GURU KASHI UNIVERSITY

Bachelor of Technology in Civil Engineering (BCE)

Session: 2022-23

Department of Civil Engineering

Semester –I						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**Credit**
BCE101	Basic Electrical Engineering	Core course	3	1	0	4
BCE102	Physics (Semiconductor Physics)	Core course	3	1	0	4
BCE103	Mathematics-1 (Calculus & Linear Algebra)	Skill based	3	1	0	4
BCE104	Engineering Graphics & Drawing	Skill based	1	0	4	3
BCE105	Physics (Semiconductor Physics) Lab	Skill based	0	0	2	1
BCE106	Basic Electrical Engineering Lab	Skill based	0	0	2	1
Discipline Elective-I (Any one of the following)						
BCE107	Introduction to Concrete Technology	Discipline Elective	3	0	0	3
BCE108	Introduction to Civil Engineering					
BCE109	Computer Fundamentals and Its Applications Lab	Ability Enhancement	0	0	2	1
		Total	**13**	**3**	**10**	**21**

Semester: 2nd (Chemistry Group)						
Course Code	**Course Name**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE201	Engineering Chemistry	Core course	3	1	0	4
BCE202	Mathematics–II (Probability and Statistics)	Core course	3	1	0	4
BCE203	Programming for Problem Solving	Technical Skill Course	3	0	0	3
BCE204	Communication Skills	Technical Skill Course	3	0	0	3
BCE205	Manufacturing Practices	Technical Skill Course	1	0	4	3
BCE206	Engineering Chemistry Lab	Technical Skill Course	0	0	2	1
BCE207	Programming for Problem Solving Lab	Technical Skill Course	0	0	2	1
BCE208	Communication Skills Lab	Technical Skill Course	0	0	2	1
Value Added Course (Anyone of the following)						
BCE209	Numerical Aptitude and Reasoning Ability	VAC	1	0	0	1
BCE210	Stress Management					
Discipline Elective-II (Anyone of the following)						
BCE211	Basics of Management	Discipline Elective	3	0	0	3
BCE212	Wastewater Treatment and Recycling					
		Total	**17**	**2**	**10**	**24**

Semester: 3rd						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE301	Surveying & Geomatics	Core course	3	1	0	4
BCE302	Solid Mechanics	Core course	3	0	0	3
BCE303	Fluid Mechanics	Core course	3	0	0	3
BCE304	Mathematics-III (Transform & Discrete)	Ability Enhancement	4	0	0	4
BCE305	Surveying & Geomatics Lab	Technical Skill	0	0	2	1
BCE306	Solid Mechanics Lab	Technical Skill	0	0	2	1
BCE307	Fluid Mechanics Lab	Technical Skill	0	0	2	1
BCE308	Summer/Institutional Training	Technical Skill	NA	NA	NA	S/US*
Open Elective Course						
		Open Elective	2	0	0	2
Discipline Elective-III (Anyone of the Following)						
BCE309	Basic Electronics & applications in civil engineering	Discipline Elective	3	0	0	3
BCE310	Civil Engineering-Introduction, Societal & Global Impact					
BCE399		MOOC	-	-	-	-
		Total	18	1	6	22
Open Elective (For other Departments also)						
BCE311	Business Analytics	Open Elective	2	0	0	2
BCE312	Industrial Safety					
Note: Summer/Institutional Training will be imparted in the Institute at the end of 2nd Semester for 6-weeks duration. However this Subject is not applicable to LEET Students						

Semester: 4th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE401	Concrete Technology	Core course	4	0	0	4
BCE402	Concrete Technology Lab	Technical Skill	0	0	2	1
BCE403	Transportation Engineering Lab	Technical Skill	0	0	2	1
BCE404	Transportation Engineering	Core Course	4	1	0	5
BCE405	Environmental Studies	Value Added Course	3	0	0	3
BCE406	Disaster Preparedness & Planning	Ability Enhancement	4	0	0	4
BCS415	Basics of Management	Value Added Couse	2	0	0	2
Discipline Elective-IV (Anyone of the following)						
BCE407	Material, Testing & Evaluation	Discipline Elective	5	0	0	5
BCE408	Hydrology & Water Resources					
BCE409	Mentoring and Professional Development of Students					
		Total	20	1	4	25

Semester: 5th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE501	Environmental Engineering	Core course	3	0	0	3
BCE502	Mechanics of materials	Core course	3	0	0	3
BCE503	Hydraulic Engineering	Core course	3	0	0	3
BCE504	Structural Engineering	Core course	3	0	0	3
BCE505	Hydraulic Engineering Lab	Technical Skill	0	0	2	1
BCE506	Geotechnical Engineering Lab	Technical Skill	0	0	2	1
BCE507	Constitution of India	Technical Skill	3	0	0	NC
BCE508	Survey Camp*	Technical Skill	0	0	8	4
Open Elective Course						
		Open Elective	4	0	0	4
Discipline Elective-V (Anyone of the following)						
BCE509	Geotechnical Engineering	Discipline Elective	4	0	0	4
BCE510	Engineering Geology					
BCE599		MOOC	-	-	-	-
		Total	**23**	**0**	**12**	**29**
Open Elective (For other Departments also)						
BCE511	Professional Practice, Law & Ethics	Open Elective	4	0	0	4
BCE512	Waste to Energy					

Semester: 6th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE601	Construction Engineering & Management	Core course	2	1	0	3
BCE602	Irrigation Engineering	Core course	3	0	0	3
BCE603	Traffic Engineering & Management	Core course	3	0	0	3
BCE604	Solid & Hazardous Waste Management	Core course	3	0	0	3
BCE605	Engineering Economics, Estimation & Costing	Core course	3	0	0	3
BCE606	Engineering Economics, Estimation & Costing, Laboratory	Technical Skill	0	0	2	1
BCE607	Repair & Rehabilitation of Structures	Core course	3	0	0	3
Value Added Course (Anyone of the following)						
BCE608	Human Relations at Work	VAC	3	0	0	3
BCE609	Cost Management of Engineering Projects					
		Total	**20**	**1**	**2**	**22**

Note:-The Students will go for 6-8 weeks summer training/ internship in industry after semester 6th and it is evaluated in 7th Semester.

Semester: 7th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE701	Research Methodology	Research Skill	4	0	0	4
BCE702	Foundation Engineering	Core Course	4	0	0	4
BCE703	Web Designing and Development Lab	Technical Skill	0	0	2	1
BCE704	Project-I*	Research Skill	0	0	2	1
BCE705	Industrial/Institutional Training-I **	Technical Skill	NA	NA	NA	10
BCE799	MOOC	MOOC	-	-	-	
Total			**8**		**4**	**20**

***Project-I** :- The problem related with design, construction, experimentation etc. based on specialization group of electives is to be carried out the result and analysis followed by discussion regarding suitability or non suitability of project with conclusion and recommendation for future extension of the project must be covered. The project work will be carried out in groups(Maximum 5 students are allowed in one group)

****Industrial/Institutional Training**: The student will cover this training on the basis of his/her subject choice and he/ she will complete the training within the institute or outside of institute (with permission).

* **Also the student will undergo for this training after the final examinations of 6th Semester.**

Semester: 8th						
Course Code	**Course Title**	**Type of Course**	**L**	**T**	**P**	**No. of Credits**
BCE801	Internship	Skill Based	NA	NA	NA	20
	Total		**0**	**0**	**0**	**20**

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]

   i. Surprise Test (Two best out of three) - (10 Marks)
   ii. Term paper (10 Marks)
   iii. Assignment(s) (5 Marks)

B. Attendance (5 marks)
C. MST-1: [30 Marks]
D. MST-II: [20Marks]
E. End-Term Exam: [20 Marks]

Evaluation Criteria for other courses has been given separately with the respective courses

SEMESTER: I

COURSE TITLE: BASIC ELECTRICAL ENGINEERING
COURSE CODE: BCE101

L	T	P	Credits
3	1	0	4

Total: 60 hours

Course Outcomes:

On successful completion of this course, students would be able to:

1. Discuss the DC and AC electrical circuit elements with RLC in detail.
2. Analysis of simple circuits with dc excitation. Superposition, Theven in and Norton Theorems.
3. Analyze Single Phase AC Circuits and representation of alternating quantities and determining the power in these circuits.
4. Classify the different types of Electrical machines.
5. Understand the different type of electrical installation devices.

Course Content

UNIT I **10 Hours**

DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems. Time-domain analysis of first-order RL and RC circuits.

UNIT II **18 Hours**

AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three- phase balanced circuits, voltage and current relations in star and delta connections.

Transformers

Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT III **16 Hours**

Electrical Machines

Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.

UNIT IV **16 Hours**

Power Converters

DC-DC buck and boost converters, duty ratio control. Single-phase and three-phase voltage source inverters; sinusoidal modulation.

Electrical Installations

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text / Reference Books

1. Kothari, D. P. and Nagrath, I. J. (2010). Basic Electrical Engineering. Tata McGraw Hill.
2. Kulshreshtha, D. C. (2009). Basic Electrical Engineering. McGraw Hill.
3. Bobrow, L. S. (2011). Fundamentals of Electrical Engineering. Oxford University Press.
4. Hughes, E. (2010). Electrical and Electronics Technology. Pearson

SEMESTER: I

COURSE TITLE: PHYSICS (Semiconductor Physics)
COURSE CODE: BCE102

L	T	P	Credits
3	1	0	4

Total: 60 hours

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

1. Apply knowledge of electricity and magnetism to explain natural physical processes and related technological advances
2. Use the knowledge regarding calculus along with physical principles to effectively solve problems encountered in everyday life, further study in science, and in the professional world
3. Design experiments and acquire data in order to explore physical principles, effectively communicate results, and critically evaluate related scientific studies.
4. Assess the contributions of physics to our evolving understanding of global change and sustainability while placing the development of physics in its historical and cultural context
5. Acknowledge the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws and analyze and solve RL circuits

Course Content

UNIT I **15 Hours**

Electrostatics in vacuum

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential and uniqueness of their solution and connection with steady state diffusion and thermal conduction; Practical examples like Farady's cage and coffee-ring effect; Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

UNIT II **15 Hours**

Electrostatics in a linear dielectric medium

Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement; Solving simple electrostatics problems in presence of dielectrics – Point charge at the centre of a dielectric sphere, charge in front of a dielectric slab, dielectric slab and dielectric sphere in uniform electric field.

Magnetostatics

Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

UNIT III **15 Hours**

Magnetostatics in a linear magnetic medium

Magnetization and associated bound currents; auxiliary magnetic field; Boundary conditions on and solving for magnetic field due to simple magnets like a bar magnet; magnetic susceptibility and ferromagnetic, paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

Faraday's law

Faraday's law in terms of EMF produced by changing magnetic flux; equivalence of Faraday's law and motional EMF; Lenz's law; Electromagnetic breaking and its applications; Differential form of Faraday's law expressing curl of electric field in terms of time-derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi-static approximation; energy stored in a magnetic field.

UNIT IV **15 Hours**

Displacement current, Magnetic field due to time-dependent electric field and Maxwell's equations

Continuity equation for current densities; Modifying equation for the curl of magnetic field to satisfy continuity equation; displace current and magnetic field arising from time- dependent electric field; calculating magnetic field due to changing electric fields in quasi- static approximation. Maxwell's equation in vacuum and non-conducting medium; Energy in an electromagnetic field; Flow of energy and Poynting vector with examples. Qualitative discussion of momentum in electromagnetic fields.

Electromagnetic waves

The wave equation; Plane electromagnetic waves in vacuum, their transverse nature and polarization; relation between electric and magnetic fields of an electromagnetic wave; energy carried by electromagnetic waves and examples. Momentum carried by electromagnetic waves and resultant pressure. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text / Reference Books

1. David J Griffths. (1999). Introduction to Electrodynamics. PrenticeHall.
2. Walker, Jearl, David Halliday, and Robert Resnick. (2011). Fundamentals of Physics. Hoboken, N.J: Wiley.
3. Saslow, W. (2008). Electricity, magnetism and light. e-book.

SEMESTER: I

COURSE TITLE: MATHEMATICS –I (CALCULUS AND LINEAR ALGEBRA)
COURSE CODE: BCE103

L	T	P	Credits
3	1	0	4

Total: 60 hours

Course Outcomes:

On successful completion of this course, students would be able to:

1. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
3. The tool of power series and Fourier series for learning advanced Engineering Mathematics.
4. To deal with functions of several variables that is essential in most branches of engineering.
5. The essential tool of matrices and linear algebra in a comprehensive manner.

Course Content

UNIT I **30 Hours**

a. Calculus:

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

b. Advanced Calculus

Differentiation: Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

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

c. Trigonometry

Hyperbolic and circular functions, logarithms of complex number resolving real and imaginary parts of a complex quantity, De Moivre's Theorem.

Theory of equations:Relation between roots and coefficients, reciprocal Equations, transformation of equations and diminishing the roots.

UNIT II **8 Hours**

Matrices

Matrices: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Eigen values & vectors.

UNIT III **10 Hours**

Sequences and series

Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT IV **12 Hours**

Algebra

Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank-nullity theorem, composition of linear maps, Matrix associated with a linear map.
Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
5. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
6. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
7. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
8. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
9. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
10. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
    1. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
11. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
12. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.

SEMESTER: I

COURSE TITLE: ENGINEERING GRAPHICS & DRAWING

COURSE CODE: BCE104

L	T	P	Credits
1	0	4	3

Total: 60 hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. Understand about engineering drawing applications and its importance in society.
2. Learn about the visual aspects of engineering design
3. Understand the engineering graphics standards.
4. Understand the concept of solid modeling techniques.
5. Apply the computer-aided geometric design in engineering

Course Content

UNIT I **15 Hours**

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

1. Orthographic Projections covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes.

UNIT II **15 Hours**

1. Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
2. Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)

UNIT III **15 Hours**

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

1. Overview of Computer Graphics covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];
2. Customization & CAD Drawing consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for

coordinate dimensioning and tolerance; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles.

UNIT IV **15 Hours**

1. Annotations, layering & other functions covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface and wireframe models. Part editing and two-dimensional documentation of models. Planar projection theory including sketching of perspective, isometric, multi view, auxiliary, and section views. Spatial visualization exercises. Dimensioning guidelines, tolerance techniques; dimensioning and scale multi views of dwelling;
2. Demonstration of a simple team design project that illustrates Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerance; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying color coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modeling (BIM).

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books

1. Gill, P.S.(2001).Engineering Drawing. S.K; Kataria and Sons, Ludhiana.
2. Bhatt, N.D.(2012). Engineering Drawing. Charotar Book Stall, TulsiSadan, Anand.
3. French, T.E. and Vierck. C.J.(1993).Graphic Science. McGraw-Hill, New York.
4. Zozzora, F.(1958). Engineering Drawing. McGraw Hill, NewYork.
   (Corresponding set of) CAD Software Theory and User Manuals

SEMESTER: I

Course Title: PHYSICS (Semiconductor Physics) LAB
Course Code: BCE105

L	T	P	Credits
0	0	2	1

Total: 15 hours

Course Outcomes

On successful completion of this course, the students would be able to:

1. Apply knowledge Experiments on electromagnetic induction and electromagnetic breaking.
2. Predict use LC circuit and LCR circuit.
3. Design Resonance phenomena in LCR circuits
4. Assess Magnetic field from Helmholtz coil.
5. Understand Measurement of Lorentz force in a vacuum tube

Course Content

Choice of experiments from the following:

1. Experiments on electromagnetic induction and electromagnetic breaking;
2. LC circuit and LCR circuit;
3. Resonance phenomena in LCR circuits;
4. Magnetic field from Helmholtz coil;
5. Measurement of Lorentz force in a vacuum tube.

SEMESTER: I

Course Title: BASIC ELECTRICAL ENGINEERING LAB
Course Code: BCE106

L	T	P	Credits
0	0	2	1

Total: 15 hours

List of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to a step change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.
3. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and currents, and power.
4. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents). Phase-shifts between the primary and secondary side. Cumulative three-phase power in balanced three-phase circuits.
5. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.
6. Torque Speed Characteristic of separately excited dc motor.
7. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections. Torque-Slip Characteristic of an induction motor. Generator operation of an induction machine driven at super- synchronous speed.
8. Synchronous Machine operating as a generator: stand-alone operation with a load. Control of voltage through field excitation.
9. Demonstration of (a) dc-dc converters (b) dc-ac converters – PWM waveform (c) the use of dc-ac converter for speed control of an induction motor and (d) Components of LT switchgear.

SEMESTER: I

COURSE TITLE: Computer Fundamentals & Its Applications lab	**L**	**T**	**P**	**Credits**
COURSE CODE: BCE109	**0**	**0**	**2**	**1**

Total: 15 hours

Course Content

1. Various Components of a Computer.
2. Introduction to Microsoft Word & Presentation
3. Make a simple presentation on your college,
4. use 3D effects , on prescribed presentation
5. Applications of Ms-Office Ms-Word
6. Ms-Excel
7. Ms-PowerPoint
8. Create web pages for your college using different tags.
9. web Browser and E- Mail.
10. Conversion of a word documents into PDF/ Image conversion

SEMESTER: I

COURSE TITLE: Introduction to Concrete Technology	**L**	**T**	**P**	**Credits**
COURSE CODE: BCE107	**3**	**1**	**0**	**4**

Total: 40 hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. To define and understand concepts related Concrete technology which involves types and property of concrete and different adhesive materials and its vital use for safe, economic development for the buildings.
2. To present the foundations of many basic Engineering tools and concepts related to Concrete technology and Civil Engineering.
3. To give an experience in the implementation of engineering concepts which are applied in field of Civil Engineering.

Course Content

Unit-I **10 Hours**

Basics: Historical background, composition of concrete, general note on strength mechanism, recent practice and future trends.

Unit-II **10 Hours**

Constituent of Concrete:

1. Cement - Chemical composition, hydration, heat of hydration, hydrated structure, various types of cement, testing of cement as per Indian standard.

2. Aggregates - Utility in concrete, classification, effect of geometry & texture, strength, mechanical properties, moisture content, water absorption, bulking of sand, deleterious substances, sieve analysis, various grading and grading requirements, sampling & testing as per Indian Standards.

Unit-III **10 Hours**

1. Water - General Requirements & limiting values of impurities.

2**. Admixtures** - Additives and admixtures, types, necessity and benefit Mineral admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and dosage.

Unit-IV **10 Hours**

Fresh concrete:

Methods of mixing, transporting and placing of concrete. Workability – Definition and requirement, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books:

1. M S Shetty; Concrete Technology , S.Chand Publication New Delhi

2. P Kumar Mehta, Monteiro; Concrete Technology, Indian Concrete Institute

3. A R Santhakumar; Concrete Technology , Oxford University Press

4. A.M.Neville ; Properties of Concrete , Pearson Education 5. M L Gambhir; Concrete Technology , Tata McGraw Hill

SEMESTER: I

COURSE TITLE: Introduction to Civil Engineering
COURSE CODE: BCE107

L	T	P	Credits
3	0	0	3

Total: 40 hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. Have the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
2. Explain different types of buildings, building components, building materials and building construction.
3. Describe the importance, objectives and principles of surveying.
4. Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps.

Unit-I **10 Hours**

Relevance of Civil Engineering in the overall infrastructural development of the country. Responsibility of an engineer in ensuring the safety of built environment. Brief introduction to major disciplines of Civil Engineering like Transportation Engineering, Structural Engineering, Geo-technical Engineering, Water Resources Engineering and Environmental Engineering. Introduction to buildings: Types of buildings, selection of site for buildings, components of a residential building and their functions. Building rules and regulations: Relevance of NBC, KBR & CRZ norms (brief discussion only). Building area: Plinth area, built up area, floor area, carpet area and floor area ratio for a building as per KBR.

Unit-II **10 Hours**

Surveying: Importance, objectives and principles.

Construction materials, Conventional construction materials: types, properties and uses of building materials: bricks, stones, cement, sand and timber

Cement concrete: Constituent materials, properties and types.

Steel: Steel sections and steel reinforcements, types and uses.

Modern construction materials: - Architectural glass, ceramics, Plastics, composite materials, thermal and acoustic insulating materials, decorative panels, waterproofing materials. Modern uses of gypsum, pre-fabricated building components (brief discussion only).

Unit-III **10 Hours**

Building Construction: Foundations: Bearing capacity of soil (definition only), functions of foundations, types – shallow and deep (brief discussion only).

Load bearing and framed structures (concept only).

Brick masonry: - Header and stretcher bond, English bond & Flemish bond random rubble masonry.

Unit-IV **10 Hours**

Roofs and floors: - Functions, types; flooring materials (brief discussion only).

Basic infrastructure services: MEP, HVAC, elevators, escalators and ramps (Civil Engineering aspects only), fire safety for buildings.

Green buildings: - Materials, energy systems, water management and environment for green buildings. (Brief discussion only).

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference:

1. Penn, M. and P. Parker, Introduction to Infrastructure (2012), John Wiley & Sons, Inc., New York [ISBN978-0-470-41191-9].

SEMESTER: II

COURSE TITLE: ENGINEERING CHEMISTRY
COURSE CODE: BCE201

L	T	P	Credits
3	1	0	4

Total: 60 Hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. Demonstrate Schrodinger equation, Particle in a box solution and their applications
2. Conjugated molecules and Nano particles,
3. Evaluate band structure of solids and the role of doping on band structures.
4. Distinguish the ranges of Vibrational and rotational spectroscopy of diatomic molecules,
5. Applications, Nuclear magnetic resonance and magnetic resonance imaging
5. Rationalize periodic properties such as ionization potential, electro-negativity, Oxidation states and electro-negativity.
6. List the Thermodynamic functions: energy, entropy and free energy and also Estimations of entropy and free energies.

Course Content

UNIT I **15 Hours**

Atomic and molecular structure

Schrodinger equation, Particle in a box solution and their applications for conjugated molecules and Nano particles, Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations, Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT II **15 Hours**

Spectroscopic techniques and applications

Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques, Diffraction and scattering.

1. Intermolecular forces and potential energy surfaces

Ionic, Dipolar and Vander Waals interactions, Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

UNIT III **15 Hours**

1. Use of free energy in chemical equilibria

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria, Water chemistry, Corrosion, Use of free energy considerations in metallurgy through Ellingham diagrams.

2. Periodic properties

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

UNIT IV **15 Hours**

1. Stereochemistry

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

2. Organic reactions and synthesis of a drug molecule

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text / Reference Books:

1. Mahan, B. H. (1987). University chemistry.
2. Sienko, M. J. & Plane, R. A. Chemistry. (1979): Principles and Applications. New York: McGraw-Hill.
3. Banwell, C. N. (1966). Fundamentals of Molecular Spectroscop. New York, McGraw-Hill.
4. Tembe, B. L., Kamaluddin& Krishnan, (2008). M. S. Engineering Chemistry (NPTEL Web-book).

SEMESTER: II

COURSE TITLE: Mathematics –II (probability and statistics.)
COURSE CODE: BCE202

L	T	P	Credits
3	1	0	4

Total: 60 Hours

Course learning outcomes: On successful completion of this course, students will be able to:

- Demonstrate the methods of forming and solving Ordinary differential equations and Solve linear differential equations with constant and variable coefficients.
- Explain the concept of differential equation and classifies the differential equations with respect to their order and linearity.
- Solve first-order ordinary and exact differential equations and converts separable and homogeneous equations to exact differential equations by integrating factors.
- Apply the method of undetermined coefficients to solve the non-homogeneous linear differential equations with constant coefficients.
- Compare the Methods of Cauchy's Riemann Integral and Analytical methods.

Course Content

UNIT-I **15 Hours**

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

UNIT-II **15 Hours**

First order ordinary differential equations:

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher orders:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

UNIT-III **15 Hours**

Complex Variable – Differentiation

Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.

UNIT-IV **15 Hours**

Complex Variable – Integration

Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books:

Thomes, G.B.and Finney, R.L. (2010) Calculus and Analytic Geometry; Ninth Edition; Pearson Education

Kreyszig, E. (1998) Advanced Engineering Mathematics; Eighth Edition, JohnWiley and sons.

Grewal, B.S. (1965) Higher Engineering Mathematics; KhannaPublishers, NewDelhi.

BabuRam(2009) Advance Engineering Mathematics; First Edition;PearsonEducation.

Richard Courant and Fritz John (2012) Introduction to Calculus and Analysis, Volume II , V Springer Publication

Harold M. Edwards (2013) Advanced Calculus: A Differential Forms Approach, Birkhauser.

SEMESTER: II

COURSE TITLE: PROGRAMMING FOR PROBLEM SOLVING
COURSE CODE: BCE203

L	T	P	Credits
3	0	0	3

Total: 45 Hours

Course Outcomes:

On successful completion of this course, the students would able to:

1. Design the algorithms to write programs.
2. Apply arrays, pointers and structures to formulate algorithms and programs
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
4. To implement conditional branching, iteration and recursion
5. Test and execute the programs and correct syntax and logical errors

Course Content

UNIT I **8 Hours**

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

UNIT II **12 Hours**

1. Arithmetic expressions and precedence
2. Conditional Branching and Loops
3. Writing and evaluation of conditionals and consequent branching
4. Iteration and loops
5. Arrays: Arrays (1-D, 2-D), Character arrays and Strings

UNIT III **15 Hours**

1. Basic Algorithms
   Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of Equations, notion of order of complexity through example programs (no formal definition required)
2. Function
   Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.
3. Recursion
   Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT IV **10 Hours**

1. Structure

Structures, Defining structures and Array of Structures

2. Pointers Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)
   File handling (only if time is available, otherwise should be done as part of the lab)

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books

1. Byron Gottfried, Schaum's (1995), Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill

SEMESTER: II

Course Title: COMMUNICATION SKILLS
Course Code: BCE204

L	T	P	Credits
2	0	0	2

Total: 42 Hours

Course Outcomes

On successful completion of this course, the students would be able to:

1. Develop vocabulary and improve the accuracy in Grammar.
2. Apply the concepts of accurate English while writing and become equally ease at using good vocabulary and language skills.
3. Develop and Expand writing skills through Controlled and guided activities
4. Compose articles and compositions in English
5. Become autonomous and self-directed English language learners.

Course Content

UNIT I **10 Hours**

Vocabulary Building

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

UNIT II **10 Hours**

Basic Writing Skills

Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely

UNIT III **10 Hours**

Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés

UNIT IV **12 Hours**

1. **Nature and Style of sensible Writing)**

Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion

2. **Writing Practices):** Comprehension, Précis Writing, Essay Writing

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books

1. Swan, Michael. (1995). Practical English. OUP.
2. Wood, F.T. (2007). Remedial English Grammar.Macmillan.
3. Zinsser, W. (2001). On Writing Well. Harper Resource Book.

4. Lyons, L. H.&Heasly, B.(2006). Study Writing. Cambridge University Press.
5. Kumar, S &Lata, P. (2011). Communication Skills. Oxford University Press.
6. CIEFL, Hyderabad. Exercises in Spoken English. Parts. I-III. Oxford University Press.

SEMESTER: II

Course Title: MANUFACTURING PRACTICES
Course Code: BCE205

L	T	P	Credits
1	0	4	3

Total: 60 Hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. Apply the various manufacturing methods in different fields of engineering.
2. Learn about the different fabrication techniques.
3. Learn about the practices in manufacturing of simple components using different materials.
4. Understand the advanced and latest manufacturing techniques being used in engineering industry.
5. Prepare different sand molds for various parts.

Course Content

UNIT I **15 Hours**

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. CNC machining, Additive manufacturing

UNIT II **15 Hours**

1. Fitting operations & power tools
2. Electrical & Electronics
3. Carpentry

UNIT III **15 Hours**

1. Plastic moulding, glass cutting
2. Metal casting

UNIT IV **15 Hours**

Welding (arc welding & gas welding), brazing [More hours can be given to Welding for Civil Engineering students as they may have to deal with Steel structures fabrication and erection; 3D Printing is an evolving manufacturing technology and merits some lectures and hands-on training. (1 hour)

Workshop Practice:

1. Machine shop - 10 hours
2. Fitting shop - 8 hours
3. Carpentry - 6 hours
4. Electrical & Electronics - 8 hours
5. Welding shop - 8 hours (Arc welding 4 hours) + gas welding 4 hours))
6. Casting - 8 hours
7. Smithy - 6 hours
8. Plastic moulding & Glass Cutting -6 hours

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text/Reference Books

1. Raghuwanshi, B.S.(2009). A Course in Workshop Technology, Vol 1 & II. DhanpatRai &Sons.
2. Jain, R.K.(2010).Production Technology.Khanna Publishers.
3. Singh, S.(2003).Manufacturing Practice.S.K. Kataria&Sons.

SEMESTER: II

Course Title: ENGINEERING CHEMISTRY LAB
Course Code: BCE206

L	T	P	Credits
0	0	4	2

Total: 15 Hours

Course Outcomes:

On successful completion of this course, the students would be able to:

1. Estimate rate constants of reactions from concentration of reactants /products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
3. Apply the theoretical concepts for result analysis and interpret data obtained from experimentation
4. Identify the compound using a combination of qualitative test and analytical methods

Course Content **15 Hours**

Choice of 10-12 experiments from the following:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Determination of the partition coefficient of a substance between two immiscible liquids
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

SEMESTER: II

Course Title: PROGRAMMING FOR PROBLEM SOLVING LAB
Course Code: BCE207

L	T	P	Credits
0	0	2	1

Total: 15 Hours

Course Outcomes: On successful completion of this course, the students would be able to:
1. Create, read and write to and from simple text files.
2. Identify and correct logical errors encountered at run time
3. Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration
4. Represent data in arrays, strings and structures and manipulate them through a program
5. Test and execute the programs and correct syntax and logical errors

Course Content **15 Hours**

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

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

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

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

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

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

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

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration)
Lab 8 and 9: Numerical methods problems

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

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

Tutorial 12: File handling
Lab 12: File operations

Suggested Text/Reference Books

1. Byron Gottfried, Schaum's (1995), Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy (2005) Programming in ANSI C, Tata McGraw-Hill.

SEMESTER: II

Course Title: COMMUNICATION SKILLS LAB
Course Code: BCE208

L	T	P	Credits
0	0	2	1

Total: 15 Hours

Course outcomes: On successful completion of this course, the students would be able to:
1. Illustrate the importance of pronunciation and apply the same day to day conversation
2. Apply verbal and non-verbal communication techniques in the Professional Environment
3. Develop coherence, cohesion and competence in Oral discourse.
4. Handle the interview process confidently.
5. Communicate contextually in specific personal and professional situations with courtesy.

Course Content **15 Hours**

Oral Communication

(This unit involves interactive practice sessions in Language Lab)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm
- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

SEMESTER: II

Course Title: NUMERICAL APTITUDE & REASONING ABILIT
Course Code: BCE209

L	T	P	Cr.
1	0	0	1

Total: 15 Hours

Course Outcomes:

On successful completion of this course, students would be able to:

1. Understand the basic concepts of quantitative ability
2. Understand the basic concepts of logical reasoning Skills
3. Acquire satisfactory competency in use of reasoning
4. Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability
5. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

Course Content

UNIT I **4 Hours**

1. Quantitative Ability (Basic Mathematics)
1.1. Number Systems
1.2. LCM and HCF
1.3. Decimal Fractions
1.4. Simplification
1.5. Square Roots and Cube Roots
1.6. Average
1.7. Problems on Ages
1.8. Surds & Indices
1.9. Percentages
1.10 Problems on Numbers

UNIT II **4 Hours**

2. Quantitative Ability (Applied & Engineering Mathematics)
2.1. Logarithm
2.2. Permutation and Combinations
2.3 Probability
2.4 Profit and Loss
2.5 Simple and Compound Interest
2.6. Time, Speed and Distance
2.7. Time & Work
2.8. Ratio and Proportion
2.9. Area
2.10 Mixtures and Allegation

UNIT III **3 Hours**

3. Data Interpretation
3.1. Data Interpretation

3.2. Tables
3.3. Column Graphs
3.4. Bar Graphs
3.5. Line Charts
3.6. Pie Chart
3.7. Venn Diagrams

UNIT IV **4 Hours**

4. Logical Reasoning (Deductive Reasoning)
4.1. Analogy
4.2. Blood Relation
4.3 Directional Sense
4.4. Number and Letter Series
4.5. Coding – Decoding
4.6. Calendars
4.7. Clocks
4.8. Venn Diagrams
4.9. Seating Arrangement
4.10. Syllogism
4.11. Mathematical Operations

Suggested Text / Reference Books

1. A Modern Approach To Verbal & Non Verbal Reasoning By R S Aggarwal
2. Analytical and Logical reasoning By Sijwali B S
3. Quantitative aptitude for Competitive examination By R S Aggarwal
4. Analytical and Logical reasoning for CAT and other management entrance test By Sijwali B S
5. Quantitative Aptitude by Competitive Examinations by Abhijit Guha 4th edition

SEMESTER: II

Course Title: STRESS MANAGEMENT

Course Code: BCE210

L	T	P	Cr.
1	0	0	1

Total: 16 Hours

Course Outcomes:

On successful completion of this course, students would be able to:

1. Identify the nature and causes of stress in organizations
2. Knowledge of stress prevention mechanism
3. Demonstrate the strategies that help cope with stress
4. Apply stress management principles in order to achieve high levels of performance
5. Adopt effective strategies, plans and techniques to deal with stress

Course Content

UNIT I **Hours: 4**

1. Understanding Stress (7 hours)
1.1 Stress – concept, features, types of stress
1.2 Relation between Stressors and Stress
1.3 Potential Sources of Stress – Environmental, Organizational and Individual
1.4 Consequences of Stress – Physiological, Psychological and Behavioural Symptoms
1.5 Stress at work place – Meaning, Reasons
1.6 Impact of Stress on Performance
1.7 Work Stress Model
1.8 Burnout – Concept
1.9 Stress v/s Burnout

UNIT II **Hours: 4**

2. Managing Stress – I (8 hours)
2.1 Pre-requisites of Stress-free Life
2.2 Anxiety - Meaning, Mechanisms to cope up with anxiety
2.3 Relaxation - Concept and Techniques
2.4 Time Management - Meaning, Importance of Time Management
2.5 Approaches to Time Management
2.6 Stress Management - Concept, Benefits
2.7 Managing Stress at Individual level
2.8 Role of Organization in Managing Stress/ Stress Management Techniques
2.9 Approaches to Manage Stress - Action oriented, Emotion oriented, Acceptance oriented.

UNIT III **Hours: 4**

3. Managing Stress – II (7 hours)
3.1 Models of Stress Management - Transactional Model, Health Realization/ Innate Health Model
3.2 General Adaption Syndrome (GAS) - Concept, Stages
3.3 Measurement of Stress Reaction - The Physiological Response,
3.4 The Cognitive Response, TheBehavioural Response.

3.5 Stress prevention mechanism - Stress management through mind control and purification theory and practice of yoga education.
3.6 Stress management interventions: primary, secondary, tertiary.
3.7 Meditation – Meaning, Importance

UNIT IV **Hours: 4**

4. Stress Management Leading to Success (8 hours)
4.1 Eustress – Concept, Factors affecting Eustress
4.2 Stress Management Therapy - Concept, Benefits
4.3 Stress Counselling - Concept
4.4 Value education for stress management
4.5 Stress and New Technology
4.6 Stress Audit Process
4.7 Assessment of Stress - Tools and Methods
4.8 Future of Stress Management

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Text / Reference Books

1. Heena T. Bhagtani. (2018). Stress Management. Himalaya Publishing House.
2. Dutta, P,K, (2010) Stress Management. Himalaya Publishing House.
3. Roy,S (2012). Managing Stress. Sterling Publication.

SEMESTER-II

Course Title: Basics of Management
Course Code: BCE211

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Content

UNIT-I **15 Hours**

Principles of Management: Introduction, definition and importance of management, Functions of Management, Planning, Organizing, Staffing, Coordinating, Directing, Motivating and Controlling. Concept and Structure of an Organization Types of industrial organization: Line organization, Functional organization, Line and Functional organization. Hierarchical Management Structure: Top, middle and lower-level management, Departmentalization Introduction and its advantages.

Work Culture: Introduction and importance of Healthy Work Culture in organization, Components of Culture, Importance of attitude, values and behavior, Behavioral Science – Individual and group behavior, Professional ethics – Concept and need of Professional Ethics.

UNIT-II **15 Hours**

Leadership and Motivation: Leadership: Definition and Need of Leadership, Qualities of a good leader, Manager vs. leader, Motivation: Definition and characteristics of motivation, Factors affecting motivation, Maslow's Need Hierarchy Theory of Motivation, Job Satisfaction.

Legal Aspects of Business: Introduction and Need, Labour Welfare Schemes: Wage payment: Definition and types, Incentives: Definition, need and types, Factory Act 1948, Minimum Wages Act 1948.

UNIT-III **15 Hours**

Management Scope in different Areas: Human Resource Development: Introduction and objective, Manpower Planning, recruitment and selection, Performance appraisal methods. Material and Store Management: Introduction, functions and objectives of material management, Purchasing: definition and procedure, Just in time (JIT). Marketing and Sales: Introduction, importance and its functions, Difference between marketing and selling, Advertisement- print media and electronic media, Market-Survey and Sales promotion. Financial Management – Introduction: Concept of NPV, IRR, Cost-

benefit analysis, Elementary knowledge of Income Tax, Sale Tax, Excise duty, Custom duty, Provident Fund, Maintenance Management , Concept , Preventive Maintenance.

UNIT-IV **15 Hours**

Miscellaneous Topics: Customer Relationship Management (CRM): Definition and Need, Types of CRM, Customer satisfaction. Total Quality Management (TQM): Inspection and Quality Control, Concept of Quality Assurance, TQM. Intellectual Property Rights (IPR): Introduction, definition and its importance, Infringements related to patents, copyright, trade mark.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

REFERENCE/TEXT BOOKS:

1. Principles of Management by Philip Kotler TEE Publication
2. Principles and Practice of Management by Shyamal Bannerjee: Oxford and IBM Publishing Co, New Delhi.
3. Financial Management by MY Khan and PK Jain, Tata McGraw Hill Publishing Co., 7, West Patel Nagar , New Delhi.
4. Modern Management Techniques by SL Goel: Deep and Deep Publications Pvt Limited , Rajouri Garden, New Delhi.
5. Management by James AF Stoner, R Edward Freeman and Daniel R Gilbert Jr. : Prentice Hall of India Pvt Ltd, New Delhi.
6. Essentials of Management by H Koontz, C O' Daniel , McGraw Hill Book Company, New Delhi.
7. Marketing Management by Philip Kotler, Prentice Hall of India, New Delhi
8. Total Quality Management by DD Sharma, Sultan Chand and Sons, New Delhi.
9. Intellectual Property Rights and the Law by Dr. GB Reddy.
10. Service Quality Standards, Sales & Marketing Department, Maruti Udyog Ltd.
11. Customer Relationship Management: A step-by-step approach, Mohamed & Sagadevan Oscar Publication, Delhi
12. Customer Relation Management, Sugandhi RK, Oscar Publication, Delhi.

SEMESTER: II

Course Title: Waste water Treatment & Recycling
Course Code: BCE212

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes:

On successful completion of this course, students would be able to:

1. Distinguish between the quality of domestic and industrial water requirements and Wastewater quantity generation
2. Understand the industrial process, water utilization and waste water generation
3. Impart knowledge on selection of treatment methods for industrial wastewater
4. Acquire the knowledge on operational problems of common effluent treatment plants.
5. Gain knowledge on different techniques and approaches for minimizing the generation and application of Physio chemical and biological treatment methods for recovery, reuse and disposal of industrial wastewater.

UNIT – I: 12 Hours

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Effects of industrial effluents on sewers and Natural water Bodies.

UNIT – II: 12 Hours

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction.

UNIT-III 12 Hours

Waste Treatment Methods - Nitrification and De-Nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT-IV: 12 Hours

Characteristics and Composition of waste water and Manufacturing Processes of Industries like Sugar, Characteristics and Composition of Industries like Food processing Industries, Steel, and Petroleum Refineries.

UNIT-V: 12 Hours

Characteristics and Composition of Industries like Textiles, Tanneries, Atomic Energy Plants and other Mineral Processing Industries – Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

REFERENCE BOOKS:

1. M.N. Rao and Dutta – Industrial Waste.
2. Mark J. Hammer, Mark J. Hammer, Jr., "Water & Wastewater Technology", Prentice Hall of India.
3. N.L. Nemerrow –Theories and practices of Industrial Waste Engineering.
4. C.G. Gurnham –Principles of Industrial Waste Engineering.

SEMESTER: III

Course Title: Surveying & Geomatics
Course Code: BCE301

L	T	P	Credits
3	1	0	4

Total: 60 Hours

Course Outcome

The course will enable the students to:

1. Understand the concept, various methods and techniques of surveying Compute angles, distances and levels for given area.
2. Apply the concept of tachometry survey in difficult and hilly terrain.
3. Select appropriate instruments for data collection and survey purpose
4. Analyze and retrieve the information from remotely sensed data and interpret the data for survey.
5. Understand the concepts related to GIS and GPS and analyze the geographical data.

Course Content

Unit-I: **15 Hours**

Introduction to Surveying: Principles, Survey stations, Survey lines- ranging, direct &indirect ranging, Bearing and its measurement with prismatic compass, calculation of angles from bearings, Local Attraction Leveling:, Principles of leveling- booking and reducing levels; differential, reciprocal leveling, profile leveling and cross sectioning. Digital and Auto Level, Errors in leveling; contouring: Characteristics, methods, uses; areas and volumes. Setting up the plane table and methods of plane tabling(Radiation and three point problem only).

Unit-II: **15 Hours**

Triangulation and Trilateration: Theodolite survey: Instruments, Measurement of horizontal and vertical angle; Balancing of Traverse, Omitted Measurements, Tachometry: Definition, determination of tachometer constants and reduced level from tachometric observations. Triangulation - network- Signals. Baseline
choices - extension of base lines - corrections - Trigonometric leveling .

Unit-III: **15 Hours**

Curves: Elements of simple and compound curves – Method of setting out Transition curve – length of curve – Elements of transition curve.
Photogrammetry Surveying: Introduction, Basic concepts, flight planning; Stereoscopy, photographic mapping- mapping using paper prints, mapping using stereoplotting instruments,

mosaics, map substitutes.

Unit-IV: **15 Hours**

Modern Field Survey Systems: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories – Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, LADAR (drone and vehicle based)
Remote Sensing: Introduction – Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Refernces & Books

1. Duggal, S.K., Surveying Vol I & II, Tata McGraw Hill
2. Punmia, B.C., Jain, Ashok Kumar and Jain, Arun Kumar, Surveying Vol. I, II & III, Laxmi Publications
3. Agor, R., Surveying, Khanna Publishers
4. Bhavikatti, S.S. Surveying & Levelling Volume I & II

SEMESTER-III

Course Title: Solid Mechanics
Course Code: BCE302

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcome

1. Understand the concept of static equilibrium, deformations, and material constitutive behaviour.
2. Describe the concepts of stress, strain and elastic behavior of materials including Hooke's law relationships to analyze structural members subjected to tension, compression and torsion.
3. Apply the concept of Mohr's circle in the stress/strain calculations.
4. Develop SFD and BMD for different type of beams subjected to different types of loads
5. Plot elastic curves for beams undergoing displacements under different loadings
6. Understand the behaviour of columns and struts under axial loading.

Course Content

Unit-I: **15 Hours**

Concept of Equilibrium: Loads, supports, reactions, displacements; General equilibrium equations; Equilibrium of a point and a member; Concept of free body diagram; Statical determinacy of a problem.

Stresses and Strains: Concept of stress and strain; Type of stresses and strains; Stress-strain diagrams for ductile, brittle materials; Generalized Hooke's law; Concept of working stress and factor of safety; Lateral strain, Poisson's ratio and Volumetric strain; Elastic moduli and relationship between them; Bars of varying section, composite bars, thermal stresses.

Unit-II: **15 Hours**

Principal Stressres and Strains: Concept of principal stresses, principal strains and principal planes; use of Mohr circle in computation of stresses and strains; Rectangular block subjected to normal stress along and across two planes, combination of normal and tangential stress alsowith shear stress.

Shear Force and Bending Moment Diagrams: Introduction to the concept of shear force, bending moment and the sign convention; Shear force and bending moment diagrams for cantilever, simply supported and overhang beams subjected to point loads, uniformly distributed loads, uniformly varying loads, moments or their combination, point of contra flexure.

Unit-III: **15 Hours**

Slope and deflection- Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams.

Bending and Shear Stresses: Assumptions - theory of simple bending; Derivation of bending equation; Centroid and section modulus of various cross sectional shapes including rectangular, circular, I, channel, angle etc.; Determination of bending stresses, bending stress distribution across various beam sections; Determination of shear stress, shear stress distribution across various beam sections.

Unit-IV: **15 Hours**

Columns and Struts: Stability of Columns; buckling load of axially loaded columns with various end conditions; Euler's and Rankine's formula; Columns under eccentric load, lateral load.

Torsion of Circular Shafts: Derivation of torsion equation and its assumptions, application of equation to circular shafts; combined torsion and bending of circular shafts, principal stress and maximum shear stress under combined loading of torsion and bending.

Stresses and strains in thin cylinders: spherical shells subjected to internal pressures; Normal stress, tangential stress.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books :

1. 'Elements of Strength of Materials', Timoshenko, S. and Young, D. H., DVNC, New York, USA.
2. 'Solid Mechanics', Kazmi, S. M. A., TMH, New Delhi.
3. 'Mechanics of Materials', Hibbeler, R. C., Pearson Prentice Hall.
4. 'An Introduction to the Mechanics of Solids', Crandall, S. H., N. C. Dahl, and T. J. Lardner, McGraw Hill.
5. 'Mechanics of Materials', Ferdinand P. Beer, E. Russel Jhonston Jr. and John T. D. Ewolf, TMH.
6. 'Strength of Materials', James M. Gere and Barry J. Goodno, Cengage Learning India Pvt. Ltd., New Delhi.

'Strength of Materials', R. Subramanian, Oxford University Press, New Delhi.

SEMESTER-III

Course Title: Fluid Mechanics
Course Code: BCE303

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes

After completion of the course, student is able to

1. Understand the basic terms used in fluid mechanics and its broad principles
2. Estimate the forces induced on a plane/ submerged bodies
3. Formulate expressions using dimensionless approach and able to determine design parameters by creating replica of prototype at appropriate scale.
4. Apply the continuity, momentum and energy principles and design the pipelines used for water supply or sewage under different situation.
5. Calculate drag force exerted by fluid on the body of varying shapes and able to minimize them.
6. Design and addressing problems in open channel (lined/ unlined) of different shapes and size optimally as per site condition.

Course Content

Unit-I: **15 Hours**

Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid Statics - Fluid Pressure: Pressure at a point, Pascal's law, Piezometer, U-Tube Manometer, U-Tube Differential Manometer, Micromanometers, pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Unit-II: **15 Hours**

Fluid Kinematics - Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates

Fluid Dynamics - Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem.

Unit-III: **15 Hours**

Laminar Flow & Turbulent Flow - Laminar flow through: circular pipes, parallel plates. Stoke's law, Reynolds experiment, Transition from laminar to turbulent flow. Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram. Flow through Pipes: Loss of head through pipes, Darcy-Wiesbach equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel

Boundary Layer Analysis- Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and Turbulent boundary layers on a flat plate; Laminar sub- layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Unit-IV: **15 Hours**

Open Channel Flow - Introduction, Comparison between open channel flow and pipe flow, geometrical parameters of a channel, Uniform Characteristics of uniform flow, Chezy's formula, Manning's formula. Most economical section of channel. Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books :

1. Fluid Mechanics & Hydraulic Machines : Dr. R.K. Bansal
2. Hydraulic and Fluid Mechanic by P.N. Modi & S.M. Seth
3. Engineering Fluid Mechanics by R.J. Garde & A.G. Mirajgaoker
4. Fluid Mechanics by Douglas JF, Gasiorek JM, Swaffield JP; Pitman
5. Fluid Mechanics: Streetes VL & Wylie EB;
6. Fluid Mechanics by Potter, Cengage Learning

SEMESTER-III

Course Title: Mathematics-III (Transform & Discrete)
Course Code: BCE304

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Understand the basic results on vector function, their properties and fields so as to apply them for solving problems of engineering.
2. Find length, area and volume using integral calculus that is an important application in engineering.
3. Solve some real problems in engineering using Gauss Divergence and Stokes' theorem
4. To formulate Laplace transform of functions and its applications to solve differential equations that form real life problems in engineering.
5. To formulate Fourier series, its properties and its applications to solve problems in engineering.

Detailed Content

Unit I: 15 Hours

Vector Calculus-I: Scalar and Vector point function, Gradient, Directional derivatives, Divergence, Curl and their identities, line, surface, volume integrals and their applications, Solenoidal and Irrotational fields.

Unit II: 15 Hours

Vector Calculus-II: Applications of Green, Gauss and Stokes Theorems, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds.

Unit III: 15 Hours

Transforms Calculus-I:Laplace Transform, Properties of Laplace Transform, Laplace Transform of Unit step function, Impulse function, Dirac-delta function, Periodic functions. Inverse Laplace Transform, convolution theorem, Evaluation of integrals by Laplace Transform, Applications to ODEs and PDEs.

Unit IV: 15 Hours

Transforms Calculus-II: fourier series, half range Fourier Sine and Cosine series, Fourier integrals, Gibbs Phenomenon, Fourier transforms, Relation between Laplace and Fourier transform, Properties of Fourier Transforms, Convolution Theorem and applications

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Textbooks/References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
3. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
4. Thomas and Finney, Calculus and Analytic Geometry, 9th Edition, Pearson, 2017.
5. R. K. Jain and S.R.K Iyengar Advanced Engineering Mathematics, 5th Edition, 2017.

SEMESTER-III

Course Title: Surveying & Geomatics Lab
Course Code: BCE305

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes

After completing the course the students must demonstrate the knowledge and ability to:

1. Assess horizontal & vertical angles by Theodolite.
2. Survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically.
3. Compute the reduce levels using various methods of leveling.
4. Predict the location of any point horizontally and vertically using Tachometry.
5. Setting out curves in the field.
6. Use electronic survey instruments.

Course Content

1. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
2. Different methods of levelling, height of instrument, rise & fall methods.
3. Measurement of horizontal and vertical angle by theodolite.
4. Determination of tachometric constants and determination of reduced levels by tachometric observations.
5. Plane table survey, different methods of plotting, Three point problem.
6. Determination of height of an inaccessible object.
7. Setting out of circular curves in the field using different methods.
8. Plotting of traverse using the Total Station and GPS.

SEMESTER-III

Course Title: Solid Mechanics Lab
Course Code: BCE306

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes:

1. Understand the importance of physical properties of steel.
2. Identify and comprehend code provisions for testing different properties of steel.
3. Develop stress-strain curve for axial compression, axial tension and shear.
4. Assess hardness and impact strength of steel.
5. Assess flexural strength of a given material.
6. Evaluate fatigue and impact strength of steel.

Course Content

1. Determination of physical properties of steel including strength and ductility.
2. Study of tensile and compressive stress-strain behaviour of steel.
3. Compression test on brick.
4. Development of shear stress-strain curve for steel in torsion.
5. Determination of hardness of a material by Rockwell and Brinell hardness testing machine.
6. Determination of impact strength of a material by Izod and Charpy tests.
7. Determination of bending strength of a wooden beam specimen.
8. Determination of fatigue strength of a material.
9. Study of behavior of columns and struts with different end conditions.
10. To verify the moment area theorem for slope and deflection of a given beam.

Text/Reference Books

1. Laboratory Manual of Testing Materials, William Kendrick Hall

SEMESTER-III

Course Title: Fluid Mechanics Lab
Course Code: BCE307

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcome:

1. Select appropriate pressure measuring device under different condition of flow.
2. Determine the stability of a floating body.
3. Understand and apply Bernoulli's theorem practically.
4. Find discharge of fluid through pipe, orifices and in open channel. 5 Estimate the major and minor losses in pipe.
5. Estimate the various elements and energy losses in hydraulic jump.

Course Content

1. To study of pressure measuring devices as peizometer, U-tube manometer, and pressure gauges.
2. To verify Bernoulli's Theorem
3. To determine the meta centric height of a of Floating Body under different condition.
4. To determine the coefficient of discharge of a Venturimeter.
5. To determine the coefficient of discharge of a Orifice Meter
6. To determine the coefficient of friction of different diameter pipes.
7. To estimate the minor losses as energy loss in pipe bend, sudden contraction or enlargement in pipe.
8. To determine the coefficient of discharge on rectangular and V-notches.
9. To determine the various element of a hydraulic jump.

Text/Reference Books

1. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House
3. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill

Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

SEMESTER-III

Course Title: Summer/Institutional Training
Course Code: BCE308

L	T	P	Cr.
0	0	0	S/US

Course Outcomes:

After completing this course the student must demonstrate the ability to:

1. Visualize things/ concepts and express the thoughts in the form of sketches, models, etc
2. Create a well organized document using computers
3. Work in teams
4. Acknowledge the work of other in a consistent manner
5. Understanding of ethical and professional issues
6. Demonstrate effective oral communication and presentation skills

Course Content

Unit-I **3 weeks**

Institutional Training

1. Hands-on-training on MS Office/ Office suite (Word processor, Spreadsheet, Math tools, presentation/ ppt, etc.)
2. Introduction to Civil Engineering software's and basic overview of drafting tools such as Auto Cad, etc.

Unit-II **3 weeks**

Field and Market Study

1. Student shall visit construction site of significantly scale and make an inventory construction and finishing materials being used.
2. Student shall do Market Survey for availability and rates of materials in the already prepared inventory.

Note:

1. The students need to submit a summary report of the institunal training in Module I, and A detailed report/ scrapbook inventory and market survey done in Module II.
2. The viva exam for the subject will be conducted along with the practical exams of the End-Semester Examination of Third Semester.

SEMESTER-III

Course Title: Basic Electronics & applications in Civil Engineering

Course Code: BCE309

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

After undergoing this course students will be able to

1. Understand construction of diodes and their rectifier applications.
2. Appreciate the construction and working bipolar junction transistors and MOSFETs.
3. Design Op-Amp IC based fundamental applications.
4. Comprehend working of basic elements of digital electronics and circuits.

Unit I: **15 Hours**

Semiconductor Diodes and Applications - Semiconductor Diode - Ideal versus Practical, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications;

Unit II: **15 Hours**

Transistors & Amplifiers - Bipolar Junction Transistor (BJT) – Construction, Operation, Common Base, Common Emitter and Common Collector Configurations, Distortion, Operating Point, Voltage Divider Bias Configuration; Introduction to nMOS and pMOS.

Unit III: **15 Hours**

Operational Amplifiers and Applications - Introduction to Op-Amp, Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground, Op-Amp Applications – Adder, Subtractor, Voltage Follower and Comparator; Differentiator and Integrator, Square Wave and Triangular Wave Generation.

Unit IV: **15 Hours**

Digital Electronics -Boolean Algebra - Binary, Octal, Hexadecimal Number Systems, Addition, Subtraction using 1's and 2's compliment method, Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR Integrated Circuits (ICs); K- Map simplification Truth Tables and Functionality of Flip-Flops – SR, JK and D Flip-Flop.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books:

1. David. A. Bell (2003), Laboratory Manual for Electronic Devices and Circuits, Prentice Hall, India.
2. SantiramKal (2002), Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India. 3.Thomas L. Floyd and R. P. Jain (2009), Digital Fundamentals by Pearson Education.
3. Paul B. Zbar, A.P. Malvino and M.A. Miller (2009), Basic Electronics – A Text-Lab. Manual, TMH
4. R. T. Paynter (2009), Introductory Electronic Devices & Circuits, Conventional Flow Version, Pearson.

SEMESTER-III

Course Title: Civil Engineering- Introduction, Societal & Global Impact
Course Code: BCE310

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes

1. Introduction to what constitutes Civil Engineering
2. Understanding the vast interfaces this field has with the society at large
3. Providing inspiration for doing creative and innovative work for the benefit of the society
4. Need to think innovatively to ensure Sustainability
5. Highlighting the depth of engagement possible within civil engineering and exploration of various possibilities of a career in this field

Course Contents

Unit I: **15 Hours**

Civil Engineering and its historical developments; Understanding the importance of Civil Engineering in shaping and impacting the world; the ancient and modern Marvels and Wonders in the field of Civil Engineering; Scope of work involved in various branches of Civil Engineering and future vision; Recent Civil Engineering breakthroughs and innovations; Avenues for entrepreneurial working.

Unit II: **15 Hours**

Understanding the past to look into the future; Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution and how these eras helped the civil engineering to grow; Concept of sustainability and the steady erosion of the environment due to haphazard developments; Global warming, its impact and possible causes; Atmospheric pollution; Pollution Mitigation measures; Health & Safety aspects for stakeholders; Environmental Impact Analysis: Concept and procedures; Innovations and methodologies for ensuring Sustainability.

Unit III: **15 Hours**

Infrastructure development and growth of the Nation; its effects on the GDP, employment, living standards of the people, etc.; Introduction and overview to Futuristic systems: Megacities, Smart Cities, Stadia; Roads, Railways, Metros, Hyper Loop, Airports, Seaports, River ways, Sea canals, Tunnels, bridges.

Unit IV: **15 Hours**

Energy Generation: Hydro, Solar, Wind, Wave, Tidal, Geothermal, Thermal energy; Telecommunication needs: towers, above-ground and underground cabling; Flood control: Dams, Canals, River interlinking; Energy efficient built-environments and LEED ratings; Awareness of various Codes & Standards governing Infrastructure development.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Readings :

1 Salvadori, M and Heller, M, Structures in Architectures, PHI.

2. Fintel, C, Handbook of Civil Engineering, CBS Publications.

3. Ž iga Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht

4.Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120th ASEE Annual Conference and Exposition

NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004

SEMESTER: III

COURSE TITLE: Business Analytics
COURSE CODE: BCE311

L	T	P	Credits
3	0	0	3

Total: 40 Hours

Course Outcomes:

1. To introduce students to basic principles of marketing.
2. To provide understanding of marketing as a business function.
3. To understand the role of the basic marketing framework.
4. To understand practical implications of marketing principles

Course Content

Unit 1: **10 Hours**

Basic concepts: Nature & Scope of Marketing, Concepts - production, product, selling marketing & societal marketing, marketing environment –marketing management and its environment.

Unit 2: **10 Hours**

Consumer buying behaviour: Consumer decision making process (five step model), factors affecting buying behaviour, purchase behaviour, buyer's role. Market Segmentation: Meaning, Definition, Different ways to Segmentation, Essential of effective Market Segmentation, Destination between differential Marketing & Concentrated Marketing.

Unit 3: **10 Hours**

Planning Marketing Strategy Strategic Planning Process, marketing and competitive strategies, Marketing Mix strategy, Marketing mix and environment, Assembling and managing marketing mix

Unit 4: **10 Hours**

Product decisions:

Product definition, new product development process, and product life cycle, positioning, branding (Definition of Brand and Brand Equity, Selection of Brand Name,), packaging & labeling decisions Pricing decisions: importance, objectives Concept of Price, Factors Influencing Pricing, Methods of Pricing (Cost based and Competition oriented) & strategies Product promotion: promotion mix and factors affecting. Distribution: channel decisions, types & factors, physical distribution system & its components. Contemporary Issues Marketing of Services -Rural Marketing – Consumerism and Consumer Protection Act,

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

References:

- Data Analysis and Decision Making by S.Christian Albright and Wayne L. Winston.
- Data Analytics: Become A Master In Data Analytics by Richard Dorsey
- Data Analytics: The Ultimate Beginner's Guide to Data Analytics by Edward Mize

SEMESTER: III

COURSE TITLE: Industrial Safety
COURSE CODE: BCE312

L	T	P	Credits
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Evaluate workplace to determine the existence of occupational safety and health hazards.
2. Identify relevant regulatory and national consensus standards along with best practices that is applicable.
3. Predict the appropriate control methodologies based on the hierarchy of controls.
4. Analyze injury and illness data for trends.
5. Enhance their skill sets to deal with any situation in industry.

Course Content

Unit-I **15 Hours**

Operational Safety:
Hot metal operation, boiler, pressure vessels – heat treatment shop – gas furnace operation – electroplating – hot bending pipes – safety in welding and cutting, Cold – metal operation – safety in machine shop – cold bending and chamfering of pipes-metal cutting – shot blasting, grinding, painting – power press and other machines. Management of toxic gases and chemicals – industrial fires and prevention – road safety – highway and urban safety – safety of sewage disposal and cleaning – control of environmental pollution – managing emergencies in industries – planning security and risk assessments, on – site and off site. Control of major industrial hazards.

Unit-II **15 Hours**

Safety Appraisal And Analysis:
Human side of safety – personal protective equipment – causes and cost of accidents. Accidents prevention program – specific hazard control strategies – HAZOP training and development of employees – first aid – fire fight devices – accident reporting, investigation. Measurement of safety performance, accident reporting and investigation – plant safety inspection, job safety analysis – safety permit procedures. Product safety – plant safety rules and procedures – safety sampling – safety inventory systems. Determining the cost effectiveness of safety measurement

Unit-III **15 Hours**

Safety And Health Regulations:
Safety and health standards – industrial hygiene – occupational diseases prevention welfare facilities. The object of factories act 1948 with special reference to safety provisions, model rules 123a, history of legislations related to safety – pressure vessel act – Indian boiler act – the environmental protection act – electricity act – explosive act.

Unit-IV **15 Hours**

Safety Management:
Evaluation of modern safety concepts – safety management functions – safety organization, safety department safety committee, safety audit – performance measurements and motivation – employee participation in safety - safety and productivity.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

References Books

1. Grimaldi, J.V. & Simonds, R.H. (1989). Safety Management. All India traveler book seller.
2. Krishnan, N.V. (1996). Safety in Industry. Jaico Publisher House.
3. DeReamer, R. (1980). Modern Safety and health Technology. R.Wiley

SEMESTER-IV

Course Title: Concrete Technology

Course Code: BCE401

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes

1. Understand the relevance of different properties of constituent materials on properties of concrete.
2. Understand the behaviour and durability aspects of concrete under different loading and exposure conditions.
3. Understand the issues involved in production and use of concrete.
4. Design of concrete mixes as per BIS specifications.
5. Understand various testing methods for concrete and their applicability.
6. Knowledge of special type of non-conventional concretes.

Content:

Unit I: **15 Hours**

Concrete and its ingredients: Properties of cement, aggregate, admixture, water and other additives; Related Indian Standard codes & guidelines.
Concrete behaviour in fresh and hardened states: Workability, Elasticity, Shrinkage, Creep, Fatigue, Strength in compression, tension, shear and bond; Influence of various factors on test results; Concrete cracking and type of cracks; Permeability and durability characteristics of concrete including resistance to sulphate & acid attack, alkali-aggregate reaction, freezing and thawing; Fire resistance.

Unit II: **15 Hours**

Production of concrete: Mixing, handling, placing, compaction of concrete and related issues; Quality control; Behaviour in extreme environmental conditions like hot weather, cold weather and under water conditions.
Concrete mix design: Basic considerations, proportioning of material, effect of various parameters, trial mixes, Design by IS code.

Unit III: **15 Hours**

Inspection and testing of concrete: Defects in concrete; Deterioration of concrete; Strength tests including compressive, split tensile, flexural, pullout etc.; Durability tests including permeability, carbonation, rapid chlorine ion penetration etc.; Destructive and

Non-destructive testing of concrete; Acceptance and compliance requirements of concrete as per IS codes.

Unit IV: **15 Hours**

Special concretes: Types and specifications; Fibre reinforced and steel reinforced concrete; Polymer concrete; Light weight concrete, High strength concrete, Prestressed concrete, Self-Compacting Concrete, Pervious Concrete, Self-Healing Concrete.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books

1. 'Properties of Concrete', A. M. Neville, Prentice Hall
2. 'Concrete Technology', M. S. Shetty, S.Chand & Co.
3. 'Concrete Technology', M. L. Gambhir, Tata McGraw Hill Publishers, New Delhi

'Concrete Technology', A. R. Santha Kumar, Oxford University Press, New Delhi

Course Title: Concrete Technology Lab
Course Code: BCE402

L	T	P	Cr.
0	0	2	1

SEMESTER-IV

Total: 20 Hours

Course Outcomes

1. Understand the relevance of different properties of constituent materials on properties of concrete.
2. Understand the behavior and durability aspects of concrete under different loading and exposure conditions.
3. Understand the issues involved in production and use of concrete.
4. Design of concrete mixes as per BIS specifications.
5. Knowledge of special type of non-conventional concretes.

Course Content

The following experiments are to be performed in the Concrete Lab.

1. To Determine the Specific Gravity of cement.

2. To Determine the Standard Consistency, Initial and Final Setting Times of Cement.

3. To Determine Soundness of Cement.

4. To Determine the Compressive Strength of Cement.

5. To Determine the Compressive Strength of Bricks/Tiles.

6. To Determine the Fineness Modulus of Fine and Coarse Aggregates.

7. To Determine the Bulk Density, Water Absorption and Sp. Gr. of Fine and Coarse Aggregates.

8. To Determine the Slump, Compaction Factor and Vee-Bee Time of Concrete.

9. Mix Design of Concrete.

10. To Determine the Compressive Strength of Concrete by Cube and Cylinder.

11. To carry out the Tensile and Flexural tests of Concrete.

12. To determine the Compressive Strength of hardened Concrete by Non-Destructive

Test

Books/Manuals: -

1. Concrete Manual by Dr. M.L. Gambhir, Dhanpat Rai & Sons Delhi.
2. Concrete Lab Manual by TTTI Chandigarh

SEMESTER-IV

Course Title: Transportation Engineering Lab
Course Code: BCE403

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes

After completing this course, the student will be able to:

1. Appreciate the importance of different modes of transportation and characterize the road transportation.
2. Alignment and geometry of pavement as per Indian Standards according to topography.
3. Assess the properties of highway materials in laboratory
4. Understand the importance of railway infrastructure planning and design.
5. Identify the functions of different component of railway track.

Course Content

1. Tests on Sub-grade Soil

i. IS Compaction Test

ii. California Bearing Ratio Test

2. Tests on Road Aggregates

Gradation Test Crushing Value Test Abrasion Value Test Impact Value Test

Specific Gravity & Water Absorption Test

Shape Test

Marshal Stability Test

3. Tests on Bituminous Materials

Penetration Test Ductility Test Softening Point Test

Flash & Fire Point Test

Bitumen Extraction Test

4. Field Tests

i. Roughness Measurements of Road by Profilograph

Books/Manuals Recommended:

1. Khanna S.K., and Justo, C.E.G. “Highway Testing Manual”, Nem Chand and Brothers, Roorkee, 1998.

SEMESTER-IV

Course Title: Transportation Engineering
Course Code: BCE404

L	T	P	Cr.
4	1	0	5

Total: 60 Hours

Course Outcomes

After completing this course, the student must demonstrate the knowledge and ability to:

1. Appreciate the importance of different modes of transportation and characterize the road transportation.
2. Alignment and geometry of pavement as per Indian Standards according to topography.
3. Assess the properties of highway materials in laboratory
4. Understand the importance of railway infrastructure planning and design.
5. Identify the functions of different component of railway track.
6. Outline the importance of Airport Infrastructure

Course Content

Unit I: **15 Hours**

Introduction: Importance of Transportation, Different Modes of Transportation, Characteristics of Road Transport.

Transportation Systems: Multi modal transportation system, Characteristics of Mass Transit systems including technical, demand operational and economic problems, fixed Track Facility, Mass Rapid Transit System- Elevated, Surface and Underground construction, Express Bus System, integrated Operating Characteristics of Terminal and Transfer facilities.

Unit II: **15 Hours**

Highway Development & Planning: Principles of Highway Planning, Road Development in India, Classification of Roads, Road Patterns, Planning Surveys; Highway Construction: Right of way; Earthen/Gravel Road, Water Bound Macadam, Wet Mix Macadam, Bituminous Pavements, Cement Concrete Pavements

Unit III: **15 Hours**

Railway Engineering: History of Railways, Development of Indian Railway, Organization of Indian Railway, Important Statistics of Indian Railways. Railway Gauges: Definition, Gauges on World Railways, Choice of Gauge, Uniformity of Gauge, Loading Gauge, Construction Gauge.

Railway Track: Requirements of a Good Track, Track Specifications, Detailed Cross-Section of Single/Double Track used in Indian Railways. Components of permanent way - Rails, Sleepers, Ballast, Sub-grade and Formation, Track Fixtures & Fastenings, Coning of Wheels, Tilting of Rails, Adzing of Sleepers, Rail Joints, Creep of Rails.

Unit IV: 15 Hours

Airport Engineering: Introduction, Air Transport Scenario in India and Stages of Development, National and International Organizations; Airport planning - Site selection, runway orientation, etc. Concept of Head Wind, Cross Wind, Wind Rose Diagram, Runway Configuration.

Aircraft Parking System & Visual Aids: Main Taxiway, Exit Taxiway, Separation Clearance, Holding Aprons.: Marking and Lighting of Runway and Taxiway, Landing Direction Indicator, and Wind Direction Indicator, IFR/VFR.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

References

- Khanna S.K., and Justo, C.E.G. “Highway Engineering”, Nem Chand and Brothers, Roorkee,1998.
- Kadiyali, L.R. “Principles and Practice of Highway Engineering”, Khanna Publishers, New Delhi, 1997.
- Flaherty, C.A.O. “Highway Engineering”, Volume 2, Edward Arnold, London, 1986.
- Sharma, S.K. “Principles, Practice & Design of Highway Engineering”, S. Chand & Company Ltd., New Delhi, 1985.

SEMESTER-IV

Course Title: Environmental Studies
Course Code: BCE405

L	T	P	Cr.
3	0	0	NC

Total: 45 Hours

COURSE OUTCOMES:

1. Discover knowledge in ecological perspective and value of environment.
2. Understand the significance of various natural resources and its management.
3. Demonstrate a comprehensive understanding of the world's biodiversity and the importance of its conservation.
4. Categorize different types of pollutions and their control measures. Discover effective methods of waste Management. Analyze global environmental problems and come out with best possible solutions.
5. Understand environmental laws and sustainable development

Course Contents

Unit 1: **12 Hours**

The Multidisciplinary nature of environmental studies

Definition and scope and importance of multidisciplinary nature of environment, need for public awareness.

Natural Resources: Natural resources and associated problems, use and over-exploitation, case study of forest resources and water resources.

Unit II: **13 Hours**

Ecosystems

Concept of an ecosystem, Structure, Producers, interrelationship, producers, consumers and decomposers, ecological pyramids-biodiversity and importance. Hot spot of biodiversity.

Environmental Pollution

Definition, Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards. Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

Unit III: **13 Hours**

Social Issues and the Environment

From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. Waste land reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of Environmental legislation Public awareness.

Unit IV: **12 Hours**

Human Population and the Environment

Population growth, variation among nations, Population explosion – Family Welfare Programme, Environment and human health, Human Rights, Value Education, HIV / AIDS Women and Child Welfare, Role of Information Technology in Environment and human health, Case Studies.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books

1. Aggarwal, K. C. Environment Biology, Nidi Publ. Ltd. Bikaner.
2. Jadav, H and Bhosale, V.M. Environment Protection and Laws. Himalaya Pub House, Delhi.
3. Rao M. N. and Datta A.K.. Waste Treatment. Oxford and IBH Publ.

SEMESTER-IV

Course Title: Disaster Preparedness & Planning
Course Code: BCE406

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes

After completing this course the student must demonstrate the knowledge and ability to:

1. Identify various types of disasters, their causes, effects & mitigation measures.
2. Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.
3. Understand the use of emergency management system to tackle the problems.
4. Discuss the role of media, various agencies and organizations for effective disaster management.
5. Design early warning system and understand the utilization of advanced technologies in disaster management.

Course Content

Unit I: **15 Hours**

Introduction to Disaster Management: Define and describe disaster, hazard, vulnerability, risk-severity, frequency and details, capacity, impact, prevention, mitigation.

Disasters: Identify and describe the types of natural and manmade disasters, hazard and vulnerability profile of India, mountain and coastal areas, Factors affecting vulnerability such as impact of development projects and environment modifications (including dams, land-use changes, urbanization etc.), Disaster impacts (environmental, physical, social, ecological, economic etc.); health, psycho-social issues; demographic aspects (gender, age, special needs), Lessons and experiences from important disasters with specific reference to civil engineering.

Unit II: **15 Hours**

Disaster Mitigation and Preparedness: Disaster Management Cycle-its phases; prevention, mitigation, preparedness, relief and recovery; structural and nonstructural measures; Preparedness for natural disasters in urban areas.

Risk Assessment: Assessment of capacity, vulnerability and risk, vulnerability and risk mapping, stages in disaster recovery and associated problems; Use of Remote Sensing Systems (RSS) and GIS in disaster Management, early warning systems.

Unit III : **15 Hours**

Post Disaster Response: Emergency medical and public health services; Environmental post disaster response (water, sanitation, food safety, waste management, disease control, security, communications); reconstruction and rehabilitation; Roles and responsibilities of government, community, local institutions, role of agencies like NDMA, SDMA and other International agencies, organizational structure, role of insurance sector, DM act and NDMA guidelines.

Unit IV: **15 Hours**

Integration of public policy: Planning and design of infrastructure for disaster management, Community based approach in disaster management, methods for effective dissemination of information, ecological and sustainable development models for disaster management.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Books and References

1. www.http//ndma.gov.in
2. http://www.ndmindia.nic.in
3. Natural Hazards in the Urban Habitat by Iyengar, C.B.R.I., Tata McGraw Hill, Publisher
4. Natural Disaster management, Jon Ingleton (Ed), Published by Tudor Rose, Leicester 92
5. Singh B.K., 2008, Handbook of disaster management: Techniques & Guidelines, Rajat Publications.
6. Disaster Management, R.B. Singh (Ed), Rawat Publications
7. ESCAP: Asian and the Pacific Report on Natural Hazards and Natural Disaster Reduction

SEMESTER-IV

Course Title: Material, Testing & Evaluation
Course Code: BCE407

L	T	P	Cr.
5	0	0	5

Total: 60 Hours

Course Outcomes

1. Appraisal about the role of materials in civil engineering
2. Introduce common measurement instruments, equipments and devices to capture the material response under loading
3. Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice
4. Ability to write a technical laboratory report.

Unit-I: **15 Hours**

Introduction to Engineering Materials: Types, properties, advantages and uses of: Cement; Concrete; Admixtures; Glass and Plastics; Paints and Varnishes,; Acoustical material; Geo-synthetics, Bitumen and Asphalt; Ceramics and Refractory's ;Bricks; Concrete hollow blocks & Interlocking tiles.

Sand: Composition, types, Physical Properties, uses. Fly ash: Source, types, properties and uses Timbers: Properties, Seasoning, defects, preservation methods, laminates and adhesives,

Unit-II: **15 Hours**

Ferrous and nonferrous metals, Importance of Structural steel; Their characteristics and mechanical behaviour (elastic, plastic and elasto plastic, strength and durability w.r.t Climatic variation); Creep – fundaments and characteristics, concept of fatigue of materials; Impact test, toughness – different materials.

Unit-III: **15 Hours**

Testing Procedures for bricks, reinforcing steel, fine aggregates, coarse aggregates, Physical identification of tests for soils. Documenting the experimental program, including the test procedures, collected data, method of interpretation and final results.

Unit-IV: **15 Hours**

Quality control- Use of test data/ testing reports in the material selection for various civil engineering projects /construction, Sampling, Acceptance criterion, Code of practice and guidelines in this regards for Cements; Aggregates; Concrete (plain and reinforced); Soils; Bitumen and asphaltic materials; Timbers; Glass and Plastics; Structural Steel.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books:

1. Chudley, R., Greeno (2006), 'Building Construction Handbook' (6th ed.),R. Butterworth- Heinemann

2.Khanna, S.K., Justo, C.E.G and Veeraragavan, A, ' Highway Materials and Pavement Testing', Nem Chand & Bros, Fifth Edition

3.Various related updated & recent standards of BIS, IRC, ASTM, RILEM, AASHTO, etc. corresponding to materials used for Civil Engineering applications

4.Kyriakos Komvopoulos (2011), Mechanical Testing of Engineering Materials, Cognella

5.E.N. Dowling (1993), Mechanical Behaviour of Materials, Prentice Hall International Edition 6.American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards (post 2000)

SEMESTER-IV

Course Title: Hydrology & Water Resources
Course Code: BCE408

L	T	P	Cr.
5	0	0	5

Total: 60 Hours

Curse Outcomes

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

1. Understand the interaction among various processes in the hydrologic cycle.
2. Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, Evapotranspiration etc
3. Understand the various component of hydro graphs and able to estimate the run off.
4. Find the water requirement for different crops and able to proposed appropriate method of applying water.
5. Understand the distribution system of canal and various components of irrigation system.

Course Content

Unit I: **15 Hours**

Introduction - Hydrologic Cycle, History of Hydrology, Water-Budget Equation, World Water Balance, Applications in Engineering, Sources of Data.

Precipitation - Forms of Precipitation, Characteristics of Precipitation in India, Measurement of Precipitation, Rain Gauge Network, Mean Precipitation over an Area, Depth Area-Duration Relationships, Maximum Intensity/Depth-Duration-Frequency Relationship, Probable Maximum Precipitation (PMP), Rainfall Data in India.

Unit II: **15 Hours**

Abstractions from precipitation - Evaporation Process, Evaporimeters, Analytical Methods of Evaporation Estimation, Reservoir Evaporation and Methods for its Reduction, Evapotranspiration, Interception, Depression Storage, Infiltration, Infiltration Capacity, Measurement of Infiltration, Modelling Infiltration Capacity, Classification of Infiltration Capacities, Infiltration Indices.

Runoff - Runoff Volume, SCS-CN Method of estimating runoff volume, Flow Duration Curve, Flow-Mass Curve, Hydrograph, Factors Affecting Runoff Hydrograph, Components of Hydrograph, Base Flow Separation, Effective Rainfall, Unit Hydrograph Surface Water Resources of India, Environmental Flows.

Unit III: 15 Hours

Water withdrawals and uses – Water for Energy Production, Water for Agriculture, Water for Hydroelectric Generation; Flood Control. Analysis of Surface Water Supply, Water Requirement of Crops- Crops and Crop Seasons in India, Cropping Pattern, Duty And Delta; Quality of Irrigation Water; Soil-Water Relationships, Root Zone Soil Water, Infiltration, Consumptive use, Irrigation Requirement, Frequency of Irrigation; Methods of Applying Water to The Fields: Surface, Sub-Surface, Sprinkler and Trickle / Drip Irrigation.

Distribution systems - Canal Systems, Alignment of Canals, Canal Losses, Estimation of Design Discharge. Design of Channels- Rigid Boundary Channels, Alluvial Channels, Kennedy's and Lacey's Theory of Regime Channels. Canal Outlets: Non-Modular, Semi-Modular And Modular Outlets.

Unit IV: 15 Hours

Water Logging: Causes, Effects and Remedial Measures. Lining of Canals, Types of Lining. Drainage of Irrigated Lands: Necessity, Methods.

Dams and spillways - embankment dams: Classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Text/Reference Books

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. L W Mays, Water Resources Engineering, Wiley.
6. J. D Zimmerman, Irrigation, John Wiley & Sons

SEMESTER-IV

Course Title: Mentoring and Professional Development of Students
Course Code: BCE409

L	T	P	Cr.
5	0	0	5

Total: 40 Hours

Curse Outcomes

At the end of the course, students will have the following skills:

1. Presentation Skills
2. Communication Skills
3. General Awareness (Current Affairs and GK)
4. Aptitude (Technical and General)
5. Overall Personality

Course Content

Unit-I **20 Hours**

Expert and video lectures, Aptitude Test, Group Discussion, Quiz (General/Technical), Presentations by the students Team building Exercises

Unit-II **20 Hours**

Sports/NSS/NCC, Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

SEMESTER-V

Course Title: Environmental Engineering
Course Code: BCE501

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Understand different methods are used to purify the water and rectify the water which improves the standard and living style of the community.
2. Able to determine the population forecast for a city to meet its water requirement
3. Able to design water treatment plant by different methods.
4. Able to know about the drainage and plumbing system in commercial, residential and industrial area
5. Visualize the impacts of human activities on environment and role of society in these impacts

UNIT I: **15 Hours**

PUBLIC WATER SUPPLY: Beneficial uses of water, water demand, per capita demand, variation in demand; causes, detection and prevention of wastage of water, population forecasting.

SOURCES OF WATER SUPPLY: Surface and underground sources, relation and development of source in r/o quality and quantity of water, Development of wells, Storage reservoir-balancing and service storage, capacity determination by mass curve method. Intake and transmission system distribution systems: network design.

UNIT II: **15 Hours**

QUALITIY AND EXAMINATION OF WATER: Necessity for examination of water impurities in water, sampling of water, physical, chemical and bacteriological quality for domestic water supply. Drinking water quality standards and criteria.

WATER SUPPLY AND DRAINAGE OF BUILDINGS: System of water supply houses connections, mattering, internal distribution, and sanitary fittings pipe joints, Different types of pipes and pipes materials.

UNIT III: **15 Hours**

WATER TREATMENT: Unit operations in water treatment screening, sedimentation, and its theory sedimentation aided with coagulation, flocculation, sand filtration-slow, rapid, gravity and pressure filters, Disinfecting, Necessary:

requirementsofdisinfectant,methods,ofdisinfectingdifferentpracticesofchlorinating.

UNIT IV: **15 Hours**

MISCELLANEOUSMETHODSOFWATERTREATMENT: Aeration, taste and odour control iron and manganese removal water softening processes Base exchange process, Swimming pool water Treatment

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Water Supply Engineering Environmental Engg.I by B.C. Punmia, Ashok Jain, Arun Jain.
- Environmental Engineering-A Design Approach by ARCADIOP.SINCERO, GREGORIAA. SINCERO
- Environmental Engineering and Technology, by PEAVY, ROWE.

SEMESTER-V

Course Title: Mechanics of materials
Course Code: BCE502

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. This first course in mechanics of deformable bodies introduces the four concepts – Force, stress, strain, displacement.
2. Systematic procedure to solve problems of engineering interest is outlined. In particular, force and displacement.
3. Estimation of possible modes of failure of these structural elements and the failure load is outlined.
4. To determine principal stresses and angles, maximum shearing stresses and angles, and the stresses acting on any arbitrary plane within a structural element.
5. To solve problems and identify the fundamental elements involved in the mechanical design of engineering structures; e.g. which failure / safety criterion to apply for different applications, failure prediction and analysis.

UNIT I: **15 Hours**

Tension, compression & shear

Types of external loads – self weight – internal stresses – normal and shear stresses – strain – Hooke's law – Poisson's ratio – relationship between elastic constants – stress strain diagrams working stress – elongation of bars of constant and varying sections – statically indeterminate problems in tension and compression – assembly and thermal stresses – strain energy in tension, compression and shear.

UNIT II: **15 Hours**

Stress on inclined planes for axial and biaxial stress fields – principal stresses – Mohr's circle of stress – principal strains – strain rosette – principal stress/strain problem as an eigen value problem.

UNIT III: **15 Hours**

Bending moment and shear force

Different types of beams – shear force and bending moment diagrams for simply supported overhanging and cantilever beams – relationship connecting intensity of loading, shearing force and bending moment – shear force and bending moment diagrams for statically determinate plane frames.

Stresses in laterally loaded symmetrical beams
Theory of simple bending – limitations – bending stresses in beams of different cross sections – moment of resistance- beams of uniform strength – beams of two materials – shearing stresses in bending–principal stresses in bending –strain energy due to bending.

Unsymmetrical bending
Shear flow – shear center – determination of shear center for simple sections.

UNIT IV **15 Hours**

Theory of columns

Axial loading of short strut – long columns – differential equation of the elastic curve – Euler's formula – eccentric loading – direct and bending stresses – buckling load as an eigenvalue problem.

Torsion
Torsion of circular solid and hollow shafts – power transmission – strain energy in shear and torsion – close coiled and open coiled helical springs.

Thin and thick cylinders
Lame's equation – stresses in thick cylinders due to internal and external pressures – compound cylinders – shrink fit – wire wound pipes and cylinders.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Gere, J.M., Mechanics of Materials, Thomson, Singapore, 2001.
- Popov, E.P., Mechanics of Materials, Prentice Hall India, New Delhi, 2002.
- Timoshenko, S.P., and Young, D.H., Elements of Strength of Materials, East West Press, New Delhi, 2003.
- Beer, F. P. and Johnston, E. R., Mechanics of Materials, Tata McGraw Hill, New Delhi, 2005
- Hearn, E. J., Mechanics of Materials Pergamon Press, Oxford, 1982.
- Nash, W. A., Strength of Materials, Schaum's Outline Series, McGraw Hill, New York, 1988.

SEMESTER-V

Course Title: Hydraulic Engineering
Course Code: BCE503

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Become familiar with different water resources terminology like hydrology, ground water, hydraulics of pipelines and open channel.
2. Understand and be able to use the energy and momentum equations.
3. Analyze flow in closed pipes, and design and selection of pipes including sizes.
4. Become familiar with open channel cross sections, hydrostatic pressure distribution and Manning's law.
5. Familiar with drainage systems and wastewater sources and flow rates.

UNIT I: **15 Hours**

Introduction to Open Channel Flow: Difference between Open Channel Flow and Pipe Flow, Types of Channel, Geometric parameters of a channel, Classification of Open Channel Flow, Continuity and Momentum equation.

Uniform flow: Resistance flow formula, Velocity distribution, Equivalent roughness coefficient, Velocity coefficients, Uniform flow in rigid boundary channel, Uniform flow in mobile boundary channel.

UNIT II: **15 Hours**

Energy and Momentum Principle: Concept of Specific Energy, Critical Depth, Alternate depth, Specific Force, Sequent depth.

Non-Uniform Flow: Governing equation of GVF, Classification of Gradually Varied Flow, Computation of GVF profile, Rapidly Varied Flow, hydraulic Jump, Flow over a Hump, Flow in Channel Transition.

UNIT III: **15 Hours**

Canal Design: Concept of best hydraulic section, Design of rigid boundary canal, design of channel in alluvial formation- Kennedy's theory, Lacy's theory, Method of Tractive force, Free-board in canal.

Unsteady Flow: Wave and their classification, Celerity of wave, Surges, Characteristic equation

UNIT IV: **15 Hours**

Pipe Flow: Losses in pipes, Pipe in series and parallel, Pipe network analysis, Water hammer, Surge tank.

Hydraulic Model Study: Important dimensionless flow parameters, Similitude: Geometric, Kinematic and Dynamic Similarity, Model scales.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Chow,V.T. Open Channel hydraulics McGraw Hill Publication
- Subramanya, K., Flow through Open Channels, TMH, New Delhi
- RangaRaju, K.G., Flow through open channels, T.M.H. New Delhi
- Rajesh Srivastava, Flow through Open Channels, Oxford University Press
- Streeter, V.L.& White E.B., Fluid Mechanics McGraw Hill Publication
- Modi& Seth Hydraulics & Fluid Mechanics Standard Publications.
- RK Bansal Fluid Mechanics and Hydraulic Machines Laxmi Publication
- AK Jain Fluid Mechanics Khanna Publication.
- Houghtalen, Fundamentals of Hydraulics Engineering Systems 4/e Pearson Education, Noida

SEMESTER-V

Course Title: Structural Engineering
Course Code: BCE504

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Able to interpret the various methods of structural displacements.
2. Able to analyze the determinate structure and its reaction diagram.
3. Able to draw the influence line diagram for rolling loads.
4. Able to compute the pressure on supporting tower, suspension bridge etc. and to calculate loads for no tension criteria on domes chimneys and retaining walls.
5. Able to interpret the various methods of structural displacements.

Course Content

UNIT I: **15 Hours**

Deflection of Beams

Derivation of basic equation of elastic curve, deflection in beams with different end conditions and different loadings by double integration method, Macaulay's method. moment area theorem, conjugate beam method, unit method and strain energy method. Maxwel's reciprocal theorem.

UNIT II: **15 Hours**

Thin Cylinders and Spheres

Introduction, stresses and strains in thin cylinders and spherical shell, volumetric change, wire wound thin cylinders, thin vessels subjected to internal pressure.

Analysis of determinate Trusses

Introduction, determination of forces in member of trusses by method of joints, method of sections, Tension coefficient Deflection of Joints of plane frames by Castiglione's first theorem and unit load method. Analysis of Dams, chimneys and Retaining Walls Introduction, limit of eccentricity for no tension in the section, core of the section, middle third rule, wind pressure on chimneys.

UNIT III: **15 Hours**

Rolling Loads

Introduction to rolling loads and influence lines, Determination of shear force, bending moment at a section and absolute shear force and bending moment due to single point load, uniformly distributed load, several point loads etc.

Influence Lines

Construction of Influence lines for reaction, shear forces and bending moment for simply supported, overhauling and compound beams, influence lines for girders with floor beams, Influence lines for forces in members of frames. Influence lines for deflection.

UNIT IV: **15 Hours**

Arches

Introduction, Analysis of three hinged, two hinged and fixed arches, spandrel braced arches, Influence lines for horizontal thrust, shear force and bending moment for three hinged and two hinged arches.

Cables and suspension Bridges

Introduction, shape of a loaded cable, cable carrying point loads and UDL, cables with ends at different level, cable subjected to temperature stresses, suspension bridge with two hinged and three hinged stiffening girders, influence lines.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Basic structural Analysis C.S.Reddy, Mittal Publications, New Delhi.
- Analysis of Structures Vol- I and Vol.-II Vazirani&Ratwani, Khanna Publishers, New Delhi.
- Structural analysis: S. Ramamurtham; DhanpatRai Publishing Co.(P) Limited.

SEMESTER-V

Course Title: Hydraulic Engineering Lab
Course Code: BCE505

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes:

1. Become familiar with different water resources terminology like hydrology, ground water, hydraulics of pipelines and open channel.
2. Understand and be able to use the energy and momentum equations.
3. Analyze flow in closed pipes, and design and selection of pipes including sizes.
4. Become familiar with open channel cross sections, hydrostatic pressure distribution and Manning's law.
5. Familiar with drainage systems and wastewater sources and flow rates

Course Content

Experiments on the following

1. Determination of Manning's "n"
2. Specific energy curve
3. Gradually Varied Flow Profile
4. Hydraulic Jump
5. Flow over Hump
6. Flow through Channel Contraction
7. Pipe friction
8. Water hammer

SEMESTER-V

Course Title: Geotechnical Engineering Lab
Course Code: BCE506

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes:

1. To understand the origin of soil and to identify different types of soil and apply the knowledge of soil and rock to judge its behavior and suitability for civil engineering structures.
2. Able to describe Darcy's law for the flow of water through saturated soils; determine the coefficient of permeability and equivalent hydraulic conductivity in stratified soil
3. To understand the various physical and engineering characteristics of different types of soil
4. Able to calculate seepage, pore water pressure distribution, uplift forces and seepage stresses for simple geotechnical systems
5. Able to describe the direct shear test method and concept of slope stability structures.

Course Content

Experiments on the following:

1. Determination of in-situ density by core cutter method.
2. Determination of in-situ density by sand replacement method.
3. Determination of Liquid Limit & plastic Limit by Casagrande apparatus and penetrometer method.
4. Determination of specific gravity of soil solids by pyconometer method.
5. Grain size analysis of a given sample of sand and determination of coefficient of uniformity and coefficient of curvature.
6. Direct shear and triaxial test on a given soil sample. Unconfined compression test for fine grained soil.
7. Determination of permeability by constant Head Method and variable head method.
8. Compaction test (proctor) and modified proctor test.
9. Determination of Relative Density of soil.

SEMESTER-V

Course Title: Constitution of India
Course Code: BCE507

L	T	P	Cr.
3	0	0	NC

Total: 45 Hours

Course Outcomes:

1. To realize the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.
2. To identify the importance of fundamental rights as well as fundamental duties.
3. To understand the functioning of Union, State and Local Governments in Indian federal system.
4. To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.

UNIT-I **12 Hours**

Introduction to Constitution:

Meaning and importance of the Constitution, salient features of Indian Constitution. Preamble of the Constitution**.** Fundamental rights**-** meaning and limitations. Directive principles of state policy and Fundamental duties -their enforcement and their relevance.

UNIT-II **12 Hours**

Union Government: Union Executive- President, Vice-president, Prime Minister, Council of Ministers. Union Legislature- Parliament and Parliamentary proceedings. Union Judiciary-Supreme Court of India –composition and powers and functions.

UNIT-III **13 Hours**

State and Local Governments:

State Executive- Governor, Chief Minister, Council of Ministers. State Legislature-State Legislative Assembly and State Legislative Council. State Judiciary-High court. Local Government-Panchayat raj system with special reference to 73rd and Urban Local Self Govt. with special reference to74th Amendment.

UNIT-IV **13 Hours**

Election provisions, Emergency provisions, Amendment of the constitution

Election Commission of India-composition, powers and functions and electoral process. Types of emergency-grounds, procedure, duration and effects. Amendment of the constitution- meaning, procedure and limitations.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

SEMESTER-V

Course Title: Survey Camp
Course Code: BCE508

L	T	P	Cr.
0	0	8	4

Course Outcome

The course will enable the students to:

1. Understand the concept, various methods and techniques of surveying Compute angles, distances and levels for given area
2. Apply the concept of tachometry survey in difficult and hilly terrain.
3. Select appropriate instruments for data collection and survey purpose
4. Analyze and retrieve the information from remotely sensed data and interpret the data for survey.
5. Understand the concepts related to GIS and GPS and analyze the geographical data.

Course Content

The students will be required to make a topographic map of an undulating hilly terrain measuring about 250 acres.

The work will be as under: Reconnaissance, selection of main stations, measurement of horizontal and vertical angles, measurement of base line, determination of R.L. of main station by double leveling from B.M., measurement of bearing of any one line, computation of coordinates of station points, plotting of details, interpolation of contours. The duration of survey camp is of 4 weeks.

SEMESTER-V

Course Title: Geotechnical Engineering
Course Code: BCE509

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes: The course will enable the students to:

1. To understand the origin of soil and to identify different types of soil and apply the knowledge of soil and rock to judge its behavior and suitability for civil engineering structures.
2. Able to describe Darcy's law for the flow of water through saturated soils; determine the coefficient of permeability and equivalent hydraulic conductivity in stratified soil.
3. To understand the various physical and engineering characteristics of different types of soil.
4. Able to calculate seepage, pore water pressure distribution, uplift forces and seepage stresses for simple geotechnical systems
5. Able to describe the direct shear test method and concept of slope stability structures.

Course Content

UNIT I: **15 Hours**

Basic Concepts: Definition of soil and soil mechanics common soil problems in Civil Engineering field. Principal types of soils. Important properties of very fine soil i.e. adsorbed water, Base Exchange and soil structure. Characteristics of main Clay mineral groups i.e. montmorilonite, illiteand kaollite, and Basic definitions in soil mechanics. Weight volume relationship, theory and determination of specific gravity from picnometer test. Field density from sand replacement method and other methods.

UNIT II: **15 Hours**

Index Properties: Grain size analysis. Stock's law and Hydrometer analysis. Consistency and sensitivity of Clay, Atterberge Limits Flow Index and Toughness Index. Classification of soils as per Indian standard classification system (IS-1498-1970).

Compaction:Definition and object of compaction and concept of O.M.C. and zero Air Void Line. Modified proctor Test. Factors affecting compaction Effect of compaction on soil properties. Field compaction methods-their comparison of performance and relative suitability. Field compacative effor. Field control of compaction by proctor needle.

UNIT III: **15 Hours**

Consolidation: Definition and object of consolidation, difference between compaction and consolidation. Concept of various consolidation characteristics i.e. av, mv and cv primary and secondary consolidation. Terzaghi's Differential equation and its derivation Boundary conditions for Terzaghi's solution for one dimensional consolidation concept of cv,tv &U. consolidation test determination of cv from curve fitting methods, consolidation pressure determination. Normally consolidated and over consolidated clays. Causes of over-consolidation. Effect of disturbance one-Logsigma curves of normally consolidated clays, importance of consolidation settlement in the design of structures.

UNIT IV: **15 Hours**

Permeability and Seepage: Concept of effective stress principal, seepage pressure, critical hydraulic gradient and quicks and condition. Capillary phenomenon in soil. Darcy's Law and its validity, seepage velocity, co-efficient of permeability and its determination in the laboratory. Average permeability of stratified soil mass, factors affecting 'K' and brief discussion.

Shear Strength: Stress analysis of a two-dimensional stress system by Mohr circle. Coulomb's law of shear strength coulomb-Mohr strength theory. Direct, triaxial and unconfined shear strength tests. Triaxial shear tests based on drainage conditions. Derivation of skempton's pore pressure parameters. Stress strain and volume change characteristics of sands.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Soil Mech. & Foundation Engg, by K.R. Arora
- Geotechnical Engineering, by P. Purshotama Raj
- Soil Mech. & Foundation Engg., by V.N. S. Murthy

SEMESTER-V

Course Title: Engineering Geology
Course Code: BCE510

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes: The course will enable the students to:

1. Able to know the importance of seismic activity considerations in a terrain.
2. Learn geology and its types, various features like fault, fissures, weathering etc., minerals, rocks, and rock formations in relation to civil engineering structures.
3. Understand various techniques to analyses and to made possible solutions for various Geological Engineering problems.
4. Understand various techniques to determine engineering properties of rocks etc.
5. Understand Geological considerations in the Engg. Projects like tunnels

Course Content

UNIT I **15 Hours**

General Geology:

Importance of Engg. Geology applied to Civil Engg. Practices. Weathering, definition, types and effect. Geological works of rivers, wind, glaciers as agents of erosion, transportation and depostion.

Rocks & Minerals:

Minerals, their identification igneous, sedimentary & metamorphic rocks. classification of rocks for engineering purposes. Rock quality designation (ROD)

UNIT II **15 Hours**

Structural Geology:

Brief idea about stratification, apparent dip, true dip, strike and in conformities. Folds, faults & joints: definition, classification relation to engg., Operations.

Engineering Geology:

Geological considerations in the Engg. Projects like tunnels, highways, foundation, dams, reservoirs. Earthquake: Definition, terminology, earthquake waves, intensity, recording of earthquake.

UNIT III **15 Hours**

Engineering properties of rocks and laboratory measurement:

Uniaxial compression test, tensile tests, permeability test, shear tests, size and shape of specimen rate of testing. Confining pressure, stress strain curves of typical rocks. Strength of intact and fissured rocks, effect of anisotropy, influence of effect of pore fluid type unsaturated and temperature.

UNIT IV **15 Hours**

In-situ determination of Engg. Properties of Rock masses :

Necessity of in-situ tests, uniaxial load tests in tunnels and open excavations, cable tests, flat jack test, shear test, pressure tunnel test. Simple methods of determining in situ stresses bore hole inner coring technique-bore hold deformation gauges.
Improvement in properties of Rock masses:
Pressure grouting for dams and tunnels, rock reinforcement rock bolting.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Introduction to Rock Mechanics: Richard E. Goodman, Cbs Publishers & Distributors Pvt. Ltd.
- Rock Mechanics and Engg.:Jaager C, George Allen &Unwin Publishers.

Engineering Geology: D.S.Arora, Khanna Publishers, New Delhi

SEMESTER-V

Course Title: Professional Practice, Law & Ethics
Course Code: BCE511

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes: The course will enable the students to:

1. Realize the importance of human values.
2. Understand that excessive desires of the mind make a person unethical and restless, while fewer desires lead to peace and professional progress
3. Assess different types of risks involved in unethical practices. Know various means of protesting against unethical practices.
4. Assess the benefits of restraining from unethical practices like bribery, extortion, nepotism, nexus between politicians and industrialists.
5. Summarize case studies of ethical violations in Chernobyl meltdown, Challenger disaster, Ford Pinto design, and Kingfisher Airlines financial misappropriation.

Course Content

UNIT I: **15 Hours**

Introduction To Terminology In Ethics: Integrity, Honesty, Courage, Empathy, Personality, Character, Self-Confidence, Respect for Others – Work culture, Social responsibility, Responsibilities as a citizen, Cooperation and commitment – Religion vs. Spirituality, Philosophy, Customs and practices – Self-interest, Fear, Deception, Ignorance, Ego, Uncritical acceptance of authority.

UNIT II: **15 Hours**

Mind and Its Mysteries: What is Mind? Mind and body, Mind and food – Mental faculties – Theory of perception, Memory, Imagination, Thought-Culture, Desires – Cultivation of Virtues, Control of Senses and Mind – Concentration, Meditation and Enlightenment.

UNIT III: **15 Hours**

Risk and Safety In Engineering: Estimating risk – What is acceptable risk? – Engineer's liability, Changing legal rights of the employees by non-participation, by protest – Environmental laws and judicial intervention in related matters.

UNIT IV: **15 Hours**

Case Studies – Variety of Moral Issues in Profession: Chernobyl nuclear disaster, Fukushima reactor meltdown, Challenger blowup, Ford Pinto design, Highway safety, Kingfisher Airlines financial misappropriation.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

1. Charles E Harris, Micheal J Rabins, Engineering Ethics, Cengage Learning Pub.
2. Mike Martin and Roland Schinzinger, Ethics in Engineering, McGraw Hill Pub.
3. Swami Sivananda, Mind, Its Mysteries and Control, Divine Life Society Pub.

SEMESTER: V

COURSE TITLE: Waste to Energy

COURSE CODE: MCE512

L	T	P	Credits
4	0	0	4

Total: 60 Hours

Course Outcomes: The course will enable the students to:

1. To enable students to understand of the concept of Waste to Energy.
2. To link legal, technical and management principles for production of energy form waste.
3. To learn about the best available technologies for waste to energy.
4. To analyze of case studies for understanding success and failures.
5. To facilitate the students in developing skills in the decision making process.

Course Content

UNIT-I **12 Hours**

Introduction The Principles of Waste Management and Waste Utilization. Waste Management Hierarchy and 3R Principle of Reduce, Reuse and Recycle. Waste as a Resource and Alternate Energy source.

UNIT-II **15 Hours**

Waste Sources & Characterization Waste production in different sectors such as domestic, industrial, agriculture, postconsumer, waste etc. Classification of waste – agro based, forest residues, domestic waste, industrial waste (hazardous and non-hazardous). Characterization of waste for energy utilization. Waste Selection criteria.

UNIT-III **15 Hours**

Technologies for Waste to Energy Biochemical Conversion – Energy production from organic waste through anaerobic digestion and fermentation. Thermo-chemical Conversion – Combustion, Incineration and heat recovery, Pyrolysis, Gasification; Plasma Arc Technology and other newer technologies.

UNIT-IV **18 Hours**

Waste to Energy Options Landfill gas, collection and recovery. Refuse Derived Fuel (RDF) – fluff, briquettes, pellets. Alternate Fuel Resource (AFR) – production and use in Cement plants, Thermal power plants and Industrial boilers. Conversion of wastes to fuel resources for other useful energy applications.

Case Studies – Success/failures of waste to energy Global Best Practices in Waste to energy production distribution and use. Indian Scenario on Waste to Energy production distribution and use in India. Success and Failures of Indian Waste to Energy plants. Role of the Government in promoting 'Waste to Energy.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books:

1. Industrial and Urban Waste Management in India, TERI Press.
2. Wealth from Waste: Trends and Technologies by Banwari Lal and Patwardhan, TERI Press. Fundamentals of waste and Environmental Engineering, S.N Mukhopadhyay, TERIPress.
3. Gazette Notification on Waste Management Rules 2016.
4. CPCB Guidelines for Co-processing in Cement/Power/Steel Industry
5. Waste-to-Energy in Austria – White Book – Figures, Data Facts, 2nd edition , May 2010.
6. Report of the task Force on Waste to Energy, Niti Ayog (Formerly Planning Commission) 2014.
7. Municipal Solid Waste Management Manual, CPHEEO, 2016.

SEMESTER-VI

Course Title: Construction Engineering & Management
Course Code: BCE601

L	T	P	Cr.
2	1	0	3

Total: 60 Hours

Course Outcomes:

1. Be able to apply theoretical and practical aspects of project management techniques to achieve project goals
2. Possess organizational and leadership capabilities for effective management of construction projects
3. Be able to apply knowledge and skills of modern construction practices and techniques
4. Have necessary knowledge and skills in accounting, financing, risk analysis and contracting.
5. Be capable of using relevant software packages for planning, scheduling, executing and controlling of construction projects.

Course Content

UNIT I: **15 Hours**

CONSTRUCTION PLANNING: Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

UNIT II **15 Hours**

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Methods – Statistical Quality Control with Sampling by Attributes – Statistical Quality Control with Sampling by Variables – Safety

UNIT III **15 Hours**

COSTANALYSISAND CONTRACT:

Type of costs, cost time relationships, cost slopes, conducting a crash programmer, determining the minimum total cost of project, flexible budgets, cost & quality control, profit planning control & decision making, cost accounting systems, numerical

problems. Updating a project, when to update, time grid diagram, resource scheduling. Planning of different components of civil engineering projects such as a house, workshop, dam, and tunnel.

UNIT IV **15 Hours**

MANPOWER PLANNING- Manpower Planning process, Organising, Staffing, directing, and controlling – Estimation, manpower requirement – Factors influencing supply and demand of human resources – Role of HR manager – Personnel Principles..

MANAGEMENT AND DEVELOPMENT METHODS 9 Wages and Salary, Employee benefits, Employee appraisal and assessment – Employee services – Safety and Health Management – Special Human resource problems – Productivity in human resources – Innovative approach to designing and managing organization – Managing New Technologies – Total Quality Management – Concept of quality of work life – Levels of change in the organizational Development – Requirements of organizational Development – System design and methods for automation and management of operations – Developing policies, practices and establishing process pattern – Competency upgradation and their assessment – New methods of training and development – Performance Management.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.

Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986..

Charles D Pringle, Justin GooderiLongenecter, Management, CE Merril Publishing Co. 1981.

Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.

SEMESTER-VI

Course Title: Irrigation Engineering
Course Code: BCE602

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. To take up the basic concepts of irrigation and construction of various hydraulic structures.
2. To introduce students to basic concepts of water, plants, their interactions, as well as irrigation and drainage systems design, planning and management.
3. The structures involved the elementary hydraulic design of different structures and the concepts of maintenance shall also form part.
4. To develop analytical skills relevant to the areas mentioned above, particularly the design of irrigation and drainage projects.
5. To learn about distribution systems for canal irrigation, design of unlined and lined irrigation canals design sediment problems associated with canal

UNIT I **15 Hours**

INTRODUCTION: Importance of Irrigation Engineering, purposes of Irrigation,

objectives of Irrigation, Benefits of Irrigation, Advantages of various techniques of irrigation--Furrow Irrigation, Boarder strip Irrigation, Basin Irrigation, Sprinkler Irrigation , Drip Irrigation.

METHODS OF IRRIGATION: Advantages and disadvantages of irrigation, water

requirements of crops, factors affecting water requirement, consumptive use of water, water depth or delta , Duty of water, Base Period, relation between delta, duty and base period, Soil crop relation-ship and soil fertility.

UNIT II **15 Hours**

CANAL IRRIGATION: Classifications of canals, canal alignment, Inundation canals, Bandhara irrigation, advantages and disadvantages, Silt theories-Kennedy's theory, Lacey's theory, Drawbacks in Kennedy's &Lacey's theories, comparison of Lacey's and Kennedy's theories, Design of unlined canals based on Kennedy &Lacey's theories.

LINED CANALS: Types of lining, selection of type of lining, Economics of lining, maintenance of lined canals, silt removal, strengthening of channel banks,

measurement of discharge in channels, design of lined canals, methods of providing drainage behind lining.

UNIT III **15 Hours**

LOSSES IN CANALS, WATER LOGGING AND DRAINAGE: Losses in canals-

Evaporation and seepage, water logging, causes and ill effects of water logging anti wter

logging measures. Drainage of land, classification of drains - surface and subsurface drains, Design considerations for surface drains, Advantages and maintenance of tile drains.

INVESTIGATION AND PREPARATION OF IRRIGATION PROJECTS:Classification of project, Project preparation-investigations, Design of works and

drawings,concept of multi - purpose projects, Major, Medium and miner projects, planing of an irrigation project, Economics & financing of irrigation works. Documentation of project report.

UNIT IV **15 Hours**

TUBE - WELL IRRIGATION: Types of tube wells - strainer type, cavity type andslotted type. Type of strainers, Aquifer, porosity, uniformity coefficient, specific yield &specific retention, coefficients of permeability, transmissibility and storage. Yield or discharge of a tube well, Assumptions, Theim's&Dupuit's formulae, Limitations of Theim's and Dupuit's formulae. Interference of tube wells with canal or adjoining tube-wells, causes of failure of tubewells, optimum capacity, Duty and delta of a tube well. Rehabilitation of tubewell.

RIVER TRAINING WORKS: Objectives, classification of river-training works, Design of Guide Banks. Groynes or spurs - Their design and classification ISI. Recommendations of Approach embankments and afflux embankments, pitched Islands, Natural cut-offs and Artificial cut-offs and designs Considerations.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

1. Principles & practice of Irrigation Engg. S.K.Sharma; S. Chand, Limited.
2. Irrigation & Water Power Engg. B.C. Punmia, Pande B.B.Lal; Laxmi Publications (p) Ltd
3. Fundamentals of Irrigation Engg. Dr. Bharat Singh; Nem Chand & Bros
4. Irrigation Engg.& Hydraulic Structure S.R. Sahasrabudhe; S. K. Kataria & Sons

5. Irrigation Engg.& Hydraulic Structure Varshney, Gupta & Gupta; Nem Chand and Brothers
6. Irrigation Engg.& Hydraulic Structure Santosh Kumar Garg; Khanna Publishers

SEMESTER-VI

Course Title: Traffic Engineering & Management
Course Code: BCE603

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Analys traffic problems and plan for traffic systems various uses
2. Design Channels, Intersections, signals and parking arrangements
3. Develop Traffic management Systems
4. The course introduces the concepts of characterizing traffic, various modeling approaches, and design of facilities to control and manage traffic.
5. To have an overall knowledge of the traffic components and assess the traffic characteristics and related problems.

UNIT I: **15 Hours**

Traffic stream characteristics: Introduction to traffic engineering: Road user characteristics, human and vehicle characteristics; Fundamental parameters and relations of traffic flow: speed, density, volume, travel time, headway, spacing, time-space diagram, time mean speed, space mean speed and their relation, relation between speeds, flow, density, fundamental diagrams; Traffic stream models: Greenshield's model, Greenberg's logarithmic model, Underwood's exponential model, pipe's generalized model, multi-regime models;

UNIT II: **15 Hours**

Traffic Surveys

Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses -Methods, interpretation and presentation -Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.

UNIT III **15 Hours**

Traffic Design and Visual Aids

Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals — Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Networking pedestrian facilities and cycle tracks.

UNIT IV: **15 Hours**

Traffic Management

Area Traffic Management System – Traffic System Management (TSM) with IRC standards -Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods -Congestion and parking pricing – All segregation methods-Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

1. Roess, RP.,McShane, WR. andPrassas,ES.(1998), Traffic Engineering,Prentice Hall.
2. May,A. D.(1990), Fundamentals of Traffic Flow,Prentice Hall.
3. Papacostas, C.S.(1987), Fundamentals of Transportation Engineering,Prentice Hall.
4. Kadiyali, LR (1987), Traffic Engineering and Transportation Planning,Khanna.
5. Highway Capacity Manual (2000), Transportation Research Board, USA.
6. Khanna,S.K. and Justo, C.E. G.(1991), Highway Engineering, Nemchand.
7. Pingnataro, G. J.(1970),Principles of Traffic Engineering, McGraw – Hill

SEMESTER-VI

Course Title: Solid & Hazardous Waste Management
Course Code: BCE604

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Understanding of problems of municipal waste, biomedical waste, hazardous waste, ewaste, industrial waste etc.
2. Knowledge of legal, institutional and financial aspects of management of solid wastes
3. Become aware of Environment and health impacts solid waste mismanagement.
4. Understand engineering, financial and technical options for waste management
5. To understand the awareness regarding hazardous waste related health and environmental problem.

Course Content

UNIT I: **15 Hours**

General introduction including definitions of solid waste including municipal, hospital and industrial solid waste; legal issues and requirements for solid waste management and health and environmental issues related to solid waste management.

Sampling and characterization of solid waste

UNIT II: **15 Hours**

Analysis of hazardous constituents in solid waste including QA/QC issues
Municipal Solid Waste Management – Fundamentals Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options

UNIT III: **15 Hours**

Hazardous Waste Management – Fundamentals Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effects
Environmental Risk Assessment Defining risk and environmental risk; methods of risk assessment; case studies

UNIT IV: **15 Hours**

Biological Treatment of Solid and Hazardous Waste Composting; bioreactors; anaerobic decomposition of solid waste; principles of biodegradation of toxic waste; inhibition; co-metabolism; oxidative and reductive processes; slurry phase bioreactor; in-situ remediation

Landfill design Landfill design for solid and hazardous wastes; leachate collection and removal; landfill covers; incineration

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

1. John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
2. LaGrega, M.D.Buckingham,P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
3. Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1997.

SEMESTER-VI

Course Title: Engineering Economics, Estimation & Costing
Course Code: BCE605

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. Explain method to Perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
2. Calculate payback period and capitalized cost on one or more economic alternatives.
3. Describe method to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives
4. Discuss Preparation of cost estimation report for any project.
5. Describe cost accounting, replacement analysis.

Course Content

UNIT I: **15 Hours**

Introduction to economics – Flow in an economy – Law of supply and demand – Concept of engineering economics – Engineering efficiency – Economic efficiency – Scope of engineering economics – Element of costs – Marginal cost – Marginal revenue – Sunk cost – Opportunity cost – Break-even analysis – V ratio – Elementary economic analysis – Material selection for product design selection for a product – Process planning.

UNIT II: **15 Hours**

Introduction: Purpose of estimating and valuation, Types of estimates. Building Estimate: Main items and their unit of measurement, methods of Measurement-Methods of estimating quantities, Estimating quantities of building. Estimation of quantity of load bearing structure with single room & two rooms, Estimation of quantity single storied residential building, Estimation of quantity Different R.C.C. structures , Estimation of quantity of water supply and sanitary works, Estimation of quantity of culverts and bridges, Road estimating, Estimation of quantity of Trusses. Introduction to estimates of other Civil engineering structures.

UNIT III: **15 Hours**

Market Survey: Traditional and modular materials, Market survey of materials of Construction, Wages of labour, Tools plant and equipment of construction. Rate Analysis : Prerequisites, factors affecting rate analysis, over head expenses, procedure for rate

analysis, schedule of rates, Task work: labour requirement for different works, material requirement for different works, Rate analysis of different Items of work.

Abstracting and Billing: Purpose of abstract, preparation of abstract, measurement and billing, Checking of bills and final bill

UNIT IV: 15 Hours

Valuation: Purpose of valuation, types of property- Depreciation, Sinking fund, Lease hold and free hold property, obsolescence, Gross income, Outgoing and Net income, Capitalized value and year's purchase. Rental method of valuations, and typical problems.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

1. Pasrija, HD, Arora, CL and S. Inderjit Singh, "Estimating, Costing and Valuation (Civil)", New Asian Publishers, Delhi,
2. Rangwala, S.C, Estimating and Costing", Anand, Charotar Book Stall
3. Chakraborti, M, "Estimating, Costing and Specification in Civil Engineering", Calcutta
4. Dutta, BN, "Estimating and Costing
5. Mahajan Sanjay, "Estimating and Costing" SatyaParkashan, Delhi
6. Quality surveying by Gurbakshish Singh; Eagle Prakashan, Jalandher

SEMESTER-VI

Course Title: Engineering Economics, Estimation & Costing, Laboratory
Course Code: BCE606

L	T	P	Cr.
0	0	2	1

Total: 20 Hours

Course Outcomes:

1. **Choose** the stages involved in construction like excavation, shuttering, bar bending tendering and valuation for estimating the cost incurred in the project.
2. **Apply** the approximate method and the detailed estimating method for calculating various quantities such as brick work R. C Structures.
3. **Make use of** the mid sectional area, and mean sectional area method for determining road embankment and cutting of earth work quantities.
4. **Apply** the concepts of prismatic and trapezoidal rule for calculating earth work quantities of various irrigation canal structures.
5. **Analyze** the quantities of materials of various components used in construction works such as beams, slabs, columns, and footings, as per specifications for preparation of Rate analysis.

Course Content

Experiments on the following

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

Recommended Books:

1. B. N. Dutta, “Estimating and Costing”, UBS publishers,2000.
2. G. S. Birdie., “Estimating and Costing”, Dhanpat Rai publications,1988.

SEMESTER-VI

Course Title: Repair & Rehabilitation of Structures
Course Code: BCE607

L	T	P	Cr.
3	0	0	3

Total: 60 Hours

Course Outcomes:

1. To make the students to gain the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.
2. To learn various distress and damages to concrete and masonry structures.
3. To study the various types and properties of repair materials
4. To learn the importance and methods of substrate preparation
5. To learn various repair techniques of damaged structures, corroded structures

Course Content

UNIT I: **15 Hours**

Introduction Maintenance, rehabilitation, repair, retrofit and strengthening, need for rehabilitation of structures. Cracks in R.C. buildings Various cracks in R.C. buildings, causes and effects

Maintenance importance of maintenance, routine and preventive maintenance. Damages to masonry structures Various damages to masonry structures and causes

UNIT II: **15 Hours**

Repair materials Various repair materials, Criteria for material selection, Methodology of selection, Health and safety precautions for handling and applications of repair materials Special mortars and concretes Polymer Concrete and Mortar, Quick setting compounds Grouting materials Gas forming grouts, Salfoalumate grouts, Polymer grouts, Acrylate and Urethane grouts. Bonding agents Latex emulsions, Epoxy bonding agents. Protective coatings Protective coatings for Concrete and Steel FRP sheets

UNIT III: **15 Hours**

Damage diagnosis and assessment Visual inspection, Non Destructive Testing using Rebound hammer, Ultra sonic pulse velocity, Semi destructive testing, Probe test, Pull out test, Chloride penetration test, Carbonation, Carbonation depth testing, Corrosion activity measurement Substrate preparation Importance of substrate/surface preparation, General surface preparation methods and procedure, Reinforcing steel cleaning

UNIT IV: **15 Hours**

Crack repair Various methods of crack repair, Grouting, Routing and sealing, Stitching, Dry packing, Autogenous healing, Overlays, Repair to active cracks, Repair to dormant cracks. Corrosion of embedded steel in concrete Corrosion of embedded steel in concrete, Mechanism, Stages of corrosion damage, Repair of various corrosion damaged of structural elements (slab, beam and columns) Jacketing Jacketing, Column jacketing, Beam jacketing, Beam Column joint jacketing, Reinforced concrete jacketing, Steel jacketing, FRP jacketing. Strengthening Strengthening, Beam shear strengthening, Flexural strengthening

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Recommended Books:

- Shetty M.S., "Concrete Technology – Theory and Practice", S.Chand and Company, 2008.
- DovKominetzky.M.S., "Design and Construction Failures", Galgotia Publications Pvt. Ltd., 2001
- Ravishankar.K.,Krishnamoorthy.T.S, "Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
- CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.
  Gambhir.M.L., "Concrete Technology", McGraw Hill, 2013.

SEMESTER-VI

Course Title: Human Relations at Work
Course Code: BCE608

L	T	P	Cr.
3	0	0	3

Total: 40 Hours

Course outcomes:

1. Understand the modalities of Human Relations in the Workplace.
2. Explain why human relations skills are important in today's workplace.
3. Explain the role of Corporate Culture and Organizational Politics and their impact on human relations within today's workplace.
4. Demonstrate the ability to work effectively with others with diverse backgrounds & values.
5. Demonstrate strategies for managing emotions within the workplace.
6. Create innovative workplace solutions and programs to retain and educate employees.

Course Content

Unit 1: **8 Hours**

Understanding organizations and Organization Behaviour; Definition, and Features; Models of Organizational Behaviour.

Unit 2: **8 Hours**

The Individual: Ability; Learning; Attitudes; Personality and Values; Perception & Individual Decision making; Motivation- Definition, Nature of Motivation, Early and Contemporary Theories of Motivation

Unit 3: **10 Hours**

Foundations of Group Behaviour and Dynamics– Defining and Classifying Groups ; Stages of Group Development ; Team and Team Building- Purpose, Types and Creating Effective Teams; Communication-Communication network , The Communication Process, Interpersonal and Organizational Communication, Leadership-Trait and Behavioral Theories.

Unit 4: **14 Hours**

Interpersonal Behaviour: Power and Politics- Definition, Bases of Power, Dependency and Power Tactics, Unequal Power and Implication for Managers.

Conflict Management- The traditional View, The Human Relation View, The Interactionist View, Conflict Process, Negotiation- Bargaining strategies.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books:

1. Organization Behaviour, Stephen P. Robbins; Timothy A. Judge; Seema Sanghi. 13th Edition, Pearson-Prentice Hall.
2. Organizational Behaviour- A Modern Approach by Arun Kumar , N Meenakshi , Vikas Publishing.
3. Organization Behaviour, V.S.P. Rao, 1st Edition, Excel Books.
4. Organization Behaviour, Margie Parikh, Rajen Gupta, 1st Edition, Tata McGraw Hill.

SEMESTER: VI

COURSE TITLE: Cost Management of Engineering Projects

COURSE CODE: BCE609

L	T	P	Credits
1	1	0	2

Total: 60 Hours

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

1. Understand the concept of strategic cost management, strategic cost analysis – target costing, life cycle costing and Kaizen costing and the cost drive concept.
2. Describe the decision-making; relevant cost, differential cost, incremental cost and opportunity cost, objectives of a costing system.
3. Understand the meaning and different types of project management and project execution, detailed engineering activities.
4. Understand the project contracts, cost behaviour and profit planning types and contents, Bar charts and Network diagram.
5. Analyse by using quantitative techniques for cost management like PERT/CPM.

UNIT-I **15 Hours**

Introduction and Overview of the Strategic Cost Management Process. Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision Making.

UNIT-II **15 Hours**

Project: meaning, Different types, why to manage, cost overruns centers, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents. Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

UNIT-III **15 Hours**

Cost Behavior and Profit Planning Marginal Costing; Distinction between Marginal Costing and Absorption Costing; Break-even Analysis, Cost-Volume-Profit Analysis. Various decision-making problems. Standard Costing and Variance Analysis. Pricing strategies: Pareto Analysis. Target costing, Life Cycle Costing. Costing of service sector. Just-in-time approach, Material Requirement, Planning, Enterprise Resource Planning, Total Quality Management and Theory of constraints. Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-V **15 Hours**

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation Problems, Assignment problems, Simulation, Learning Curve Theory.

Transactional Mode:

Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Reference Books:

1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi.
2. Charles T. Horngren and George Foster Advanced Management Accounting.
3. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheeler publisher.

SEMESTER-VII

Course Title: Research Methodology
Course Code: BCE701

L	T	P	Cr.
3	1	0	4

Total: 60 Hours

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Identify and discuss the role and importance of research in the social sciences.
2. Identify and discuss the issues and concepts salient to the research process.
3. Choose the appropriate research design and develop appropriate research hypothesis for a research project.
4. Discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project.
5. Describe the appropriate statistical methods required for a

Course Content

UNIT-I **14 Hours**

Research: Objectives of Research, Research Types, Research Methodology, Research Process – Flow chart, description of various steps, Selection of research problem.

UNIT-II **14 Hours**

Research Design: Meaning, Objectives and Strategies of research, different research designs, important experimental designs, Completely randomized, Randomized block, Latin Square, Factorial Experimental Design.

UNIT-III **14 Hours**

Data Collection Methods: Data Collection Classification of Data, Methods of Data Collection, Sampling, Sampling techniques procedure and methods, Ethical considerations in research.

UNIT-IV **18 Hours**

Sampling Methods: Different methods of Sampling: Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Non-Probability Sampling methods, Sample size. Technical Writing and reporting of research

Types of research report: Dissertation and Thesis, Report Format – Cover page, introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation. Research paper, review article, short communication, conference

presentation etc., Referencing and referencing styles, Research Journals, Indexing and citation of Journals, Intellectual property, Plagiarism

Transactional Mode: Video based Teaching**,** Collaborative Teaching**,** Cooperative Teaching**,** Quiz, E-Team Learning.

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

Suggested Readings

1.C. R. Kothari, GauravGarg.(2004).*Research Methodology Methods and Techniques* .New Age International publishers.
2. Ranjit Kumar.(2005).*Research Methodology: A Step-by-Step Guide for Beginners*.SAGE.
3. Donald Cooper, Pamela Schindler.*(* 2006 *).Business Research Methods* .McGraw-Hill.
4. Creswell, John W. (2013).*Research design: Qualitative, quantitative, and mixed methods approaches.* Sage publications,

SEMESTER-VII

Course Title: Foundation Engineering
Course Code: BCE702

L	T	P	Cr.
4	0	0	4

Total: 60 Hours

Course Outcomes:

1. To understand the origin of soil and to identify different types of soil and apply the knowledge of soil and rock to judge its behavior and suitability for civil engineering structures.
2. Able to describe Darcy's law for the flow of water through saturated soils; determine the coefficient of permeability and equivalent hydraulic conductivity in stratified soil
3. To understand the various physical and engineering characteristics of different types of soil
4. Able to calculate seepage, pore water pressure distribution, uplift forces and seepage stresses for simple geotechnical systems
5. Able to describe the direct shear test method and concept of slope stability structures.

Course Content

Unit-I **15 Hours**

Shallow Foundation-I:

Type of shallow foundation Depth and factors affecting it. Definition of ultimate bearing capacity, safe b.c. and allowable b.c. Rankine's analysis and Terzaghi's analysis. Types of failures. Factors affecting bearing capacity. Skemptons equation. B.I.S. recommendations for shape, depth and inclination factors. Plate Load test and standard penetration Test. Their procedure, merits and demerits Factors affecting 'N' value Corrections to be applied to observed value. Bosussinesq equation for a point load, uniformly loaded circular and rectangular area, pressure distribution diagrams. New marks chart and its construction. Two - to - one method of load distribution. Comparison of Bosussinesq and westerguard analysis for a point load. Limitations of elastic formula

Shallow Foundation-II:

Contact pressure Distribution. Causes of settlement of structures, comparison of Immediate and consolidation settlement calculation of settlement by plate load Test and Static Cone penetration test data. Allowable settlement of various structures according to I.S. Code. Situation most suitable for provision of rafts. Proportioning of

rafts in sand-s and Clays. Various methods of designing raft. Floating foundation.

Unit-II **15 Hours**

Soil Investigation:

Object of soil investigation for new and existing structures. Depth of exploration for different structures. Spacing of bore Holes. Methods of soil exploration and relative merits and demerits. Types of soil sample. Design features of sampler affecting sample disturbance. Essential features and application of the various types of samples. Geophysical exploration by seismic and resistivity methods. Bore Hole log for S.P.T

Unit-III **15 Hours**

Pile Foundations – I:

Necessity and uses of piles classification of piles. Merits and demerits of different types based on composition. Types of pile driving hammers & their comparison. Effect of pile driving on adjacent ground. Use of engineering News Formula and Hiley's Formula for determination of allowable load. Limitations of pile driving formulae. Pile load test-object, pre- requisites, test arrangement, procedure and assessment of safe load. Separation of skin friction and point resistance using cyclic pile load test date. Related numerical problems.

Pile Foundation – II:

Determination of point resistance and frictional resistance of a single pile by Static formulas. Piles in Clay-Safe load on a Friction and point Bearing pile. Pile in sand Spacing of piles in a group. Efficiency of pile group by converse - Labare formula. Bearing capacity of apile group in clay by block failure and individual action approach. Calculation of settlement of friction pile group in clay using the following equation.

S = H x Cc Log10 (Sigma + del Sigma)

1+ eo Sigma

Related Numerical problems. Settlement of pile groups in sand Negative skin friction.

Unit-IV **15 Hours**

Caissons and Wells:

Major areas of use of caissons advantages and disadvantages of open box and pneumatic caissons. Essential part of a pneumatic caisson. Components of a well foundation. Calculation of allowable bearing pressure. Conditions for stability of a well,

Terzagh's analysis for lateral stability for a light well-embedded in sand. Modification of the analysis for a heavy well.Forces acting on a well foundation. Computation of scour depth.

Earth Pressure:

Terms and symbols used for a retaining wall. Movement of all and the lateral earth pressure. Earth pressure at rest. Rankine states of plastic equilibrium and derivations of expressions for Ka and Kp for horizontal backfills. Rankine's theory both for active and passive earth pressure for Cohesion less backfill with surcharge and fully submerged case. Cohesive backfill condition. Rankine's Earth pressure for a cohesion less backfill with sloping surface (with proof) concept of active and passive Earth pressure on the basis of stability of a sliding wedge. Coulomb's method for cohesion less backfill. Merits and demerits of Ranking and Coulomb's theories graphical construction and Rebhan's graphical construction (without surcharge load).

Transactional Mode:
Video based teaching, Group Discussion, Cooperative teaching, Demonstration, Open Talk

BOOKS RECOMMENDED:

1. Soil Mechanics & Foundation Engineeringcv by B.C.Punmia
2. Geotechnical Engineering by Alam Singh

SEMESTER-VII

Course Title: Web Designing & Development Lab

Course Code: BCS703

L	T	P	Cr
0	0	2	1

Total: 15 hours

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Develop a dynamic webpage by the use of java script.
2. Connect a java program to a DBMS.
3. Design a well formed and valid and XML and DHTML document.
4. Examine a server side java application called Servlet to update and delete operations on DBMS table.
5. Design a page for internal links; when the user clicks on different links on the web page it should go to the appropriate locations/sections in the same page.

Course Content

1. Create a basic web page to show use of head, title, and body tag.
2. Create a web page to show use heading and text formatting tags.
3. Create a web page to show use img, ul, olandanchors.
4. Create a web page to show use tables and divtags.
5. Create a web page using class, id and inlinestyles.
6. Create a web page to create aform.
7. Create a web page to show an alert using javascript.
8. Show the use of get Element by Id in javascript.
9. Create a web page using variables, loop and Conditions in javascript.
10. Create a web page using Switch in javascript.
11. Create a web page to show use of jquery.
12. Create a web page to implement get & post inAjax.
13. Create a web page to print your name usingPHP.
14. Create a web page to show use of all data types inPHP
15. Create a web page to show use loops &ConditionalStatement.
16. Create a web page to show use arrays inPHP.

Course Title: Project-I

L	T	P	Cr

Course Code: BCS704

0	**0**	**2**	**1**

SEMESTER-VII

Total: 15 Hours

Course Learning Outcomes: On successful completion of this course, the students will be able to:

1. Use of latest Software in the research lab.
2. Design and construct a multistory Building.
3. Do work on multidisciplinary Problems.
4. Know how to recycle a waste material.

Course Content

1. Sustainable construction material recycling.
2. Urban surface/subsurface water management.
3. Landscape architecture considerations relevant to urban design and human health.
4. Waste treatment and biofuel production.
5. Power generation and safety; Building Information Modeling; and smart cities and sensing.

SEMESTER-VII

Course Title: Institutional /Industrial Training
Course Code: BCE705

L	T	P	Cr
0	0	0	10

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. Get experience of real life working environment.
2. Gain practical knowledge, new skills and be aware of current technologies.
3. Provide opportunities to students to be as prospective employees.
4. Analyze problems and find/suggest possible solutions.
5. Present a project report both in oral and written form based on work experiences.

Course Content

The Training will normally contain:

1. Get experience of real life working environment.
2. Gain practical knowledge, new skills and be aware of current technologies.
3. Provide opportunities to students to be as prospective employees.
4. Analyze problems and find/suggest possible solutions.
5. Present a project report both in oral and written form based on work experiences.

Course Title: Dissertation
Course Code: BCE801

L	T	P	Cr
0	0	20	10

SEMESTER-VIII

Course Learning Outcome: On successful completion of this course, the students will be able to:

1. The capability to create, analyze and critically evaluate different technical/architectural solutions.
2. A consciousness of the ethical aspects of research and development work.
3. The capability to create, analyze and critically evaluate different technical/architectural solutions.
4. The capability to critically and systematically integrate knowledge.
5. The capability to use a holistic view to critically, independently and creatively identify, formulate and deal with complex issues.

Course Content

The dissertation will normally contain:

- An account of the process of obtaining the data required for the dissertation and the results obtained; relationship to other research, and any methodological or theoretical implications;
- The relationship of the findings to existing professional understanding and, where
- Appropriate, potential implementation difficulties.
- It is not intended to restrict students to a precisely defined format for the dissertation but it
- Should follow the standard practices of dissertation writing. Although a written report should be submitted, it should be accompanied by soft copy on CD.