of superposition, transmissibility of forces.

(2 Hrs)

#### Resultant of concurrent force system

Parallelogram Law of forces, Resolution of forces, Principle of resolved parts; Numerical problems on composition of coplanar concurrent force systems.

(2 Hrs)

#### Resultant of non-concurrent force system :

Moment of a force, Couple, Equivalent force - couple system, Numerical problems on resultant of non-concurrent force system.

(3 Hrs)

### Unit 2: Equilibrium and Friction

**Equilibrium of system of forces** - Definition of Equilibrant; Free body diagram, Equilibrium of two and three force system, Conditions of static equilibrium, Lami's theorem.

(3 Hrs)

#### Application- Static Friction in rigid bodies in contact

Types of friction, Laws of static friction, Limiting friction, Angle of friction, angle of repose; Impending motion on horizontal and inclined planes; Numerical Problems on single and two blocks on inclined planes, ladder and wedge friction.

(4 Hrs)

### Unit 3: Analysis of Plane truss and Beam

**Support Reaction in beams:** Types of beams, Types of Loads and Supports, statically determinate beams, Numerical problems on support reactions for statically determinate beams with Point load (Normal and inclined) and uniformly distributed and uniformly varying loads and Moments.

(3 Hrs)

**Plane Truss:** Perfect and imperfect truss Assumptions and Analysis of Plane Truss by Method of joints and Method of section.

(4 Hrs)

### Unit 4: Centroids and Moments of Inertia of Engineering Sections

**Centroids:** Introduction to the concept, Centroids of line and area, Centroids of basic geometrical figures, computing Centroids for regular and composite cross-sections.

(4 Hrs)

**Moment of Inertia :** Introduction to the concept, Radius of gyration, Parallel axis theorem, Perpendicular axis theorem, Moment of Inertia of basic planar figures, computing moment of Inertia for regular and composite cross-sections.

(4 Hrs)

### Unit 5: Kinematics and kinetics

**Kinematics of particles:** Motion related to Cartesian and polar coordinates, motion curves, relative motion and dependent motion. Projectile motion, tangential and normal components of acceleration.

(4 Hrs)

**Kinetics of particles:** Newton's second law of Motion; Energy principles; Impulse momentum principle; direct central impact.

(3 Hrs)

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **LEARNING OUTCOMES**

1. Identify principles of mechanics used in real life engineering problems.
2. Know basics of Engineering based on force application, and selection of materials in application.
3. Understand the action of Forces, Moments and other loads on systems of rigid bodies;
4. Compute the reactive forces and the effects that develop as a result of the external loads;
5. Locate the Centroids and compute the Moment of Inertia of regular cross-sections.
6. Express the relationship between the motions of bodies
7. Equipped to pursue studies in allied courses in Mechanics.

### **Text Books:**

1. A. Nelson, "Engineering Mechanics: Statics & Dynamics", Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 1<sup>st</sup> edition, 2009.Reprint 2016
2. S.S. Bhavikatti, "Engineering Mechanics", New Age International Publishers Ltd., New Delhi, 3<sup>rd</sup> edition, SI Metric 2009.

### **Reference Books:**

1. S. Timoshenko, D.H. Young, J.V. Rao and S. Pati, "Engineering Mechanics", TATA McGraw-Hill Education, New Delhi, 5<sup>th</sup> edition, 2013.
2. F.P. Beer and E.R. Johnson, "Mechanics for Engineers- Dynamics and Statics", Tata McGraw-Hill, 3<sup>rd</sup> SI Metric edition, 2008.
3. I.H. Shames and G.K.M. Rao, "Engineering Mechanics: Statics & Dynamics", Pearson Education India, 4<sup>th</sup> edition, 2005.
4. A.R. Basu, "A Text book of Engineering Mechanics", Dhanpat Rai & Co.(P) Ltd., 2003.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	ME102	Subject Title	Mechanical Measurements						
LTP	1-0-2	Credit	2.0	Subject Category	UC	Year	1 <sup>st</sup>	Semester	I/II

### Course Objective:

To educate students on different measurement systems and to share application of principle of metrology and measurements as applied in industries. To learn laboratory skills, conduct experiments and identify sources of variability.

### Measurement-Basics:

Unit & Dimension, Traceability, Calibration, Least count, Error, Accuracy, Precision, Uncertainty, Repeatability, Reproducibility and Steadiness.

### Measurement - Solids:

Inside / Outside Diameter, Height / Depth, Eccentricity / Run-out, Taper, Backlash (play), Thermal conductivity

### Measurement - Material Properties:

Metals, Non-metals & Polymers, Measurement of mechanical properties as Tensile strength, Impact Strength and Hardness, Mass Moment of Inertia of rigid body and Poission's Ratio.

### Measurement - Fluids:

Density, Specific Gravity, Specific volume, Surface Tension & Viscosity Measurement, open channel discharge & velocity measurement, Heat Engine and Heat exchanger.

### List of Experiments

1. Error Analysis and Graph drawing and Evaluation.
2. Measurement of inside & outside diameter, taper, run-out etc.
3. Measurement of thermal conductivity of a material.
4. Tensile test.
5. Impact test.
6. Hardness test.
7. Measurement of Mass Moment of Inertia of rigid body.
8. Measurement of Poission's ratio.
9. Surface tension & viscosity measurement.
10. Open channel simple techniques flow measurement.
11. Others

### LEARNING OUTCOMES

- Demonstrate excellent laboratory skills, conduct experiments and Identify sources of variability
- Analyse, interpret, and present measurement data from measurements/experiments
- Enhance ability to apply knowledge of mathematics, statics, physics and engineering sciences
- Gain eye hand coordination, enhance psycho motor skills and attitude.

### Text Books

1. B.C. Nakra and K.K. Chaudhry, "Instrumentation, Measurement and Analysis", Tata McGraw-Hill Pvt. Ltd., New Delhi, 5<sup>th</sup> edition, 2015.
2. E.O. Doebelin and D.N. Manik, "Doebelin's Measurement Systems", McGraw Hill Education, 6<sup>th</sup>ed

### Lab Manual

1. DIT Engineering Measurements Lab Manual, ME Department Aug 2017

### Reference Books:

1. SP Venkateshan IIT Madras, Mechanical Measurements 2<sup>nd</sup> Edition; e-Book,
2. NPLaboratory, Beginners guide to measurements in Mech Engineering, UK; e-Book



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	ME103	Subject Title	Engineering Graphics						
LTP	0-0-3	Credit	1.5	Subject Category	UC	Year	1 <sup>st</sup>	Semester	I/II

### Course Objective:

To improve the visualization skills and to develop an understanding of the theory of projection. To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.

### Contents:

- 1. Introduction:** Importance of graphics in engineering applications, Sheet Layout, Size of Sheets, Title blocks, Type of lines, Lettering, Dimensioning, Scale (Full, Reduced, Large)
- 2. Projection:** Methods of Projection, Planes of Projection, Projection of points, Projection of straight lines, Projection of planes.
- 3. Projection:** Projection of solids.
- 4. Orthographic views:** Machine parts with dimensioning.
- 5. Freehand sketching:** Isometric Projections; Introduction and basics.
- 6. AutoCAD:** Introduction to Commands, Explaining need of AutoCAD over Manual drafting.

**Mode:** The contents of the subject needs to be delivered in the form of basic teaching process in one hour of the three hours practice session , such that the student is able to understand the basic principles before initiating drawings.

**Exam:** Engg Graphics will have both Mid Term and End Term Practical Exams

### Learning Outcomes:

- To enable students to acquire and use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions.
- To enable students to acquire requisite knowledge, techniques and attitude required for advanced study of engineering drawing.
- Understand AutoCAD commands and appreciate the need of AutoCAD over Manual Drafting.

### Text Books:

- 1) N. D. Bhatt and V.M. Panchal, "Engineering Drawing", Charotar Publishing House Pvt. Ltd., 53<sup>rd</sup> edition, 2016 reprint.
- 2) P.S. Gill, "Engineering graphics", S. K. Kataria & Sons, 13<sup>th</sup> edition, 2016.

### Reference Books:

- 1) D.A. Jolhe, "Engineering Drawing", Tata McGraw-Hill Education Pvt. Ltd., 1<sup>st</sup> edition, 2008.
- 2) K.C. John, "Engineering graphics", PHI Learning Pvt. Ltd., 2<sup>nd</sup> edition, 2010.
- 3) F.E. Giesecke, A. Mitchell, H.C. Spencer, I.L. Hill, J.T. Dygdon, J.E. Novak, "Technical Drawing", Prentice Hall, 12<sup>th</sup> edition, 2003

### List of Experiments/ Drawing sheets (L+P)

- |   |           |
|---|-----------|
| 1. One sheet on Lettering and Geometric construction.               | (1+4 Hrs) |
| 2. One sheet on Basics of Projection of points and lines.           | (2+4 Hrs) |
| 3. One sheet on Projection of Planes.                               | (2+4 Hrs) |
| 4. One sheet on Projection of Solids.                               | (2+4 Hrs) |
| 5. One sheet on Orthographic views of simple isometric blocks.      | (1+4 Hrs) |
| 6. One sheet on Free hand sketches and Basic Isometric Projections. | (0+4 Hrs) |
| 7. Basic AutoCAD commands.  | (1 +3Hrs) |

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CH101	<b>Subject Title</b>	Engineering Chemistry						
<b>LTP</b>	3-1-2	<b>Credit</b>	4.5	<b>Subject Category</b>	UC	<b>Year</b>	1 <sup>st</sup>	<b>Semester</b>	I/II

**OBJECTIVE:** To provide a summary on water chemistry, water treatment, green chemistry and synthetic chemistry. The course intends to provide an overview of the working principles, mechanism of reactions and application of the building blocks like batteries, fuel cells, polymers and an overview of surface coatings in order to protect the metal. This course relies on elementary knowledge of polymers, engineering materials and basics of nanotechnology to illustrate the concepts involved. To provide an impression of organic chemistry, spectroscopy, biomolecules, fuels and lubricants. To gain the knowledge on existing & future upcoming devices, materials and methodology.

### Unit 1. Water Treatment and Analysis (08 Lectures)

Standards for drinking water, Water Quality parameters, Determination of alkalinity of water, Hardness of water: Units and determination. Demineralization of water, Softening of water: Limesoda Process, Ion exchange process, Zeolite process and RO process. Internal conditioning methods: Carbonate conditioning, Phosphate conditioning, Colloidal conditioning, Calgon conditioning. Desalination of brackish water.

### Unit 2. Electrochemistry & Corrosion (06 Lectures)

Migration of ions, Transference number, Determination of Transference number by Hittorf's method, Conductometric titrations, Types of electrode: Calomel and glass electrode, Liquid junction potential, Potentiometric Titrations, Corrosion and its economical aspects, Types of corrosion: Galvanic, Erosion, Crevice, Pitting, Waterline, Soil, Microbiological. Theories of corrosion: Acid, Direct Chemical attack, Electrochemical. Corrosion prevention by metallic, organic/inorganic coatings and corrosion inhibitors

### Unit 3. Polymers & Biomolecules (10 Lectures)

Introduction; Classification of Polymers; Functionality; Mechanism of Polymerization; Plastics; Individual Polymers; LDPE, HDPE, PVC, Polystyrene, Bakelite, Teflon, PMMA, PET, Nylon-6, Rubbers (BUNA-S and BUNA-N); Speciality Polymers (Conducting Polymers, Silicones and Polycarbonates), Gypsum, Plaster of Paris, Insulating Materials. Structural and functional attributes of cell and cell organelles; Biomolecules (Proteins, Carbohydrates, Lipids, Enzymes, Nucleic acids). r-DNA technology and its applications in industry, health, environment and agriculture. Microbial technology and its common applications.

### Unit 4. Fuels, Battery & Lubrication (08 Lectures)

Classification of fuels, Calorific value, Cetane number, Octane number, fuel quality, Comparison of solid, liquid and gaseous fuel, properties of fuel, alternative fuels: Biofuels, Power alcohol and synthetic petrol, Battery, Photovoltaic cell, Metal-air battery, Lithium and nickel battery. Introduction of Lubricants, Functions of Lubricants, Classification of lubricants, Mechanisms of Lubrication, Properties of Lubricants.

### Unit 5. Green Chemistry & Nano Chemistry (08 Lectures)

Emergence of green chemistry, Twelve principle of green chemistry, use of alternative feedstock (biofuels), Use of innocuous reagents, use of alternative solvents, design of safer chemicals, designing alternative reaction methodology, minimizing energy consumption. Introduction to Nano chemistry, properties of Nanomaterials, preparation of nanomaterial, self-assembly, Nanomaterials, Applications of Nanomaterials

### LIST OF PRACTICALS

1. Determination of alkalinity in the given water sample.
2. Estimation of temporary and permanent hardness in water sample using EDTA as standard solution.
3. Calculation of percentage of available chlorine in bleaching powder.
4. Chloride content in the given water sample by Mohr's method.
5. Determination of iron content in the given ore by using external indicator
6. pH-metric titration.
7. Proximate Analysis of coal sample
8. Conductometric titration.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

9. Synthesis of Phenol formaldehyde resin
10. Viscosity of a lubricant by Redwood Viscometer
11. Flash and Fire point determination of a Lubricant
12. Calorific value of a fuel sample by Bomb calorimeter.
13. Determination of order of reaction in ester hydrolysis reaction
14. To determine the DO in a given water sample
15. To study the adsorption of acetic acid on activated charcoal

**LEARNING OUTCOME:** Ability to know and to understand the various process of removing the hardness of water and principles of green chemistry. Understand the operating principles and the reaction mechanisms of batteries and fuel cells. Students will be able to apply this knowledge to the analysis and design of batteries. Hydrogen fuel cell technology is used in automobiles in order to reduce environmental pollution. Electrochemistry concept is used to know the Corrosion treatment process of alloys. An ability to identify and formulate polymers and have a knowledge of various polymers like polyethylene, PVC, PS, Teflon, Bakelite, Nylon which have engineering applications. To gain acquaintance regarding biomolecules and their application in engineering. An ability to handle various instruments like spectroscope, flame photometer etc. Have a knowledge of synthesizing Nano materials and their applications in industry. Know the properties of Fuels and Lubricants. Have a scope in the area of Material Chemistry.

### **Text Books Recommended:**

1. Engineering Chemistry by Shikha Agarwal. Cambridge University Press Edition 2015.
2. Engineering Chemistry by S. Vairam & Suba Ramesh. Wiley India Pvt. Ltd. 2014.

### **Reference Books:**

1. Environmental Chemistry by Stanley E. Manahan. CRC Press Taylor and Francis.
3. Organic Chemistry by Morrison and Boyd. Pearson.
4. Physical Chemistry by Atkins. Oxford University Press.
5. Concise Inorganic Chemistry by J.D. Lee. Oxford University Press.
6. Basic Biotechnology by S Ignacimuthu. Tata Mcgraw-Hills
7. Spectroscopy by Silver Stein. Pearson.
8. Nano: The essentials by T. Pradeep. McGraw Hill Education.
9. Biochemistry by Stryer/Lubert. Mcmillan learning. 2015.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CH201	<b>Subject Title</b>	ENVIRONMENTAL SCIENCE						
<b>LTP</b>	2 0 0	<b>Credit</b>	0	<b>Subject Category</b>	AC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE

To impart basic knowledge about the environment and its allied problems and to develop an attitude of concern for the environment. Further the course structure will create the awareness about environmental problems among students and motivate the students to participate in environment protection and environment improvement programs. The course aims to develop skills to help the concerned individuals in identifying and solving environmental problems.

#### Unit 1: Basics of Environment and Natural Resources:

**04 Hrs**

Definition and Concept of Environment, Multidisciplinary nature of environmental studies. Scope and importance of environmental studies, Need for public awareness, Environmental concerns and people. Introduction and classification of natural resources. Energy Resources, Water Resources, Land Resources, Forest Resources, Food Resources, Mineral Resources, Case studies related to over exploitation of resources and their impacts. Role of an individual in conservation of natural resources, Sustainable lifestyles.

#### Unit 2: Ecosystems:

**04 Hrs**

Definition and concept of ecology, Structure and Function of an Ecosystem, Energy Flow in Ecosystems, Biogeochemical cycles (Nitrogen, Carbon, Phosphorus, Oxygen, Hydrological). Species interactions in ecosystems. Ecological succession and ecological pyramids. Characteristic features of grassland, pond, desert and forest ecosystems. Ecosystem services and conservation.

#### Unit 3: Biodiversity and its conservation:

**04 Hrs**

Introduction and types of biodiversity. Bio-geographic classification of India, Value and significance of biodiversity, Biodiversity at global, national and local levels, India: A mega-diversity nation, Biodiversity hotspots, Threats to Biodiversity: Poaching and man-wildlife conflicts, IUCN Red Data Book and endangered & endemic species of India. Biodiversity conservation strategies, Institutes and organizations.

#### Unit-4 Environmental Pollutions:

**05 Hrs**

Introduction and Definition. Causes, consequences and control measures of: Air pollution, Water pollution, Noise pollution, Nuclear pollution, Soil pollution, Thermal and Marine pollution. Solid waste management, Bio-medical waste management. Disasters and its mitigation strategies, Global warming, Climate change, Acid rain, Ozone depletion and Smog. Pollution case studies. Role of an individual in pollution prevention.

#### Unit-5 Social Issues and Environment:

**04 Hrs**

Sustainable Development: Concept and importance, Environmental Impact Assessment (EIA), GIS, Remote sensing. Water conservation and rain water harvesting. Resettlement and rehabilitation problems, Environmental audit, eco-labeling and eco-friendly business. Environmental Legislation in India, Population explosion and its impact on environment and human health, Value Education and environmental ethics.

#### Field work:

**03 Hrs**

- Visit to a local area to document environmental asset: river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common flora and fauna.
- Study of a common ecosystem-pond, river, hill slopes, etc.

#### Course Outcome:

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

CO1. Demonstrate depleting nature of Environmental Resources and Ecosystem concepts.

CO2. Able to identify the structure and functioning of natural ecosystems.

CO3. Establish man-wildlife harmonious relationship.

CO4. Adapt to 3R (Reuse, Recovery, Recycle). Identify the causes and control measures related to Pollutions.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

CO 5. Illustrate and analyse various Case Studies related to Environmental issues and Env. Legislation.

### **TEXT BOOKS**

1. Bharucha Erach, 2004. Textbook for Environmental Studies, University Grants Commission, New Delhi.
2. Kaushik A & Kaushik C P. 2007. Perspectives in Environmental Studies, New Age International Publ.
3. S. Deswal & A. Deswal 2015. A Basic Course in Environmental Studies. Dhanpat Rai & Co.

### **REFERENCES**

1. Miller T.G. Jr. 2002. Environmental Science, Wadsworth Publishing Co. (TB).
2. De A.K., 1996. Environmental Chemistry, Wiley Eastern Ltd.
3. Sharma, P.D. 2005. Ecology and environment, Rastogi Publication.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	HS244	<b>Subject Title</b>	INDIAN CONSTITUTION						
<b>LTP</b>	2 0 0	<b>Credit</b>	0	<b>Subject Category</b>	AC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE

To familiarize the students with the features of the Indian Constitution

To provide a knowledge of their constitutional rights

#### Unit 1 Introduction

**5 Hrs**

Constitution- meaning of the term, basic features Indian Constitution: Sources and constitutional history.

Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy, debates on Fundamental Rights and Directive. 1 Hr

Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive, Principles of State Policy, debates on Fundamental Rights and Directive. 4 Hrs

#### Unit 2 Union Government and its Administration

**6 Hrs**

Structure of the Indian Union: Federalism, Centre- State relationship, 2 Hrs

President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha 2 Hrs

Institutional Functioning: Prime Minister, Parliament and Judiciary, Power Structure in India: Caste, class and patriarchy 2 Hrs

#### Unit 3 State Government and its Administration

**3 Hrs**

Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions 3 Hrs

#### Unit-4 Local Administration

**7 Hrs**

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected, Representative, CEO of Municipal Corporation. 3 Hrs

Pachayati Raj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy 4 Hrs

#### Unit V: Election Commission

**5 Hrs**

Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

### COURSE OUTCOME:

CO 1 Enable the students to protect their rights

CO 2 The students will be engaged in the political system of India

### TEXT BOOKS

- Abbas, H., Kumar, R. & Alam, M. A. (2011) Indian Government and Politics. New Delhi: Pearson, 2011.
- Chandhoke, N. & Priyadarshi, P. (eds.) (2009) Contemporary India: Economy, Society, Politics. New Delhi: Pearson.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCE BOOKS**

- Chakravarty, B. & Pandey, K. P. (2006) Indian Government and Politics. New Delhi: Sage.
- Chandra, B., Mukherjee, A. & Mukherjee, M. (2010) India after Independence. New Delhi: Penguin.
- Singh, M.P. & Saxena, R. (2008) Indian Politics: Contemporary Issues and Concerns. New Delhi: PHI Learning.
- Vanaik, A. & Bhargava, R. (eds.) (2010) Understanding Contemporary India: Critical Perspectives. New Delhi: Orient Blackswan.
- Menon, N. and Nigam, A. (2007) Power and Contestation: India since 1989. London: Zed Book.
- Austin, G. (1999) Indian Constitution: Corner Stone of a Nation. New Delhi: Oxford University Press.
- Austin, G. (2004) Working of a Democratic Constitution of India. New Delhi: Oxford University Press.
- Jayal, N. G. & Maheta, P. B. (eds.) (2010) Oxford Companion to Indian Politics. New Delhi: Oxford University Press.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	MA201	<b>Subject Title</b>	ENGINEERING MATHEMATICS – III						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	SC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### Objective:

- Introduce the fundamentals in Complex variable.
- Solving Partial Differential Equations.
- Legendre polynomial of first kind with properties.
- Bessel function of first kind and its properties.

### UNIT I: Complex variable- I

(8)

Elementary functions, limit, continuity & differentiability, Analytic Functions; Cauchy – Riemann equations, Harmonic functions, Line integral in the complex plane, Cauchy's Integral theorem, Cauchy's Integral formula for derivatives of analytic function.

### UNIT II: Complex Variables -II

(6)

Power series, Taylor's series, Laurent's series, Poles, Zeros, Singularities, Residue Theorem, Evaluation of real

integrals of the type  $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$  and  $\int_{-\infty}^{\infty} f(x) dx$ .

### UNIT III: Special Functions

(8)

Series solution of ODE of 2<sup>nd</sup> order with variable coefficient with special emphasis to Legendre and Bessel differential equation by Frobenius method, Legendre polynomial of first kind, Bessel function of first kind and their properties.

### UNIT IV: Fourier Transform & Z-transform

(8)

Fourier integral, Fourier transform, Fourier sine and cosine transforms, Linearity, Scaling, frequency shifting and time shifting properties, Convolution theorem and its application.

Z – Transform, Properties of Z-transforms, Convolution of two sequences, Inverse Z-transform, Solution of difference equations.

### UNIT V: Partial differential equations and its Applications

(8)

Introduction to partial differential equations; Linear partial differential equations with constant coefficients of second order and their classification; Method of Separation of Variables for solving Partial Differential Equations, One-Dimensional Wave Equation, One Dimensional heat equation.

### Course Outcomes:

- Familiarity with methods of solving partial differential equations.
- Learn differentiation and Integration of complex functions.
- Solving real integrals with complex integration.
- Learn Fourier and Z-transform rules with applications.

### Text Books:

1. J.W. Brown & R. V. Churchill: Complex Variables & Applications, 9<sup>th</sup> edition, McGraw-Hill, 2013.
2. R. K. Jain & S. R. K. Iyenger, Advanced Engineering Mathematics, 2<sup>nd</sup> Edition, Narosa Publishing House, New Delhi, India, 2014.

### Reference Books:

1. B. S. Grewal, Higher Engineering Mathematics, 42<sup>th</sup> Edition, Khanna publication, New Delhi, India, 2012.
2. E. Kreyszig, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, John Wiley & Sons, U.K., 2006.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE201	<b>Subject Title</b>	FLUID MECHANICS						
<b>LTP</b>	3 1 2	<b>Credit</b>	5	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE:

The course is designed to gain knowledge regarding the flow characteristics and its effects on the Civil Engineering Structures.

#### Unit 1: Fluid Properties and Hydrostatics

Introduction to Fluid Mechanics, Definition of Fluid, Solid and Fluid Continuum. Definition, Units and dimensions of Mass density, Specific weight, Specific Volume, Relative density, Viscosity, Capillarity & Surface Tension. Newton's law of viscosity, Equation for capillarity. 4 L

Definition of Pressure, Hydrostatic pressure equation, Absolute and Gauge pressures. Measurement of Pressure, Force exerted by a liquid on a flat surface, concept of buoyancy. 4 L

#### Unit 2: Kinematics and Dynamics of Fluid Flow

Introduction, Classification of flow, Three dimensional continuity equation (Cartesian coordinates), General Continuity equation, Stream function, Velocity potential, Stream line, Equipotential line, (Two dimensional only). 4 L

Concept of inertia force and forces causing motion. Derivation of Euler's equation & Bernoulli's equation with assumptions and limitations, problems on application of Bernoulli's equation 4 L

#### Unit 3 Flow through Pipes

Introduction, Reynolds's number and its significance, Laminar and Turbulent Flow, Hagen- poiseulle's equation, Major and minor losses in pipe flow Equation for head loss due to friction (Darcy's), Equation for head loss due to sudden expansion 5 L

Pipes in series, pipes in parallel and equivalent pipes, Water Hammer in pipes. 3 L

#### Unit-4 Dimensional Analysis and Model Studies

Introduction to Dimensional analysis, Units and dimensions, Dimensional Homogeneity. Raleigh's and Buckingham's methods of analysis, 3 L

Model studies, similitude, dimensional parameters, Types of models, Froude's models: Reynold's models 4 L

#### Unit- 5:Flow Measurements

Introduction, Equation for discharge over triangular notch, Rectangular notch, Trapezoidal notch. Classification of orifices, Hydraulic coefficients of an orifice, Problems on Vertical Orifice. 8 L

### COURSE OUTCOME:

At the end of the course, the student can:

CO1. Calculate Hydrostatic forces on bodies by applying concepts of fluid properties.

CO2. Apply knowledge of Fluid statics and Fluid dynamics in CFD analysis.

CO3. Compute major and minor losses in pipe and water hammer pressure.

CO4. Apply Knowledge of Model laws and Dimesional analysis.

CO5. Measure discharge through Notches and Orifices.

### TEXT BOOKS

1. Bansal, R. K., "Fluid Mechanics and Hydraulic Machine", Lakshmi Publications, New Delhi., 2008
2. Subramanya. K., "Fluid FluidMechanics", Tata McGraw Hill, New Delhi.
3. Rajput, R.K., "A Textbook of Fluid Mechanics and Hydraulic Machines", S. Chand Publications, 6th Edition. 2016

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCES**

- 1 Modi, P. N., Seth, S. M., "Hydraulics and Fluid Mechanics", Standard Book House, New Delhi, 2004.
- 2 Jain, A.K., "Fluid Mechanics: Including Hydraulic Machines", Khanna Publishers, New Delhi, 2010

<b>SR.NO.</b>	<b>EXPERIMENT NAME</b>
1	Verification of Bernoulli's Theorem
2	Metacentric Height
3	Calibration of V- Notch
4	Calibration of Rectangular Notch
5	Calibration of Trapezoidal Notch
6	Calibration of Venturimeter
7	Calibration of Orificemeter
8	Losses in Pipes

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE202	<b>Subject Title</b>	<b>SOLID MECHANICS</b>						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE:

The course objective is to learn the strength behavior of materials and properties of those materials used in Civil Engineering

### Unit 1: Simple Stresses and Strains

**Basic idealizations** - Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain diagram for structural steel and nonferrous metals, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Elongation due to self – weight, volumetric strains-expression, Elastic constants, relationship among elastic constants. 5 L

Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications

### Unit 2: Principal Stresses and Strains

Introduction, Stress components on inclined planes, General two dimensional stress system, Principal planes and stresses, Mohr's Circle of stresses. 6 L

### Unit 3: Bending Moment and Shear Force in Beams

Introduction, Types of beams, loadings and supports, Shear force and Bending moment, Sign conventions, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams for Point loads, UDL, Triangular loads and Couple. 10 L

### Unit-4: Bending and Shear Stress in Beams

Introduction – Bending stress in beam, Assumptions in simple bending theory, Derivation of Bernoulli's equation for simple bending, Section modulus, Flexural rigidity, Expression for horizontal shear stress in beam, Shear stress distribution for rectangular, 'I' and 'T' sections. 8 L

### Unit- 5: Deflection of Prismatic Beams & Elastic Stability of Columns

Definitions of slope, deflection, Elastic curve derivation of differential equation for flexure, Slope and deflection using Macaulay's method for simply supported and cantilever beams subjected to point loads, UDL and Couple. Elastic stability of columns- Introduction – Short and long columns, Euler's theory on columns, Effective length slenderness ratio, radius of gyration, buckling load, Assumptions, derivations of Euler's Buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems. 10 L

### COURSE OUTCOME:

At the end of the course, the student can:

- CO1. Calculate the properties of materials, stresses and strains developed under different types of loadings and the relationship between Elastic Moduli's
- CO2. Know the types of beams with different end conditions and also to find S.F. and B.M. at any section of the beam subjected to different types of loadings.
- CO3. Determine bending stress and shear stress distribution across various beam sections
- CO4. To determine the bending and shear stresses.

### TEXT BOOKS

1. Ramamrutham, S., Narayan, R., "Strength of Materials", Dhanpat Rai Publications, 14th Edition, 2011.
2. Rajput, R. K., "Strength of Materials", S. Chand Publications, 2006.
3. "Strength of Materials" by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCES**

1. Timoshenko, S. P., "Elements of Strength of Materials", East West Press, 2009.
2. Beer, F. P., Johnston, E. R., DE Wolf, J. J. T., "Mechanics of Materials", The McGraw Hill Companies, 3rd Edition.
3. Basavarajaiah, B. S., Mahadevappa, P., "Strength of Materials", and Orient Black swan, New Delhi, 2010.
4. Pytel, A., Singer, F. L., "Strength of Materials", Harper Collins Publications, 1990.
5. Russell C. Hibbeler, Mechanics of materials, Pearson 10th Edition, 2017

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE203	<b>Subject Title</b>	<b>BASIC SURVEYING</b>						
<b>LTP</b>	3 0 2	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE:

The course is designed to gain knowledge about surveying and its relevance in mapping and to introduce the students with various methods of calculating areas and volumes using maps.

#### Unit 1: Introduction

**6 L**

Importance of surveying to engineers. Types and classification of survey. Concept of scale, Symbols & colours, Principles of surveying. Concept of field and office work. Horizontal and vertical control. Units of measurement. Definition of maps and understanding topographical maps of Survey of India.

#### Unit 2: Horizontal control

**8 L**

Operation and use of metric chain and tape. Sources of errors and corrections. Use of ranging rods, cross staff, arrows, pegs etc. Use of prismatic compass and - Surveyor's compass - Bearings - Whole circle and Reduced Bearing -Traversing - Local attraction - Magnetic dip and declination. Plane table survey and accessories- Radiation, intersection and traversing. Two point problem, Three point problem.

#### Unit 3 Vertical Control

**8 L**

Definitions of terms used in levelling, different types of levels, adjustments, bench marks. Booking and reducing the levels- rise and fall method and plane of collimation method. Profile levelling- longitudinal and cross sectioning – Plotting. Contouring- definition and characteristics of contours. Uses of contours. Methods of contouring-direct and indirect.

#### Unit-4 Theodolite Survey

**12 L**

Definition – types, principle and fundamental axes. Temporary adjustments. Measurements of horizontal and vertical angles. Method of repetition and Reiteration. Finding out height and elevation of object by single and double plane method. Curves: Simple curve-Elements of simple curves. Designation of a curve. Setting out simple curve Tabulation and setting out of compound curve, reverse curve, transition curve, combined curve and vertical curves.

#### Unit- 5:Areas and Volumes

**5 L**

General methods for determining areas. Areas from offsets to a base line, area by double meridian distances, coordinates, map measurements and planimeter. Measurement of volume by prismoidal and trapezoidal formula, volume from spot levels and volume from contour plans.

### COURSE OUTCOME:

At the end of the course, the student can :

CO1. Identify principles of surveying to be used for solving real life engineering problems.

CO2. Know how to interpret maps in surveying.

CO3. Perform Theodolite survey for horizontal control and leveling for vertical control

CO4. Students can compute area and volume of large area using different methods for use in surveying.

### TEXT BOOKS

1. Punmia, B. C., Jain, A. K., "Surveying", Laxmi Publications Pvt. Ltd., New Delhi, Vol. I, 16 th Edition, 2005.

2. Punmia, B. C., Jain, A. K., "Surveying", Laxmi Publications Pvt. Ltd., New Delhi, Vol. II, 15 th Edition, 2005.

3. Engineering Roy, S. K., "Fundamentals of surveying", Prentice Hall of India, New Delhi, 2 nd Edition, 2010.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCES**

1. Chandra, A. M., "Plane Surveying", New age International, 2nd Edition, 2006.
2. Beer FP and Johnson ER, "Mechanics for Engineers- Dynamics and Statics"-3rd SI Metric edition, Tata McGraw Hill.-2008
3. De, A., "Plane surveying", S. Chand and Company Ltd., 2000.

### **SR.NO.**

### **EXPERIMENT NAME**

- 1 Study of different types of maps, their scales, latitude, longitude, colours and symbols.
- 2 Setting out polygons using prismatic compass; Location of details using compass traversing.
- 3 Method of radiation and intersection by plane tabling.
- 4 Two point and three point problem.
- 5 Finding elevations using dumpy level with change point and using plane of collimation method.
- 6 Plotting of contours by block levelling.
- 7 Finding horizontal angle by method of repetition, method of reiteration and measurement of vertical angles.
- 8 Finding out height and elevation of an object by single plane method.
- 9 Setting out simple curves by offsets from long chord & chord produced method.
- 10 Setting out simple curves by Rankine's deflection angle method.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE204	<b>Subject Title</b>	WATER SUPPLY ENGINEERING						
<b>LTP</b>	3 1 2	<b>Credit</b>	5	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE:

The course provides an understanding of drinking water quality, treatment and design of treatment units, water supply and water connections to households.

#### Unit 1: Need for public water supply and role of engineers

6 L

Quantity of water, Different water demands, design period and population forecast-Arithmetic mean, Geometric mean and incremental increase method. Sources of water.

#### Unit 2: Quality of water

9 L

Physical, chemical and bacteriological water quality parameters, Standards of Water quality desired for domestic water supplies – BIS and WHO Standards - Water borne diseases.

#### Unit 3: Treatment of water

10 L

Objectives. Conventional treatment plant layout. Different treatment units (location and its function) - Screening, Aeration, Sedimentation, Filtration and Disinfection. Concept of flow through treatment units. Design of circular sedimentation tanks and Rapid Sand Filter. Miscellaneous treatment methods, swimming pool water treatment.

#### Unit-4: Storage and distribution of water

8 L

Layouts of distribution systems, Methods of distribution: pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method of pipe network analysis.

#### Unit- 5: Water supply to buildings

6 L

Components of house water supply system, Pipe sizes and recommended velocities and pressures. Pipe fittings and pipe joints. Valves and taps. Hot water supply, Rainwater harvesting, Fire safety and firefighting installation in buildings.

### COURSE OUTCOME:

#### The students will be able to learn about

CO1. Various water demand quantities and basic knowledge about drinking water parameters.

CO2. Treatment of public water supply.

CO3. Design of water treatment plants and storage capacity of reservoir

CO4: Understanding of various components of house water supply system

### TEXT BOOKS

1. Garg, S. K., "Water Supply Engineering", Khanna Publishers (RS), New Delhi, 2010.
2. Punmia, B. C., Jain, A. K., "Environmental Engineering-I", Laxmi Publication (P) Ltd., New Delhi, 2005.

### REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi.
2. Panchdhari, A. C., "Water Supply and Sanitary Installations", New Age International Publishers, New Delhi, 2<sup>nd</sup> Edition, 2000.
3. Nazaroff, W. W., Cohen, A. L., "Environmental Engineering Science", Wiley India, 2001.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

<b>SR.NO.</b>	<b>EXPERIMENT NAME</b>
1	Determination of turbidity, color and conductivity
2	Determination of pH, alkalinity and acidity
3	Determination of hardness and chlorides
4	Determination of residual chlorine and chlorine demand
5	Determination of dissolved oxygen
6	Measurement of sound level with sound level meter
7	Determine the quantity of alum required to coagulate a given sample of raw water
8	Find out suspended solids, dissolved solids, total solids



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE205	<b>Subject Title</b>	<b>BUILDING MATERIALS AND CONSTRUCTION</b>						
<b>LTP</b>	2 0 0	<b>Credit</b>	2	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	III

### OBJECTIVE:

The objectives of this course is to learn to know about the supporting structures and building amenities.

#### Unit 1: Introduction to Building Materials 6 L

Bricks: Classification, ingredients, different tests and its applications; Timber: It's Varieties, defects, tests, seasoning, applications; Application of Plywood and Veneers; Tests for fine aggregates.

#### Unit 2: Lime, Mortar and Stones 5 L

Lime: Classification and its application; Stone: Types of building stone, uses, deterioration and preservation, dressing stones and tests; Mortar: Importance, types and its ingredients.

#### Unit 3 Foundations 4 L

Requirement of good foundation; Bearing Capacity of soil; classifications and various Applications.

#### Unit-4 Flooring and Roofing, Stairs Doors and Windows 6 L

Requirements of good floors; Selection of flooring materials; Types of roof and different roofing materials; Types of doors and Windows.

#### Unit- 5: Masonry and Plastering 5 L

Brick masonry (Bonds); Purpose, methods and defects of plastering, damp proofing.

### TEXT BOOKS

1. Kumar, S., "Building Construction", Standard Publishers Distributors, New Delhi, 16<sup>th</sup> Edition, 2006.
2. Rangwala, S. C., "Engineering Materials (Material Science)", Charotar Publishing House Pvt. Limited, 2008.

### REFERENCES

1. Rai, M., Jaisingh, M. P., "Advanced Building Materials and Construction" CBRI Publications, Roorkee, 1985.
2. Punmia, B. C., "Building Construction", Lakshmi Publications (P) Ltd., New Delhi, 2005.
3. Rajput, R. K., "Engineering Material", S. Chand Publication, 2008.

### COURSE OUTCOME:

At the end of the course, the student can:

- CO1. About the different types of materials used for building construction
- CO2. Understand types of doors and stairs and its uses and masonry, floors, and roofs.
- CO3. Able to decide the types of materials to be used based on the extent of work to be done.
- CO4. Select suitable type of flooring, plastering and also suitable color to the building.
- CO5. Select and design suitable type of framework.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives I

Subject Code	HS241	Subject Title	Education and Social Change						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	II	Semester	IV

#### Course Objective

- To define the various types of education policies
- To understand the role in striving for social change.
- To overview on education and its implications on social changes to the students.

#### Unit 1

6 Hrs

General introduction to the place of learning in society. Learning, education and training.

Changing meanings of education across time and society. A brief historical perspective on education in India.

#### Unit 2

6 Hrs

Social-political arithmetic as a spurious way of understanding education and social change.

Structural functionalist perspectives and structural-conflict perspectives on education

#### Unit 3

7 Hrs

Class, conflict, legitimation processes, reproduction of society. Anarchist perspectives. "New" Sociology of Education. Symbolic interactionist perspectives on education. Resistances to schooling. Critical theory and education.

#### Unit 4

7 Hrs

Neo-Weberian perspectives on education. Status politics and education. Caste, class, gender and education in India. Indian thinkers on education. Current debates on the place of education in India.

#### LEARNING OUTCOME:

- The students will understand how the education system assesses the importance of education in society.
- The students will be able to take a significant action in area of education to maintain social change
- The student will be able to participate in the changes required in society.
- Education will be used as a tool to implement adequate changes in society.

#### TEXT BOOKS

1. Desai, A.R. (2005), *Social Background of Indian Nationalism*, Popular Prakashan.
2. Giddens, A (2009), *Sociology*, Polity, 6<sup>th</sup> ed.

#### REFERENCE BOOKS

- Guha, Ramachandra (2007), *India after Gandhi*, Pan Macmillan.
- Sharma R.S. (1965), *Indian Feudalism*, Macmillan.
- Deshpande, Satish (2002), *Contemporary India: A Sociological View*, Viking.
- Gadgil, Madhav & Ramachandra Guha (1993), *This Fissured Land: An Ecological History of India*, OU Press.
- Haralambos M, RM Heald, M Holborn (2000), *Sociology*, Collins.
- Mohanty, M (ed.) (2004), *Class, Caste & Gender- Volume 5*, Sage.
- Dhanagare, D.N., *Themes and Perspectives in Indian Sociology*, Rawat

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives I

<b>Subject Code</b>	<b>HS242</b>	<b>Subject Title</b>	<b>Introduction to Psychology</b>						
<b>LTP</b>	<b>2-0-0</b>	<b>Credit</b>	2	<b>Subject Category</b>	Elective	<b>Year</b>	II	<b>Semester</b>	IV

#### Course Objective

- To understand the basic psychological processes and their applications in everyday life.

#### Unit 1 Introduction

**5Hrs.**

Psychology as a science, perspective, origin and development of Psychology, Psychology in India, Methods: experimental and case study.

#### Unit 2 Cognitive Processes-Perception

**7Hrs.**

Nature of perception, laws of perceptual organization, learning, conditioning observational learning, memory processing, information processing model, techniques for improving memory

#### Unit 3 Motivation and Emotion

**7Hrs.**

Motives: Biogenic and Sociogenic; Emotion: Nature of Emotions, key Emotion

#### Unit 4 Personality and Intelligence-Personality

**7Hrs.**

Nature and Theories; Intelligence: Nature and Theories

#### Course Outcome:

- The students will develop an understanding of the various psychological processes to maintain their daily activities
- The students will understand themselves better.
- The students will be better equipped for life.
- The Students will be able to demonstrate critical and creative thinking and scientific approach to understand human behaviour.

#### Text Books:

- Baron, R.A. and Misra, G., Psychology (Indian Subcontinent Edition). Person Education Ltd. (2014)
- Chndha, N.K. & Seth, S., The Psychological Realm: An Introduction. Pinnacle Learning, New Delhi. (2014)

#### REFERENCE BOOKS:

- Ciccarelli, S.K. & Meyer, G.E., Psychology (South Asian Edition). New Delhi: Tata Mc Graw Hill. (2008)
- Glassman, W.F., Approaches to Psychology (3rd Ed.) Buckingham: Open University Press. (2000)
- Passer, M.W., Smith, R.E., Holt, N. and Bremner, A., Psychology: The Science of Mind and Behaviour, McGraw-Hill Education, UK. (2008)

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives I

<b>Subject Code</b>	<b>HS243</b>	<b>Subject Title</b>	<b>Science, Technology &amp; Society</b>						
<b>LTP</b>	<b>2-0-0</b>	<b>Credit</b>	2	<b>Subject Category</b>	Elective	<b>Year</b>	II	<b>Semester</b>	IV

#### Course Objective

To increase the basic understanding of students towards science and technology, and basic implications of science & technology on social development.

#### Unit 1

**5Hrs.**

Introduction of society, Sociological imagination, the two revolutions and their socio-economic technological and scientific implications; Social significance of science and technology, ideas beyond technology.

#### Unit 2

**5Hrs.**

Perspectives on relations between science and technology; Sociological perspective on scientific knowledge: Karl Marx, Emile Durkheim and Karl Mannheim's Sociology of knowledge; Merton's approach to science and technology.

#### Unit 3

**7Hrs.**

Ethos of science, Matthew effect in science, Thomas theorem and Mathew effect; Thomas Kunn's notions paradigm and paradigm-based science, Scientific community and growth of scientific knowledge.

#### Unit 4

**9Hrs.**

Science in India: science and technology policies in India, Scientific communities and their linkages, national and international Science, Ethics in science & engineering, environment and science and technology

#### COURSE OUTCOME:

- Enable students to examine the role of science and technology in social and economic development.
- The students will understand perspectives on relations between science and technology.
- The student will be able to understand the scientific temper & its social significance.
- The student will be able to understand and implement technological policies for the betterment of society.

#### TEXT BOOKS

1. Federic A. Lyman: Opening Engineering Students Mind to Idea to Ideas Beyond Technology. IEEE Technology and Society Magazine, Fall, pp.16-23. (2002)
2. John Theodore Rivers: Technology and the use of Nature. Technology in Society, 25(3), August, pp.403-416 (2003).

#### REFERENCE BOOKS

- Ronald R. Kline: Using History & Sociology to Tech Engineering Ethics. IEEE Technology and Society Magazine, Winter, pp.13-20 (2002).
- V.V. Krishna: A portrait of the scientific community in India: Historical Growth and Contemporary Problems, Gaillard et al. (eds). Scientific Communities in the Developing World, Sage (1997)

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives I

<b>Subject Code</b>	HS245	<b>Subject Title</b>	Ethics & Self Awareness						
LTP	2-0-0	Credit	2	<b>Subject Category</b>	Elective	Year	II	Semester	IV

#### Course Objective

- To introduce the concepts pertaining to ethical and moral reasoning and action
- To develop self – awareness

#### Unit 1 Introduction

**4Hrs.**

Definition of Ethics; Approaches to Ethics: Psychological, Philosophical, Social.

#### Unit 2 Psycho-social theories of moral development

**4Hrs.**

View of Kohlberg, Morality and Ideology, Culture and Morality, Morality in everyday context

#### Unit 3

**8Hrs.**

Ethical Concerns: Work Ethics and Work Values, Business Ethics, Human values in organizations, Self-Awareness: Self Concept: Johari Window, Self and Culture, Self-Knowledge, Self-Esteem

#### Unit 4

**11Hrs.**

Perceived Self-control, Self-serving bias, Self-presentation, Self-growth: Transactional Analysis and Life Scripts. Self-Development: Character strengths and virtues, Emotional intelligence, Social intelligence, Positive cognitive states and processes (Self-efficacy, Empathy, Gratitude, Compassion, and Forgiveness).

#### COURSE OUTCOME

- Students will develop an understanding of the ethical values and their application in daily activities
- Students will learn business ethics and work ethically in every sphere.
- Students will understand themselves better and develop healthy interpersonal relationships.
- Students will be able to develop themselves into wholesome personalities.

#### TEXT BOOKS

1. Leary M.R., "The Curse of Self: Self-awareness, Egotism and the Quality of Human Life", Oxford University Press. 2004
2. Louis P. P., "The Moral Life: An Introductory Reader in Ethics and Literature", Oxford University Press. 2007

#### REFERENCE BOOKS

- Corey, G., Schneider Corey, M., & Callanan, P., "Issues and Ethics in the Helping Professions", Brooks/Cole. 2011
- Snyder, C.R., Lopez, Shane, J., & Pedrotti, J.T., "Positive Psychology" Sage, 2<sup>nd</sup> edition. 2011

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE206	<b>Subject Title</b>	Structural Analysis						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	IV

### Course Objective:

The course is designed to make students aware about the basic concepts of structural analysis and different design principles used there in.

**Course Pre/Co- requisite (if any):** NA

### Detailed Syllabus

#### **Unit 1: Introduction and Analysis of Plane Trusses**

**8 L**

Structural forms, Conditions of equilibrium, Degree of freedom, Linear and Nonlinear analysis, Static and Kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

#### **Unit 2: Deflection of Beams**

**8 L**

Deflection of determinate beams by Moment area and Conjugate beam methods, Strain energy due to axial force, Principle of virtual work and Castigliano's theorems, Maxwell's Reciprocal Theorem, Unit load and its application to deflection of determinate beams and trusses

#### **Unit 3: Arches and Cable Structures**

**8 L**

Three hinged parabolic arches with supports at same and different levels, Determination of normal thrust, radial shear and bending moment, Analysis of cables under point loads and UDL, Length of cables for supports at same and at different levels.

#### **Unit-4: Influence Lines and Moving loads**

**10 L**

Concept of influence lines, ILD for reactions, SF and BM for determinate beams, Muller Breslau Principle, ILD for axial forces in determinate trusses, BM, SF and axial forces in determinate systems using ILD, Maximum BM and SF in determinate beams using rolling loads concepts.

#### **Unit- 5: Analysis of Indeterminate Structures**

**5 L**

Slope Deflection method and Moment distribution method

### Learning Outcome

At the end of the course, the student can:

CO1. Analyze the framed structures.

CO2. Find out forces in different members of a truss.

CO3. Analyze the beams with moving loads and drawing influence lines.

CO4. Analyze the various components of Indeterminate Structures

### **TEXT BOOKS**

1. Jain, A. K., "Elementary Structural Analysis", Nem Chand Publishers, Roorkee, 1990.
2. Ramamrutham, S., Narayan, R., "Theory of Structure", Dhanpat Rai & Co. Ltd.

### **REFERENCES**

1. Norris, C. H., Wilbur, J. B., "Elementary Structural Analysis", International Student Edition, Literary Licensing, LLC, 2012.
2. Reddy, C. S., "Basic Structural Analysis", Tata McGraw Hill, New Delhi, 2011.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE207	<b>Subject Title</b>	Concrete Technology						
<b>LTP</b>	3 0 2	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	IV

### Course Objective:

The objectives of this course are to learn the design concrete mixes for various mix proportions using different types of blending materials such as silica fume, fly ash and blast furnace slag.

### Course Pre/Co- requisite (if any): NA

### Detailed Syllabus

#### **Unit 1: Concrete Ingredients and Microstructure**

**9 L**

Cement – Chemical composition, hydration of cement, types of cement, manufacture of OPC with flow charts. Tests on cement – field testing, fineness, normal consistency, setting time, soundness, and compressive strength (detailed procedures covered in laboratory). Quality of mixing water. Structure of aggregate phase, structure of hydrated cement paste, structure - property relationship in hydrated cement paste, transition zone in concrete, influence of transition zone on properties of concrete.

#### **Unit 2: Fresh Concrete**

**7 L**

Workability – definition, factors affecting workability, measurement of workability by slump, compaction factor, Vee-Bee, flow tests. Segregation and bleeding, process of manufacture of concrete – batching. Mixing, transporting, placing, compaction, curing of concrete. Chemical admixtures – plasticizers, accelerator, retarders and air entraining agents. Mineral admixtures – fly ash, blast furnace slag, meta kaolin, Silica fume, rice husk ash.

#### **Unit 3 Hardened Concrete**

**10 L**

Factors affecting strength, w/c ratio, gel/space ratio, maturity concept, effect of aggregate properties, compressive strength, tensile strength, bond strength, modulus of rupture, modulus of elasticity, Poisson's ratio, relationship between these parameters. Accelerated curing, aggregate- cement bond strength. Shrinkage – plastic shrinkage and drying shrinkage, factors affecting shrinkage. Creep – measurement of creep, factors affecting creep, effect of creep. Durability – definition, significance, permeability, sulphate attack, chloride attack, carbonation, freezing and thawing. Factors contributing to cracks in concrete – plastic shrinkage, settlement cracks, construction joints. Thermal expansion, transition zone, structural design deficiencies. Tests on hardened concrete – compressive strength, split tensile strength, flexural strength, non-destructive testing of concrete.

#### **Unit-4 Concrete Mix design**

**5 L**

Concept of mix design, variables in proportioning, exposure conditions, procedure of mix design as per IS 10262-1982, numerical examples of mix design.

#### **Unit- 5: Special Concretes**

**8 L**

Constituents, Properties and applications of lightweight concrete, high performance concrete (HSC, SCC), high density concrete, fibre reinforced concrete, Ferro-cement.

### Learning Outcome

At the end of the course, the student can:

- CO1. Study the microstructure of basic constituents of concrete.
- CO2. Study the behavior of fresh concrete and hardened concrete.
- CO3. Design different types of concrete mixes.
- CO3. Design different types of special concretes.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **TEXT BOOKS**

1. Shetty, M. S., "Concrete Technology", S. Chand & Co. Ltd, New Delhi, 6<sup>th</sup> Edition, 2005.
2. Mehta, P. K, Monteiro, P. J. M., "Concrete: Microstructure, Properties, and Materials", McGraw Hill Professional, 2013.
3. Gambhir, M. L., "Concrete Technology", Tata McGraw Hill, New Delhi, 5<sup>th</sup> Edition, 2013.
4. Neville, A. M., Brooks, J. J., "Concrete Technology", Prentice Hall, 2<sup>nd</sup> Edition, 2010.

### **REFERENCES**

1. Neville, A. M., "Properties of concrete", ELBS Publications, London.
2. IS: 10262: "Recommended Guidelines for Concrete Mix design", BIS Publication.

### **SR.NO.      EXPERIMENT NAME**

- |    |   |
|----|---|
| 1  | Normal consistency of cement.   |
| 2  | Initial and final setting time of cement.                               |
| 3  | Compressive strength of cement.   |
| 4  | Soundness of cement.  |
| 5  | Tensile strength of cement  |
| 6  | Bulking of sand   |
| 7  | Water absorption of bricks.   |
| 8  | Compressive strength of bricks.   |
| 9  | Workability test: Slump Test and Compaction Factor Test                 |
| 10 | Flow Test   |
| 11 | Compressive Strength Test of Hardened Concrete.                         |
| 12 | Flexural Strength Test of Hardened Concrete.                            |
| 13 | Split Tensile Strength Test of Hardened Concrete.                       |
| 14 | Non Destructive Testing of Concrete                                     |
| 15 | Concrete mixed design as per Indian Standard recommendation guidelines. |



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE208	<b>Subject Title</b>	Engineering Geology						
<b>LTP</b>	3 0 2	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	IV

### Course Objective:

The objectives of this course are to apply geological concepts and approaches on rock engineering projects and also to use the geologic literature to establish the geotechnical framework.

### Course Pre/Co- requisite (if any): NA

### Detailed Syllabus

#### **Unit 1: Physical Geology**

**8 L**

Geology and its importance in civil engineering projects; internal structure of the earth and its composition; Epigene and Hypogene geological agents; Weathering of rocks, Kinds of weathering; Formation of soil and its classification, Soil profile, Soil Texture; Geological hazards such as landslides, volcanoes and earthquakes- causes, effects and remedial measures; Concept of plate tectonics and seafloor spreading.

#### **Unit 2: Applied Mineralogy**

**6 L**

Definition of mineral, Physical and chemical properties in minerals, Classification of minerals based on chemistry such as rock forming Minerals, Economic ore minerals and industrial minerals. Study of Common Rock forming minerals: Silicate Structure, Quartz and its varieties, Feldspars group, Pyroxene Group and Olivine Group

#### **Unit 3 Petrology**

**6 L**

Igneous rocks: Mode of occurrence, Classification, Texture and Structure. Sedimentary rock: Mode of occurrence, textures and structures. Metamorphic rocks- Metamorphism, Agents of metamorphism, Types of metamorphism, Textures and Structure

#### **Unit-4 Structural Geology**

**10 L**

Dip and Strike; Compass clinometer; Description of folds, Faults, Joints and Unconformities with their Types; Recognition of folds and faults in the field and its consideration in Civil Engineering projects.

#### **Unit- 5: Engineering and Hydrogeology**

**9 L**

Geological site investigation, surface and subsurface explorations by geological and geo-Physical investigations, Selection of Geological site for construction of Dams and Reservoirs, Tunnels, Bridge Sites, and Highways. Hydrogeology: Hydrological cycle, water bearing properties of rocks and soils. Aquifers and its types.

### Learning Outcome

At the end of the course, the student can :

- CO1. Able to interpret the geological data and information required for the safe development of civil works.
- CO2. Apply basic Engineering concepts to assessment and mitigation of geologic hazards such earthquakes, landslides, flooding;
- CO3. Focus on the core activities of engineering geologists, site characterization for civil work projects
- CO4. Distinguish the characteristic of most important geological formations and problems that may arise in various public works.
- CO5. Understand issues concerning the geological basement and structure of a region.

### **TEXT BOOKS**

1. Singh, P., "Engineering Geology", S. K. Kataria & Sons, New Delhi, 2009.
2. B.S. Satyanarayana Swamy, Engineering Geology Laboratory Manual, Dhanpat Rai Sons, New Delhi.

### **REFERENCES**

1. Reddy D. V., "Engineering Geology", Vikas Publishing House Pvt. Ltd, Noida.
2. Varghese, P. C., "Engineering geology for Civil Engineers", PHI Learning Pvt. Ltd., 2012.

### **SR.NO.**

### **EXPERIMENT NAME**

- |   |   |
|---|---|
| 1 | Identification of minerals in hand specimen |
|---|---|

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

- 2 Identification of igneous rocks in hand specimen
- 3 Identification of sedimentary rocks in hand specimen
- 4 Identification of metamorphic rocks in hand specimen
- 5 Study and Interpretation of Contour
- 6 Topography and Geological Maps
- 7 Solving Dip and Strike Problems

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE209	<b>Subject Title</b>	Transportation Engineering -I						
<b>LTP</b>	3 1 2	<b>Credit</b>	5	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	IV

### Course Objective:

This course provides in-depth exposure to highway development and planning, construction materials and their testing, highway geometric design, types of highway, highway design and their construction methods along with guidelines for their maintenance.

### Course Pre/Co- requisite (if any) : NA

### Detailed Syllabus

#### **Unit 1: Highway Development and Planning:**

**6 L**

Importance of transportation, Different modes of transportation and their characteristics, Classification of roads, Different road patterns, Jaykar committee recommendations and implementation, Twenty year road development plans in India, Introduction to recent developments in road network in India, Highway planning and alignment

#### **Unit 2: Highway Materials and Properties**

**8 L**

Classification of subgrade soil, CBR and plate load tests on soil, Properties and requirements of road aggregates and bitumen, Cutbacks and bituminous emulsions, Introduction to new materials in pavements

#### **Unit 3 Geometric Design**

**8 L**

Highway Cross sectional elements, Sight distances, Super elevation, Camber, Extra widening on curves, Design of horizontal and vertical alignments

#### **Unit-4 Pavement Design and Maintenance:**

**11 L**

Various factors of pavement design, Concept of ESWL, Design of flexible pavement by IRC method, Stresses in rigid pavement, Design of rigid pavement thickness by IRC method. Highway Construction ,Various types of Pavement failures, Design of Overlay thickness by Benkelman Beam Method

#### **Unit- 5: Traffic Engineering**

**6 L**

Introduction to Traffic Engineering, Traffic Characteristics, Road user and vehicular characteristics, Traffic Studies, Traffic operations, Traffic control devices

### Learning Outcome

After learning the course the students will be able to:

CO1. Plan effectively the road system.

CO2. Judge the suitability of the road materials

CO3. Design, construct and maintain effectively the roads. .

CO4. Solve the traffic problems by properly designing the geometric elements of the road ensuring traffic safety.

### **TEXT BOOKS**

1. Khanna, S. K., Justo, C. E. J., Veeraraghavan, A., „Highway Engineering”, Nem Chand and Bros., Roorkee, 9th Edition, 2011.
2. Kadiyali, L. R., Lal, N. B., „Principles and Practices of Highway Engineering”, Khanna Publishers, New Delhi, 4th Edition, 2005.
3. Kadiyali, L. R., “Traffic Engineering and Transportation Planning”, Khanna Publishers, New Delhi, 6th Edition, 1997.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCES**

1. Sharma, S. K., Sharma, R. C., “Principles and Design of Highway Engineering”, S. Chand & Company. 2012
2. Khanna, S. K., Justo, C. E. J., “Highway Material Testing Laboratory Manual”, Nem Chand and Bros., Roorkee.

<b>SR.NO.</b>	<b>EXPERIMENT NAME</b>
1	Specific gravity test of bitumen
2	Ductility test of bitumen
3	Flash point and fire point test of bitumen
4	Penetration test of bitumen
5	Softening test of bitumen
6	Viscosity test of bitumen
7	Bitumen Content
8	Stripping Test on aggregate
9	Abrasion test of aggregate
10	Shape test (flakiness, elongation and angularity number) of aggregate
11	Impact value test of aggregate
12	Specific gravity test of aggregate
13	Crushing strength of aggregate
14	Marshall Test for stability and flow value
15	Benkelman Beam Test (Demonstration)

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE211	<b>Subject Title</b>	Soil Mechanics						
<b>LTP</b>	3 1 2	<b>Credit</b>	5	<b>Subject Category</b>	DC	<b>Year</b>	2 <sup>nd</sup>	<b>Semester</b>	IV

### Course Objective:

The objectives of this course are to understand the basic properties of soil, to determine the strength of soil so that various properties can be known before design and to undertake a variety of laboratory tests on soils.

### Course Pre/Co- requisite (if any) : NA

### Detailed Syllabus

#### **Unit 1: Introduction Properties of Soils:**

**8 L**

Definition of void ratio, Porosity, percentage air voids, Air Content, Degree of saturation, moisture content, specific Gravity, Bulk density. Dry density, saturated density, Submerged density and their inter relationships. Index property of soil –particle size Distribution, Relative Density, consistency limits and indices, in situ density, laboratory method of determination of index properties of soil: moisture content, specific gravity, particle size distribution (Sieve analysis and hydrometer analysis only), in situ density by Core cutter & sand replacement methods, relative density, liquid limit- Casagrande and Cone penetration method, Plastic limit and Shrinkage limit determination.

#### **Unit 2: Classification of soils and Clay mineralogy and Soil Structure:**

**6 L**

Purpose of soil classification, basis of soil classification, particle size classification-MIT classification and IS classification, plasticity chart and its importance, field identification of soil. single grained, honey combed, flocculent and dispersed structure, Electric diffuse a double layer, Adsorb water, Base Exchange capacity, Isomorphous substitution. Common Clay mineral in soil and their structure- Kaolinite, Illite and montmorillonite. Thixotropy of clay, Soil water system, Effective stress concept total pressure and effective stress, quick sand phenomenon, capillary phenomenon.

#### **Unit 3: Flow of Water Through Soils and Compaction of Soils:**

**8 L**

Darcy's law- assumptions and validity, coefficient of permeability and its determination (laboratory and field) factor affecting permeability, permeability of stratified soil, seepage velocity, superficial velocity and coefficient of percolation.

Principle of compaction, standard and modified proctor's tests, factor affecting compaction, effect of compaction on soil properties, field compaction control, proctor needle, compacting equipments.

#### **Unit-4: Consolidation of Soils**

**8 L**

Definition, Mass spring Analogy, Terzaghi's one dimensional consolidation theory assumption and limitation, normally consolidated, under consolidated and over consolidated soils pre consolidation pressure and its determination by Casagrande's method. Consolidation characteristics of soil, laboratory one dimensional consolidation test, Determination of consolidation characteristic Proportioning of soil compression index and coefficient of consolidation, determination of coefficient of consolidation by square root of time fitting method, logarithmic time fitting method.

#### **Unit- 5: Shear Strength of Soils**

**9 L**

Concept of shear strength, Mohr-coulomb theory, conventional and modified failure envelope, total and effective shear strength parameters, concept of pore Pressure, factor affecting shear strength of soils, sensitivity, Measurement of shear strength- direct shear test, Unconfined compression test, Triaxial compression test and Vane shear test, shear tests and under different drainage condition.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Learning Outcome

At the end of the course, the student can:

- CO1. Develop and understand the physical relationships between physical characteristics and mechanical properties of soil.
- CO2. Understand and experience experimental measurement of physical and mechanical soil properties commonly used in engineering practice.
- CO3. Learn compaction and consolidation of soil
- CO4. Learn analysis and measurement of shear strength of soil

### **TEXT BOOKS**

1. Punmia, B. C., Jain, A. K., Jain, A. K., "Soil Mechanics and Foundations", Laxmi publication Co. New Delhi, 17<sup>th</sup> edition, 2017.
2. Ranjan, G., Rao, A. S. R., "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi, 3<sup>rd</sup> Edition, 2016.

### **REFERENCES**

1. Das, B. M., Sobhan, K., "Principles of Geotechnical Engineering" 8<sup>th</sup> Edition. Thomson business information India (P) Ltd., India
2. Singh, A., Chowdhary, R., "Soil Engineering in Theory and Practice", CBS publishers and distributors Ltd., New Delhi.
3. Murthy, V. N. S., "Soil Mechanics and Foundation engineering", 4<sup>th</sup> Edition, UBS publishers and Distributors, New Delhi.
4. Sitaram, T. G., Ramamuthy, T. N., "Geotechnical engineering", S. Chand & Co New Delhi.
5. Off., H. M. S., "Soil mechanics for road engineers, Road Research Laboratory", U. K., Vol. I, 1952.

<b>SR.NO.</b>	<b>EXPERIMENT NAME</b>
1	Sieve Analysis
2	Hydrometer Analysis
3	Liquid, Plastic & Shrinkage Limit Test
4	Proctor Compaction Test
5	Triaxial Compression Test
6	Specific Gravity Determination of Coarse and Fine Grained Soils
7	In Situ Density-Core Cutter & Sand Replacement Test
8	Permeability Test
9	Direct Shear Test
10	Static Cone Penetration Test
11	Standard/Dynamic Cone Penetration Test

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE301	<b>Subject Title</b>	Waste Water Engineering						
<b>LTP</b>	2 0 0	<b>Credit</b>	2	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The course is designed to have the knowledge about different types of sewerages and sewage treatment procedures

### Course Pre/Co- requisite (if any) : NA

### Detailed Syllabus

#### **Unit 1: Introduction**

**4 L**

Basic Definitions, Types of sewerage systems, Quantity of sewage, Dry weather flow and factors affecting dry weather flow

#### **Unit 2: Design of Sewers**

**6 L**

Hydraulic formulae for velocity, Effects of flow variation on velocity, Laying and jointing of sewers, Testing of sewers, Ventilation and cleaning of sewers, Sewer appurtenances

#### **Unit 3: Wastewater Characterization**

**5 L**

Analysis of sewage with emphasis on BOD and COD, Concept of aerobic and anaerobic activity, Sampling, Effluent standards.

#### **Unit-4: Treatment of Sewage**

**5 L**

Flow diagram of municipal sewage treatment plant, Primary treatment, Screening, Grit chamber, Skimming tank, Primary sedimentation tank.

#### **Unit- 5: Secondary Treatment**

**6 L**

Theory and operation of trickling filter and types of trickling filters. Activated sludge process and its modifications. Sludge drying beds, Other methods of sludge disposal on site treatment method.

### Learning Outcome

At the end of the course, students must be in a position to:

- CO1. To apply sewage treatment knowledge in various rural and urban city planning.
- CO2. Estimate waste water characteristics.
- CO3. Design of sewerage tanks and pipes for sewers after determining the capacity.
- CO4. Design of sewerage treatment plants based on characteristics.

### **TEXT BOOKS**

1. Garg, S. K., "Environmental Engineering: Sewage Disposal and Air Pollution Engineering", Khanna Publishers, New Delhi, 26th Edition (Paperback), Vol. II, 2010.
2. Punamia, B. C., Jain, A. K., "Waste Water Engineering", Firewall Media, New Delhi, 1998.

### **REFERENCES**

1. Manual on Sewage and Sewerage Treatment, CPHEEO, Ministry of Urban Development, New Delhi.
2. Eddy & Metcalf, 'Waste water Engineering', Tata McGraw Hill

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE302	<b>Subject Title</b>	Transportation Engineering II						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

This course covers complete knowledge of “Cross-section, Components, and geometric design of railway track as well as development of railway station and yards.” In this course all Airport characteristics, Geometric design and Air traffic control are covered.

### Course Pre/Co- requisite (if any) : NA

### Detailed Syllabus

#### **Unit 1: Introduction and Components:**

**12 L**

Role of railways in transportation, The Permanent way, Gauges in railway track, Typical cross sections of railway track, Coning of wheels, Track components: Type of rails, Rail Joints and Welding of rails ,Sleepers, Ballast, and Fixtures, Stresses in rails, Tractive resistances.

#### **Unit 2: Geometric Design of Railway Tracks**

**8 L**

Geometric design of tracks- speed calculations, Gradients- ruling, momentum, pusher and minimum gradient, Super elevation, Cant Deficiency, Negative super elevation, Component of turn outs, points and crossings, Track Junctions

#### **Unit 3: Railway Station and Yards:**

**4 L**

Classification of railway Stations, Types of station Yards, Signalling and Control System, Interlocking of Signals and Points. Modern Development of Railways

#### **Unit-4 Airport Characteristics:**

**6 L**

Role of Airways in transportation, Aeroplane Component Parts, Aircraft Characteristics, Airport planning, Site selection, Airport Obstructions

#### **Unit- 5:Geometric Design and Air Traffic Control:**

**9 L**

Wind rose diagram, Basic runway length, and corrected runway length, Geometric runway and Taxiway Design ,Turning radius of taxiway, Exit taxiway- design factors and elements, Airport markings and lightings, Air traffic control, Instrument landing systems

### Learning Outcome

This course will help the students in learning of :

- CO1. Working of world’s largest rail network,
- CO2. Designing of rail tracks.
- CO3. Managing safety issues in railways.
- CO4. Airport runway designing.
- CO5. Air traffic control in the busiest route.

### **TEXT BOOKS**

1. Saxena, S. C., Arora, S. P., “A Text Book of Railway Engineering”, DhanpatRai Publications Pvt. Ltd.,New Delhi, 6th Edition, 2001.
2. Khanna, S. K., Arora, M. G., and Jain, S. S., “Airport Planning and Design”, Nem Chand and Bros., Roorkee, 6th Edition, 2008.

### **REFERENCES**

- 1.Horonjeff, R. M., Mckelvey, F. X., Sproule, W. J., and Young, S., “Planning and Design of Airports”, Mc-Graw Hill Publications, New Delhi, 5th Edition, 2010.
2. Chandra, S., and Agrawal, M. M., “Railway Engineering”, Oxford University Press, 2007.
- 3.Saxena S.C, “Airport Engineering, Planning and Design”, CBS Publishers and Distributors , Pvt. Ltd. Reprint Ed. 2015.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE303	<b>Subject Title</b>	Design of Reinforced Concrete Elements						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The course is designed to make students aware about the various principles of reinforced concrete structures and to design various elements using limit state method.

**Course Pre/Co- requisite (if any) :** CE202 (Solid Mechanics)

### Detailed Syllabus

#### **Unit 1: Introduction to Working Stress Design**

**5 L**

Introduction to working stress method, elastic behavior of rectangular section, under, balanced and over reinforced section. Deflection and cracking in beams and slabs using IS code provisions. Design of singly reinforced beams

#### **Unit 2: Introduction to Limit State Design**

**8 L**

Philosophy and principle of limit state design along with the assumptions, partial safety factors, characteristic load and strength. Introduction to stress block parameters, concept of balanced, under reinforced and over reinforced sections, limit state of collapse in flexure of rectangle and flanged sections with examples. Limit state of collapse in shear and torsional strength of sections with examples

#### **Unit 3: Limit state design of beams**

**8 L**

Design principles and procedures for critical sections for bending moment and shear forces. Flexural and shear design example of singly and doubly reinforced simply supported and cantilever beams using the codal provision. Detailing of longitudinal and shear reinforcement, anchorage of bars, check for development length. Reinforcement requirements, slenderness limits for beams for lateral stability. Flexural and shear design of simply supported T and L beams. Design of rectangular section for torsion.

#### **Unit-4: Limit State Design of Slabs**

**9 L**

Introduction to one way and two way slabs, design of one way cantilever, simply supported and continuous slab and design of two way slabs.

#### **Unit- 5: Limit State Design of Columns and Footings**

**9 L**

General design aspects of compression members. Design of short axially loaded columns with reinforcement detailing. Design of uniaxial and biaxial bending columns using SP- 16 charts and design of slender column. Design and detailing of isolated rectangular footing for axial load and uniaxial moment and design of pedestal.

### Learning Outcome

At the end of the course, the student can:

CO1. Understand the principle of RC Structure

CO2. Understand the design of structure with limit state analysis.

CO3. Identify different elements of a R.C.C structure as per IS code provisions

CO4. Understand the reinforcement detailing of various building components

### **TEXT BOOKS**

1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
2. Pillai, S. U., Menon, D., "Design of reinforced concrete structures"- Tata McGraw hill publications, 3rd Edition, 2009.
3. Varghese, P. C., "Limit State Design of Reinforced Concrete", PHI Learning Pvt. Ltd., India, 2nd Edition, 2008

# **Course Structure & Syllabus of B.Tech – Civil Engineering Applicable for Batch: 2017-2021**

## **REFERENCES**

- 1.Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
- 2.Design of concrete structures – ArthusH.Nilson, David Darwin, and Chorles W. Dolar, Tata McGraw-Hill, 3rd Edition, 2005
- 3.Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
- 4.Design of concrete structures by J.N.Bandhyopadhyay PHI Learning Private Limited.
- 5.Design of Reinforced Concrete Structures by I.C.Syal and A.K.Goel, S.Chand& company.
- 6.Sinha, S. N., “Reinforced concrete Design”, Tata McGraw-Hill Education, New Delhi, 2002 .
- 7.Park, R., Paulay, T., “Reinforced Concrete Structures”, John Wiley and Sons, New York, 1975.
- 8.Punmia, B. C., Jain, A. K., Jain, A. K., “Limit State Design of Reinforced Concrete”, Firewall Media, New Delhi, 2007.
- 9.Jain, A. K., “Reinforced Concrete Limit State Design”, Nemchand& Brothers, Roorkee

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE304	<b>Subject Title</b>	Foundation Engineering						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The objective of this course is to learn application of soil mechanics and other related techniques to design and analyze various types of foundation by learning methods of soil exploration; bearing capacity and settlements determination for shallow and deep foundation and provision of earth retaining structures.

**Course Pre/Co- requisite (if any) :** CE211 (Soil Mechanics)

### Detailed Syllabus

#### **Unit 1: Introduction & Soil Exploration**

**6 L**

Brief review of soil mechanics principles used in foundation engineering, Methods of soil exploration, Boring, Sampling, Penetration tests, Correlations between penetration resistance and soil design parameters, geophysical and advance soil exploration methods.

#### **Unit 2: Earth Pressures and Slope Stability**

**8 L**

Earth pressure at rest, Active and passive earth pressure, Rankine's and Coulomb's earth pressure theories, Earth pressure due to surcharge, Retaining walls, Stability analysis of retaining walls, Slopes: Mode of failure-Mechanism, Stability analysis of infinite slopes, Swedish slip circle method, Taylor's stability number

#### **Unit 3: Shallow Foundations**

**12 L**

Types of Foundations, Mechanism of load transfer in shallow and deep foundations, Shallow foundations, Terzaghi's bearing capacity theory, Computation of bearing capacity in soil, Effect of various factors, Use of field test data in design of shallow foundations, Stress below the foundations, Settlement of footings and rafts, proportioning of footings and rafts, Sheet piling and bracing of foundation excavation

#### **Unit-4 Deep Foundations**

**8 L**

Types and methods of construction, estimation of pile capacity, Capacity and settlement of group of piles, Proportioning of piles, Methods of construction of well foundation, Tilt and Shift, Remedial measures, Bearing capacity, Settlement and lateral stability of well foundation.

#### **Unit- 5: Reinforced Earth and Geotextiles**

**5 L**

Reinforced Earth, Geotextile: Definition, types, functions. Use of Geotextiles in Earth dams, roads, railways, erosion control and bearing capacity improvement. Storage, handling and placement of Geotextiles

### Learning Outcome

At the end of the course, the student can:

- CO1. Learn about types and purposes of different foundation systems and structures.
- CO2. Learn about the systematic methods for designing foundations.
- CO3. Evaluate the feasibility of foundation solutions to different types of soil conditions
- CO4. Learn about applications of geotextiles for reinforced earth and soil stabilization.

### **TEXT BOOKS**

1. Punmia, B. C., Jain, A. K., Jain, A. K., "Soil Mechanics and Foundations", Laxmi publication Co. New Delhi, 17th edition, 2017.
2. Ranjan, G., Rao, A. S. R., "Basic and Applied Soil Mechanics", New Age International (P) Ltd., New Delhi, 3rd Edition, 2016.

### **REFERENCES**

1. Bowles, J. E., "Foundation Analysis and Design", McGraw-Hill, New Delhi, International Edition, 2001.
2. Singh, A., Chowdhary, G. R., "Soil engineering in theory and practice", CBS Publishers, New Delhi.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE305	<b>Subject Title</b>	Structural Analysis Lab						
<b>LTP</b>	0 0 2	<b>Credit</b>	1	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

To learn the basic structural behavior under different loading patterns and variation in geometry

Course Pre/Co- requisite (if any) :CE206 (Structural Analysis)

### Detailed Syllabus

#### **List of Experiments**

1. Redundant Joint Apparatus
2. Elastically Coupled Beam Structure
3. Deflection of Truss Apparatus
4. Three Hinged Arch Apparatus
5. Beam Model
6. Two Hinged Arch Apparatus
7. Elastic Properties of Deflected Beam Apparatus
8. Column Apparatus
9. Portal Frame Apparatus
10. Curved Member Apparatus

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE341	<b>Subject Title</b>	Advanced Highway Engineering						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3rd	<b>Semester</b>	V

### Course Objective:

The objectives of this course is to introduce the students to latest methods of pavement construction and to enable students to design different types of pavements as per the requirement.

**Course Pre/Co- requisite (if any) :**CE209 (Transportation Engineering-I)

### Detailed Syllabus

#### **Unit 1: Introduction:**

**3 L**

National Road Development Program, Bombay Plan, Lucknow Plan, IRC Vision- 2021 and Rural Road Vision- 225, Comparison and significance, financial analysis of highway projects, Vehicle Operating Cost.

#### **Unit 2: Road Materials:**

**6 L**

Tests on soil (Triaxial), strength of pavement materials, importance and functions of each layer of pavement and subgrade, Alternate forms of aggregates, theory of specifications of fillers, additives, emulsions, cutbacks and modified binder, Bituminous Mix design Methods( Marshall, Hubbard Field and Hveem), Soil Stabilized Roads: Properties of Soil- Aggregate mixtures, Proportioning, types of stabilization, advantages and limitation, Highway drainage- Surface and Sub surface drainage.

#### **Unit 3: Design of Flexible Pavements:**

**6 L**

Design of Flexible Pavements: Design factors, empirical, semi empirical and analytical design method: California bearing ratio, Triaxial, Mcleod and Burmister method, advantages and limitations, IRC method of design (as per IRC 37:2012). Pavement Failures, Overlay design

#### **Unit-4 Design of Rigid Pavements**

**6 L**

Design of Rigid Pavements: Design factors, load and temperature stresses, load transfer devices, design of Dowel bar and Tie bar, Type of Joints, IRC methods of design of SFRC pavements, construction techniques and specifications, quality control tests, continuously reinforced concrete pavements. Pavement Failures, Overlay design.

#### **Unit- 5: Highway Construction:**

**5 L**

Construction of Water bound Macadam road, Bituminous Pavements, Concrete Roads. Reinforced Concrete Roads, Prestressed Concrete Pavements.

### Learning Outcome

This course enables the students to:

- CO1. Use various materials for pavement constructions.
- CO2. Apply the principles of pavement design.
- CO3. Various methods of mix design.
- CO4. Various design methodologies of pavement construction

#### **TEXT BOOKS**

1. Yodar, E. J., "Principle of Pavement Design", Wiley, 2nd Edition.
2. Statinary Off., H. M., "Bituminous Material in Road Construction", Road Research Laboratory, 1962.
3. Kerbs, R. D., and Walker, R. D., "Highway Materials", McGraw-Hill, 1971.

#### **REFERENCES**

1. Khanna, S. K., Justo, C. E. G., "Highway Engineering", Nem Chand and Bros, 2001.
2. Huang, Y.H., "Pavement Analysis and Design" Prentice Hall

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE342	<b>Subject Title</b>	<b>Environmental Risk Assessment and Disaster Management</b>						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The objectives of this course are to learn basic concepts of Environmental components, Impact assessment, Natural hazards and mitigation strategies.

**Course Pre/Co- requisite (if any) :** CH201 (Environmental Science)

### Detailed Syllabus

#### **Unit 1: Environmental attributes and assessment**

**6 L**

Introduction and Scope utility of the Environmental Impact Assessment process, expanded and narrowed scope of Environmental Impact Assessment, impacts of development activities, planning and management of impact studies. Environmental attributes and environmental indices and indicators, environmental assessment, methods and techniques, matrices, network and checklist methods, prediction techniques for quality of environmental attributes

#### **Unit 2: Environmental Impact and Risk Assessment**

**7 L**

Impact evaluation, assessment of impact on air, water, soil and ground water, noise, biological environment. Assessment of impact on socio-economic environment, evaluation methods, mitigation measures. Health risk assessment, Hazard identification, toxicology and dose response characterization, exposure characterization, risk characterization, uncertainty in estimates. Risk evaluation, risk acceptance, basic principles of health risk management.

#### **Unit 3 Understanding Disasters**

**7 L**

Meaning, nature, characteristics and types of Disasters, Causes and effects, Disaster: A Global View, Disaster Profile of India, The Disaster Management cycle.  
Geological and Mountain Area Disasters: Earthquakes, Volcanic eruption, Landslides, Snow Avalanches. Wind and Water Related Natural Disaster: Floods and Flash Floods, Droughts Cyclones, Tsunamis. Man Made Disasters: Understanding Man Made Disasters: Fires and Forest Fires, Nuclear, Biological and Chemical disaster, Road Accidents.

#### **Unit-4 Disaster Risk Reduction and Role of various Organizations**

**3 L**

Disaster Management: Prevention, Preparedness and Mitigation. Roles and responsibilities of different agencies and Government. Technologies for Disaster Management. Disaster Mitigation Strategies.

#### **Unit- 5: Disasters, Environment and Development**

**3 L**

Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

### Learning Outcome

At the end of the course, the student can:

- CO1. Identify environmental attributes, necessity and components of Impact assessment and its various methods
- CO2. Have the complete knowledge about natural and human induced disasters.
- CO3. Gain the idea about various mitigation measures, remedial actions to minimize the loss of resource and lives.
- CO4. Identify the roles of various Government and non-Government agencies for enforcing Environmental laws and disaster mitigations

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **TEXT BOOKS**

1. CK Rajan, N Pandharinath – 2009, Earth and Atmospheric Disaster Management: Nature and Man-made, BS publications
2. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
3. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
4. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation

### **REFERENCES**

1. Kenneth, W., Werner, F. C., Davis W. T., "Air Pollution: Its Origin and Control", 3<sup>rd</sup> Edition, Prentice Hall.
2. Mishra, P. C., "Fundamentals of Air and Water Pollution", South Asia Books, 1990.
3. Masters, G., "Introduction to Environmental Engineering and Science", Prentice Hall of India, 2004.
4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE343	<b>Subject Title</b>	Advanced Surveying						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The course is designed to make students aware about theory of errors and the advanced methods and techniques of surveying, establishing horizontal & vertical control over the terrain with the degree of accuracy as desired.

**Course Pre/Co- requisite (if any)** : CE203 (Basic Surveying)

### Detailed Syllabus

#### **Unit 1: Theory of Errors**

**5 L**

Types and sources of errors, theory of least squares, method of weights, method of correlates, angle and station adjustment, figure adjustment.

#### **Unit 2: Triangulation**

**6 L**

Necessity of Control Surveying, Principle of Triangulation, Classification of Triangulation Systems, Station Marks, Towers and Signals, Satellite station, Reconnaissance, Inter-visibility of stations, Angular Measurement, Base line measurement and its extension.

#### **Unit 3 Project surveys**

**5 L**

General requirements and specifications for engineering project surveys, reconnaissance, preliminary and locations surveys for highway, earthen bund and canals. Layout of culverts, canals, and buildings-both load bearing wall structure and column structures by centerline method. Modern trends- EDM, electronic Theodolites and Electronic Total Station

#### **Unit-4 Introduction to remote sensing**

**5 L**

Remote sensing: Definition and concepts. Concept of signatures. Multi-spectral concept. Remote sensing systems. Remote sensors and platforms. Data products generation and analysis. Application of remote sensing in agriculture, forestry, land cover/ use mapping, water resources, wet land management, coastal zone management and marine fisheries.

#### **Unit- 5:Global Positioning System**

**5 L**

Global Positioning System- NAVSTAR GPS system. Advantages of GPS. Components of GPS- Space, control and user segments. Principles of position fixing with GPS. Relative and differential positioning. Factors affecting GPS observations, GPS applications.

### Learning Outcome

At the end of the course, the student can:

- CO1. Identify and correct errors in field measurements.
- CO2. Apply procedures of triangulation in field survey.
- CO3. Comprehend the use and applications of advanced methods of data collection like remote sensing.
- CO3. Understand the working principles of GPS.

### **TEXT BOOKS**

1. Punmia, B. C., Jain, A. K., Jain, A. K., "Surveying", Laxmi Publications Pvt. Ltd., New Delhi, Vol. I & II, 12th Edition, 2005.
2. Reddi, M. A., "Remote Sensing and Geographical Information Systems", BS Publications, 2001.



# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCES**

1. Roy S. K., "Fundamental of surveying", Prentice Hall of India, 2nd Edition, 2010.
2. Chandra, A. M., "Plane Surveying", New age International, 2nd Edition, 2006.
3. Arora, K.R., "Surveying", Standard Book House, Delhi, Vol. II & III, 11th Edition, 2010.
4. McCormac, J. C., Sarasua, W., Davis, W., "Surveying", Wiley India, 6th Edition, 2012.
5. Lillesand, T. M., Kiefer, R.W., Chipman, J. W., "Remote Sensing and Image Interpretation", John Wiley & Sons Limited, Canada, 5th Edition, 2004.
6. Agor, R., "A Text Book of Surveying and Levelling", Khanna Publications, Delhi, 11th Edition, Vol. II & III, 2012.

### **SR.NO.**

### **EXPERIMENT NAME**

1. Marking of building by centre line method for load bearing wall residential building.
2. Marking of building by centre line method for columns for small commercial complex.
3. Exposure to the use of Total Station.
4. Measurement and data logging of distances, horizontal angles and vertical angles using Total Station.
5. Measurement of Areas using total station
6. Collection of field data using GPS.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE344	<b>Subject Title</b>	Building Planning & Drawing						
<b>LTP</b>	1 0 4	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The objective of this course is to learn drawing of each element of construction on paper before beginning the actual construction in field and To gain knowledge about construction of structures in steps.

### Course Pre/Co- requisite (if any) : ME103 (Engineering Graphics)

### Detailed Syllabus

#### **Unit 1: Introduction**

**4 L**

Introduction to concept of drawings, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Modify commands, Layers, Text and Dimensioning, Blocks. Drawing presentation norms and standards.

#### **Unit 2: SYMBOLS AND SIGN CONVENTIONS**

**3 L**

Building Bye-Laws: Objectives, importance of bye-laws, Principles underlying building bye laws. Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards.

#### **Unit 3: MASONRY BONDS**

**2 L**

English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall, Doors & windows

#### **Unit-4: BUILDING DRAWING**

**2 L**

Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings, Foundation plan

#### **Unit- 5: PICTORIAL VIEW**

**2 L**

Principles of isometrics and perspective drawing. Perspective view of building.

#### **SR.NO.**

#### **EXPERIMENT NAME**

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

### Learning Outcome

At the end of the course, the student can:

- CO1. Learn details of different construction elements and will enable them to read a construction drawing which is a requisite for an economic and speedy construction
- CO2. Learn various projection techniques used in Engineering Drawings
- CO3. Learn the standards of various building components as per national building code
- CO4. Learn the building by laws in Indian context

### **TEXT BOOKS**

1. Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 2001", Tata- Mc Graw-Hill Company Limited, New Delhi
3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,
4. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age International Pvt. Ltd.,

### **REFERENCES**

1. Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades publishing KDR building, Calicut.
2. (Corresponding set of) CAD Software Theory and User Manuals.
3. Malik R.S., Meo, G.S. (2009) Civil Engineering Drawing, Computech Publication Ltd New Asian.
4. Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria & Sons,, 2010.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE345	<b>Subject Title</b>	Photogrammetry & Remote Sensing						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	V

### Course Objective:

The course objective is to make students aware of the photogrammetry and the concepts of stereoscopy, also to learn photo interpretation techniques.

**Course Pre/Co- requisite (if any) :** CE208 (Engineering geology)

### Detailed Syllabus

#### **Unit 1: Fundamentals of Aerial Photogrammetry**

**7 L**

Fundamentals of Aerial Photogrammetry: Introduction, Classification, Aerial Camera, Films and Filters, Geometrical elements of vertical photograph, Scale, Relief Displacements, photo and ground coordinates, flight planning.

#### **Unit 2: Stereoscopy**

**6 L**

Stereoscopic vision, Lens and Mirror stereoscope, parallax equations, Parallax bar, Measurement of heights and heights and slopes, Ground control for aerial Photography, Topo sheets, Photographs and Mosaics.

#### **Unit 3 Aerial Photo Interpretation**

**4 L**

Basic considerations, principles of photo interpretation, Characteristics of photographic images, Techniques of photo interpretation, photo interpretation key, Ground truth verification.

#### **Unit-4 Principles of Remote Sensing**

**5 L**

Sources of Energy, active and passive radiation, Electromagnetic spectrum, radiation laws, interaction of energy with atmosphere scattering, absorption, atmospheric windows, interaction of EMR with earth surface features- spectral signatures, stages in remote sensing.

#### **Unit- 5:Remote Sensing Applications in Civil Engineering**

**4 L**

Water Resources, Watershed Management, Environmental studies, Land use and Land Cover mapping – Urban sprawl and Transportation Network mapping, Geology and soil mapping, Ground Water Exploration.

#### **SR.NO.            EXPERIMENT NAME**

1. Study of different types of satellite data products
2. Visual interpretation of satellite images of different resolutions.
3. Study of aerial photographs in 3D using stereoscope.
- 4 Extraction of thematic information from satellite images
- 5 Use of satellite images for land use mapping.

### Learning Outcome

At the end of the course, the student can \_:

CO1.Make measurements from aerial photographs.

CO2. Retrieve the information content of remotely sensed data.

CO3. Analyse the energy interactions in the atmosphere and earth surface features.

CO4. Understand land use and land cover mapping.

# **Course Structure & Syllabus of B.Tech – Civil Engineering Applicable for Batch: 2017-2021**

## **TEXT BOOKS**

1. Lillesand, T. M., Kiefer, R.W., Chipman, J. W., “Remote Sensing and Image Interpretation”, John Wiley & Sons Limited, Canada, 5th Edition, 2004.
2. Punmia, B. C., Jain, A. K., Jain, A. K., “Surveying”, Laxmi Publications Pvt. Ltd., New Delhi, Vol. II, 12th Edition, 2005.

## **REFERENCES**

1. Wolf P. R., Elements of Photogrammetry with Application in GIS, McGraw Hill International Book Company, 2013.
2. Moffitt, Francis H. & Mikhail, Edward M., Photogrammetry, Harper and Row Publishers, 1980.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	HS301	<b>Subject Title</b>	APTITUDE & SOFT SKILLS III						
<b>LTP</b>	3 0 0	<b>Credit</b>	0	<b>Subject Category</b>	AC	<b>Year</b>	III	<b>Semester</b>	V

**Course Outline:** The first step of an intensive two step placement training module equips the students to successfully handle the placement program of any on-campus/off-campus company. It not only provides career guidance about the selection process but also helps students in profile building; self-introduction and proactive internship search techniques.

**Course Objective:**

1. Interpret the questions of aptitude building objectively and prepare for various competitive examinations
2. Understand the optimized approach of dealing with placement questions
3. Learn ways of representing themselves effectively in formal settings

**Course Pre / Co-requisite (if any):** Understanding of writing concepts, general intelligence of LR, algebra concepts and equation formation, time management and presentation skills covered in Aptitude and Soft Skills I and II.

**Detailed Syllabus**

**UNIT 1 - QUANTITATIVE APTITUDE 11 HOURS**

**Number System 03 hours**

Types of numbers; Factors; Divisibility test; Place and face Value; Base system; Remainder theorem; digits at the unit places and finding last two digits in a given expression; Calculating number of zeroes, Finding maximum power of any prime number or any composite number in any factorial, HCF and LCM.

Fractions–Types of fractions; Conversion of terminating and non-terminating types of decimal into fraction; Subtraction, addition and multiplication of terminating and non-terminating decimals.

**Percentage 02 hours**

Basic concepts; Conversion from fraction to percentage; Application of percentage in – Expenditure, Cost, Consumption problems; Population increase or decrease problems; Production, Manpower and Working hour problems; successive increment or decrement; Comparison of salary or numbers; Percentage change in area or volume, etc.

**Ratio and Proportion 02 hours**

Ratio, Proportion and Variation: Ratio- Introduction; Types of ratios; Comparison of Ratios; Concept of duplicate, triplicate, sub-duplicate and sub-triplicate ratios.

Proportion and variation – Concept of direct, inverse, continuous and mean proportions.

**Profit and Loss 02 hours**

Introduction; Concept of single, double and triple discount and marked price.

**Simple / Compound Interest 02 hours**

Simple Interest and compound Interest: Basic concept of Principal, Time, Amount and Rate of Interest; Concept of Lent money.

**UNIT 2- VERBAL APTITUDE 09 HOURS**

**Tenses 02 hours**

Understanding and aligning them with the various question types.

**Subject – Verb Agreement 02 hours**

Subject-Verb Agreement: Rules and Applications; commonly confused words-II; Gerunds, Active and Passive voice.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Question Types

03 hours Introduction to Question types-I: Fill in the blanks, One word Substitution, Spellings, understanding the right word choice, concept of para jumbles and para completion, reading comprehension, verbal analogies, odd man out, phrases and idioms. Introduction to Question types-II: Error identification, Homophones, Usage of the various figures of speech, commonly confused words and phrases, techniques for tackling synonyms and antonyms.

### Reading Comprehensions

02 hours Reading Comprehension: Basics of Comprehensions, different tones of comprehensions, cracking question types like contextual vocabulary, fill in the blanks, true/false questions, reference to context, summary and title of the passage, paraphrasing the text.

## UNIT 3- LOGICAL REASONING

10 HOURS

### Coding Decoding and Sequences

02 hours

Coding Decoding, Cryptarithmic, Sequence and Series - Finding the missing term/wrong term in the logical sequence of letter/number/word/alphanumeric, Continuous pattern series.

### Verbal Analogies and Odd man out

02 hours

Verbal Analogy based on various parameters - Antonym / synonym relationship, Quantity and unit, Individual and Group, Product and Raw material, cause and Effect etc.

Odd man out based on several kind of relationship – Relationship based on meaning, functional relationship, even- odd or prime-composite, divisibility rule, etc.

### Blood Relation and Direction Sense

02 hours Blood Relation-

Indicating form / puzzle form / coding form, Direction Sense, Direction puzzles.

### Seating Arrangements

02 hours Seating Arrangements

– Linear / Circular / Distribution / comparison/ Floor and box arrangement /Quant based arrangements/ etc.

### Critical Reasoning– I

02 hours

Statement and assumptions, course of action, statement and conclusion, probably true/false.

## UNIT 4- NON VERBAL COMMUNICATION

04 HOURS

Types of Non Verbal Communication, Body Language-Exercises and Activities, Error Analysis & Feedback Sharing.

**Suggested Activities & Exercises:** (i) Communication Origami, (ii) Power of body language, (iii) Draw it.

## UNIT 5- ONLINE PROFILING & SOCIAL MEDIA ETHICS

05 HOURS

Social Media ethics and etiquette, Do's & Don'ts, LinkedIn Profile Development, Example Sharing, Feedback Sharing & Error Analysis.

**Suggested Activities & Exercises:** (i) Online Portfolio Creation, (ii) Fun Social Media Projects, (iii) LinkedIn profile development project with feedback sharing and error analysis

### LEARNING OUTCOME:

By the end of this semester, students will be able to perceive and analyse the requirements of placement trends as detailed information about the selection process would be provided by career guidance. They will be more confident and will be able to develop a professional profile, both online and offline.

### Text book [TB]:

1. Quantitative Ability:How to prepare for Quantitative Aptitude, Arun Sharma, McGraw Hill, 8th edition-2018.
2. Logical Reasoning: A Modern Approach to Logical Reasoning-R.S. Aggarwal S Chand Publishing; 2<sup>nd</sup>Colour edition-2018.
3. Verbal Aptitude: English is Easy- Chetanand Singh, BSC Publication-2018.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

4. Soft Skills: The Definitive Book of Body Language by Barbara and Allan Pease; RHUS; 1 edition-2006.

### **Reference books [RB]:**

1. QA :Quantitative Aptitude for Competitive Examinations- R.S. Agarwal S. Chand Publications-2017.  
QA: Quantitative Aptitude- Saurabh Rawat and Anushree Sah Rawat, Savera Publishing House, 1<sup>st</sup> Edition-2016.
2. LR: Logical Reasoning and Data Interpretation for the CAT - Nishit K Sinha, Pearson India; 5<sup>th</sup> edition-2016.  
LR: Wiley's Verbal Ability and Reasoning - P A ANAND, Wiley-2016.
3. VA :Oxford Guide to English Grammar- John Eastwood, Oxford University Press-2003.  
VA: Fun with grammar- Suzanne W. Woodward Pearson Education ESL-1996
4. Soft Skills :How to Talk to Anyone by Leil Lowndes Harper Element; New edition-2015.  
Soft Skills: Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler; Brilliance Audio; Abridged, Updated edition-2013.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE309	<b>Subject Title</b>	Design of Steel Structure						
<b>LTP</b>	3 2 0	<b>Credit</b>	5	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The course objective is to gain the knowledge regarding design of steel structures, stability, strength and serviceability.

**Course Pre/Co- requisite (if any):** CE206 (Structural Analysis)

### Detailed Syllabus

#### **Unit 1: Introduction & Connections**

**8 L**

Introduction, Types & properties of structural steel rolled sections, Grades of steel, Codal Provisions, Concept in the design of connections, Codal Provisions, Simple and moment resistant riveted, welded and bolted connections and eccentric connections

#### **Unit 2: Tension Members**

**8 L**

Introduction, Codal provisions, Analysis and design of tension members with different cross sections subjected to axial tension, splicing of tension member and Lug angle

#### **Unit 3: Compression Members**

**12 L**

Codal provisions, Slenderness ratio, Analysis and design of simple compression members (angles and I-Sections), including continuous strut and discontinuous strut. Built up compression members, Lacing and battening.

#### **Unit-4: Flexural Members**

**6 L**

Concept in the design of flexural member, Codal provisions, Analysis and design of laterally restrained and unrestrained beams, built up beams, Web buckling and web crippling. Introduction to lintels, purlins and castellated beams.

#### **Unit- 5: Plate Girder**

**5 L**

Design of plate girders including stiffeners, splices and curtailment of flange plates. Introduction to gantry girder.

### Learning Outcome

At the end of the course, the student can :

CO1.Design of Structural members with different types of connections.

CO2. Design of Compression members.

CO3. Design of Beams.

CO4. Understand flexural behavior of steel components

### **TEXT BOOKS**

1.Design of Steel structures by K.S. Sai Ram, Person Education.

2. Design of Steel Structures Vol. 1 & 2 – Ramchandra, Standard Publications.

3. Design of steel structures, Structures, S.S. Bhavikatti, I.K Publication House, New Delhi, 2010.

4. Structural Design and Drawing by N.Krishna Raju, Universities

### **REFERENCES**

1. Limit State Design Steel Structures, S .k. Duggal, Tata Mc Grawhill.

2. Design of Steel Structures - N. Subramanian, Oxford University Press

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE311	<b>Subject Title</b>	Hydraulics and Hydraulic Machines						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objective of this course is to introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

**Course Pre/Co- requisite (if any):** CE201 (Fluid Mechanics)

### Detailed Syllabus

#### **Unit 1: Open Channel Flow**

**5 L**

Definition of open channel, Geometric properties, Uniform flows in open channels: Chezy and Manning's equation, Velocity Distribution in Open Channel. Most Economical sections: Rectangle and Trapezoidal

#### **Unit 2: Specific Energy**

**6 L**

Specific Energy, Specific energy curve, condition for minimum specific energy and maximum discharge, Critical flow in Rectangular channels, Problems. Gradually Varied Flow, Flow profiles, Hydraulic Jump in a rectangular channels, classification of jump.

#### **Unit 3: Impact of Jet on Vanes**

**5 L**

Introduction to impulse momentum equation and its applications, Force exerted by a jet on a fixed target, Derivations, Force exerted by a jet on a moving target, derivations, Force exerted by a jet on a series of a curved vanes, concept of velocity triangles, equation for work done and efficiency.

#### **Unit-4: Hydraulic Turbines**

**5 L**

Introduction, types and classifications, Pelton wheel, equation for work done and efficiency, Specific speed, Francis turbine- Theory, equation for work done and efficiency, Design parameters, Draft tube.

#### **Unit- 5: Centrifugal and Reciprocating Pumps**

**5 L**

Definition of pumps and classification, Principle of working, priming and methods, Specific speed, Work done and efficiencies of centrifugal and reciprocating pumps, Minimum starting speed, Cavitation in centrifugal pumps, multistage pumps

#### **SR.NO.**

#### **EXPERIMENT NAME**

- |   |  |
|---|--|
| 1 | To determine the Manning's Co-efficient of roughness for a given Channel bed |
| 2 | To study the characteristics of Pelton Turbine                               |
| 3 | To study the characteristics of hydraulic jump                               |
| 4 | To find the efficiency of Francis Turbine                                    |
| 5 | To find the efficiency of Centrifugal Pump                                   |
| 6 | To find the efficiency of Reciprocating Pump                                 |
| 7 | To find the coefficient of Jet Impact  |

### Learning Outcome

At the end of the course, the student can:

- CO1. Apply their knowledge of fluid mechanics in addressing problems in open channels.
- CO2. Possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions
- CO3. Compute forces on Flat plate and Curved vanes by the impact of water Jet.
- CO4. Solve problems related to hydraulic machineries (pumps and turbines).

### **TEXT BOOKS**

1. Bansal, R. K., "Fluid Mechanics and Hydraulic Machine", Lakshmi Publications, New Delhi.
2. Subramanya. K., "Flow in open Channel", Tata McGraw Hill, New Delhi.
3. Rajput, R.K., "A Textbook of Fluid Mechanics and Hydraulic Machines", S. Chand Publications, 4th Edition.

# **Course Structure & Syllabus of B.Tech – Civil Engineering Applicable for Batch: 2017-2021**

## **REFERENCES**

5. Modi, P. N., Seth, S. M., “Hydraulics and Fluid Mechanics”, Standard Book House, New Delhi, 2004.
6. Jain, A.K., “Fluid Mechanics: Including Hydraulic Machines”, Khanna Publishers, New Delhi, 2010.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE312	<b>Subject Title</b>	Design of Reinforced Concrete Structures						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The course is designed to familiarize students with design concepts of reinforced structures like stair case, retaining walls, water tanks and flat slab.

**Course Pre/Co- requisite (if any) :** CE303 (Design of Reinforced Concrete Elements)

### Detailed Syllabus

#### **Unit 1: Design of Stair Cases**

**8 L**

General specifications, Types of stair cases, Loads on stair cases, Effective span of stairs, Design of dog legged stair case, Design principles of other type of staircase

#### **Unit 2: Design of Retaining Walls**

**8 L**

General specifications, Forces acting on retaining walls, Stability consideration, Wall proportioning, Design of cantilever type retaining walls, Design of counterfort type retaining walls.

#### **Unit 3: Design of Water Tanks**

**12 L**

Types of water tanks, Design of circular water tanks resting on ground with rigid base, Design of circular water tanks resting on ground with flexible base, Design of overhead water tank (Intz type tank)

#### **Unit-4: Design of Continuous Beams**

**5 L**

Introduction to continuous beams, Design of continuous RC beams, Moment redistribution

#### **Unit- 5: Multi-storey Building Frames**

**6 L**

Introduction to multi-storey building frames, Analysis of multi-storey frames, Method of substitute frames

### Learning Outcome

At the end of the course, the student can :

- CO1. Design the staircases, Retaining walls
- CO2. Design water tanks
- CO3. Design continuous Beams
- CO4. Design multi-storey building frames

### **TEXT BOOKS**

1. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
2. Pillai, S. U., Menon, D., "Design of reinforced concrete structures"- Tata McGraw hill publications, 3rd Edition, 2009.
3. Varghese, P. C., "Advanced Limit State Design of Reinforced Concrete", PHI Learning Pvt. Ltd., India

### **REFERENCES**

1. Sinha, S. N., "Reinforced Concrete Design", Tata McGraw Hill Publications, New Delhi, 2nd Edition, 2007.
2. IS 456: 2000, "Plain and Reinforced Concrete - Code of Practice", 4th Revision, BIS, New Delhi.
3. SP 16: "Design Aid for RC to IS: 456-1978", BIS, New Delhi.
4. SP 34: "Handbook on Concrete Reinforcement and Detailing", BIS, New Delhi.
5. "Advance R.C.C. Design (R.C.C. Volume-II)" S.S. Bhavikatti, New Age Publishers

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE346	<b>Subject Title</b>	Traffic Engineering and Management						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objectives of this course is to familiarize the students with the concepts of transportation planning and analysis and to ensure that students are able to use the knowledge in solving real time problems in traffic engineering field.

**Course Pre/Co- requisite (if any) :** CE209 (Transportation Engineering-I)

### Detailed Syllabus

#### **Unit 1: Fundamentals of traffic engineering:**

**5 L**

Characteristics of traffic engineering elements- vehicle, driver, road; Fundamentals of traffic flow- speed, density, flow and their relationship.

#### **Unit 2: Traffic flow characteristics**

**6 L**

Uninterrupted traffic flow- data collection, different models related to traffic flow; Interrupted traffic flow- shock wave, flow at signalized and un-signalized intersections; Delay and queue analysis.

#### **Unit 3: Traffic facilities**

**7 L**

Intersections – signalized and un-signalized. Interchanges – types, warrant. Parking – different types, Road signs, Road markings, Bus terminals.

#### **Unit-4 Transportation planning process:**

**4 L**

Goals, objectives; Transportation needs; Generation, evaluation of alternatives and their implementation.

#### **Unit- 5:Travel demand analysis:**

**4 L**

Introduction, nature and analysis of travel demand, Data collection, Four stage transportation models, Trip generation, trip distribution, modal split and traffic assignment.

#### **SR.NO.**

#### **EXPERIMENT NAME**

- |   |   |
|---|---|
| 1 | Spot speed study using speed Gun.                               |
| 2 | Speed –density linear relationship using Speed Gun.             |
| 3 | Two Phase signal design using video data at an intersection.    |
| 4 | Trip Generation analysis, using regression method.              |
| 5 | Parking study characteristics.                                  |
| 6 | Modal Choice using binary logit model using data of O-D survey. |

### Learning Outcome

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

- CO1. Apply the advanced concepts of traffic engineering making them able to design various traffic facilities.
- CO2. Analyze techniques of travel demand and transportation planning.
- CO3. Analyze traffic flow characteristics
- CO4. Understand road intersection and planning

### **TEXT BOOKS**

1. Chakroborty, P., Das, A., “Principle of Transportation Engineering”, Prentice Hall of India Pvt. Ltd.
2. Flaherty, C. A. O., “Transport Planning and Traffic Engineering”, Butterworth-Heineman.

### **REFERENCES**

1. Roger P. Roess William R. McShane & Elena S. Prassas, Traffic Engineering, Prentice – Hall, 1990

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE347	<b>Subject Title</b>	Rock Mechanics						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objectives of this course is to learn basics concepts of recognize the geological consideration needed in rock mechanics and determine and analyze physical properties, compressive strength, tensile strength, shear strength of rock.

**Course Pre/Co- requisite (if any) :** CE208 (Engineering geology)

### Detailed Syllabus

#### **Unit 1: Geotechnical behavior of Earth Material**

**6 L**

Definition, importance and scope of the subject. Analysis of stress and strain at a point; Mohr's circle of stress and strain, characterization of rock joints and jointed rock masses, Intact (crystalline) rock, stratified rock, weak rock (weathered rock and soft sediments), chemically weak rock (carbonates).

#### **Unit 2: Behavior of Soil**

**6 L**

Factors influencing nature and formation of soils. Soil structure, types of bonds. Important clay materials. Engineering properties of soils, Genetic and engineering classification of soils, Complexity of soil nature. Permeability and flow through soil media, Soil stress and seepage, compressibility and consolidation. Stability analysis of soil slopes. Type of foundations, settlement of foundations, bearing capacity, pile foundations. Type of soils as an aggregate material.

#### **Unit 3 Structural Geology for Site Engineering**

**6 L**

Scope of structural geology with special reference to engineering geology. Anisotropy and heterogeneity in deformed rocks, Geometric analysis of folds, faults, joints and rock cleavages. Structural evaluation of sites of construction: Preparation and interpretation of fence diagram, Structure contour maps, Isopach and isochore maps. Joint and fracture maps, Stereographic projections. Isometric projections, block diagrams, Fence diagrams. Geomorphic and structural evaluation of river valley projects – considerations.

#### **Unit-4 Physical and mechanical properties of rocks**

**6 L**

Compressive, tensile, shear and triaxial strength of rock; Behaviour of rock under stress/strain and creep in rocks rheological models. Theories of rock failure: Coulmb-Navier Criteria, Griffiths criteria, Mohr's criteria. Stress concentration around an opening. Rock bursts and bumps. Subsidence - causes, prediction, monitoring and prevention case histories in Indian scenario. Determination of in-situ stresses

#### **Unit- 5: Geotechnical Applications**

**2 L**

Instrumentation and monitoring of stability of structure in rocks. Stabilization of weak and fractured ground - grouting and shotcreting. Numerical modeling for Geotechnical applications

### Learning Outcome

At the end of the course, the student can \_:

CO1. Critically review rock mechanics principles and methods and their applications to engineering practices.

CO2. Measure the physical characteristics of rock masses, including the engineering description of rocks, discontinuities and rock mass; the strength of rock substance, defects and rock mass; laboratory testing of rock, data presentation.

CO3. Analyze stresses under gravitational and imposed loads for rock engineering applications.

CO4. Predict the response of rock masses to loading (and unloading) and analyze rock slope stability and foundations on rock

CO5. Classify rock masses for engineering applications, such as tunnel design and construction.

### **TEXT BOOKS**

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

1. Fundamentals of rock mechanics by John Conrad Jaeger, Wiley India Private Ltd, 4<sup>th</sup> edition, Jan, 2012.
2. Rock mechanics and engineering by Charles Jaeger, Cambridge university press, 2<sup>nd</sup> edition
3. Engineering Rock Mechanics: An Introduction to the Principles by John A. Hudson, Elsevier Science, 2000

### **REFERENCES**

1. Practical Rock Mechanics by Steve Hencher
2. Engineered Rock Structures in Mining and Civil Construction by Raghu N. Singh and Ajoy K. Ghose

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE348	<b>Subject Title</b>	Water and Land management						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objectives of this course are to study the problems in irrigation system in our country and different types of irrigation methods. Also to understand the norms and method of land leveling for irrigation and know about drought management and water management.

### Course Pre/Co- requisite (if any) : CE342 (Environmental Risk Assessment and Disaster Management)

### Detailed Syllabus

#### **Unit 1: Problems of irrigation systems in India & Soil, Water Plant Relationship** **4 L**

**Introduction**, Problems of irrigation systems in India, Soil and Land Irrigability, classification, Basic concepts of diagnostic analysis. Evapotranspiration, crop coefficient, effective rainfall, crop water demand and availability, irrigation efficiencies.

#### **Unit 2: Irrigation scheduling & Micro level Planning:** **6 L**

Irrigation scheduling, Stressed irrigation, drought and water management policy during drought. Micro level Planning for any canal/tube well system, Evaluation of chak planning and design.

#### **Unit 3 Water application methods & Operation and maintenance of irrigation system: 8 L**

Water application methods, Border irrigation, basin irrigation, furrow irrigation, sprinkler and drip irrigation. Operation and maintenance of irrigation system, rotational water distribution systems- arabandi. Evaluation of irrigation project's performance and improvement.

#### **Unit-4 Evaluation and status of land development:** **4 L**

Evaluation and status of land development in irrigated commands, Norms of land leveling, methods of land leveling. Plane method or centroid method, contour adjustment method.

#### **Unit- 5: Water Management for Irrigation:** **4 L**

Irrigation behaviour and decision making, Attitudes and their influence on irrigation management, night irrigation, participatory irrigation management, irrigation organizations.

### Learning Outcome

At the end of the course, the student can :

CO1. Understand Basic concepts of water and land management for irrigation.

CO2. Learn Different methods of Irrigation.

CO3. Learn the Drought and Water Management Policy.

CO4. Compute the Reservoir capacity by various methods and principles of reservoir operation.

### **TEXT BOOKS**

1. Michael, A. M., "Irrigation: Theory and Practice", Vikas Publishing House Pvt Ltd, New Delhi, 2008.
2. Allen, R. G., Pereira, L. S., Raes, D., Smith, M., "FAO Irrigation and Drainage Paper: Crop Evapotranspiration (guidelines for computing crop water requirements)", No. 56, Rome, Italy.
3. FAO Irrigation and Drainage Paper no. 24 & 58, Rome, Italy.
4. Asawa, G. L., "Irrigation and Water Resources Engineering", New Age International, New Delhi, 2006.
5. Mazumdar, S. K., "Irrigation Engineering", Tata McGraw Hill Publication, New Delhi.

### **REFERENCES**

1. Diagnostic Analysis of Minor irrigation scheme, Publication no. 11, WALMI, Aurangabad (Maharashtra).
2. Application of soil survey in Irrigation Water Management, Publication no. 21, WALMI, Aurangabad (Maharashtra).



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE349	<b>Subject Title</b>	Water Resource Engineering						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objectives of this course is to understand the basic types of irrigation, irrigation standards and crop water assessment, to study the different aspects of design of unlined and lined channel and to provide knowledge on various hydraulic structures such as Weir, Barrage, Canal head and cross regulators, canal falls and structures involved in cross drainage works

### Course Pre/Co- requisite (if any) : CE201 (Fluid Mechanics)

### Detailed Syllabus

#### **Unit 1: Principles of water Management 4 L**

**Introduction**, definition, necessity of irrigation, physical properties of soils, soils classification, Indian soils, soil water relationship. Frequency of irrigation.

**Water requirement of crop.**Duty, delta and Base period.Quality of water for irrigation.Irrigation efficiencies.

#### **Unit 2: Method of irrigation 5 L**

**Surface irrigation methods:** furrow irrigation method.

**Subsurface irrigation:** Drip or trickle method. Overhead irrigation- types of sprinklers. Advantages and disadvantages of drip and Sprinkler irrigation.Land drainage.

#### **Unit 3 Irrigation channels 6 L**

**Classification**, component of canal system. Design of channels on alluvial soils Kennedy and Lacey theory.

#### **Design of Lined channels**

#### **Unit-4 Reservoirs: 6 L**

**Types of reservoir**, selection of site for reservoir, investigation of reservoir and dam site, Definition of general term.

**Reservoir capacity from mass curve.** Life of reservoir and its computation.Water losses from reservoir. Principles of reservoir operation.

#### **Unit- 5: Head Works and Canal Structures 5 L**

**Layout, components**, canal regulators: function and types of regulators. Canal drops component and types of canal drop.

**Cross drainage works:** classification ,canal outlets. Hydraulic design for a notch type of drop..

### Learning Outcome

At the end of the course, the student can :

CO1. Basic requirements of irrigation and water requirements of the crops.

CO2. Various Methods of Irrigation and their advantages, disadvantages.

CO3. Distribution systems for canal irrigation and the basics of design of unlined and lined irrigation canals.

CO4. Compute the Reservoir capacity by various methods and principles of reservoir operation.

CO5. Design ofvarious hydraulic structures such as Weir, Barrage, Canal head and cross regulators, canal falls and structures involved in cross drainage works.

### **TEXT BOOKS**

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

- 1 Modi., P. N., "Irrigation water resources and water power engineering", Standard Book House, New Delhi.
- 2 Garg, S. K., "Irrigation engineering and hydraulic structures", Khanna Publishers, New Delhi, 23<sup>rd</sup> Edition, 2009.

### **REFERENCES**

- 1 Sharma, R. K., "Text Book of Irrigation Engineering and Hydraulic Structures", Oxford and IBH Publishing Co., New Delhi, 1984.
- 2 SahasraBudhe, "Irrigation Engineering and Hydraulic Structures", Dhanpat Rai Publication Ltd., New Delhi.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE351	<b>Subject Title</b>	Ground Improvement Technique						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The course aim is to identify basic deficiencies of various soil deposits, to decide various ways and means of improving the soil and implementing techniques of improvement.

**Course Pre/Co- requisite (if any) :** CE211 (Soil mechanics)

### Detailed Syllabus

#### **Unit 1: Introduction to Engineering Ground Modification**

**4 L**

Need and objectives, Identification of soil types, In situ and laboratory tests to characterize problematic soils; Mechanical, Hydraulic, Physico-chemical, Electrical, Thermal methods, etc. and their applications.

#### **Unit 2: Mechanical Modification**

**5 L**

Principles of soil densification – Properties of Compacted soil, Compaction control tests, Specification of compaction requirements, Blasting Vibrocompaction, Dynamic Tamping and Compaction piles.

#### **Unit 3: Hydraulic Modification**

**7 L**

Objectives and techniques, traditional dewatering methods and their choice, Design of dewatering system, Electro-osmosis, Filtration, Drainage and seepage control with Geosynthetics, Preloading and vertical drains, Electro-kinetic dewatering.

#### **Unit-4: Physical and Chemical Modification**

**5 L**

Modification by admixtures, Shotcreting and Guniting Technology, Modification at depth by grouting, Crack Grouting and compaction grouting, Jet grouting, Thermal Modification, Ground freezing.

#### **Unit- 5:Modification by Inclusions and Confinement**

**5 L**

Soil reinforcement, reinforcement with strip, bar, mesh, sheet and grid reinforced soil. In-situ ground reinforcement, ground anchors, rock bolting and soil nailing.

### Learning Outcome

At the end of the course, the student can:

- CO1.Solve the field problems related to problematic soils and solve the problems using the above ground improvement techniques.
- CO2. Design drainage, dewatering for the field problems.
- CO3. Design and construct reinforced earth retaining structures.
- CO4: Design of Soil reinforcement techniques

### **TEXT BOOKS**

1. Hausmann, M. R. (1990) – Engineering Principles of Ground Modifications, McGraw Hill publications
2. Mosley – Ground Improvement

### **REFERENCES**

1. Koerner, R. M (1994) – Designing with Geosynthetics – Prentice Hall, New Jersey
2. Jones C. J. F. P. (1985) – Earth Reinforcement and soil structures – Butterworths, London.
3. Xianthakos, Abreimson and Bruce - Ground Control and Improvement

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE352	<b>Subject Title</b>	Air and Water Pollution						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	3 <sup>rd</sup>	<b>Semester</b>	VI

### Course Objective:

The objective of this course is to learn the knowledge for various air and water pollutants, dispersion of the pollutants, mitigations measures, quality improvement and various standards.

### Course Pre/Co- requisite (if any) : CE209 (Water Supply Engineering)

### Detailed Syllabus

#### **Unit 1: Introduction**

**5 L**

Introduction and scope, air pollutant and types, classification, Dispersion and interaction of pollutants, Air pollutant chemistry and interactions at various atmospheric levels, Aerosols and its characteristics, noise pollution

#### **Unit 2: Measurement of Air Quality and control of air pollution**

**6 L**

Overview of Air quality, Mass balance approaches, Box model approaches, Gaussian plume model, regression model. Air quality dispersion-modeling approaches, Emission inventory, Air pollution monitoring and analysis, Different measurement methods, Key meteorological data, Plume shape, Air quality indices, Control technologies.

#### **Unit 3: Overview of Water Pollution**

**5 L**

Physico-chemical properties of water, molecular structure, common sources of water pollution, surface, ground, Ocean water pollution, water pollutant chemistry, pollutant transport, tracer kinetics, Eutrophication.

#### **Unit-4: Water Pollution measurement and Treatment**

**5 L**

Physical, chemical, biological quality parameters, quality indices for surface and ground water, interpretation of quality indices, numerical modeling approaches, treatment-primary, secondary and tertiary. Oxidation pond.

#### **Unit- 5: Impact of air and water quality, regulations, standards**

**5 L**

Air and water pollution versus health risk and global climate change, Ecological risk, Air and water quality standards, National and international regulations and legislations. Reclamation of water bodies, National and International regulatory bodies, Mitigation strategies.

### Learning Outcome

At the end of the course, the student can:

CO1. Identify various types of air pollutants, interactions and chemistry

CO2. Have the complete knowledge about pollutant source, transport mechanism, monitoring and control technologies.

CO3. Gain the idea about pollutant monitoring organizations, environmental laws, implementation mechanisms

CO4. Gain the idea about pollutant monitoring organizations, environmental laws, implementation mechanisms

### **TEXT BOOKS**

1. Mishra, P. C., "Fundamentals of Air and Water Pollution", APH Publishing Corporation, 2008.

2. Kenneth, W., Warner, F. C. and Davis W. T., "Air Pollution, Its Origin and Control", Prentice Hall, 3<sup>rd</sup> Edition, 1997.

### **REFERENCES**

1. Davis, M. L. and Cornwell, D. A., "Introduction to Environmental Engineering", McGraw-Hill, 5<sup>th</sup> Edition, 2012.

2. Chin, D. A., "Water Quality Engineering in Natural Systems: Fate and Transport Processes in the Water Environment, John Wiley, 2<sup>nd</sup> Edition, 2012.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	HS304	<b>Subject Title</b>	Aptitude and Soft Skills IV						
<b>LTP</b>	3 0 0	<b>Credit</b>	0	<b>Subject Category</b>	AC	<b>Year</b>	III	<b>Semester</b>	VI

**Course Outline:** Aptitude and Soft Skills IV is the final step of programme and the module is designed to enhance the analytical and interpersonal skills of students to make them ready to face various placements, interviews. It will also help them learn various personality development techniques by enhancing their GD and PI skills. Mock Placement Drive will test and improve students by Feedback Sharing & Error Correction.

**Course Objective:**

1. Align themselves with the placement requirements and their needs
2. Learn analytical and employability skills
3. Prepare students for job placements so that they could clear the selection process successfully and give them strategies and skills to crack GD as well as PI to get selected with decent job offers

**Course Pre/Co-requisite (if any):**

1. Understanding grammar, number system and basic arithmetic, analytical reasoning concepts, covered in Aptitude and Soft Skills III
2. Professional profile building and Self introduction

**Detailed Syllabus**

<b>UNIT 1: QUANTITATIVE APTITUDE</b>	<b>11 HOURS</b>
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**Partnership**

**02 hours**

Introduction & types; Speed, Distance and Time: Average Velocity; Race tracks - Straight and Circular; Trains; Boats and Streams.

**Time and Work**

**02 hours**

Basic concepts (relationship between men, days and work); Understanding group efficiency; Alternate work; Negative work; Wages; Pipes and Cisterns.

**Permutation and Combination**

**02 hours**      Basic Principles of

Counting (Addition and Multiplication); Arrangements around- Circular, Square and Rectangular tables and in straight lines, circular permutation, selection, distribution.

**Probability**

**02 hours**

Introduction, various types of events; Classical definition of probability; Random and Discrete variables; Bayes' Theorem and question types.

**Data Interpretation**

**03 hours**

Introduction; Different ways of representing data- Narration based, pictorial, pie chart, Bar graph, line charts; various questions based upon them.

<b>UNIT 2: VERBAL APTITUDE</b>	<b>09 HOURS</b>
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**Cloze test**

**02 hours**

Intricacies of cloze test, correct use of specific adjectives, concept of sentence improvement, writing concept, auxiliaries and modals.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

**Words** **02 hours**  
Concept of consistency, precision, concision in terms of reading and writing, advance word choice with respect to placement papers, SAP (Subject-Audience-Purpose) approach.

**Clauses** **02 hours**  
Subordinate Clauses- The noun clause, the adjective clause, the adverb clause, Analysis of simple and complex sentences, prepositional phrases, transformation of sentences.

**Vocabulary** **01 hour**  
Revisiting vocabulary- high, medium and low frequency words, organization of ideas and thoughts in order to understand the text- The Pyramid Principle.

**Questions** **02 hours**  
Various test taking skills in accordance with the placement papers.

<b>UNIT 3: LOGICAL REASONING</b>	<b>11 HOURS</b>
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**Deductive Logic** **03 hours**  
Premises and conclusion structure, Quality of deductive argument, Categorical arguments, Syllogism, Conditional Arguments- If..then, only if..then, If and only if, Either or.

**Puzzles** **02 hours**  
Grouping and selection, Double line up, Binary logic- truth teller-lie teller, Team formation and miscellaneous puzzles.

**Set Theory and Critical Reasoning-II** **03 hours** Union and Intersection of sets, Use of Venn diagrams in problem solving with two, three, four set, concept of maxima-minima through Venn diagram.

Critical reasoning II: Statement and Inference, cause and Effects, Statement and Arguments- Strengthen or Weaken the argument, Statement Assertion and Reason.

**Non-Verbal Reasoning** **01 hour**  
Mirror-image, Water-image, Spotting out the embedded figures, Completion of incomplete pattern, Figure matrix, Paper folding, Paper cutting, Grouping of identical figures, Counting figures, Non verbal series / analogies / odd man out.

**Data Sufficiency** **02 hours**  
Data Sufficiency based on logical reasoning field like Coding-Decoding / Puzzle Test / Blood Relations / Mathematical calculations / clock / calendar / etc.

<b>UNIT 4: SOFT SKILLS</b>	<b>08 HOURS</b>
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**Group Discussion** **04 hours**  
Importance, Do's & Don'ts, Personality Traits, Tips and Strategies, Types of Group Discussions.  
**Suggested Exercises, Games & Activities:** Mock Group Discussions (on basic topics), with feedback sharing and error analysis.

**Personal Interview** **04 hours**  
Importance, Do's & Don'ts, Personality Interview, Tips and Strategies, Etiquette Rules.  
**Suggested Exercises, Games & Activities:** Mock Personal Interviews (contd.) with feedback sharing and error analysis.

**Learning Outcomes:**

By the end of this semester, students will:

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

1. Be prepared for the upcoming placements and they will also be ready for other competitive exams.
2. Improve their GD and PI Skills and be able to have firsthand experience of a Placement drive and gain sufficient confidence to perform well.

### **Text book [TB]:**

1. Quantitative Aptitude :How to prepare for Quantitative Aptitude, Arun Sharma, McGraw Hill, 8th edition, 2018.
2. Logical Reasoning:A Modern Approach to Logical Reasoning-R.S. Aggarwal, S Chand Publishing; 2<sup>nd</sup>Colour edition-2018.
3. Verbal Aptitude : English is Easy- Chetanand Singh, BSC Publication-2018.
4. Soft Skills : Group Discussion on Current Topics by P. N. Joshi; Upkar Prakashan-2010.

### **Reference books [RB]:**

1. Quantitative Aptitude: Quantitative Aptitude for Competitive Examinations- R.S. Agarwal, S. Chand Publications-2017.

Quantitative Aptitude: Quantitative Aptitude-Saurabh Rawat & Anushree Sah RawatSavera Publishing House, 1<sup>st</sup> edition-2016.

2. Logical Reasoning: Logical Reasoning and Data Interpretation for the CAT - Nishit K Sinha, Pearson India; 5<sup>th</sup> edition-2016.

Logical Reasoning: Wiley's Verbal Ability and Reasoning - P A ANAND, Wiley-2016.

3. Verbal Aptitude: Oxford Guide to English Grammar- John Eastwood, Oxford University Press-2003.

Verbal Aptitude: Fun with grammar- Suzanne W. Woodward Pearson Education ESL-1996.

4. Soft Skills: AComplete Kit for Group Discussion by S. Hundiwala; Arihant publications; edition-2018.

Soft Skills: Basic Interviewing Skills by Raymond L. Gorden, Waveland Press, Inc.; 1 edition-1998.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE401	<b>Subject Title</b>	<b>ESTIMATION AND COSTING</b>						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DC	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** To learn the estimation of RCC, masonry and road structures and to study different terms related to contracts and tenders.

**Course Pre/Co- requisite (if any) : NA**

### Detailed Syllabus

#### **Unit 1: Introduction & Estimation of Buildings**

**4 L**

**Introduction** - Importance of estimation in Civil Engineering, Different types of Estimates.

**Estimation methods:** Methods in Estimation, Methods of taking out quantities and cost by Centre line method and long wall and short wall method.

#### **Unit 2: Estimation of R.C.C. Structures**

**6 L**

**Estimation of simple RCC structures** - Estimates of components RCC works in beams, column footings and roof slabs

**Estimation of complex RCC structures** - Estimation of septic tank, manhole and RCC slab culverts.

#### **Unit 3 Specifications and Rate Analysis**

**5 L**

**Specifications of items:** Definition of specifications, objectives of writing specification, essentials of specification of various items of working in buildings

**Rate Analysis of quantities estimated:** Importance working out quantities and rates for the following standard items of works-earth works in different types of soils, cement concrete of different mixes, Brick masonry, Painting and steel works, wooden works for doors, windows

#### **Unit-4 Estimation of Earth Work and Road Projects:**

**6 L**

**Earthwork:** Methods for computation of Earthwork-cross sections-mid sections formula, trapezoidal and average end area or mean sectional formula

**Road Projects:** Estimation of Road Works -WBM, Bituminous mixes and cement concrete roads.

#### **Unit- 5 Contracts and Tender**

**5 L**

**Contracts:** Types of contract, essential of contracts agreement and document- legal aspects, penal provisions on breach of contract

**Tender:** Tender- E.M.D, Security deposit, Tender form, Tender notification procedures, Nominal muster roll, Measurement book.

### **COURSE OUTCOME:**

At the end of the course, the student can :

CO1. Identify the various methods of estimation of quantities.

CO2. Apply the concepts to estimate the quantities required in RCC structures.

CO3. Comprehend the concepts of various construction specifications and their rates.

CO4. Compute the quantities of materials required in road construction.

CO5. Understand the role of contracts and tenders in civil engineering construction industry.

### **TEXT BOOKS**

1. Chakraborti, M., "Estimating, Costing, Specification and Valuation in Civil Engineering", Published by author, Calcutta.
2. Dutta, B. N., "Estimating and Specification" UBS publishers and distributors, New Delhi, 2002.

### **REFERENCES**

1. Basin, P. L., "Quality surveying", S. Chand and Co., New Delhi.
  2. Rangawala, S. C., "Estimating and Specification", Charotar publishing House, Anand.
- Nanavati, J., "Professional Practice for Civil engineers".



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE402	<b>Subject Title</b>	<b>BRIDGE ENGINEERING</b>						
<b>LTP</b>	3 1 0	<b>Credit</b>	4	<b>Subject Category</b>	DC	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The course is designed to gain the knowledge of basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location

**Course Pre/Co- requisite (if any) : NA**

### Detailed Syllabus

#### **Unit 1: Introduction**

**7 L**

Definition, Components of bridge, Historical Developments, Site Selection for bridges, classification of bridges, Survey and data collection for a bridge site selection, Hydraulic design, Design Discharge, Linear waterway, Economical span.

#### **Unit 2: Specifications of Road Bridges**

**10 L**

Indian road Congress Bridge code, carriageway, clearance, forces on bridge, review of IRC loadings, applications of loads on bridge such as dead load, impact load, live load etc.

#### **Unit 3: R.C.C. Slab Culvert:**

**8 L**

RCC Slab culvert, dead load BM and SF, BM and SF for IRC class AA tracked vehicle, BM and SF for IRC class AA wheeled vehicle, BM and SF for IRC Class A loading, structural design of slab culvert.

#### **Unit-4: T-Beam Bridge**

**8 L**

Proportioning of components, analysis of slab using IRC class AA tracked vehicle, structural design of slab, analysis of cross girder for dead load and IRC class AA tracked vehicle, structural design of cross girder, analysis of main girder using COURBON'S method, calculation of dead load and SF, calculation of live load BM and SF using IRC class AA tracked vehicle, structural design of main girder.

#### **Unit- 5: Substructure, Foundations, Bearings, Joints and Appurtenances**

**6 L**

Definition of pier and abutment, design and drawing of pier and abutments, scour at abutments and pier, types of foundations, pile, well and pneumatic caissons, importance of bridge bearings, sketches of different types of bearings.

### **COURSE OUTCOME:**

At the end of the course, the student can :

- CO1. Study different types of bridges,
- CO2. Estimate forces acting on bridges
- CO3. Design bridge.
- CO4. Design foundations and bearings

### **TEXT BOOKS**

1. Raju, N. K., "Design of bridges", Oxford and IBH publishing Co., New Delhi.
2. Victor, J., "Essentials of bridge engineering", Oxford and IBH publishing Co., New Delhi, 3rd Edition, 1980.

### **REFERENCES**

- 1 Bindra, S. P., "Principles and practice of bridge Engineering", Dhanpat Rai and Sons, New Delhi, 7<sup>th</sup> Edition, 1992.
- 2 "IRC 6-1966 Standard Specifications and code of practice for Road Bridges Section II loads and stresses", The Indian Road Congress, New Delhi.
3. Bridge Deck Analysis, R.P.Pama&A.R.Cusens, John Wiley & Sons.
- 4.Design of Bridge Structures, T.R.Jagadish&M.A.Jairam, Prentice Hall of India, N.Delhi.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE441	<b>Subject Title</b>	Pavement Evaluation and Rehabilitation						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The objectives of this course is to introduce students to different types of pavement failures and to make students able to evaluate functional and structural condition off an existing pavement.

**Course Pre/Co- requisite (if any) :**CE341 (Advanced Highway Engineering)

### Detailed Syllabus

#### **Unit 1: Analysis of Pavement Structures:**

**4 L**

Analysis of bituminous pavement- elastic half space solution, layered elastic solution. Analysis of concrete pavement-slab on elastic foundation. Stiffness modulus and fatigue performance of bituminous mix.

#### **Unit 2: Types of pavement distress:**

**4 L**

Introduction, major forms of distress in bituminous and concrete pavement. Distress survey.

#### **Unit 3: Functional and structural evaluation of pavements:**

**7 L**

Methods of Pavement evaluation. Present serviceability Index. Functional condition evaluation of pavements- Roughness, Skid Resistance and its measurement. Structural evaluation of pavements – non-destructive testing, Benkelman beam and Falling Weight Deflectometer, Lacroix Deflectometer, Dynaflect. Dynamic Cone Penetrometer Test.

#### **Unit-4 Pavement strengthening:**

**5 L**

Surface repairs. Overlay design and construction- need of overlays, overlay design methods for flexible and rigid pavements. Recycling of flexible and rigid pavements

#### **Unit- 5:Pavement Systems:**

**6 L**

Components, structure, data requirements, Project level and Network level needs, Pavement performance prediction – concepts, Pavement performance prediction – concepts, modelling techniques– AASTHO, CRR1 and HDM models, Budget forecasting for maintenance and rehabilitation, Ranking and optimization methodologies, life cycle costing.

**Course Outcome:** At the end of the course, the student can:

CO1. Identify principles of pavement design to be used for solving real life engineering problems.

CO2. Apply highway engineering concepts for selection of material

CO3. Compute various distresses occurring in case of different pavements

CO4. Understand various pavement systems

### **TEXT BOOKS**

1. Yodar, E. J., “Principle of Pavement Design”, Wiley, 2nd Edition.
2. Statinary Off., H. M., “Bituminous Material in Road Construction”, Road Research Laboratory, 1962.
3. Kerbs, R. D., and Walker, R. D., “Highway Materials”, McGraw-Hill, 1971

### **REFERENCES**

1. Khanna, S. K., Justo, C. E. G., “Highway Engineering”, Nem Chand and Bros, 2001.
2. Huang, Y.H., “Pavement Analysis and Design” Prentice Hall

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE442	<b>Subject Title</b>	GROUND WATER ENGINEERING						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The objectives of this course are to learn the role of groundwater and its importance over surface water. The students will also learn the Artificial Groundwater recharge processes like surface recharge and subsurface recharge processes.

**Course Pre/Co- requisite (if any) :**CE208 (Engineering Geology)

### Detailed Syllabus

#### **Unit 1: Introduction**

**5 L**

Groundwater occurrence and its role in hydrologic cycle, various usage of ground water, Groundwater bearing formations, Aquifer classification, Flow and storage characteristics of various types of aquifers, Indian Scenario.

#### **Unit 2: Ground Water Flow in Cartesian Coordinates**

**5 L**

Differential Equations governing groundwater flow in Cartesian coordinates, Analytical solutions for confined, leaky and unconfined aquifers, Numerical solutions, Stream-aquifer interflows

#### **Unit 3 Ground Water Flow in Polar Coordinates**

**8 L**

Differential Equations governing groundwater flow in Polar coordinates, Analytical solutions for confined, leaky confined and unconfined aquifers, Image well theory, Time-variant pumping rates, Well interference, Analysis of pumping test data.

#### **Unit-4: Wells and Ground Water Recharge**

**4 L**

Construction of wells, Various drilling techniques, Estimation of recharge, Flow in unsaturated zone, Artificial recharge, Induced recharge, Roof water harvesting

#### **Unit- 5: Contamination of Ground Water**

**4 L**

Contamination of ground water, Quality parameters and standards, River bank infiltration, Sea water intrusion and its monitoring techniques.

### **Course Outcome:**

At the end of the course, the student can:

CO1. Learn the fundamentals of the Groundwater or 'the hidden asset'.

CO2. Estimate the ability of Protection needs of groundwater and groundwater dependent receptor needs.

CO3. Analyze Groundwater quality assessment and classification.

CO4. Develop the quantitative skills for solving basic Groundwater related problems.

CO5. Carry out the following: interpret cross-sections, calculate the thickness of the unsaturated zone, and the rate of groundwater flow.

### **TEXT BOOKS**

1. Todd, D. K., "Ground Water Hydrology", John Wiley & Sons, 1980.

2. Raghunath, H. M., "Ground Water", New Age International, 2007.

### **REFERENCES**

1. Walton, W.C., "Ground Resource Evaluation", McGraw Hill, New Delhi, 1970.

2. Bear, J., "Hydraulics of Ground Water", McGraw-Hill International Book Co., 1979.

3. Bouwer, H., "Ground Water Hydrology", McGraw-Hill

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE443	<b>Subject Title</b>	PRINCIPLES OF GPS & GIS						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The course objective is to introduce students to the concept of geographical information systems and enable them to understand types of GIS data, different data models and concept database management.

**Course Pre/Co-requisite (if any) :** CE345 (Photogrammetry and remote Sensing)

### Detailed Syllabus

#### **Unit 1: Fundamentals of GPS**

**6 L**

Components of GPS, GPS receivers, reference coordinate systems, datums, ellipsoids, WGS 84 system, signal propagation through atmosphere- their modelling and estimation, satellite orbit.

#### **Unit 2: GPS Signals and Data**

**6 L**

Navigational data, GPS data collection methods: static positioning, kinematic positioning, pseudo kinematic and stop & go, observation planning and strategy.

#### **Unit 3 Introduction to GIS**

**5 L**

Geographical concepts and terminology, Utility of GIS, various packages and their features, essential components of a GIS. Data acquisition through scanners and digitizers, methods of digitization.

#### **Unit-4 Introduction to remote sensing**

**6 L**

Raster and Vector data, data storage, verification and editing. Rectification and registration, interpolation of data, Database structure: hierarchical data, network systems, relational database. Data manipulation and analysis, spatial and mathematical operations on data, area analysis, query-based analysis.

#### **Unit- 5: Applications of GPS & GIS**

**3 L**

Applications of GPS & GIS for engineering problems and in planning and management of various natural resources.

#### **SR.NO.**

#### **EXPERIMENT NAME**

1. Georeferencing of a scanned map
2. Digitization of Points and Lines
3. Editing Map Elements
4. Attribute Data Entry and Manipulation
5. Cleaning, Building and Transformation
6. Data Analysis – Overlay, Buffer
7. Map Generation with Patterns and Legends

### **COURSE OUTCOME:**

At the end of the course, the student can:

CO1: Digitize scanned maps and create informative thematic maps in GIS.

CO2. Perform data manipulation and analysis

CO3. Comprehend and realize the potential of GIS to address various engineering problems.

CO4. Learn GPS

### **TEXT BOOKS**

1. The Global Positioning System & GIS: An Introduction, Michael Kennedy, Taylor and Francis publication.
2. Principles of Geographic Information for Land resources assessment, P.A. Burrough and McDonnel, Oxford University Press.
3. Geographic Information Systems: A Management Perspective, by Stan Arnoff, WDL Publications.

### **REFERENCES**

1. Fundamentals of Spatial Information Systems by Robert Laurini and Derek Thompson, Academic Press.
2. Geographical Information Systems, Vo. I and II edited by Paul Longely, M.F. Goodchild, et.al, John Wiley and Sons, Inc. 1999

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE444	<b>Subject Title</b>	<b>CONSTRUCTION PLANNING AND MANAGEMENT</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** To learn network techniques in construction planning and management and to learn control and safety procedures in construction

**Course Pre/Co- requisite (if any) : NA**

### Detailed Syllabus

#### **Unit 1: Network Techniques 8 L**

Introduction to network techniques, Use of Computer aided CPM and PERT for planning, Scheduling and control of construction works, Bar charts, Error in networks, Types of nodes and node numbering systems

#### **Unit 2: PERT 6 L**

Time Estimates, probability distribution, time computations, slack, network analysis, critical path

#### **Unit 3 CPM 8 L**

CPM processes, network, activity time estimates, float, network analysis, critical path

#### **Unit-4 Control and Safety in Construction 8 L**

Construction quality control and inspection, Significance of variability and estimation of risk, Construction cost control, crashing of networks. Resource planning and scheduling, Introduction, Evolution of safety, Cause of accident, injury. Principle of safety, safety act and regulations, roles of safety personnel, safety management system

#### **Unit- 5 Construction Equipment and Methods 9 L**

Equipment for earthworks, Concrete construction, Aggregate production, Concrete production, Handling and placement, Mixers, Vibrators and temperature control

### **COURSE OUTCOME:**

At the end of the course, the student can:

- CO1. Identify the various network techniques for planning and scheduling any project
- CO2. Learn the concepts involved in PERT network analysis techniques
- CO3. Learn the concepts involved in CPM network analysis techniques
- CO4. Understand the importance of safety in construction projects
- CO5. Identify the various machines involved in construction projects.

### **TEXT BOOKS**

1. Shrivastav, U. K., "Construction Planning Management", Galgotia Publications.
2. Peurifoy, R. L., "Construction Planning, Equipment and Methods", McGraw Hill Publication, New Delhi, 7th Edition, 2013.
3. Jha, K. N., "Construction Project Management: Theory and Practice", Pearson Publication, New Delhi, 2012.

### **REFERENCES**

1. Ahuja, H. N., "Construction Performance Control by Networks", John Wiley & Sons, 1976.
2. Satyanarayana, B., Saxena, S. C., "Construction, Planning and Equipment", Standard Publishers, 3rd Edition, 1985.
3. Moder, J. J., Phillips, C. R., "Project Management with CPM and PERT", Van Nostrand Reinhold Co., 2nd Edition, 1970.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE445	<b>Subject Title</b>	River Pollution and Control						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The course aim is to gain the knowledge regarding river water quality, pollutant transport and to learn about the chemistry of water pollutant and pollutant management

**Course Pre/Co- requisite (if any) :CE204 (Water Supply Engineering)**

### Detailed Syllabus

#### **Unit 1**

**6 L**

River water quality description, river ecology. Sources of pollution, point and non-point sources of pollution, characteristics of pollutants.

#### **Unit 2**

**9 L**

Pollutant transport and mixing in water environment, rivers, lakes and estuaries. River water quality simulation models

#### **Unit 3**

**9 L**

River stage and pollution load relationship, interaction between ground water and surface water pollution. Theory of jets and plumes, location of outfalls, separation zones and pollutant logging,

#### **Unit-4**

**7 L**

Hydrological character of river and pollution management. River water quality monitoring, methodologies, standards. River pollution management, Regional and local approaches.

#### **Unit- 5**

**8 L**

River pollution management preventive and curative methods, natural energy concepts of river pollution management. Environmental regulations for river pollution control.

**Course Outcome:** The students will learn

- CO1. River pollution characteristics
- CO2. Pollution transport dynamics
- CO3. River pollution management
- CO3. Hydrological Characteristics of river

### **TEXT BOOKS**

George T, 'Water quality modeling for rivers and streams', springer, 2013, first  
Jain, A K, 'River pollution', APH Publishing, 2009.

### **REFERENCES**

- Ahuja, H. N., "Construction Performance Control by Networks", John Wiley & Sons, 1976.
- Satyanarayna, B., Saxena, S. C., "Construction, Planning and Equipment", Standard Publishers, 3rd Edition, 1985.
- Moder, J. J., Phillips, C. R., "Project Management with CPM and PERT", Van Nostrand Reinhold Co., 2nd Edition, 1970.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE446	<b>Subject Title</b>	<b>SOIL DYNAMICS AND MACHINE FOUNDATION</b>						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:** The course aim is the design and analysis for machine foundations come along with this course to consider the dynamic properties of both soil and foundation as combined mass. Behaviour of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading are discussed here along with the reference to design code provisions.

**Course Pre/Co- requisite (if any) :** CE211 (Soil mechanics)

### Detailed Syllabus

#### **Unit 1: Introduction**

**5 L**

Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping – Constant force and rotating mass type excitation –Types of damping-Equivalent stiffness of springs in series and parallel. – Resonance and its effect – magnification-logarithmic decrement –Transmissibility.

#### **Unit 2: Theories of Vibration Analysis**

**4 L**

EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory – Sung’s solutions – Pauw’s Analogy – Heigh’s Theory.

#### **Unit 3: Dynamic principle of soil**

**5 L**

Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

#### **Unit-4: Types of machine foundation**

**6 L**

General requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

#### **Unit- 5: Vibration isolation**

**6 L**

Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction – Dynamic bearing capacity, Earth retaining structures under dynamic loads.

### **COURSE OUTCOME:**

On successful completion of these course, the student able to

CO1: Use theory of vibrations to find the behavior of soil under dynamic loading.

CO2: Design machine foundations under different loads and soil conditions.

CO3: Understand the liquefaction phenomina. Conduct various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation.

CO4: Design vibration isolators under any vibratory machines.

### **TEXT BOOKS**

‘Vibrations of Soils and Foundations’ by Richart Hall and Woods

### **REFERENCES**

‘Vibration Analysis and Foundation Dynamics’ by NSV Kameswara Rao, Wheeler Publishing, New Delhi.

‘Foundations of Machines- Analysis and Design’ by Prakash and Puri.

‘Analysis and design of Foundations for Vibrations’ by P J Moore

‘Fundamentals of Soil Dynamics’ by B M Das

‘Dynamics of bases and Foundations’ by D DBarkar

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE447	<b>Subject Title</b>	HYDRAULIC STRUCTURES						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>		<b>Year</b>	4th	<b>Semester</b>	VII

**Course Objective:**

The course enables students to learn about different hydraulic structures like dams, spillways etc.

**Course Pre/Co- requisite (if any) :**CE201 (Fluid Mechanics)

**Detailed Syllabus**

**Unit 1: Introduction**

**4 L**

Hydraulic structures for water resources projects.

**Unit 2: Embankment and Gravity Dams**

**6 L**

Embankment Dam: Types, design considerations, seepage analysis and control, stability analysis, construction techniques.

Gravity Dam: Forces acting on failure of a gravity dam, stress analysis, elementary profile, design of gravity dam, other functional features of a gravity dam

**Unit 3: Spillways**

**6 L**

Types and their design, spillway gates, Cavitation, Aerators and energy dissipation (terminal structures)

**Unit-4: Channel transition**

**5 L**

Design principles for subcritical and supercritical flows.

**Unit- 5: Hydropower plant**

**5 L**

Terms relating to hydropower, basic design aspects of different unit of hydropower plant

**COURSE OUTCOME:**

CO1: The student will learn classification and design of dams

CO2: The student will learn classification and design of spillways

CO3: The Student will have knowledge of hydropower plants and its parts

CO4: The Student will have knowledge of channel transition

**TEXT BOOKS**

1. Singh, B., "Fundamentals of Irrigation Engineering", Nem Chand & Bros, 9<sup>th</sup> Edition, 1997.
2. Subramanya, K., "Flow in Open Channels", Tata McGraw-Hill, 2<sup>nd</sup> Edition, 2000.

**REFERENCES**

1. Asawa, G. L., "Irrigation Engineering", New Age International, 2<sup>nd</sup> Edition, 1996.
2. Ranga Raju, K. G., "Flow through open Channels", Tata McGraw-Hill, 2003.
3. Chow, V. T., "Open Channel Hydraulics", McGraw-Hill, 1959.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CS481	<b>Subject Title</b>	Software Quality Engineering						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### UNIT-I: Introduction

(7 L)

Defining Software Quality, Software Quality Attributes and Specification, Cost of Quality, Defects, Faults, Failures, Defect Rate and Reliability, Defect Prevention, Reduction, and Containment, Overview of Different Types of Software Review, Introduction to Measurement and Inspection Process, Documents and Metrics.

### UNIT-II: Software Quality Metrics

(8 L)

Product Quality Metrics: Defect Density, Customer Problems Metric, Customer Satisfaction Metrics, Function Points, In-Process Quality Metrics: Defect Arrival Pattern, Phase-Based Defect Removal Pattern, Defect Removal Effectiveness, Metrics for Software Maintenance: Backlog Management Index, Fix Response Time, Fix Quality, Software Quality Indicators.

### UNIT-III: Software Quality Management and Models

(8 L)

Modeling Process, Software Reliability Models: The Rayleigh Model, Exponential Distribution and Software Reliability Growth Models, Software Reliability Allocation Models, Criteria for Model Evaluation, Software Quality Assessment Models: Hierarchical Model of Software Quality Assessment.

### UNIT-IV: Software Quality Assurance

(8 L)

Quality Planning and Control, Quality Improvement Process, Evolution of Software Quality Assurance (SQA), Major SQA Activities, Major SQA Issues, Zero Defect Software, SQA Techniques, Statistical Quality Assurance, Total Quality Management, Quality Standards and Processes.

### UNIT-V: Software Verification, Validation & Testing:

(8 L)

Verification and Validation, Evolutionary Nature of Verification and Validation, Impracticality of Testing all Data and Paths, Proof of Correctness, Software Testing, Functional, Structural and Error-Oriented Analysis & Testing, Static and Dynamic Testing Tools, Characteristics of Modern Testing Tools.

#### Text Book:

1. Jeff Tian, Software Quality Engineering (SQE), Wiley-Interscience, 2005; ISBN 0-471- 713457.
2. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley (2002), ISBN: 0201729156

#### Reference Book:

1. Stephen H. Kan, Metrics and Models in Software Quality Engineering, Addison-Wesley Professional
2. Taz Daughtrey, Fundamental Concepts for the Software Quality Engineer, ASQ Quality Press.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	IT353	<b>Subject Title</b>	<b>Basics of Data Science</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### Course Objective:

1. The objective of the course is to make the students understand the different techniques for efficient mining of the data.
2. To introduce students to the concepts, processes and practice of Inference Rules at different abstraction levels of Data.
3. To provide an understanding of the Data management perspective regarding the use of business intelligence (BI), Data Mining systems and Advanced Applications.

### Detailed Syllabus

#### UNIT 1

**Data Science** :Introduction to Data Science, Overview, Motivation, Data Mining-Definition & Functionalities.

**Data Warehousing**: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting.

**(12L)**

#### UNIT 2

**Data Pre-Processing**: Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Inconsistent Data, Data Integration and Transformation.

Data Reduction: Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.

Data objects and attribute types, Measuring Data Similarity and Dissimilarity, Cosine Similarity.

**(7 L)**

#### UNIT 3

**Concept Description**: Definition, Data Generalization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Box Plots, Measuring Dispersion of Data, Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases , FP-growth algorithm.

**(7 L)**

#### UNIT 4

**Classification**: What is Classification, Issues regarding Classification, Attribute selection measures, Information Gain, Gain Ratio, Gini Index, Decision tree, Naïve Bayesian Classification, Metrics for evaluating classifier performance, Confusion matrix.

**(6 L)**

#### UNIT 5

**Cluster Analysis**: Data types in cluster analysis, Overview of basic clustering methods, Partitioning methods: K-Means and K-medoids technique, Hierarchical Clustering: Agglomerative and Divisive, Density Based Methods :DBSCAN and OPTICS, Grid Based Methods: STING and CLIQUE, Outlier Analysis.

**(8 L)**

### Learning Outcome

The course provides the students the ability to:

- 1 - Undertake systematic investigation/research related to the Data mining Concepts
- 2- Understand advanced Database systems and technologies for today's dynamic business environment.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **Text book [TB]:**

1. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques" Elsevier.

### **Reference books [RB]:**

1. M.H. Dunham, "Data Mining: Introductory and Advanced Topics" Pearson Education
2. Mallach, "Data Warehousing System", McGraw-Hill

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	IT356	<b>Subject Title</b>	<b>Multimedia</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### Course Objective:

1. To make students learn about basic understanding of the multimedia objects and tools for object generation
2. To teach students audio and video file formats used now days as a part of IT generation.
3. To make students learn clear understanding of multimedia projects.
4. To make students learn different compression techniques.

### Detailed Syllabus

#### UNIT 1

**Introduction:** Introduction to Multimedia, Multimedia Information, Multimedia Objects, Multimedia in business and work, Stages of Multimedia Projects, presentation tools, tools for object generations, video, sound, image capturing, authoring tools, card and page based authoring tools **(8 L)**

#### UNIT 2

**Multimedia Building Blocks:** Text, Sound MIDI, Digital Audio, audio file formats, MIDI under windows environment Audio & Video Capture. **(8 L)**

#### UNIT 3

**Data Compression:** Introduction to data compression, Compression ratio, loss less & lossy compression, Huffman Coding, Shannon Fano Algorithm, Huffman Algorithms, Adaptive Coding, Arithmetic Coding, Finite Context Modelling, Dictionary based Compression, Sliding Window Compression, LZ77, LZ78, LZW compression. **(8 L)**

#### UNIT 4

**Image, Audio and Video Compression:** Digital Audio concepts, Sampling Variables, Loss less compression of sound, loss compression & silence compression, lossy graphic compression, image file format, animations Images standards, JPEG Compression, Zigzag Coding, Multimedia Database. Content based retrieval for text and images, Video Compression, MPEG standards, MHEG Standard Video Streaming on net. **(8 L)**

#### UNIT 5

**Advanced forms of interaction in Multimedia:** Video Conferencing, Elements of (immersive/non-immersive) Virtual Reality, Augmented Reality, Tele presence, Mobile technologies.  
**Multimedia Security:** Overview- Multimedia Systems, Secured Multimedia, Digital Rights Management Systems and Technical trends, Multimedia Encryption and Digital Watermarking, Security Attacks and Multimedia Authentication. **(8 L)**

### Learning Outcome

At the end of the course, Learning Outcomes Having successfully completed this course, the student will demonstrate:

1. Students will understand various multimedia tools available.
2. Students will be able to learn with Multimedia projects
3. Students can differentiate between lossy and lossless compression.

**Text Book [TB]:**

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

1. Tay Vaughan "Multimedia, Making IT Work" Osborne McGraw Hill, 7<sup>th</sup> edition
2. Khalid sayood "Introduction to data compression" Morgan Kaufmann Publishers, 3<sup>rd</sup> edition

### **Reference Book [RB]:**

1. Buford "Multimedia Systems" Addison Wesley, 4<sup>th</sup> edition
2. Mark Nelson "Data Compression Book" BPB, 3<sup>rd</sup> edition
3. Sleinreitz "Multimedia System" Addison Wesley, 5<sup>th</sup> edition

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	EC383	<b>Subject Title</b>	Consumer Electronics						
LTP	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

**Objectives of the Course:** The students will learn

- Consumer Electronics and its application
- Concept of audio and video related system.
- Concepts of recording and power supplies.

### UNIT-I

Audio Systems: Microphones, Loudspeakers, Speaker baffle and enclosure, Acoustics, Mono, Stereo, Quad, Amplifying Systems, Equalisers and Mixers, Electronic Music Synthesisers, Commercial Sound, Theater Sound System

**8LU**

### UNIT – II

Video Systems and Displays: Monochrome TV, Colour TV standards and systems, TFT, Plasma, HDTV, Digital TV, Video Telephone and Video Conferencing

**8L**

### UNIT III:

Domestic Appliances: Washing machines, Microwave ovens, Air- conditioners and Refrigerators, In car computers Office Systems: FAX, Xerox, Telephone Switching System, Mobile Radio System

**8L**

### UNIT IV:

Recording and Reproduction Systems: Disc recording and reproduction, Magnetic recording and reproduction, Video tape recording and reproduction, Video disc recording and play back, Distortion and Noise reduction in Audio and Video System

**8L**

### UNIT-V

Power Supplies and other systems: SMPS, UPS and Preventive Maintenance, Set Top Boxes, Remote controls, Bar codes, ATM

**8L**

### **Text Books:**

1. Consumer Electronics S P Bali Pearson ed 2005

### **OUTCOMES OF THE COURSE:**

The course provides an understanding of:

- Electronic systems related to consumer applications.
- Principle of working of various home appliances.
- Skills to use modern consumer electronics systems used in day to day life.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	EC385	<b>Subject Title</b>	Analog Electronics						
LTP	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

**Objectives of the Course:** To teach the fundamental concepts of various electronic devices, circuits and their application. To develop ability among students for problem formulation, system design and solving skills.

### UNIT-I

Semiconductor materials and properties Group-IV materials, Covalent bond, electron-hole concepts Basic concepts of energy bands in materials, concepts of forbidden gap Intrinsic and extrinsic semiconductors, donors and acceptors impurities **4L**

### UNIT-II

Junction diode and diode applications p-n junction, depletion layer, v- i characteristics, diode resistance, capacitance diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage). **4L**

Diode Applications Rectifiers (half wave and full wave), filter (C– filter), clipping circuits, clamping circuits, voltage multipliers **4L**

### UNIT-III

Breakdown diodes Breakdown mechanisms (zener and avalanche), breakdown characteristics, zener diode application as shunt regulator **4L**

### UNIT-IV

Bipolar Junction Transistor Basic construction, transistor action, CB, CE and CC configurations, input/output Characteristics, Transistor Amplifier Graphical analysis of CE amplifier, concept of voltage gain, current gain. **6L**

### UNIT-V

Field Effect Transistor

JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristics equation CG, CS and CD configurations, MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics.

**6L**

### **Reference Books:**

1. Boylestad and Nashelsky, 'Electronic Devices and Circuits' PHI, 6e, 2001.
2. A Mottershead, 'Electronic devices and circuits'. PHI, 2000.
3. Morris Mano, 'Digital Computer Design', PHI, 2003.
4. R.K. Singh & Ashish, Basic Electronics Engg. Laxmi Publication, 2007.
5. Milman & Halkias, Integrated electronics Electronics, PHI, 2005.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### OUTCOME OF THE COURSE:

- Students will be able to build, develop, model, and analyze the electronic circuits along with learning the device ratings and characteristics
- Students will be able to design and analyse electronic circuits

### List of Experiments:

1. To study V-I characteristics of p-n junction diode.
2. To study V-I characteristics of zener diode.
3. To study half-wave rectifier and calculate ripple factor and efficiency.
4. To study full-wave rectifier and calculate ripple factor and efficiency.
5. To study clipper circuits.
6. To study clamper circuits.
7. To study the input and output characteristics of CB and CE transistor.
8. To study drain and transfer characteristics of JFET.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	EE481	Subject Title	NEW AND RENEWABLE ENERGY SOURCES						
LTP	3 0 0	Credit		Subject Category	Open Elective	Year	4th	Semester	VII

### Objectives of the Course

- To introduce fundamentals of various renewable energy source
- To introduce fundamentals of technologies used to harness usable energy from solar, wind,
- To introduce fundamentals of technologies used to harness usable energy from ocean and Biomass energy sources.

**Unit 1**      **Introduction** :Energy resources and their classification, oil crisis of late 20th century and its impacts on energy planning, consumption trend of primary energy sources, world energy future, energy audit and energy conservation, energy storage.      **8L**

**Unit 2**      **Solar Energy Conversion** :Solar resources, passage through atmosphere, solar thermal energy conversion: solar energy collectors, solar thermal power plant, solar PV conversion: solar PV cell, V-I characteristics, MPPT, Solar PV power plant and applications.      **8L**

**Unit 3**      **Biomass Energy Conversion** : Usable forms of Bio Mass, Biomass energy resources, biomass energy conversion technologies, ethanol blended petrol and diesel, biogas plants. Energy farming.      **8L**

**Unit 4**      **Wind Energy Conversion** : Wind Power: Energy estimation, Power extraction, lift and drag forces, horizontal axis wind turbine, vertical axis wind turbine, wind energy conversion and control schemes, environmental aspects.      **8L**

**Unit 5**      **Other Alternate Energy Sources/Technologies:** Geothermal Energy: geothermal fields, types, geothermal energy generation systems, ocean tidal energy systems, fuel cell: basic operation and classification, principle of MHD generation, output voltage and power, environmental aspects.      **8L**

### Text Books:

1. B.H. Khan, Non conventional Energy Resources, 2nd edition, 2009.

### Reference Books

1. G.D. Rai, Non Conventional Sources of Energy, (Khanna Publishers).
2. J.W. Twidell & A.D. Weir, Renewable Energy Resources, (ELBS / E. & F.N. Spon., London).
3. Godfrey Boyle, Renewable Energy, Oxford, 2nd edition 2010.

### Outcome of the Course:

- **Identify renewable energy sources.**
- **Understand the mechanism of solar, wind and ocean energy sources.**
- **Demonstrate the understanding of various technologies involved in power generation from renewable energy sources.**

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	ME342	Subject Title	Composite Materials						
LTP	30 0	Credit	3	Subject Category	DE/OE	Year	4 <sup>th</sup>	Semester	VII

**Course Objective:** To enable the students, know and understand the mechanical behavior of composite materials

**Course Pre/Co-requisite (if any):** Strength of Materials, Materials Engineering

### Detailed Syllabus

#### UNIT 1:

Definition and applications of composite materials, classifications, Fibers- glass, carbon, ceramic and aramid fibers. Matrices- polymer, graphite, ceramic and metal matrices; characteristics of fibers and matrices. Fillers and whiskers. Advantages and limitations of composites

#### UNIT 2:

Mechanical behaviour of composite materials, surface treatment of fibers, thermosets matrix materials, Thermoplastics and other matrix materials, Manufacturing of thermoset composites, bag moulding, compression moulding, pultrusion, filament welding, other manufacturing processes

#### UNIT 3:

Composite mechanics Terminology, Behaviour of unidirectional composites, Behaviour of short fiber composites Analysis of orthotropic ply. Hook's Law for orthotropic lamina, Relation between Engg. constants and Elements of matrices for orthotropic ply, Transformation of Engg. constants, Failure in isotropic materials

#### UNIT 4:

Analysis of laminated composites, symmetric laminates, angle ply laminates, cross ply laminates, laminate, evaluation of lamina properties, determination of stress and strain in laminate, maximum stress and strain criteria, von Mises Yield criterion for isotropic materials,

#### UNIT 5:

Residual stresses during curing, prediction of laminate failure, thermal analysis of composite laminates. Analysis of laminated plates - equilibrium equations of motion, static bending analysis, buckling analysis, free vibrations, natural frequencies.

### Learning Outcome

At the end of the course the student can:

CO1: Have an overview of the mechanical behaviour and application of composite materials.

CO2: Get an overview of the methods of manufacturing composite materials

CO3: students will understand various mechanics of composite materials.

### Text book [TB]:

1. Gibson R.F. Principles of Composite Material Mechanics, second edition, McGraw Hill, 1994.
2. Hyer M.W., Stress Analysis of Fiber- Reinforced Composite Materials, McGraw Hill, 1998.

### Reference books [RB]:

1. F. L. Matthews, Rees D. Rawlings, Composite Materials: Engineering and Science Woodhead Publishing, 1999 - Composite materials.
2. Autar K. Kaw, Mechanics of Composite Materials, CRC Press, 30-May-1997

# **Course Structure & Syllabus of B.Tech – Civil Engineering Applicable for Batch: 2017-2021**

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME445	<b>Subject Title</b>	Total Quality Management						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

**Course Objective:** To facilitate the understanding of total quality management principles and processes.

**Course Pre/Co- requisite (if any):** Manufacturing Process, Industrial Engineering and Management

### Detailed Syllabus

#### **UNIT 1:**

Introduction, need for quality, evolution of quality; Definitions of quality, product quality and service quality; Basic concepts of TQM, TQM framework, contributions of Deming, Juran and Crosby. Barriers to TQM; Quality statements, customer focus, customer orientation & satisfaction, customer complaints, customer retention; costs to quality.

#### **UNIT 2:**

TQM principles; leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement; PDCE cycle, 5S, Kaizen; Supplier partnership, Partnering, Supplier rating & selection.

#### **UNIT 3:**

The seven traditional tools of quality; New management tools; Six sigma- concepts, methodology, applications to manufacturing, service sector including IT, Bench marking process; FMEA- stages, types.

#### **UNIT 4:**

TQM tools and techniques, control charts, process capability, concepts of six sigma, Quality Function Development (QFD), Taguchi quality loss function; TPM- concepts, improvement needs, performance measures.

#### **UNIT 5:**

Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation, Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits; TQM implementation in manufacturing and service sectors.

### Learning Outcome

At the end of the course the student can:

CO1: To facilitate the understanding of total quality management principles and processes.

CO2: Student will learn about ISO systems

CO3: Student will learn about various quality tools to improve products quality.

### **Text book [TB]:**

1. Besterfield D.H. et al., Total quality Management, 3rd ed., Pearson Education Asia, 2006.
1. Evans J.R. and Lindsay W.M., The management and Control of Quality, 8th ed., first Indian edition, Cengage Learning, 2012.
2. SubburajRamasamy, McGraw-Hill Education, 2012 - Total quality management.

### **REFERENCES [RB]:**

1. Janakiraman B. and Gopal R.K., Total Quality Management, Prentice Hall India, 2006.
2. Suganthi L. and Samuel A., Total Quality Management, Prentice Hall India, 2006.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	PE481	<b>Subject Title</b>	Fuel Technology						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### 1. Course Summary

This course will introduce students to classification of fuel and their properties. In this course, students unable to understand coal preparation, coal storage process, coal gasification process. This course also covers various topics which includes Fischer Tropsch Synthesis, Gaseous and liquid fuels i.e. natural gas, producer gas, water gas, coal gas, biogas, LPG, kerosene, diesel. Students will also learn combustion mechanism for solid, liquid and gaseous fuel.

### 2. Course Objectives

The students should be able to:

1. Understand different types of fuel, basic terms in fuels and combustion
2. Understand the coal preparation and conversion of coal into suitable products using gasification and Fishers Tropsch Synthesis process.
3. Understand physical and chemicals properties of different types of fuel and their storage techniques, combustion mechanism
- 4.

### 3. Course Outcomes

A good knowledge of this course will enable students to:

1. Understand origin of different of types of fuel and their properties and classification
2. Understand the Coal preparation and storage techniques, Physical and chemical properties of coal, Briquetting and liquefaction of solid fuels
3. Understand the conversion of coal into useful products using gasification techniques and Fischer Tropsch Synthesis
4. Understand about gaseous and liquid fuels, their physical and chemical properties and Testing methods for these fuels
5. Understand about combustion mechanism for different types of fuels and Furnace elements.

### 4. Curriculum Content

#### UNIT 1

**Classification of Fuel- Solid Fuels, Liquid Fuels, Gaseous Fuels, Various Terms Related to the Study of Fuels and Combustion. Coal-Origin, Composition, Petrography, Analysis and Properties of Coal, Classification of coal**

#### UNIT 2

Coal Preparation, Coal Storage, Coal Carbonization and by-product Recovery. Physical and Chemical, Properties of Coke. Briquetting of Solid Fuels. Liquefaction of Solid Fuels

#### UNIT 3

**Coal: A Source of Energy- Gasification of Coal. Fixed Bed Gasification, Fluidized Bed Gasification, Entrained Bed Gasification. Integrated Gasification Combined Cycle (IGCC). Underground Gasification of Coal. Indian Scenario related to Coal Gasification. Coal to Liquid (CTL) via Fischer – Tropsch (F-T) Synthesis.**

#### UNIT 4

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

Gaseous and Liquid Fuels- Natural gas, Producer gas, Water gas, Carbureted Water gas, Coal gas, Gases from biomass, LPG. Gasoline, Kerosene, Diesel. Physico Chemical Properties and Testing of Liquid Fuels. Coal Tar Fuels (CTF).

### **UNIT 5**

**Combustion: General Principle of Combustion, Combustion of Solid Fuels – Grate Firing and Pulverized Fuel Firing System. Combustion of Liquid Fuels, Burners for Liquid and Gaseous Fuels Combustion**

### **Text book [TB]:**

1. Kuo, K.K., Principles of Combustion, John Wiley and Sons, Inc. (2005).
2. Sarkar, S., Fuels and Combustion, Orient Longman, (1990).

### **Reference books [RB]:**

1. Sharma, S.P., and Chander, M., Fuels and Combustion, Tata Mcgraw Hill (1984)

### **5. Teaching and Learning Strategy**

All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	PE482	<b>Subject Title</b>	Health Safety and Environment in Industry						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### 1. Course Summary

The course will introduce students to the need and scope of health, safety and environment in industry. The students will learn about the sources and causes of pollution, effects of the pollutants on living and environment, and the safety and remedial measures that should be adopted to reduce the pollution.

### 2. Course Objectives

The students should be able to:

1. Understand the sources of pollutions.
2. Understand the effects of pollutions on health and environment.
3. Understand the remedial measures and safety precautions associated with each source of pollution.

### 3. Course Outcomes

On successful completion of the course, students have the understanding of the following:

1. Understand the scope of HSE in industry.
2. Understand the sources, effects and remedies of air pollution.
3. Understand the sources, effects and remedies of water pollution.
4. Understand the sources, effects and remedies of liquid and solid wastes.
5. Understand the sources, effects and remedies of noise pollution.

### 4. Curriculum Content

#### UNIT 1

Introduction: Man And Environment: Overview (Socio-Economic Structure & Occupational Exposures); Scope Of Environmental Engineering; Pollution Problems Due To Urbanization & Industrialization.

#### UNIT 2

Air Pollution : Causes Of Air Pollution; Types & Sources Of Air Pollutants; Climatic & Meteorological Effect On Air Pollution Concentration; Formation Of Smog And Fumigation; Analysis Of Air Pollutants Collection Of Gaseous Air Pollutants; Collection Of Particulate Pollutants; Analysis Of Air Pollutants Like : Sulphur Dioxide, Nitrogen Oxide, Carbon Monoxide, Oxidants & Ozone; Hydrocarbons; Particulate Matter; Control Of Particulate Emission- Control Of Gaseous Emission; Flue Gas Treatment Methods : Stacks Gravitational And Inertial Separation; Settling Chambers; Dynamic Separators; Cyclone; Filtration; Liquid Scrubbing; Spray Chambers; Packed Towers; Orifice And Venturi Scrubbers; Electrostatic Precipitators.

#### UNIT 3

Water Pollution & Its Control - Origin Of Waste Water – Types Of Water Pollutants And Their Effects ; Adverse Effects On: Human Health & Environment; Aquatic Life; Animal Life; Plant Life; Water Pollution Measurement Techniques; Water Pollution Control Equipments & Instruments; Indian Standards For Water Pollution Control.

#### UNIT 4

Liquid & Solid Wastes – Domestic & Industrial Wastes; Pesticides; Toxic: Inorganic & Organic Pollutants; Soil Deterioration; Ground Water Pollution; Concentration Of Infecting Agents In Soil; Solid Waste Disposal; Dumping Domestic & Industrial Solid Wastes; Advantages & Disadvantages; Incineration- Advantages & Disadvantages – Sanitary Land Field: Advantages & Disadvantages; Management Of Careful & Sanitary Disposal Of Solid Wastes.

#### UNIT 5

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

Noise Pollution & Control: Intensity; Duration; Types Of Industrial Noise; Ill Effects Of Noise; Noise Measuring & Control; Permissible Noise Limits.

### **Text book [TB]:**

1. J. Turk & A. Turk, "Environmental Science Environmental Pollution".

### **Reference books [RB]:**

1. Odum, "Fundamental of Ecology.

### **5. Teaching and Learning Strategy**

All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	MA541	<b>Subject Title</b>	<b>STATISTICAL TECHNIQUE AND APPLICATIONS</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	Open Elective	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

**OBJECTIVE:** The objective of this subject is to give the basic knowledge of descriptive and mathematical part of statistics. Applications of various probability distribution in the field of insurance and finance. The course will focus on the different situations in the field of actuarial science which can be dealt with transformation of variables. The course will make able the students to understand the association between two random quantities and to find their mathematical measure.

### Unit I

Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.

### Unit II

Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation, rank correlation. Simple linear regression.

### Unit III

Principle of least squares and fitting of polynomials and exponential curves. Theory of attributes Independence and association of attributes, consistency of data, measures of association and contingency, Yule's coefficient of colligation.

### Unit IV

Testing of hypothesis: Z-test, t-test, F-test, Chi-square test for goodness of fit, Introduction to analysis of variance.

**LEARNING OUTCOME:** Students will able to:

- Analyze given statistical data.
- Have confidence to deal with real life situation, especially, in insurance and finance.
- Understand applications of standard probability distributions in every span of life.
- Find the association between two random quantities using mathematical theory.

### Text Books:

1. Gupta, S.C. and Kapoor, V.K. (2007): Fundamental of Mathematical Statistics, 11th Edition. (Reprint), Sultan Chand & Sons.
2. Y.P. Agarwal (2012) Statistical Methods: Concepts, Application and Computation, 3rd edition; Sterling Publishers.

### Reference Books:

3. Freund E F John, Mathematical statistics, 6th edition, Prentice Hall International, 1999.
4. Hogg, R. V. and Craig, T. T. (1978) Introduction to Mathematical Statistics (Fourth Edition) (Collier-McMillan).
5. Rohatgi, V. K. (1988) Introduction to Probability Theory and Mathematical Statistics (Wiley Eastern).

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Code	AR-481	Subject Title	GRAPHICS & PRODUCT DESIGN						
LTP	3 0 0	Credit	3	Subject Category	OE	Year	4 <sup>th</sup>	Semester	VII

### Course Objective:

To introduce the various aspects of graphics design and important stages of product design and development.

### Unit 1: Introduction

Introduction and importance of graphics and product design. Principles and elements of design. History of Design. Colour Theory. Techniques and processes to communicate graphically.

### Unit 2: Product Design Cycle

Stages of product development. Introduction to ergonomics

### Unit 3: Design Process

Introduction to concept. Concept development. Role of sketching in concept development. Implementation stages of concept for product development

### Unit 4: Technology & Market Assessment

Customer needs identification, Market research essentials. Advertising and marketing tools.

### Unit 5: Design Tools

Introduction to various design tools.

### LEARNING OUTCOME:

1. The student will be able to understand the importance of Graphics.
2. The students will be able to understand and demonstrate their ideas visually.
3. The students will be able to understand the various stages of product development.

### Text Books:

1. The Elements of Graphic Design, Alex W. White
2. The Design of Everyday Things, Don Norman

### Reference Books:

1. Product Design & Development, Karl T. Ulrich & Steven D. Eppinger

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME381	<b>Subject Title</b>	Entrepreneurship and Startup						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	UC	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VII

### COURSE OBJECTIVE:

To understand the basic concepts Entrepreneurship and start up. To understand role and importance of entrepreneurship for economic development. To develop personal creativity and entrepreneurial initiative or start up.

### COURSE OUTCOME

At the end of the course the student can:

CO1: Analyse the business environment in order to identify start up opportunities

CO2: Identify the elements of success of entrepreneurial ventures

CO3: Consider the legal and financial conditions for starting a start up

CO4: Evaluate the effectiveness of different entrepreneurial strategies

#### Unit 1:

**4Hrs.**

Conceptual definition of entrepreneurs, entrepreneurship and start up. Historical development of entrepreneurship. Entrepreneurship in economic theory. Entrepreneurial practice. Impact of Entrepreneurship on society. The role of entrepreneurship in economic development. Role of innovation in entrepreneurship.

#### Unit 2:

**6Hrs.**

Entrepreneurial economy. Entrepreneurship and Economic Development. Type of Entrepreneurship. Entrepreneur and small business. Features and types of entrepreneurs. Terms of entrepreneurship. Sources of business ideas. Technical and technological analysis of entrepreneurial projects. Designing a business investment. Angel Investor and Venture capitalist – Roles and Importance.

#### Unit 3:

**5Hrs.**

Forms of entrepreneurial organization. Entrepreneurial process. Entrepreneurial and start-up strategies. Role of Government agencies in Entrepreneurship development. Entrepreneurial project: entrepreneurial venture and entrepreneurial development chain. Knowledge of business economy. Group based strategies development.

#### Unit 4:

**5Hrs.**

Sources of capital. Market Research, Understanding the Market need for your concept. Defining the business concept and formulating a business plan for startup. Fundamentals of entrepreneurial management. Business process: product design, operational art, stock management.

#### Unit 5:

**6Hrs.**

Entrepreneurbiographies - the actual successes and failures. Exit strategies for entrepreneurs. Case studies of : Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures. Some case studies related to Product & Technology.

### TEXT BOOKS:

1. S.S.Khanka, "Entrepreneurial Development". S.Chand & Co. Ltd., 10<sup>th</sup> edition, 2014.
2. Kuratko & Hodgetts, "Enterprenuership – Theory, process and practices", Thomson learning 6<sup>th</sup> edition, 2016.
3. Donald F Kuratko, "Entreprenuership – Theory, Process and Practice", 9th Edition, Cengage Learning 2014.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **REFERENCE:**

1. Hisrich R D and Peters M P, "Entrepreneurship". Tata McGraw-Hill. 9<sup>th</sup> Edition, 2014.
2. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, 1998.
3. EDII "Faulty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.
5. Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition Dream Tech, 2005.

### **EVALUATION BREAKUP:**

- Case study – 25 Marks (Internal)
- Assignments – 10 Marks (Internal)
- Mid Term Evaluation of Project – 10 Marks (Internal)
- Startup Idea, Seminar - 15 Marks (External)
- End Term Evaluation of Project – 40 Marks (External)

\*The End Term evaluation will consist of 25 to 30 minutes' presentation followed by questionnaire by External Experts.

### **RESOURCE PERSONS FROM VARIOUS DEPARTMENTS:**

- Mechanical Engineering
- MBA
- Computer Science Engineering.
- Information Technology.
- Industry Persons.
  1. Experts from Industry – As recommended by STPI
  2. DrUmakantPanwar – Entrepreneur
  3. MrVivekHarinarian- Entrepreneur.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE405	<b>Subject Title</b>	<b>EARTHQUAKE ENGINEERING</b>						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DC	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The course is designed to incorporate earthquake effects in analysis of structures and to learn about seismicity and various parameters related to measurement of earthquake effects.

**Course Pre/Co- requisite (if any) : NA**

### Detailed Syllabus

#### **Unit 1: Seismology**

**5 L**

Earth's interior and plate tectonics, Global Seismic Belts, Seismic waves, Earthquake measurement parameters, Indian seismic zoning map, effect of soil on earthquake.

#### **Unit 2: Single degree of freedom systems**

**6 L**

Un-damped and Damped free vibration with viscous damping, Forced vibrations, Steady state, Vibration Isolation, Response of un-damped systems to time dependent force functions (Pulse/impulses), Duhamel's Integral, Response spectrum, DVA spectrum and construction of design spectrum.

#### **Unit 3: Multi Degree of Freedom Systems**

**6 L**

Mode shapes, Orthogonality of modes, of frequency and mode shapes by Holzer method, Stodola Method, Rayleigh's method.

#### **Unit-4: Earthquake Excitation**

**6 L**

Equivalent lateral force for Earthquake, Response spectrum method for analysis of structures and code provisions, code provisions for seismic isolation, Soil structure interaction.

#### **Unit- 5: Earthquake Effects**

**3 L**

Ground failures, Local site effects, Effects on ground and structure, Land-slides, Cracks & collapse of structures.

### **COURSE OUTCOME:**

At the end of the course, the student can :

CO1. Apply the concepts of earthquake effects in analysis of structures.

CO2. Solve Multi Degree of Freedom systems.

CO3. Use response spectra in earthquake related problem.

CO4. Understand earthquake related effects on ground

### **TEXT BOOKS**

1. Chopra, A.K., "Dynamic of structures", Prentice Hall, 4<sup>th</sup> Edition, 2011.

2. Paz, M., Leigh, W., "Structural Dynamics: Theory of Computation", Springer, 5<sup>th</sup> edition, 2006.

### **REFERENCES**

Krishna, J., Chandrasekran, A.K. and Chandra, B. "Elements of Earthquake Engineering", South Asia Publisher, New Delhi, 2<sup>nd</sup> edition.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE406	<b>Subject Title</b>	HYDROLOGY						
<b>LTP</b>	2 0 0	<b>Credit</b>	2	<b>Subject Category</b>	DC	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** This subject aims at making the students to understand the relevance of various components of hydrologic cycle. Students will know about the spatial and temporal distribution of water availability.

**Course Pre/Co-requisite (if any) : NA**

### Detailed Syllabus

#### **Unit 1: Precipitation**

**4 L**

Introduction, hydrologic cycle, water-budget equation, history of hydrology, World water balance, applications in engineering, sources of data. Definition of Precipitation, forms and types of precipitation. Measurement of rainfall using Non recording (Simon's) and Recording (Syphon) Rain Gauges. Computation of average rainfall over a Catchment area. Checking the consistency of rain fall data by double mass curve methods, computation of missing rainfall by different methods.

#### **Unit 2: Water Losses**

**4 L**

Introduction, types of losses. Evaporation- definition, factor affecting evaporation, methods of measurement, methods of reducing evaporation. Potential evapotranspiration, measurement, estimation of consumptive use under Indian conditions. Infiltration – definition, factor affecting, infiltration indices, measurement of infiltration

#### **Unit 3: Runoff**

**8 L**

Introduction, catchment area, component of runoff, factor affecting runoff, SCS-CN method of estimating runoff volume. Runoff hydrograph: components, separation of base flow, unit hydrograph theory, assumption, limitations and advantages, derivation of unit hydrograph from simple storm hydrographs, S curve and its uses.

#### **Unit-4: Flood and Flood Routing:**

**6 L**

Introduction, Various methods of flood discharge-Rational method, Empirical method, Unit hydrograph method, Gumbel's method, Introduction to flood routing, Basic equations, Hydrologic storage routing, Attenuation, Hydrologic channel routing- Muskingum equation, Flood control.

#### **Unit-5: Ground Water hydrology**

**4 L**

Basic concept of ground water, definition, occurrence and distribution, Darcy laws – transmissibility of aquifers Problems on confined and unconfined aquifer.

### **COURSE OUTCOME:**

At the end of the course, the student can:

CO1. Understand the interaction among various processes in the hydrologic cycle.

CO2. Estimate Evapotranspiration and infiltration.

CO3. Compute Rainfall runoff using Hydrograph, SCNS-CN and S-curve methods.

CO4. Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood.

CO5. Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions.

### **TEXT BOOKS**

1. Subramanya, K., "Engineering Hydrology", Tata Mcgraw Hill, New Delhi, 4<sup>th</sup> Edition, 2013.
2. Reddy, P. J. R., "A Text Book of Hydrology", Lakshmi publication, New Delhi, 2016.
3. Patra, K. C., "Hydrology and Water Resources Engineering", Alpha Science International, Limited, 2<sup>nd</sup> Edition, 2008.

### **REFERENCES**

1. Sharma, R.K., Sharma, T. "A Textbook of Hydrology and Water Resources Engineering", Dhanpat Rai, New Delhi, 2016
2. Raghunath, H. M., "Hydrology: Principles, Analysis & Design", New Age international (P) Ltd., New Delhi, 2<sup>nd</sup> Edition, 2014.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE448	<b>Subject Title</b>	PRESTRESSED CONCRETE						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The course objective is to understand the need for prestressed concrete structures and to understand pre-tensioning, post-tensioning, full and partial prestressing concepts.

**Course Pre/Co- requisite (if any) : CE312 ( Design of Reinforced Concrete Structures)**

### Detailed Syllabus

#### **Unit 1: Materials, Basic Principles of Pre-Stressing, Prestressing Systems:**

**4 L**

Basic concepts of prestressing, High strength concrete and steel, Stress-strain characteristics and properties, Various prestressing systems, Pre-tensioning and Post-tensioning systems with anchorages, Advantages and limitations of prestressed concrete

#### **Unit 2: Analysis of Sections for Flexure**

**6 L**

Basic assumptions, Analysis of stresses in concrete due to pre-stress and loads for different types of cross section, Pressure line or thrust line, Cable profile, Concept of load balancing, Cracking moment

#### **Unit 3: Losses of Pre-Stress & Deflections:**

**8 L**

Nature of losses in pre-stress, various losses encountered in pre-tensioning and post tensioning methods, Deflection, Factors influencing deflection, Elastic deflection under transfer loads and due to different cable profile. Deflections limits as per IS-1343. Effects of creep on deflection, crack widths

#### **Unit-4: Flexural and Shear Strength of Prestressed Concrete Sections**

**4 L**

Types of flexural failure, IS code recommendations for flexure, Ultimate flexural strength of section. Shear and principal stresses, Ultimate shear resistance of prestressed concrete members, Shear reinforcement

#### **Unit- 5: Transfer of Prestress in Pre tensioned Members and Anchorage Zone Stresses in Post Tensioned Members**

**4 L**

Transmission of pre-stress in pre-tensioned members, Transmission length, Bond stresses, Codal provisions for bond and transmission length, Anchorage stress in post-tensioned member. Bearing stress and bursting tensile force, IS code provisions.

### **COURSE OUTCOME:**

At the end of the course, the student can:

- CO1. Understand the prestressed concrete, prestressing concrete principles in addition to the difference of traditional concrete and pre stressed concrete.
- CO2. Analyze a Pre-stressed Concrete section
- CO3. Design and construct reinforced earth retaining structures.
- CO4. Design pre-tensioned and post tensioned beams for flexure and shear

### **TEXT BOOKS**

1. Raju, N. K., "Pre-stressed concrete", Tata McGraw Hill, New Delhi, 1st Edition, 2012.
2. Ramamrutham, S., "Pre-stressed Concrete", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2003.
3. Lin, T. Y., Burns, N. H., "Design of pre-stressed Concrete Structures", John Wiley and Sons. New York, 3rd Edition, 1981.

### **REFERENCES**

1. Pre stressed concrete by N.RajaGopalan, Nerosa Publishing house

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE449	<b>Subject Title</b>	<b>ENVIRONMENTAL MANAGEMENT &amp; SUSTAINABLE DEVELOPMENT SEMESTER - VIII</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The objective of this course is to learn the knowledge of Environmental monitoring, environmental economics, making of and enforcing Environmental acts for the benefits of society and also about the realistic balance between environmental quality and resource utilizations.

**Course Pre/Co- requisite (if any): CE342 (Environmental Risk Assessment and Disaster Management)**

### Detailed Syllabus

#### **Unit 1: Introduction**

**8 L**

**Introduction:** Introduction and scope, Inter-linkages of energy-environment and economy from engineering infrastructure perspective.

#### **Unit 2: Environmental Resources, Monitoring and Management**

**12 L**

**Environmental Resources, Monitoring and Management:** Concepts of environmental components and ecology, Systems approach and sustainability engineering, Interaction between energy and environmental resources, Environmental quality standards and indices (Indian and International), Environmental monitoring, Analysis, Statistics and data interpretation, Environmental management system.

#### **Unit 3: Environmental Laws and Policy**

**10 L**

**Environmental Laws and Policy:** Introduction to environmental laws and policies, Governance, understanding climate change, carbon crediting, carbon foot print etc., Introduction to trade and environment. International environmental laws, Right to Environment as Human Right, International Humanitarian Law and Environment, environment and conflicts management, Famous international protocols like Kyoto.

#### **Unit-4: Environmental Impact Assessment**

**5 L**

**Environmental Impact Assessment:** Environmental impact assessment, Life cycle assessment, Resource Balance, Energy Balance & Management, Review; Operational Control and risk analysis of scientific and technological developments, Environmental audit.

#### **Unit- 5: Sustainable Development**

**4 L**

**Sustainable Development:** Sustainable development within the context of global economy, Technology and climate change, conservations of environmental resources.

### **COURSE OUTCOME:**

At the end of the course, the student can:

- CO1. Identify the environmental components, interactions, scientific utilization of environmental resources
- CO2. Have the complete knowledge about the Environment economics, legislations acts, Environment Protocols
- CO3. Gain the idea about Environmental Impact Assessment
- CO4. Gain the idea about Environmental sustainable development

### **TEXT BOOKS**

1. Mishra, P. C., "Fundamentals of Air and Water Pollution", APH Publishing Corporation, 2008.
2. Kenneth, W., Warner, F. C. and Davis W. T., "Air Pollution, Its Origin and Control", Prentice Hall, 3<sup>rd</sup> Edition, 1997.
3. Baker, S., "Sustainable Development", Routledge Publication, New York, 2008.

### **REFERENCES**

1. Davis, M. L. and Cornwell, D. A., "Introduction to Environmental Engineering", McGraw-Hill, 5<sup>th</sup> Edition, 2012.
2. Chin, D. A., "Water Quality Engineering in Natural Systems: Fate and Transport Processes in the Water Environment, John Wiley, 2<sup>nd</sup> Edition, 2012.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE451	<b>Subject Title</b>	River Engineering						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** To understand theoretical concepts of water and sediment movements in rivers. To understand the concepts of fluvial hydraulics. To introduce the flow characteristics in an alluvial channel with erodible boundary. To have knowledge of various river training works

**Course Pre/Co- requisite (if any) :** CE349 (Water Resource Engineering)

### Detailed Syllabus

#### **Unit 1: River Functions**

**4 L**

**Introduction,** Primary function of a river, River uses and measures, Rivers in India, Himalaya and Peninsular, Types and stages of rivers

#### **Unit 2: Sediment transport & Incipient motion**

**4 L**

Properties of sediments, incipient motion of sediments, Shield's curve. Regimes of flow, Bed forms and channel resistance. Bed load, suspended load and Total load.

#### **Unit 3 River Mechanics**

**5 L**

Meandering of Rivers, Braided rivers, Degradation and aggradations of river bed, Local Scour at Bridge Piers and other Hydraulic Structures

#### **Unit-4 River Measurements & Models :**

**8 L**

Measurements in Rivers (Stage measurements, Channel geometry, Discharge, Sediment samplers and suspended and bed load measurement). Physical river Models (fixed and movable bed models; sectional models, distorted Models).

#### **Unit- 5: River Protection Works**

**5 L**

River Protection and Training Works (Revetments, Dikes, Gabions, Spurs, Bank Protective measures and Bed control structures), Design of river training and flood protection structures, River restoration.

### **COURSE OUTCOME:**

At the end of the course, the student can :

CO1. Understand the complex behavior of rivers.

CO2. Gain the skills to take up research activities in river engineering.

CO3. Analyze and design movable boundaries channel.

CO4. Simulate behavior of River using various Mathematical Models.

CO5. Design river training structures.

### **TEXT BOOKS**

- 3 Garde RJ and Ranga Raju KG., "Mechanics of Sediment Transportation and Alluvial Stream problem", New Age International Publishers, Revised III<sup>rd</sup> Edition.
- 4 Garde RJ, "River Morphology" ,New Age Publisher, Revised II<sup>nd</sup> Edition 2011.

### **REFERENCES**

- 1 Pierre Y. Julien ., "River Mechanics" ,Cambridge University Press, 2002.
- 2 Janson PL.Ph., LvanBendegamJvanden Berg, Mdevries A. Zanen ( Editors), Principles of River Engineering – The non tidal alluvial rivers – Pitman, 1979

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE452	<b>Subject Title</b>	HYDRO POWER ENGINEERING						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The course is designed to have knowledge about Hydropower potential of India, understand power requirements, load patterns, firm power and secondary power, types of power plants and its principal component works.

**Course Pre/Co- requisite (if any) :**CE349 (Water Resource Engineering)

### Detailed Syllabus

#### **Unit 1: Introduction 5 L**

Prospects of hydropower, Sources of energy, Hydropower potential, Distribution and development. Basin wise development of hydropower, Constraints in hydropower development

#### **Unit 2: Stream Flow Data and Hydropower Potential 7 L**

Flow and Power duration curves, Estimation of flow duration curve on un gauged site, Primary and secondary power, Storage and pondage, Load factor, Capacity factor, Utilization factor, Plant Factor Pondage Factor.

#### **Unit 3 Types of Hydropower Plants 5 L**

Classification of hydropower plants, Base and peak load hydropower plants, Detail Study of Run-of- river plants Storage power plant and Pumped-storage power plants.

#### **Unit-4 Intake Structures and Conveyance System : 5 L**

Functions of intake structures, Its locations and types, Trash rack dimensions, Design, Spacing of bars, Methods of cleaning.

Penstocks types, Design and layout, Economical diameter of penstock, Hydraulic losses, Branches, Water Hammer Pressure and Surges in Power Channel and surge tank design.

#### **Unit- 5: Small Hydro Power Plant Development 4 L**

Benefits and potential of small hydropower plants, Components of small hydropower plants, Trench weir, Desilting tank and turbines

### **COURSE OUTCOME:**

At the end of the course, the student can :

CO1. Compare various sources of energy for power development and have knowledge about the distribution of hydropower potential in India.

CO2. Compute Firm Power by drawing Flow and Load duration Curves.

CO3. Have information about various types of hydropower plants and Power development schemes.

CO4. Design Water conductor system namely Penstock, Trash rack, Surge tanks etc,

CO5. Apply knowledge in the field of Small Hydro power development.

### **TEXT BOOKS**

1. Sharma R.K , Sharma T.K., "A Textbook of Water Power Engineering", S Chand Publications, First Edition 2003.
2. Varsney, R. S., "Hydro Power Structures", Nem Chand & Bros, 5<sup>th</sup> Edition, 2010.
3. M.M. Dandekar and K.N. Sharma, "Water Power Engineering", Vikas Publishing House, New Delhi.

### **REFERENCES**

1. Barrow, H. K., "Water Power Engineering", Tata McGraw-Hill.
2. Warnick, C.C., "Hydropower Engineering", Prentice Hall, 1984.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE453	<b>Subject Title</b>	PORT AND HARBOUR ENGINEERING						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The objectives of this course is to make students aware about latest mode of transportation, development of this mode in India and to enable students to learn the concepts of harbor planning.

**Course Pre/Co- requisite (if any) :** CE302 (Transportation Engineering II)

### Detailed Syllabus

#### **Unit 1: National Waterways**

**3 L**

Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways

#### **Unit 2: Harbour Planning:**

**6 L**

Types of water transportation, water transportation in India, requirements of ports and harbours, classification of harbours, selection of site and planning of harbours, location of harbour, traffic estimation, master plan, ship characteristics, harbour design, turning basin, harbour entrances,

#### **Unit 3: Docks and Repair Facilities:**

**6 L**

Type of docks, its location and number, Site investigations – hydrographic survey, topographic survey, soil investigations, current observations, tidal observations, Design and construction of breakwaters, berthing structures - jetties, fenders, piers, wharves, dolphins, trestle, moles, Harbour docks, use of wet docks, design of wet docks, repair docks, lift docks, dry docks, keel and bilge blocking, construction of dry docks, gates for dry docks

#### **Unit-4 Port facilities:**

**7 L**

Port development, port planning, port building facilities, transit sheds, warehouses, cargo handling facilities, container handling terminal facilities, shipping terminals, inland port facilities. Inland waterways, Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways.

#### **Unit- 5:Dredging and Coastal Protection:**

**4 L**

Classification, types of dredgers, choice of dredger, uses of dredged materials, coastal erosion and protection, sea wall, revetment, bulkhead, coastal zone and beach profile.

### **COURSE OUTCOME:**

This course will help the students in learning of :

- CO1. Working of rapidly growing transport network,
- CO2. Designing of docks and harbors.
- CO3. Managing safety issues in ports.
- CO4. Dredging and Coastal Protection

### **TEXT BOOKS**

1. Bindra, S.P., “Docks and Harbour Engineering”, Dhanpat Rai publications, 2012
2. Srinivasan, R., “Harbour, dock and tunnel engineering”, Charotar publishing house pvt ltd, 2015
3. Oza, Gautam H. and Oza, Hasmukh P., “Dock & Harbour Engineering”, Charotar publishing house pvt ltd, 2012

### **REFERENCES**

Subramanian, K.P., “Highway, Railway, Airport and Harbour Engineering”, Scitech publications (India) pvt.. Ltd., 2010

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE454	<b>Subject Title</b>	<b>STRUCTURAL GEOLOGY</b>						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The objectives of this course are to learn about the rock unit; thickness; lithology; and their contact relationships with other sediments or sedimentary rocks.

**Course Pre/Co- requisite (if any) : CE208 (Engineering Geology)**

### Detailed Syllabus

#### **Unit 1: Physical Geology**

**5 L**

Evolution of the earth; Exogenous and endogenous processes shaping the earth. Transportation and deposition; Geological work of running water, wind, glaciers, seas and ground water; Diastrophism; Earthquakes and volcanoes, Introduction to Plate Tectonics

#### **Unit 2: Behavior of rock**

**7 L**

Strength Behavior of Rocks, Stress and Strain in rocks. Concept of Rock deformation & Tectonics. Forms of igneous intrusions - dyke, sill and batholith. Effects of folds and fractures on strata/orebodies and their importance in exploration activities.

#### **Unit 3 Structural Geology**

**6 L**

Interpretation of topographic maps; Attitude of planar and linear structures; Effects of topography on outcrops. Unconformities, folds, faults and joints - their nomenclature, classification and recognition. Principles of stereographic projection.

#### **Unit-4 Principles of Structural Analysis**

**8 L**

Interference patterns in superposed folding and structural geometry in superposed folding. Behavior of lineations in superposed deformations. Use of foliations and lineations in tectonic analysis. Methods of constructing profiles of folds: Convolute and evolute methods, Concentric-arc method, Kink-style construction, Dip-isogon method, Down-plunge projection method.

#### **List of Experiments**

Sr No	Details of Experiments
1	Preparation of contour maps
2	Measurement of Dip and Strike
3	Stereographic Projections of Plane
4	Stereographic Projection of Line
5	Preparation of Structural Maps
6	Formation of Profile Section
6	Three Point problem

#### **COURSE OUTCOME:**

At the end of the course, the student can :

CO1. Explain the origin and sources of the sediment and classify sediments and sedimentary rocks as well as geological structural features and their formation processes.

CO2. Understand the types of geological structural (joints, Faults, Folds), how it's formed, how we can identify and describe them.

CO3. Measure and describe the outcrop and distribution of the rock unit; thickness; lithology; and their contact relationships with other sediments or sedimentary rocks.

CO4. Understand and describe the features formed in rocks when subject to stress, analyses the strain in these rocks and interpret the palaeostress field that affected the rock and caused the deformation.

#### **Textbooks:**

Structural geology- Fundamentals and modern Developments by S. K. Ghosh, Pregamon press Ltd UK 1993

#### **References:**

Structural Geology by Marland P Billings, Phi Learning, third edition, 2000

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE455	<b>Subject Title</b>	STATISTICAL APPROACH TO ENVIRONMENTAL DATA ANALYSIS						
<b>LTP</b>	2 0 2	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** The objective of the course to know about the basics of statistical analysis of environmental datasets and apply this knowledge for numerical modeling and forecasting of datasets.

**Course Pre/Co- requisite (if any):** CE342 (Environmental risk Assessment and Disaster Management)

### Detailed Syllabus

#### **Unit 1: Introduction**

**5 L**

**Introduction:** Introduction to environment and various parameters, various data sources, concept of one and multidimensional datasets, concept of data matrices, temporal and spatial datasets. Various types of grids, Cartesian, spherical, cylindrical, coordinate systems.

#### **Unit 2: Basics of data formats and plotting**

**7 L**

**Basics of data formats and plotting :** Introduction to various formats of datasets, Comma Separated Values, ASCII, NetCDF format, text values, plotting of time series, scatter plot, contouring, concept of shaded contouring.

#### **Unit 3: Regression analysis of environmental datasets**

**6 L**

**Regression analysis of environmental datasets:** Regression analysis, predictor-predictand relationship, residual error, confidence intervals, t score test, null hypothesis, degrees of freedom

#### **Unit-4: Analysis of long term datasets and identification of prominent features**

**4 L**

**Analysis of long term datasets and identification of prominent features :** Eigenvalues and Eigen function, Singular value decomposition, Root mean square error, Correlation, Standard deviation, variance, skill score analysis, index calculation.

#### **Unit- 5: Data smoothing and interpolation**

**4 L**

**Data smoothing and interpolation:** Simple linear interpolation, error analysis, gridding concepts, objective analysis, Barnes and Cressman methods, concept of moving average.

#### **SR NO.**

#### **LIST OF PRACTICAL / ASSIGNMENTS**

- |    |   |
|----|---|
| 1  | Introduction to MATLAB, basic application of MATLAB,        |
| 2  | representation of 1D, and multi- dimensional datasets,      |
| 3  | creating arrays, writing script file, executing script file |
| 4  | Matrices and vectors, matrix and array operations           |
| 5  | Character strings, command line functions                   |
| 6  | Plotting and formatting of multidimensional datasets        |
| 7  | Eigenvalues, Eigen vectors, Singular Value Decomposition    |
| 8  | Regression analysis, all statistical operations             |
| 9  | Objective analysis, gridding from scattered datasets        |
| 10 | Interpolation and moving average concepts                   |

#### **COURSE OUTCOME:**

At the end of the course, the student can:

- CO1. Identify the various types of environmental data, and data dimensions.
- CO2. Have the complete knowledge statistical approaches to Environmental datasets
- CO3. Gain the idea about data smoothing and interpolation
- CO4. Gain the idea about data gridding

#### **TEXT BOOKS**

1. Spiegel, M R, Stephens L J, 'Statistics Schaum Outline', Tata Mcgraw Hill Publishing Co Ltd, 2008.
2. Spiegel, M R, Schiller, J J, Srinivasan A R, 'Probability & Statistics' Tata Mcgraw Hill Publishing Co Ltd, Third edition
3. RudraPratap, 'Getting started with MATLAB', Oxford; Edition edition (2010).

#### **REFERENCES**

1. B L Agarwal, 'Basic Statistics', New Age International Private Limited; 6th Edition edition (1 January 2013)

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE456	<b>Subject Title</b>	ADVANCED STRUCTURAL DESIGN						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

### Course Objective:

The objective of this course is to make student capable of designing different parts of building structure

**Course Pre/Co- requisite (if any) :**CE303 (Design of Reinforced concrete Elements)

### Detailed Syllabus

#### **Unit 1: Analysis of Structural Element**

**4 L**

Elastic analysis of R.C. beams and frames. Analysis and design of flat slabs; equivalent frame method, direct design method, deflection calculations.

#### **Unit 2: Analysis of beam**

**6 L**

Analysis and design of deep beams. Design of grid floors and cylindrical shells.

#### **Unit 3: Analysis of Shear wall**

**6 L**

Analysis and Design of shear walls

#### **Unit-4: Design of building**

**5 L**

Design of industrial buildings, bracing, gantry girders and stepped columns.

#### **Unit- 5: Design of Tower**

**5 L**

Microwave towers, Chimney and transmission towers. Plastic design principle, High rise building

### **COURSE OUTCOME:**

CO1: Student will be able to design the structural elements

CO2: Student will be able to do analysis of building

CO3: Student will be able to do analysis and design of shear wall

CO4: Student will be able to do analysis and design of Tower

### **TEXT BOOKS**

1. Jain, A. K., "Reinforced Concrete- Limit State Design", 6<sup>th</sup> Ed., Nem Chand & Bros, 2006.
2. Varghese, P. C., "Advanced Reinforced Concrete Design", Prentice Hall, 2001.
3. Pillai, S. D., Menon, D., "Reinforced Concrete Design", Tata McGraw- Hill, 2003.

### **REFERENCES**

1. Agarwal, P., Shrinkhande, M., "Earthquake Resistance Design of Structures", Prentice- Hall of India, 2006.
2. Raju, N., K. "Advance Reinforced Concrete Design", CBS Publishers, 1986

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CE457	<b>Subject Title</b>	FINITE ELEMENT ANALYSIS						
<b>LTP</b>	2 1 0	<b>Credit</b>	3	<b>Subject Category</b>	DE	<b>Year</b>	4th	<b>Semester</b>	VIII

**Course Objective:** This course aims to understand the basics of Finite Element Method and its application related to engineering problems.

**Course Pre/Co-requisite (if any) :** CE206 (Structural Analysis)

### Detailed Syllabus

#### **Unit 1: Introduction**

**5 L**

Basic concepts, Background review, Theory of elasticity, matrix displacement formulation, energy concepts, equilibrium and energy methods of analyzing structure, Rayleigh- Ritz method, Galerkin's method, simple application in structural analysis

#### **Unit 2: Fundamentals of Finite element Method**

**7 L**

Displacement function and natural coordinate's construction of displacement function for 2D truss and beam element, application for FEM for the analysis of truss, continuous beam and simple frame problems.

#### **Unit 3: Analysis of 2D continuum Problems**

**6 L**

Element and shape function, Triangular, rectangular and quadrilateral element, different type of element, their characteristics and suitability for application, polynomial shape function, Lagrange's and Hermitian polynomial, compatibility and convergence requirements of shape functions.

#### **Unit-4: Theory of Isoparametric Element**

**4 L**

Isoparametric, sub-parametric and super-parametric elements, characteristics of isoparametric quadrilateral elements.

#### **Unit- 5: Introduction to plate bending problems and techniques**

**4 L**

Introduction to plate bending problems and techniques for nonlinear analysis, Structure of computer program for FEM analysis, description of different modules, pre and post processing.

### **COURSE OUTCOME:**

At the end of this course student will:

CO1: have understanding of finite element method.

CO2: know the applicability of FEM in various problems.

CO3: know the working of analysis software.

CO4: know the concepts of plate bending problems and techniques

### **TEXT BOOKS**

1. Krishnamoorthy, C. S., "Finite Elements Analysis-Theory and Programming", Tata McGraw Hill Co. Limited, New Delhi.
2. Abel, J. F., Desai, C. S, "Introduction to the Finite element Method", Affiliated East West Press Pvt. Ltd., New Delhi.

### **REFERENCES**

1. Bathe, K. J, "Finite Elements Procedure", PHI Pvt. Ltd, New Delhi.
2. Zienkeiwicz, O. C., "The Finite Element Method", Tata McGraw Hill Co. Limited, New Delhi.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives II

Subject Code	HS493	Subject Title	Indian Culture & Tradition						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	IV	Semester	VIII

#### Course Objective

- To promote an integral and holistic growth of young minds
- Develop a broad understanding of Indian society and intercultural literacy through cultural immersion.
- Deepen your knowledge of Indian development, environmental, and cultural issues through coursework, local engagement, and independent projects.

#### Unit 1 Indian Culture: An Introduction

8Hrs.

Characteristics of Indian culture, Significance of Geography on Indian Culture; Society in India through ages- Ancient period- Varna and Caste, family and marriage in India, position of women in ancient India, Contemporary period; caste system and communalism.

#### Unit 2 Indian Languages and Literature

6 Hrs.

Evolution of script and languages in India: Harappan Script and Brahmi Script; Short History of the Sanskrit literature: The Vedas, The Brahmins and Upanishads & Sutras, Epics: Ramayana and Mahabharata & Puranas.

#### Unit 3 Brief History of Indian Arts and Architecture

6Hrs.

*Indian Art & Architecture:* Gandhara School and Mathura School of Art; Hindu Temple Architecture, Buddhist Architecture, Medieval Architecture and Colonial Architecture.

Indian Painting Tradition: ancient, medieval, modern Indian painting and Odishan painting tradition *Performing Arts:* Divisions of Indian classical music: Hindustani and Carnatic, Dances of India: Various Dance forms: Classical and Regional, Rise of modern theatre and Indian cinema.

#### Unit 4 Spread of Indian Culture Abroad

6Hrs.

Causes, Significance and Modes of Cultural Exchange - Through Traders, Teachers, Emissaries, Missionaries and Gypsies, Indian Culture in South East Asia India, Central Asia and Western World through ages

#### COURSE OUTCOME:

- Understand background of our religion, customs institutions, administration and so on.
- Understand the present existing social, political, religious and economic conditions of the people.
- Analyze relationship between the past and the present relevance of Indian tradition.
- Develop practical skills helpful in the study and understanding of historical events.

#### TEXT BOOKS

- Chakravarti, Ranabir: Merchants, Merchandise & Merchantmen, in: Prakash, Om (ed.): The Trading World of the Indian Ocean, 1500-1800 (History of Science, Philosophy and Culture 361 in Indian Civilization, ed. by D.P.Chattopadhyaya.
- Chaudhuri, Kirti N.: Trade and Civilisation in the Indian Ocean, CUP, Cambridge, 1985.
- Malekandathil, Pius: Maritime India: Trade, Religion and Polity in the Indian Ocean, Primus Books, Delhi, 2010.
- McPherson, Kenneth: The early Maritime Trade of the Indian Ocean, in: ib.: The Indian Ocean: A History of People and The Sea, OUP, 1993, pp. 16-75.
- Christie, J.W., 1995, State formation In early Maritime Southeast Asia, BTLV



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives II

Subject Code	HS483	Subject Title	Indian Philosophy						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	IV	Semester	VIII

#### Course Objective

- Develop an understanding of Indian philosophical systems
- To empower for self-exploration

#### Unit 1 Introduction

11Hrs.

Meaning of Philosophy, Origin of Philosophy in India, Major Indian philosophical systems: Sankhya: Metaphysics, Theory of causation, Prakriti, Purusha, Evolution, Yoga: Concept of Chitta, Types and Modification of Chitta, Eight-fold Yoga & Vedant: Notions of Maya & Brahma

#### Unit 2 Major Principles

5Hrs.

Panchkosha, Triguna, Tridosh, Macrocosm-Microcosm

#### Unit 3 Major Contemporary Indian Philosophers

6Hrs.

Lord Buddha, Mahaveer, Gandhi, Vivekanand, Aurovindo-The Life Divine, Pt. Sri Ram Sharma Acharya, Vinoba & Acharya Rajneesh Osho, ParamhansYogananda-Autobiography of a Yogi

#### Unit 4 Activities & Projects

4Hrs.

Identifying human prakriti, Using Trigun inventory, Understanding self

#### COURSE OUTCOME:

- Students will acquire understanding of concepts of Indian philosophy.
- Students will be enabled to analyze their self.
- The students will be able to relate some of the core concepts and theories of modern Indian philosophy to concepts and ideas in classical Indian philosophy.
- The students will be able to appreciate how philosophical approaches may be integrated more practically as a “way of life”.

#### TEXT BOOK

Chattejee, S.G. and Datta, D.M. (1960) An Introduction to Indian Philosophy, Calcutta: University of Calcutta Press

#### REFERENCE BOOKS

- The Yoga Sutras of Patanjali: (annoted commentary) (Divine Cool Breeze Realized Writers Book 15) by Shri Patanjali, Shri Mataji Nirmala Devi (Introduction), Charles Johnson (Translation)
- Acharya, Pt. Sri Ram Sharma (2015). GayatriMahavigyan. Mathura: AkhandJyotiPrakashan.
- Vinoba, Acharya (2011). VicharPothi. Pawnar: ParamdhamPrakaashan.
- Gandhi, M.K. (2013). The story of my experiments with truth. Varanasi: SarvodayaPrakashan.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives II

<b>Subject Code</b>	<b>HS491</b>	<b>Subject Title</b>	<b>Industrial Sociology</b>						
<b>LTP</b>	<b>2-0-0</b>	<b>Credit</b>	2	<b>Subject Category</b>	Elective	<b>Year</b>	<b>IV</b>	<b>Semester</b>	VIII

#### Course Objective

- The course attempts to analyze the structure and process of industrial organizations from the sociological perspective.
- The course enables students to have a general view of modern industry.

#### Unit 1

**7Hrs.**

Industrial Sociology: Nature, Scope and Importance, Origin and Development, Industry as a social, System, Development of Industry in Post-Independence period, Evolution of Working Class, Changing nature of work, Growth of unorganized informal sector., Dynamics of Industrial Relations: Approaches to the study of Industrial Relations, Collective Bargaining, – Concepts, Types, Scope and Importance.

#### Unit 2

**7Hrs.**

Industrial Disputes: Concept, Features and Kinds of disputes, Settling disputes, Mediation, Arbitration, Conciliation, Negotiation, The Indian Worker: Features of Indian worker, the contribution of social - Philosophy, family, caste and community in determining the attitude of workers

#### Unit 3

**6Hrs.**

Trade Union: Concept, Features, Functions and Types, History of Trade Union Movement in India Trade Unions and Challenges of Privatization and Globalization; Law and work, Decline of Trade Unions.

#### Unit 4

**6Hrs.**

Dynamics of Industrial Relations: Corporate Social Responsibility, Inclusion of Women in the Corporate Sector, Scope of Industrial Sociology in India; Impact on Employment, Impact on HRD, impact on wages and benefits, Modern Industry in India

#### COURSE OUTCOME:

- It will enable students to demonstrate the different human components that make up modern industry.
- The student will get exposed to a specialized area of sociology and its insights.
- Apply sociological concepts and theories to understand contemporary social issues and/or public debates about these issues
- Communicate sociological concepts and/or research in a manner that is appropriate for the intended audience (e.g., academic, lay audience)

#### TEXT BOOKS

1. Davis, Keith, 1984. Human Behaviour at work, New Delhi. Mcgraw Hill.
2. Gisbert, Ascual S J 1972. Fundamentals of Industrial Sociology, New Delhi, Tata Mc Graw-Hill.
3. Ramaswamy, E. A, 1978. Industrial Relations in India. Delhi. MacMillian
4. Pascal Gilbert: Fundamental of Industrial Sociology; Orient-Longman.
5. E.V.Schneider – Industrial sociology
6. Baviskar et al - Social Structure and Change [Vol.IV] Sage Publishers

#### REFERENCE BOOKS

- Sheth, N R, 1979, Industrial Sociology in India, Jaipur Rawat.
- Dutt and Sundharam 2007. Indian Economy, S Chand Publications. New Delhi: Publications.
- P. Subha Rao: Human Resource Management and Industrial Relations – Himalaya Publishing House

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

### Humanities Electives II

Subject Code	HS485	Subject Title	Sustainable Development						
LTP	2-0-0	Credit	2	Subject Category	Elective	Year	IV	Semester	VIII

#### Course Objective

- To provide the overview of sustainable and its needs to the students.
- To provide the importance and components of sustainable development to the students.
- To provide the association of social and economic development to the students.

#### Unit 1 Overview of Sustainable Development

5 Hrs.

History and emergence of the concept of Sustainable Development, Components of SD i.e. Economic, Social, Human, Institutional, Technological and Environmental development; Definitions, Sustainability in Ecosystem Services; natural resource degradation, greenhouse gases, factors affecting SD (i.e. Industrialization, urbanization, population growth, globalization, etc.)

#### Unit 2 Policies on Sustainable Development at international level

4Hrs.

Government Policies for SD in India; Socio-economic policies for sustainable development in India, Sustainable development through trade, Carrying Capacity, global policies for sustainable development

#### Unit 3 Sustainable Development and International Contribution

10 Hrs.

SDGs and MDGs, Complexity of growth and equity, International Summits, Conventions, Agreements, Initiations of international organizations like WHO, UNDP, WTO, FAO and World Bank towards sustainable development

#### Unit 4 Measurement of Sustainable Development

7Hrs.

Role of developed and developing countries in the sustainable development, Demographic dynamics and sustainability, integrated approach for resource protection and management; Index based estimation of SD i.e. Environmental Sustainable Development Index and sustainable development, and other index

#### Course Outcome:

- The students will be able to understand the importance of natural resource in economic development.
- The students contribute significant efforts towards sustainable development
- Develop a future-oriented perspective that highlights the significance of their decisions, choices and actions on the quality of life of present and future generations.
- Understand and are empowered to address the real causes and consequences of unsustainable behaviour within the context of an interdependent and globalised world.

#### TEXT BOOK

The Sustainability Revolution: Portrait of a Paradigm Shift by Edwards, Andres R., New Society Publishers, 2005.

#### REFERENCE BOOKS

6. The Sustainability Revolution: Portrait of a Paradigm Shift by Edwards, Andres R., New Society Publishers, 2005.
7. Sustainable development in India: Stocktaking in the run up to Rio+20: Report prepared by TERI for MoEF, 2011.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	CS482	<b>Subject Title</b>	Human Computer Interaction						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

### Unit 1

(8L)

**Introduction:** Importance of user Interface–definition, importance of good design. Benefits of good design. A brief history of Screen design. The graphical user interface –popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –Interface popularity, characteristics- Principles of user interface.

### Unit 2

(7L)

**Design process**–Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

### Unit 3

(8L)

**Screen Designing:** Design goals–Screen planning and purpose, organizing screen elements, ordering of screen data and content –screen navigation and flow ,Visually pleasing composition -amount of information -focus and emphasis ,presentation of information simply and meaningfully information retrieval on web - statistical graphics –Technological consideration in interface design.

### Unit 4

(8L)

**Windows** –New and Navigation schemes selection of window, selection of devices based and screen based controls.

**Components** – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

### Unit 5

(8L)

**Software tools** –Specification methods, interface–Building Tools.

**Interaction Devices** – Keyboard and function keys –pointing devices –speech recognition digitization and generation – image and video displays – drivers.

### TEXT BOOKS:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale Human Computer Interaction, 3rd Edition Prentice Hall, 2004.
2. Jonathan Lazar Jinjuan Heidi Feng, Harry Hochheiser, Research Methods in Human Computer Interaction, Wiley, 2010.

### REFERENCE:

1. Ben Shneiderman and Catherine Plaisant Designing the User Interface: Strategies for Effective Human-Computer Interaction (5th Edition, pp. 672, ISBN 0-321-53735-1, March 2009), Reading, MA: Addison-Wesley Publishing Co.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	IT357	Subject Title	Internet of Things						
LTP	3 0 0	Credit	3	Subject Category	DE /OE	Year	4 <sup>th</sup>	Semester	VIII

**Course Outline:** To provide a detailed idea how the internet is connecting the entire world and helps to live a smart life with its technology.

**Course Objective:**

1. Vision and Introduction to IoT.
2. Understand IoT Market perspective.
3. Data and Knowledge Management and use of Devices in IoT Technology.
4. Understand State of the Art – IoT Architecture.
5. Real World Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

**Course Pre/Co- requisite (if any):** Wireless Sensor Networks

### Detailed Syllabus

**UNIT 1: M2M to IoT( 05 Lectures )**

The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, use case example, Differing Characteristics.

**UNIT 2: M2M to IoT (A Market Perspective)( 10 Lectures )**

Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

IoT related open source software tools introduction; tools like IoTivity, IBM Blue Mix. Introduction to Contiki, Cooja, Raspberry Pi etc.

**UNIT 3:M2M and IoT Technology Fundamentals( 05 Lectures )**

Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management.

**UNIT 4: IoT Architecture-State of the Art( 12 Lectures )**

Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model

IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints- Introduction, Technical Design constraints- hardware is popular again, Data representation and visualization, Interaction and remote control.

**UNIT 5: Industrial Automation (08 Lectures )**

Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things

Commercial Building Automation: Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

**Learning Outcome**

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

- Explain the definition and usage of the term 'The Internet of Things' in different contexts
- Understand where the IoT concept fits within the broader ICT industry and possible future trends
- Able to build and test a complete working IoT system Pursue lifelong learning for professional advancement.

### **Text book [TB]:**

Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

### **Reference books [RB]:**

1. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	IT359	Subject Title	Mobile Computing and Services						
LTP	3 0 0	Credit	3	Subject Category	DE /OE	Year	4 <sup>th</sup>	Semester	VIII

### Course Objective:

1. Understand the fundamentals of wireless networks.
2. Understand and evaluate emerging wireless technologies and standards
3. To explore mobile security issues
4. To explore the mobility concept.

### Detailed Syllabus

#### UNIT 1

**Introduction:** Mobile computing with functions & devices, Networks, Middleware & gateways, Application & services, Developing mobile computing applications, Security & standards why it necessary, Architecture for mobile computing. (3 L)

#### UNIT 2

**Emerging Technologies:** Bluetooth, Rfid, WiMAX, Mobile IP, IPv6, GSM architecture, Call routing in GSM, Mobile computing over SMS, Value added service through SMS, GPRS architecture & operations, 3G & applications (10 L)

#### UNIT 3

##### **Wireless Transmission:**

Signal propagation- path loss of radio signals, additional signal propagation effects, Multipath propagation, Multiplexing- Space division, frequency division, time division, code division, Modulation- ASK, FSK, PSK, AFSK, APSK, Multi-carrier modulation  
Spread spectrum- Direct sequence & frequency hopping  
Mac- Hidden & exposed terminals, near- far terminal, SDMA, TDMA, FDMA, Fixed TDM, CSMA, PRMA, Multiple access with collision avoidance

(12 L)

#### UNIT 4

**Wireless LAN:** IEEE 802.11 in details, HIPERLAN, Link manager protocol, L2CAP, security, SDP.

(5 L)

#### UNIT 5

##### **Mobility & Security in mobile computing:** HTTP,

Wireless application protocol- architecture, wireless datagram protocol, wireless transport layer security, wireless transaction & session protocol, WML, Push architecture, push/ pull services, i-mode & SyncML  
Information security, Security techniques & algorithms, public key infrastructure, (10 L)

### Learning Outcome

At the end of the course, Learning Outcomes Having successfully completed this course, the student will demonstrate:

- 1: Apply the fundamental design paradigms and technologies to mobile computing applications.
- 2: Develop consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.
- 3: Appraise the quality and performance of mobile applications.
- 4: Assess and implement security principles in mobile applications.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

5: Evaluate wireless network topologies, wireless connectivity and characteristics, and the impact of wireless networks on security and Internet communications.

6: Select appropriate wireless technologies in commercial and enterprise applications.

### **Text book [TB]:**

- Jochen H. Schiller: Mobile Communications - Second Edition, Pearson
- Asoke K Talukder & Roopa R Yavagal: Mobile Computing Technology, Applications and Service Creation – Tata McGraw-Hill Publishing Company Limited

### **Reference books [RB]:**

- William Stallings: Wireless Communications & Networks - Second Edition, Pearson
- Theodore S. Rappaport : Wireless Communications Principles & Practice - Second Edition, Pearson



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	EC386	Subject Title	Fundamental of Communication & Networks						
LTP	3 0 0	Credit	3	Subject Category	DE /OE	Year	4 <sup>th</sup>	Semester	VIII

### Objectives of the Course:

- To understand the concept of Computer Communication.
- To learn the basics of Data communication and Networks
- To develop and design the protocol systems for advance computer communication.

### UNIT I: Introduction to Communication:

Communication system, Analog and Digital Communication, channel bandwidth. Ideal and Practical Filters, Concept of Signal Distortion over a Communication Channel, Energy Signal and Power Signal, Introduction to noise in Communication systems. 6L

### UNIT II: Introduction to Modulation techniques:

Concept of Amplitude Modulation, Concept of Frequency & Phase Modulation, Concept of ASK, FSK & PSK, Concepts of PCM. 8L

### UNIT III: Introduction to Data Communication Network & OSI Model:

Switching systems, network hardware and software, Layering, design issues for layering, reference models and their comparison, example of networks. Concepts of OSI model. 6L

### UNIT IV: Introduction to Data Communication Protocols and transmission media

MAC protocols- Aloha, CSMA, collision free protocols, Ethernet, IEEE 802.3 standard, IP protocols, IP addressing, OSPF, IPv4, IPv6. Transmission media and channel impairments, multiplexing, digital channels, switching. Repeaters, bridges, routers and gateways. 8L

### Text Books:

1. Forouzan, B.A., "Data Communication and Networking", 4th Ed., Tata McGraw-Hill.
2. Tanenbaum, A.S., "Computer Networks", 4th Ed., Pearson Education.
3. Stallings W., "Data and Computer Communication", 8th Ed., Prentice-Hall.
4. Simon Haykins, 'Communication Systems', John Wiley, 5<sup>th</sup> edition

### Reference Books:

1. Kurose, J.F. and Ross, K.W., "Computer Networking: A Top-Down Approach Featuring the Internet", 3rd Ed., Addison Wesley.

### List of Experiments:

1. To generate amplitude modulated wave and determine the percentage modulation and Demodulate the modulated wave using envelope detector.
2. To generate AM-Double Side Band Suppressed Carrier (DSB-SC) signal.
3. To generate the SSB modulated and Demodulated wave.
4. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal and to demodulate a FM signal
5. To study ASK modulation and Demodulation.
6. To study FSK modulation and Demodulation.
7. To study PSK modulation and Demodulation.
8. To Study TDM/PCM Transmitter /Receiver.

### OUTCOMES OF THE COURSE:

The course provides an understanding of:

- Computer Communication and networks.
- Protocol design and their design issues.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	<b>EC382</b>	<b>Subject Title</b>	<b>Biomedical Instrumentation</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE /OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Objectives of the Course:** The students will learn

- Requirement of bio-medical and its application
- Concept of bio-potential electrodes and measurements related to them.
- Concepts of bio-transducers and measurements related to them.
- Concept of bio-medical instruments and their uses experimentally.

### **UNIT I: ANATOMY AND PHYSIOLOGY:**

Basic Cell Functions, Origin of Bio-potentials, Electrical Activity of Cells, components of man Instrument system, types of bio-medical stems, design factors and limitations of biomedical instruments, terms and transducers to various physiological events. **8L**

### **UNIT II: BIO-POTENTIAL ELECTRODE:**

Types of bio-potential electrodes., Electrode-Electrolyte interface, half cell potential, Polarization- polarisable and non-polarisable electrodes, Ag/AgCl electrodes, Electrode circuit model; Electrode and Skin interface and motion artifact. Body surface recording electrodes for ECG. Electrodes standards. **8L**

### **UNIT III: BIO-TRANSDUCER:**

Transduction Principles: Resistive Transducers Strain Gauge- types, construction, selection materials, Gauge factor, Bridge circuit, Temperature compensation. Strain Gauge type Blood pressure transducers. Inductive Transducers, Capacitive Transducer, Piezoelectric Transducer. **8**

### **UNIT IV: BIOTELEMETRY AND ELECTRICAL SAFETY:**

Bio-telemetry design, single channel bio telemetry transmitter and receiver system based on AM, FM and, pulse modulation. Significance of Electrical Danger, physiological effect of current, ground shock Hazards. **8L**

#### **Text Books:**

1. Joseph J. Carr & John. M. Brown, 'Introduction to Biomedical Equipment technology'
2. R.S. Khandpur, 'Handbook of Biomedical Instrumentation', McGraw Hill.

#### **Reference Books:**

- 1 J.G. Webster, 'Medical instrumentation application and design', Houghton Mifflin Co., Boston USA.
- 2 Mohan Murali H, 'Monograph on Biomedical engineering', O.U. Press 1985.
- 3 Geddes L. A. & L. E. Baker, 'Principles of Applied Biomedical Instrumentation', Wiley, 1989.
- 4 Leslie Cromwell, Fred J. Weibell and Erich A. Pfeiffer, 'Biomedical Instrumentations and Measurements' (2<sup>nd</sup> edition), PHI, 1991.

#### **OUTCOMES OF THE COURSE:**

The course provides an understanding of:

- Bio-medical instruments and measurements.
- Principle of working of bio-medical transducers.
- Skills to use modern bio-medical tools and equipment for measurements related to human body.

#### **LIST OF EXPERIMENTS**

2. Pulse measurement
3. Heartbeat measurement
4. Automatic BP measurement
5. Heart sound study using electronics stethoscope
6. ECG measurement

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

Following experiments to be done on the breadboard

7. Design of low noise and low frequency amplifier for biomedical application
8. Design of Instrumentation amplifier
9. Construction of chopper amplifier

Two Value Added Experiments to be added by Instructor.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Subject Code	EE485	Subject Title	BASIC INSTRUMENTATION AND PROCESS CONTROL						
LTP	3 0 0	Credit		Subject Category	Open Elective	Year	4th	Semester	VIII

### Objectives of the Course

- To make students understand the construction, working principle and application of various transducers used for flow measurement, strain measurement, pressure and vacuum measurement,
- force, torque and power measurement
- To develop an understanding about the different types of telemetry systems used and types of instruments required for display and recording of the data to be transmitted
- Understand about components, characteristics of various control processes used and their modes of operation.

<b>Unit 1</b>	<b>Transducer – I :</b> Definition, advantages of electrical transducers, classification, characteristics, factors affecting the choice of transducers, Potentiometers, Strain gauges, Resistance thermometer, Thermistors, Thermocouples, LVDT, RVDT	<b>8L</b>
<b>Unit 2</b>	<b>Transducer – II: Capacitive,</b> Piezoelectric Hall effect and opto electronic transducers. Measurement of Motion, Force pressure, temperature, flow and liquid level.	<b>8L</b>
<b>Unit 3</b>	<b>Telemetry: General</b> telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data Acquisition System: Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.	<b>8L</b>
<b>Unit 4</b>	<b>Telemetry: General</b> telemetry system, land line & radio frequency telemetering system, transmission channels and media, receiver & transmitter. Data Acquisition System: Analog data acquisition system, Digital data acquisition system, Modern digital data acquisition system.	<b>8L</b>
<b>Unit 5</b>	<b>Display Devices and Recorders:</b> Display devices, storage oscilloscope, spectrum analyser, strip chart & x-y recorders, magnetic tape & digital tape recorders.	
<b>Unit 5</b>	<b>Process Control:</b> Principle, elements of process control system, process characteristics, proportional (P), integral (I), Derivative (D), PI, PD and PID control modes. Electronic, Pneumatic & digital controllers.	<b>8L</b>

### Text Books:

1. A.K.Sawhney, "Advanced Measurements & Instrumentation", Dhanpat Rai & Sons
2. B.C. Nakra & K. Chaudhry, "Instrumentation, Measurement and Analysis", Tata Mc Graw Hill 2nd Edition.
3. Curtis Johns, "Process Control Instrumentation Technology", Prentice Hall

### Reference Books

1. E.O. Decblin, "Measurement System – Application & design", Mc Graw Hill.
2. W.D. Cooper and A.P. Beltried, "Electronics Instrumentation and Measurement Techniques" Prentice Hall International
3. Rajendra Prasad, "Electronic Measurement and Instrumentation Khanna Publisher
4. M.M.S. Anand, "Electronic Instruments and Instrumentation Technology" PHI Learning.

### Outcome of the Course:

- **Identify the appropriate instruments for measurement of different quantities.**
- **Ability to analyze, formulate and select suitable sensor for the given industrial applications**
- **Ability to analyze various control processes used and their modes of operation.**

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME382	<b>Subject Title</b>	Ergonomics and Value Engineering						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Course Objective:** This course provides an overview on principles of ergonomics and human factors, their applications to the design and management of industrial systems, Engineering anthropometry, Human performance, human-technology interaction, work place and work station design and concept of value engineering. To address the underlying concepts, methods and application of Value Engineering

**Course Pre/Co- requisite (if any):**

**Detailed Syllabus**

### **UNIT 1: Introduction of Ergonomics**

Background of ergonomics, historical evolution of ergonomics, definition of ergonomics, aspect of ergonomics, man machine interaction, and man machine closed loop system, man machine system (MMS)

#### **Work physiology**

Muscle structure, metabolisms, circulatory and respiratory systems, energy expenditure and workload

### **UNIT 2: work related MSDs risk and work postures assessment**

Introduction, assessment of work postures using RULA Methods, work posture assessment using rapid entire body assessment tool (REBA)

#### **Office Ergonomics-**

Introductions, Issues in workstation design, seat design, engineering anthropometry and work design, A case study: an investigation on passenger seat design in sleeper class coaches in Indian trains.

**UNIT 3: Physical stress-** Introduction, vibration, occupational noise exposure, sound, source of noise and vibration, basic theory of noise measurement, Noise measuring meters, basic sound level meters, noise control , permissible limits of exposure with respect to occupational noise.

**UNIT 4: Value Engineering Introduction:** Definition, value engineering recommendations, programs, advantages, Evaluation of function, determining function, classifying function, evaluation of costs, evaluation of worth, determining worth, and evaluation of value.

Value Engineering Job Plan: Introduction, orientation, information phase, Function phase, creation phase, evaluation phase, Investigation phase, implementation phase, speculation phase, analysis phase.

**UNIT 5: Selection of Evaluation of Value Engineering Projects:** Project selection, Methods selection, value standards, application of Value Engineering methodology.

Initiating Value Engineering Program: Introduction, training plan, career development for Value Engineering specialties.

Fast Diagramming: Cost models, life cycle costs.

Value Engineering level of Effort: Value Engineering team, Co-ordinator, designer, different services, definitions, construction management contracts, value engineering case studies

### **Learning Outcome**

At the end of the course the student can:

CO1: Specify and design ergonomically appropriate industrial workstations for the industrial and office work environment.

CO2: Identify information-centered human factors relating to visual, illumination, controls, displays and symbols.

CO3: Compare, contrast and assess human body-centered ergonomic designs for posture, material handling, repetitive motion factors, heat stress, noise and vibration.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

CO4: Define the ergonomic factors intrinsic in evaluating accidents, human errors and safety related incidents.

CO5: Student will understand the concepts, methods and application of Value Engineering

### **Text book [TB]:**

1. Lakhwinder Pal Singh, "Work Study and Ergonomics: Cambridge University Press, 2018.
2. Value Engineering : A Systematic Approach by Arthur E. Mudge - McGraw Hill 2010

### **Reference books [RB]:**

1. The Power of Ergonomics as a Competitive Strategy By Gross & Right (Productivity Press) 2010.
2. MartandTelsang, Industrial Engineering and Production Management, S. Chand & Company Limited, 2006.
3. Value Engineering A how to Manual S.S.Iyer, New age International Publishers 2009.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME366	<b>Subject Title</b>	Product Design And Development						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE /OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Course Objective:** This course aims at introducing the students to the basic concepts of engineering design and product development with focus on the front end processes. At the end of this course the student is expected to demonstrate an understanding of the overview of all the product development processes and knowledge of concept generation and selection tools.

**Course Pre/Co- requisite (if any):** Manufacturing Process, Industrial Engineering and Management

### Detailed Syllabus

#### UNIT 1:

Significance of product design, Need for developing products, product design and development process, the importance of engineering design, sequential engineering design method, relevance of product lifecycle issues in design, the challenges of product development.

Product Planning and Project Selection: generic product development process, Identifying opportunities, evaluate and prioritize projects, allocation of resources, various phases of product development-planning for products.

#### UNIT 2:

Identifying Customer Needs voice of customer, customer populations, Interpret raw data in terms of customers need, hierarchy of human needs, need gathering methods, establish the relative importance of needs.

Product Specifications: Establish target specifications, setting final specifications

Concept Generation: Activities of concept generation, clarifying problem, search both internally and externally, explore the output

#### UNIT 3:

Industrial Design: Assessing need for industrial design, industrial design process, management, assessing quality of industrial design, human factors design, user friendly design

Concept Selection: Overview, concept screening and concept scoring, methods of selection, case studies.

#### UNIT 4:

Theory of inventive problem solving (TRIZ): Fundamentals, methods and techniques, General Theory of Innovation and TRIZ, Value engineering Applications in Product development and design, Model based technology for generating innovative ideas measurement of customers response.

Concept Testing: Elements of testing: qualitative and quantitative methods including survey.

#### UNIT 5:

Intellectual Property: Elements and outline, patenting procedures, claim procedure.

Design for Environment: Impact, regulations from government, ISO system, case studies.

### Learning Outcome

At the end of the course the student can:

CO1:Product Design and Innovation course is intended to introduce overall awareness of the product design process.

CO2:This course will give an understanding of methods, tools and techniques applied in product design.

CO3:This course includes overview of innovation, product design process, user study, need/problem identification, development of design brief, understanding competitive benchmarking, aspects of human factors in product design, tools for creative concept generation, and prototyping/model making and evaluation techniques for user-product interaction.

CO4:This course will be explained with lectures including case studies and hands-on exercises. This will help students to generate creative ideas in to product design, considering human factors aspects.

### Text book [TB]:

1. Anita Goyal, Karl T Ulrich, Steven D Eppinger, "Product Design and Development", Tata McGraw-Hill Education, 4th Edition, 2009.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

2. Kevin Otto, Kristin Wood, "Product Design", Pearson Education, Indian Reprint 2004.

### **REFERENCES [RB]:**

1. Yousef Haik, T. M. M. Shahin, "Engineering Design Process Cengage Learning, 2010", 2nd Edition Reprint.
2. Kevin Otto, Kristin Wood, "Product Design", Pearson Education Indian Reprint 2004.
3. Clive L.Dym, Patrick Little, "Engineering Design: A Project-based Introduction", John Wiley & Sons, 3rd Edition 2009.



# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	ME452	<b>Subject Title</b>	Renewable Energy Sources						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Course Objective:** To provide students an overview of global energy resources with focus on renewable energy sources and their importance in the context of limited supply of conventional energy resources & global warming.

**Course Pre/Co- requisite (if any):** Basic Thermodynamics, Heat Transfer

### Detailed Syllabus

#### **UNIT 1: ENERGY RESOURCES**

Introduction: Energy & its importance in social & economic development; energy demand & supply, world energy status, energy scenario in India; energy & environment, greenhouse effect & global warming; role of renewable energy sources; a brief introduction to various renewable energy sources – hydro, solar, biomass, wind, geothermal & ocean energy – their availability & present status.

#### **UNIT 2: SOLAR ENERGY**

The sun as a source of energy, extraterrestrial & terrestrial solar radiation; solar radiation data & geometry, solar radiation on horizontal & inclined surfaces; solar thermal systems – various types of solar collectors & their applications in cooking, drying, water heating, distillation, space heating & cooling, refrigeration and power generation.

Solar photovoltaic systems, solar cell fundamentals, performance & characteristics, types of solar cells; solar cell, module, and array construction; solar PV applications.

#### **UNIT 3: BIOMASS ENERGY**

Origin of biomass, photosynthesis & generation of biomass, availability of biomass, usable forms of biomass – fuel wood, charcoal, fuel pellets, biodiesel, bioethanol, biogas and producer gas; biomass conversion technologies, thermochemical & biochemical methods, biomass gasification, classification & operational parameters of biogas plants, energy recovery from urban waste, sewage to energy conversion.

#### **UNIT 4: WIND ENERGY**

Origin & nature of winds; history of power from winds; global & local winds; estimation of wind energy at a site; maximum power extraction from wind – Betz criterion; capacity factor of wind power plants; types of wind turbines – horizontal and vertical axis wind turbines; wind energy storage; environmental & economic aspects; present status of wind energy systems.

#### **UNIT 5: GEOTHERMAL & OCEAN ENERGY**

Structure of earth's interior; origin & distribution of geothermal energy, types of geothermal resources – exploration & development of hydrothermal, geo-pressured & hot dry rock resources; electrical power generation from geothermal energy; environmental & economic considerations.

Ocean energy; tidal, wave & ocean thermal energy, energy from tidal streams (marine currents); technology for harnessing tidal & wave energy; ocean thermal energy conversion technology.

### **Learning Outcome**

At the end of the course the student will:

CO1: Understand about the interaction between energy, economy, environment, and social development.

CO2: Appreciate the importance of renewable energy sources & future energy systems based on them.

CO3: Possess the basic technical knowledge to develop energy systems based on solar, biomass, wind, geothermal & ocean energy.

# **Course Structure & Syllabus of B.Tech – Civil Engineering**

## **Applicable for Batch: 2017-2021**

### **Text book [TB]:**

1. B. H. Khan, “Non-Conventional Energy Resources”, 3<sup>rd</sup> edition ( 2017), McGraw Hill Education (India) Private Limited, Chennai.
2. S. P. Sukhatme & J. K. Nayak, “Solar Energy”, 4th edition (2018), McGraw Hill Education (India) Private Limited, Chennai.

### **References [RB]:**

1. G. N. Tiwari & M. K. Ghosal, “Renewable Energy Resources – Basic Principles and Applications”, 2005, Narosa Publishing House, New Delhi.
2. D.P. KOTHARI, K. C. SINGAL, RAKESH RANJAN, Renewable Energy Sources And Emerging Technologies, PHI Learning Pvt. Ltd., 25-Nov-2011.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	PE491	<b>Subject Title</b>	Carbon Capture and Sequestration Technology						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

### 1. Course Summary

The course provides information about the students to learn the basic concept and Applications of Carbon capture and storage process. In this course, students will learn about carbon capture techniques and the concept of the contribution of fossil fuel to climate change. During this course students will examine the Co2 emission and Carbon dioxide recycling.

### 2. Course Objectives

The students should be able to:

1. The objective of this course is make students familiar with the principles and applications of carbon capture and storage capture techniques and role of CCS.

### 3. Course Outcomes

1. To acquaint the students substantially to the objectives and necessity of Carbon Sequestration and capture.
2. To introduce the contribution of fossil fuel to climate change.
3. To understand the concept of emission and recycling of CO<sub>2</sub>.
4. To introduce the candidates to the concept of underground storage and other Carbon Capture and sequestration concepts.
5. To understand the implementation of CCS technology and IPCC.

### 4. Curriculum Content

#### UNIT 1

Introduction: Scope, Objectives and Necessity of CCS.

#### UNIT 2

The contribution of fossil fuels emission to Climate change and global warming. Concept of Carbon Credit and carbon footprint.

#### UNIT 3

Carbon capture techniques: Carbon-di-oxide emission, Scrubbing of CO<sub>2</sub>, Carbon dioxide recycling.

#### UNIT 4

Carbon dioxide sequestration: Underground storage, Potential for Geologic Storage, Application in Oil and gas industry, Carbon di oxide flooding projects, Methane recovery projects.

#### UNIT 5

Strategy for implementing CCS technology: Modelling of Cost and Performance of CCS Plants. Role and function of IPCC.

#### Text book [TB]:

1. Carbon Capture; Jennifer Wilcox; Springer
2. Capturing Carbon – The new weapon in the War Against Climate Change; Mills, Robin M.; Columbia University Press

#### Reference books [RB]:

1. Piping and pipeline engineering, George A. Antaki, Marcel Dekker Inc. New York.
2. Fundamentals of pipeline engineering by J. Vincent Genod, Technip Editions

### 5. Teaching and Learning Strategy

All materials (ppts, assignments, labs, etc.) will be uploaded in Moodle. Refer to your course in Moodle for details.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Subject Code</b>	MA452	<b>Subject Title</b>	<b>Optimization Techniques</b>						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	Open Elective	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Unit 1:** Introduction to optimization, Statement and classification of optimization problem, Multi-objective optimization, Multi-variable optimization problem with equality and inequality constraints, Classical optimization techniques, Single variable and multivariable optimization problems, Operation Research approach, general methods for Operation Research models, methodology and advantages of Operation Research.

**Unit 2:** Introduction to LPP and formulation of Linear Programming problems, Graphical solution method, alternative or multiple optimal solutions, Unbounded solutions, Infeasible solutions, Maximization – Simplex Algorithm, Minimization – Simplex Algorithm using Big-M method, Two phase method, Duality in linear programming.

**Unit 3:** Introduction to Transportation problems, various methods of Transportation problem, Variations in Transportation problem, introduction to Assignment problems, variations in Assignment problems. Sequential optimization, Representation of multistage decision process; Types of multi stage decision problems; Concept of sub optimization and the principle of optimality.

**Unit 4:** Optimization techniques, Memetic algorithm, Differential evolution, Evolutionary algorithms, Dynamic relaxation, Genetic algorithms, Hill climbing with random restart, Genetic Algorithm (GA), Artificial Bee Colony (ABC), Particle Swarm Optimization (PSO), Firefly algorithm, Fish School Search, Fly algorithm, Ant colony optimization algorithms

### References:

1. S.S. Rao, "Engineering Optimization: Theory and Practice", New Age International P) Ltd., New Delhi, 2000.
2. G. Hadley, "Linear programming", Narosa Publishing House, New Delhi, 1990.
3. H.A. Taha, "Operations Research: An Introduction", 5th Edition, Macmillan, New York, 1992.
4. K. Deb, "Optimization for Engineering Design- Algorithms and Examples", Prentice-Hall of India Pvt. Ltd., New Delhi, 1995.
5. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath Publishers, 2009.

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

Code	AR-485	Subject Title	ART APPRECIATION						
LTP	3 0 0	Credit	3	Subject Category	OE	Year	4 <sup>th</sup>	Semester	VIII

### Course Objective:

To create an overview and understanding of various art forms that exists from ancient to modern times.

### Unit 1: INTRODUCTION

Understanding various art forms in society and in different cultures.

### Unit 2: Sociological Perspective

Relationship between art, culture and society. Influence of art forms on people.

### Unit 3: Appreciation-I: Painting/ Sculptures

Understanding and appreciating films/ documentaries from past to present times and between east and west

### Unit 4: Appreciation-II: Films/ Documentaries

Understanding and appreciating painting and sculptures from past to present times and between east and west

### Unit 5: Appreciation-III: Indigenous/ Folk Art

Understanding and appreciating Indigenous/ Folk art from past to present times and between east and west.

### LEARNING OUTCOME:

4. The student will be able to understand the various art forms.
5. The students will be able to understand and establish a relationship between art, culture and society.
6. The students will be able to appreciate the various art.

### Text Books:

3. Creative Authenticity: 16 Principles to Clarify and Deepen Your Artistic Vision, Ian Roberts

### Reference Books:

The Writer: A Concise Complete and Practical Text Book of Rhetoric. Designed to Aid in The Appreciation, George Lansing Raymond

# Course Structure & Syllabus of B.Tech – Civil Engineering

## Applicable for Batch: 2017-2021

<b>Code</b>	PY481	<b>Subject Title</b>	Nano scale science and technology						
<b>LTP</b>	3 0 0	<b>Credit</b>	3	<b>Subject Category</b>	DE/OE	<b>Year</b>	4 <sup>th</sup>	<b>Semester</b>	VIII

**Unit 1** **(10L)**

Introduction to nanotechnology, definition, history of nanotechnology, nanotechnology in relation to other branches of engineering, characteristic length scale of materials and their properties, classification of nano materials, dimensionality and size dependent phenomena, confinement in 0-D, 1-D, 2-D and 3-D, surface to volume ratio, fraction of surface atoms, surface energy.

**Unit 2** **(7L)**

Nanomaterials synthesis techniques; top-down and bottom-up techniques, ball milling, PVD, CVD, self-assembly.

**Unit 3** **(8L)**

Nanomaterials characterization; XRD, SEM, TEM, AFM, UV-VIS.

**Unit 4** **(8L)**

Nanomaterials and their properties: carbon based nano materials, metal based nano materials, quantum dots, biological nano materials.

**Unit 5** **(7L)**

Applications of nanotechnology in engineering, solar energy conversion, nanomedicine.

**Text Books:**

1. Poole, Jr. CP and Owens, FJ, "Introduction to Nanotechnology", Wiley India. 2006.
2. Cao, G., Nanostructures and Nanomaterials: Synthesis, Properties and Applications, Emperial College Press (2004).
3. Edward L. Wolf: Nanophysics and Nanotechnology: An Introduction to Modern Concepts in Nanoscience, 2nd ed., Wiley-VCH, 2006.