GROUP-A
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS4-101	Physics (Mechanics and Mechanics of Solids)	3	1	0	40	60	100	4
BMATH4-101	Mathematics-I (Calculus, Multivariable Calculus & Linear Algebra)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS4-102	Physics (Mechanics & Mech. of Solids) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
BMNCC0-010	Universal Human values - I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		15	3	10	540	360	900	19

Note:

1. **There will be Induction Programme of 3 weeks before start of normal classes.**
2. **Drug Abuse: Problem, Management and Prevention and Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure at least E grade in each of them.**

*** As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org**

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH4-201	Mathematics-II (Differential Equations)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
Total		12	2	12	400	400	800	20

Note:

1. **Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rdSemester**

GROUP-B
1ST SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BCHEM0-101	Chemistry-I	3	1	0	40	60	100	4
BMATH4-101	Mathematics-I (Calculus, Multivariable Calculus & Linear Algebra)	3	1	0	40	60	100	4
BHUMA0-101	English	2	0	0	40	60	100	2
BCSCE0-101	Programming for Problem Solving	3	0	0	40	60	100	3
BCHEM0-102	Chemistry-I Lab.	0	0	2	60	40	100	1
BHUMA0-102	English Lab.	0	0	2	60	40	100	1
BCSCE0-102	Programming for Problem Solving Lab.	0	0	4	60	40	100	2
BMFPR0-101	Manufacturing Practices	1	0	4	60	40	100	3
BMNCC0-010	Universal Human values - I	22 hrs (to be completed during 21 days SIP)*			Satisfactory/ Unsatisfactory			0
ZZZZZ	Introduction to Concerned Branch of Engineering	2	0	0	100	0	100	0
Total		14	2	12	500	400	900	20

Note:

1. **There will be Induction Programme of 3 weeks before start of normal classes.**
2. **Introduction to Concerned Branch of Engineering are non-credit Courses; however, it is necessary to secure at least E grade in each of them.**

*** As per AICTE SIP Manual Hour Plan available at http://fdp-si.aicte-india.org**

2ND SEMESTER

Course		Contact Hrs.			Marks			Credits
Code	Name	L	T	P	Internal	External	Total	
BPHYS4-101	Physics (Mechanics And Mechanics of Solids)	3	1	0	40	60	100	4
BMATH4-201	Mathematics-II (Differential Equations)	3	1	0	40	60	100	4
BMECE0-101	Engineering Graphics & Design	2	0	0	40	60	100	2
BELEE0-101	Basics Electrical Engineering	3	1	0	40	60	100	4
BPHYS4-102	Physics (Mechanics & Mech. of Solids) Lab.	0	0	2	60	40	100	1
BMECE0-102	Engineering Graphics & Design Lab.	0	0	6	60	40	100	3
BELEE0-102	Basics Electrical Engineering Lab.	0	0	2	60	40	100	1
BMNCC0-004	Drug Abuse: Problem, Management and Prevention	2	0	0	100	0	100	0
Total		13	3	10	440	360	800	19

Note:

1. **Drug Abuse: Problem, Management and Prevention is a non-credit Course; however, it is necessary to secure at least E grade in it.**
2. **Marks of 4 Week Manufacturing Practices Training during Summer Vacation will be included in 3rdSemester**

PHYSICS (MECHANICS AND MECHANICS OFSOLIDS)

Subject Code: BPHYS4-101 **L T PC** **Duration: 38Hrs.**
3 1 0 4

UNIT-I

Friction and Mechanics of Solids: (10 Hrs.)

Brief introduction to friction, its laws, types, motion on horizontal and inclined plane, methods of changing friction and applications of friction. Concept of stress–strain, elasticity, plasticity, strain hardening, failure (fracture/yielding), Generalized Hooke's law, one dimensional stress- strain curve. Force analysis -- axial force, shear force, bending moment and twisting moment. Bending stress; Shear stress; Concept of strain energy; Yield criteria.

UNIT-II

Simple Harmonic Oscillator: (8 Hrs.)

Mechanical and electrical simple harmonic oscillators, damped harmonic oscillator- heavy, critical and light damping, energy decay inadamped harmonicoscillator, quality factor, orced oscillations and resonance (electrical and mechanical).

UNIT-III

Vector Mechanics: (10 Hrs.)

Transformationofscalarandvectorunderrotationtransformation,ForcesinNature,Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Potential energy function; F = - Grad V, equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, curl of a force field; Concept of Central forces; Conservation of Angular Momentum.

UNIT-IV

Frames of References and Rigid Body Dynamics: (10 Hrs.)

Inertial and Non-inertial frames of reference; Galilean and Lorentz transformations, Introduction to Cartesian, spherical and cylindrical coordinate system. Basic idea of Centripetal and Coriolis forces along with their applications. Definition and motion of a rigid body in the plane; Rotation in the plane, Angular momentum about apo into fa rigid body inplanar motion; introduction to three-dimension rigid body motion- only need to highlight the distinction from two-dimensional motion with examples.

Recommended Books:

1. M.K. Harbola, 'Engineering Mechanics', 2nd Edn.
2. M.K. Verma, 'Introduction to Mechanics'.
3. Mathur, 'Mechanics', S. ChandPublishing.
4. Upadhyaya, 'Classical Mechanics', Himalaya PublishingHouse.
5. J.L. Synge & B.A. Griffiths, 'Principles ofMechanics'.
6. J.L. Meriam, 'Engineering Mechanics – Dynamics', 7th Edn.
7. W.T. Thomson, 'Theory of Vibrations withApplications'.
8. N.C. Dahl & T.J. Lardner, 'An Introduction to the Mechanics of Solids', 2nd Edn. with SI Units-SHCrandall.
9. Malik and Singh, 'Engineering Physics', Tata McGrawHill.

MATHEMATICS-I (CALCULUS, MULTIVARIABLE CALCULUS & LINEAR ALGEBRA)

SubjectCode:BMATH4-101 **L T PC** **Duration: 46Hrs.**
3 1 0 4

UNIT–I

Calculus: (14 Hrs.)
Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima. 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. Convergence of sequence and series, tests for convergence, power series, Taylor's series. Series for exponential, trigonometric and logarithmic functions.

UNIT–II

Multivariable Calculus: (10 Hrs.)
Limit, continuity and partial derivatives, Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence: Geometrical interpretation and basic properties, Directional derivative.

UNIT–III

Multiple Integration: (12 Hrs.)
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 (Statement only), simple applications involving cubes, sphere and rectangular parallel epipeds.

UNIT–IV

Linear Algebra: (10 Hrs.)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Recommended Books:

1. G.B. Thomas and R.L. Finney, 'Calculus and Analytic Geometry', 9th Edn., Pearson, Reprint, **2002**.
2. T. Veerarajan, 'Engineering Mathematics for First Year', 11th Reprint, Tata McGraw Hill, New Delhi,**2008**.
3. B.V. Ramana, 'Higher Engineering Mathematics', Tata McGraw Hill, New Delhi,**2010**.
4. B.S. Grewal, 'Higher Engineering Mathematics', Khanna Publishers, 35th Edn.,**2000**.
5. D. Poole, 'Linear Algebra: A Modern Introduction', 2nd Edn., Brooks/Cole,**2005**.
6. V. Krishnamurthy, V.P. Mainra and J.L. Arora, 'An Introduction to Linear Algebra', Affiliated East–West Press, Reprint,**2005**.
7. ErwinKreyszig,'AdvancedEngineeringMathematics',9th Edn.,JohnWiley&Sons,**2006**.

Course Outcomes:
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:

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 ofBeta and Gammafunctions.
2. The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineeringproblems.
3. The tool of power series and Fourier series for learning advancedEngineering Mathematics.
4. To deal with functions of several variables that are essential in most branchesof engineering.
5. The essential tool of matrices and linear algebra in a comprehensivemanner.

ENGINEERING GRAPHICS &DESIGN

Subject Code: BMECE0-101 **L T P C** **Duration: 30 Hrs.**
2 0 0 2

1. Introduction

Engineering Drawing/Engineering Graphics/Technical Drawing - a Visual Science. Types of Engineering Drawing, Introduction to drawing equipment and use of instruments. Symbols and conventions in drawing Practice. Types of lines and their use, BIS codes for lines, Technical lettering as per BIS codes, Introduction to Dimensioning, Concepts of scale in drawing, Types of scales. Basic Definition of geometrical objects: Points, lines, planes and solids.

2. Theory of Projections - Relevance of projection, Type of projections, Perspective, Orthographic, Axonometric and their basic principles, System of orthographic projection: in reference to quadrants and octants, illustration through simple problems of projection.

3. Projection of Points- Projection of points in quadrants and octants. Projection of point on Auxiliary planes.

4. Projection of Lines -Parallel to both H P and V P, Parallel to one and inclined to other, and inclined to both, contained in profile plane. True length and angle orientation of straight line: rotation method and auxiliary plane method. Distance between two nonintersecting lines, and trace of line.

5. Projection of Planes- Difference between plane and lamina. Projection of lamina Parallel to one and perpendicular to other, Perpendicular to one and inclined to other, Inclined to both reference planes, and Lamina oblique to three reference planes. Application of auxiliary planes, and trace of planes.

6. Projection of Solids- Definition of solids, types of solids, and elements of solids. Projection of solids in first or third quadrant, with axis parallel to one and perpendicular to other, axis parallel to one inclined to other, axis inclined to both the principle plane, axis perpendicular to profile plane and parallel to both H P and V P. Visible and invisible details in the projection. Use rotation and auxiliary plane method to draw the projections.

7. Section of Solids Definition of Sectioning and its purpose. Procedure of Sectioning, Types of sectional planes. Illustration through examples.

8. Development of Surface Purpose of development, Parallel line, radial line and triangulation method. Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, and development of surface of sphere.

9. Isometric Projection Classification of pictorial views, Basic Principle of Isometric projection, Difference between isometric projection and isometric drawing. Isometric projection of solids such as cube, prism, pyramid and cylinder, and assignments on isometric projection of simple machine parts.

10. Orthographic Projection Review of principle of Orthographic Projection, Sketch/drawing of blocks, and of simple machine parts.

Recommended Text/Reference Books

1. N.D. Bhatt, V.M. Panchal& P.R. Ingle, 'Engineering Drawing', Charotar Publishing House, 2014.
2. M.B. Shah & B.C. Rana, 'Engineering Drawing and Computer Graphics', Pearson Education, 2008.
3. B. Agrawal& C.M. Agrawal, 'Engineering Graphics', TMH Publication, 2012.
4. K.L. Narayana& P. Kannaiah, 'Text book on Engineering Drawing', Scitech Publishers, 2008.

BASIC ELECTRICALENGINEERING

SubjectCode:BELEE0-101 **L T PC** **Duration: 42Hrs.**
3 1 0 4

UNIT-1

DC Circuits: (8 Hrs.)
Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff current and voltage laws, analysis of simple circuits with dcexcitation Superposition, Thevenin and Norton Theorems. Step response of RL, RC circuits.

UNIT-2

AC Circuits: (12 Hrs.)
Representation of sinusoidal waveforms, average, peak and rms values, phasorre presentation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC series and parallel combinations, series and parallel resonance. Three phase voltage source, phase sequence, three phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-3

Transformers: (10 Hrs.)
Magnetic materials, BH characteristics, Single-phase Transformer, no load and full load conditions,phasordiagrams,equivalentcircuit,calculationoflossesintransformers,regulation and efficiency, Auto-transformers, their applications and comparison with two winding transformers.

UNIT-4

Electrical Machines: (8 Hrs.)
Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Direct-On-Line and Star-Delta starters**.** Construction and working of single-phase motors(Splitphase,shadedpole,capacitorstart,capacitorrun,capacitorstartandrunmotors).

Electrical Installations: (4Hrs.)
Components of LT Switchgear: Switch Fuse Unit (SFU), Miniature Circuit Breaker (MCB), Earth Leakage Circuit Breaker (ELCB), Moulded Case Circuit Breaker (MCCB), Types of

Wiring, Earthing.

Recommended Books:

1. D.P. Kothari and I.J. Nagrath, 'Basic Electrical Engineering', Tata McGraw Hill,**2010**.
2. D.C. Kulshreshtha, 'Basic Electrical Engineering', McGraw Hill,**2009**.
3. L.S. Bobrow, 'Fundamentals of Electrical Engineering', Oxford University Press,**2011**.
4. E. Hughes, 'Electrical and Electronics Technology', Pearson,**2010**.
5. V.D. Toro, 'Electrical Engineering Fundamentals', Prentice Hall, India,**1989**.
6. J.P.S. Dhillon. J.S. Dhillon and D. Singh, 'Principles of Electrical & Electronics Engineering', Kalyani Publishers, New Delhi, **2005**.

Course Outcomes:

1. To understand and analyze basic DC and AC circuits.
2. To study the use and working principle of single phase transformers.
3. To study the application and working principles of three phase and single phase induction motors.
4. To introduce to the components of low voltage electrical installations.

PHYSICS (MECHANICS & MECH. OF SOLIDS)LAB.

Subject Code: BPHYS4-102 **L T P C**
0 0 2 1

Note: Students will have to perform at least 10 experiments from the given topic/list.

Experiments based on Mechanics & Mech. of Solids (Broad Area):

Coupled Oscillators:

1. Experiments on an air-track;
2. Experiment on moment of inertia measurement,
3. Experiments with gyroscope;
4. Resonance phenomena in mechanical oscillators.

Experiments based on the above mentioned Topics:

1. To determine the Height of an object using a Sextant.
2. To determine the angular acceleration α and torque τ offly wheel.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine **g** by Bar Pendulum.
5. To determine **g** by Kater's Pendulum.
6. To study the variation of time period with distance between centre of suspension and centre of gravity for a bar pendulum and to determine: (i)Radius of gyration of the bar about an axis through its C.G. and perpendicular to its length. (ii) The value of **g** in the laboratory.
7. To study the Motion of a Spring and calculate (a) Spring Constant (b) Value of **g** and(c) Modulus of rigidity.
8. To find the moment of inertia of an irregular body about an axis through its C.G with the torsional pendulum.
9. To compare the moment of inertia of a solid sphere and hollow sphere or solid disc of same mass with the torsional pendulum.
10. To study the variation of time period with distance between centre of suspension and centre of gravity for a bar pendulum and to determine: (i)Radius of gyration of the bar about an axis through its C.G. and perpendicular to its length. (ii) The value of **g** in the laboratory.
11. To determine the Elastic Constants/Young's Modulus of a Wire by Searle's method.
12. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
13. To determine the Modulus of Rigidity of brass.
14. To find the moment of inertia of an irregular body about an axis through its C.G with the torsional pendulum.
15. Tocomparethemomentofinertiaofasolidsphereandhollowsphereorsoliddiscofsame mass with the torsional pendulum.

Virtual Lab Experiments:

16. Toverifythatenergyconservationandmomentumconservationcanbeusedwithaballistic pendulum to determine the initial velocity of a projectile, its momentum and kinetic energy.
17. To verify the momentum and kinetic energy conservation using collision balls.
18. To understand the torsional oscillation of pendulum in different liquid. and determine the rigidity modulus of the suspension wire using torsion pendulum.
19. To find the Time of flight, Horizontal range and maximum height of a projectile for different velocity, angle of projection, cannon height and environment.
20. The Elastic and Inelastic collision simulation will help to analyse the collision variations for different situations.
21. Study of variation of Momentum, Kinetic energy, Velocity of collision of the objects and the Center of Mass with different velocity and mass.

22. Demonstration of collision behaviour for elastic and inelastictype.
23. Variation of collision behavior in elastic and inelastictype.
24. Calculation of the Momentum, Kinetic energy, and Velocity after collision.
Note: Any other experiment based on the above mentioned broad topics maybe included.

ENGINEERING GRAPHICS & DESIGNLAB.

Subject Code: BMECE0-102 **L T P C** **Duration: 45 Hrs.**
0 0 6 3

1. Overview of Computer Graphics
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 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;

3. Annotations, Layering & other Functions
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.

.*Lab work will be performed in two parts:

(i) Computer Lab (2 hours) Computer Graphics, CAD Drawing etc.

Drawing Hall (04 hours) Manual practice on drawing sheets of theory content the relevant theory part of Engineering Graphics & Design may also be covered in Lab work.

BASIC ELECTRICAL ENGINEERINGLAB.

SubjectCode:BELEE0-102 **L T P C**
0 0 2 1

EXPERIMENTS/DEMONSTRATIONS

1. To study basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. real-life resistors, capacitors andinductors.
2. To verify Ohm'slaw.
3. To verify Kirchhoff's voltage and currentlaws.
4. To verify SuperpositionTheorem.
5. To verify TheveninTheorem.
6. To obtain the sinusoidal steady state response of R-L circuit – impedance calculation and verification. Observation of phase differences between current andvoltage.
7. To obtain the sinusoidal steady state response of R-C circuit – impedance calculation and

verification. Observation of phase differences between current andvoltage.

8. To study resonance phenomenon in R-L-C seriescircuits.
9. To perform open circuit and short circuit test on a single phase transformer and calculate the efficiency.
10. Demonstration of cut-out sections of machines: Induction machine (squirrelcagerotorand slip ring arrangement) and single-phase induction machines.
11. To connect, start and reverse the direction of rotation by change of phase-sequence of connections of three phase inductionmotor.
12. To connect, start and reverse the direction of rotation of single-phase induction motor.
13. To demonstrate working of DOL starter for three-phase induction motor.
14. To demonstrate working of star-delta starter for three-phase induction motor.
15. To demonstrate the components of LT switchgear.

Laboratory Outcomes:

1. Get an exposure to common electrical components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand the usage of common electrical measuring instruments.
4. Understand the basic characteristics of transformers and electrical induction motors.

DRUG ABUSE: PROBLEM, MANAGEMENT ANDPREVENTION

Subject Code: BMNCC0-004 **L T PC** **Duration: 30Hrs.**
2 0 0 0

UNIT-I

Meaning of Drug Abuse:
Meaning: Drug abuse, Drug dependence and Drug addiction. Nature and extent of drug abuse in India and Punjab.

UNIT-II

Consequences of Drug Abuse:
Individual: Education, Employment, Income.
Family: Violence.
Society: Crime.
Nation: Law and Order problem.

UNIT-III

Prevention of Drug Abuse:

Role of Family: Parent-child relationship, Family support, supervision, shipping values, active scrutiny.

School: Counselling, Teacher as role-model, Parent-teacher-health professional coordination, Random testing on students.

UNIT-IV

Treatment and Control of Drug Abuse:

Medical Management: Medication for treatment and to reduce withdrawal effects.

Psychological Management: Counselling, Behavioural and Cognitive therapy.

Social Management: Family, Group therapy and Environmental intervention.

Treatment: Medical, Psychological and Social Management.

Control: Role of Media and Legislation.

Recommended Books:

1. Ram Ahuja, 'Social Problems in India', Rawat Publications, Jaipur, **2003**.
2. 'Extent, Pattern and Trend of Drug Use in India', Ministry of Social Justice and Empowerment, Govt. of India, **2004.**
3. J.A. Inciardi, 'The Drug Crime Connection', Sage Publications, Beverly Hills,**1981**.
4. T. Kapoor, 'Drug Epidemic among Indian Youth', Mittal Publications, New Delhi,**1985**.
5. Kessel, Neil and Henry Walton, 'Alcoholism, Harmond Worth', Penguin Books,**1982**.
6. Ishwar Modi and Shalini Modi, 'Addiction and Prevention', Rawat Publications,Jaipur, **1997.**
7. 'National Household Survey of Alcohol and Drug Abuse', Clinical Epidemiological Unit, All India Institute of Medical Sciences, New Delhi, **2003 &2004**.
8. Ross Coomber and Others, 'Key Concept in Drugs and Society', Sage Publications, New Delhi,**2013**.
9. BhimSain, 'Drug Addiction Alcoholism, Smoking Obscenity', Mittal Publications, New Delhi,**1991**.
10. Ranvinder Singh Sandhu, 'Drug Addiction in Punjab: A Sociological Study', Guru Nanak Dev University, Amritsar,**2009**.
11. Chandra Paul Singh, 'Alcohol and Dependence among Industrial Workers', Shipra,Delhi, **2000**.
12. S. Sussman and S.L. Ames, 'Drug Abuse: Concepts, Prevention andCessation', Cambridge University Press,**2008**.
13. P.S. Verma, 'Punjab's Drug Problem: Contours and Characteristics', Vol. LII, No. 3, P.P. 40-43, Economic and Political Weekly, **2017**.
14. 'World Drug Report', United Nations Office of Drug and Crime,**2016**.
15. 'World Drug Report', United Nations Office of Drug and Crime,**2017**.

CHEMISTRY-I

SubjectCode:BCHEM0-101 **L T PC** **Duration: 42Hrs.**

3 1 0 4

Course Objectives:

1. To understand the atomic and & molecular nature of variousmolecules
2. To understand the bandstructures
3. To elaborate the applications of spectroscopictechniques
4. To understand the thermodynamic functions and theirapplications
5. To rationalize periodicproperties
6. To understand the concepts of stereochemistry and preparation of organicmolecules

UNIT-I

1. Atomic and Molecular Structure: (12Hrs.)

Bohr Theory of Hydrogen atom, Spectrum of H atom, Sommerfeld extension of Bohr Theory, Particle and wave nature of electron, De-Broglie equation, Aufbau principle, Compton effect, Schrodinger wave equation, Laplacian and Hamiltonian operator, Linear Combination of atomic orbitals. Molecular orbitals of diatomic molecules and Energy level diagrams of homonuclearandheteronucleardiatomics.Pi-molecularorbitalsofbutadieneandbenzeneand 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 bandstructures.

UNIT-II

2. Spectroscopic Techniques and Applications: (8Hrs.)

PrinciplesandselectionrulesofElectronicspectroscopyandFluorescencespectroscopyalong withtheirapplications.PrinciplesandselectionrulesofVibrationalandrotationalspectroscopy of diatomic molecules and their Applications. Nuclear magnetic resonance up to spin-spin coupling and magnetic resonanceimaging.

3. Intermolecular Forces and Potential Energy Surfaces: (4Hrs.)

Idealgasequation,Ionic,dipolarandvanDerWaalsinteractions.Realgasequation.Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, andHCN

UNIT-III

4. Use of Free Energy in Chemical Equilibria: (6Hrs.)

Ideal Solution, Non Ideal Solutions, Thermodynamic functions: energy, entropy and free energy. Numerical problems based on entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Thermodynamic properties of ideal solutions. Introduction to Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

5. Periodic Properties: (4 Hrs.)

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 principle

UNIT-IV

6. Stereo chemistry: (4 Hrs.)

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

7. Organic Reactions and Synthesis of a Drug Molecule: (4Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule – β lactum, Paracetamol, Chloroquine and Aspirin

Recommended Books:

1. B.H. Mahan, 'UniversityChemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles andApplications'.
3. C.N. Banwell, 'Fundamentals of MolecularSpectroscopy'.
4. B.L.Tembe,KamaluddinandM.S.Krishnan,'EngineeringChemistry(NPTELWeb-book).
5. P.W. Atkins, 'PhysicalChemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5thEdn., http://bcs.whfreeman.com/vollhardtschore5e/default.asp.

Course Outcomes:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels.The course will enable the studentto:

1. Analyzemicroscopicchemistryintermsofatomicandmolecularorbitalsandintermolecular forces.
2. Rationalize bulk properties and processes using thermodynamicconsiderations.
3. Distinguishtherangesoftheelectromagneticspectrumusedforexcitingdifferentmolecular energy levels in various spectroscopictechniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states andelectronegativity.
5. List major chemical reactions that are used in the synthesis ofmolecules.

MATHEMATICS-II (DIFFERENTIALEQUATIONS)

Subject Code: BMATH4-201 **L T PC** **Duration: 44Hrs.**
3 1 0 4

UNIT–I

First Order Ordinary Differential Equations: (6 Hrs.)

Linear and Bernoulli's equations, exact equation, 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: (6 Hrs.):

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Frobenius method.

UNIT–II

Partial Differential Equations: (12 Hrs.)

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solution to homogenous and non-homogenous linear partial differential equations second and higher order by complimentary function and particular integral method.

UNIT–III

Partial Differential Equations: (10Hrs.)

The Laplacian in plane, cylindrical and spherical polar coordinates, solutions with Bessel functions and Legendre functions. one dimensional diffusion equation and its solution by separation of variables. Boundary-value problems: Solution of boundary-value problems for various linear PDEs in variousgeometries.

UNIT –IV

Partial Differential Equations: (10 Hrs.)

Flows, vibrations and diffusions, second-order linear equations and their classification, Initial and boundary conditions (with an informal description of well-posed problems), D'Alembert's solutionofthewaveequation;Separationofvariablesmethodtosimpleproblemsin Cartesian coordinates.

Recommended Books:

1. S.J. Farlow, 'Partial Differential Equations for Scientists and Engineers', Dover Publications, **1993**.
2. R. Haberman, 'Elementary Applied Partial Differential Equations with Fourier Series and Boundary Value Problem', 4th Edn., Prentice Hall,**1998**.
3. Ian Sneddon, 'Elements of Partial Differential Equations', McGraw Hill,**1964**.

4. ErwinKreyszig,'AdvancedEngineeringMathematics',9thEdn.,JohnWiley&Sons,**2006**.
5. W.E. Boyce and R.C. DiPrima, 'Elementary Differential Equations and Boundary Value Problems', 9thEdn., Wiley India,**2009**.
6. S.L. Ross, 'Differential Equations', 3rdEdn., Wiley India,**1984**.
7. E.A.Coddington,'AnIntroductiontoOrdinaryDifferentialEquations',PrenticeHallIndia, **1995**.
8. E.L. Ince, 'Ordinary Differential Equations', Dover Publications,**1958**.
9. G.F. Simmons and S.G. Krantz, 'Differential Equations', Tata McGraw Hill, **2007**.

CourseOutcomes:

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary and partial differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

1. The mathematical tools needed in evaluating multiple integrals and theirusage.
2. The effective mathematical tools for the solutions of differential equations that model physicalprocesses.
3. The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineeringproblems.

ENGLISH

Subject Code: BHUMA0-101 **L T PC** **Duration: 25Hrs.**
2 0 0 2

UNIT-I

1. Vocabulary Building:

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

UNIT-II

2. Basic Writing Skills:

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

UNIT-III

3. Identifying Common Errors in Writing:

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

UNIT-IV

4. Nature and Style of Sensible Writing:

Describing
Defining
Classifying
Providing examples or evidence
Writing introduction and conclusion

5. Writing Practices:

Comprehension
Précis Writing
Essay Writing

Recommended Books:

1. Michael Swan, 'Practical English Usage', OUP, **1995**.
2. F.T. Wood, 'Remedial English Grammar', Macmillan,**2007.**
3. William Zinsser, 'On Writing Well', Harper Resource Book,**2001.**
4. Liz Hamp-Lyons and Ben Heasly, 'Study Writing', Cambridge University Press,**2006**.
5. Sanjay Kumar and Pushp Lata, 'Communication Skills', Oxford University Press,**2011**.
6. 'Exercises in Spoken English', Parts. I-III. CIEFL, Hyderabad. Oxford UniversityPress.

Course Outcomes:

1. The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

PROGRAMMING FOR PROBLEM SOLVING

Subject Code: BCSCE0-101 **L T PC** **Duration: 41Hrs.**
3 0 0 3

UNIT-I

1. Introduction to Programming: (6 Hrs.)

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

2. Arithmetic Expressions and Precedence: (12Hrs.)

Conditional Branching and Loops. Writing and evaluation of conditionals and consequent branching. Iteration and loops.

UNIT-II

3. Arrays: (5 Hrs.)

Arrays (1-D, 2-D), Character arrays and Strings.

4. Basic Algorithms: (5 Hrs.)

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required).

UNIT-III

5. Function: (4Hrs.)

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference.

6. Recursion: (4Hrs.)

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

7. Structure: (3 Hrs.)

Structures, Defining structures and Array of Structures

8. Pointers: (2Hrs.)

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

9. File Handling: (only if time is available, otherwise should be done as part of thelab)

Recommended Text Books:

1. Byron Gottfried, 'Schaum's Outline of Programming with C', McGrawHill.
2. E. Balaguruswamy, 'Programming in ANSI C', Tata McGrawHill.

Recommended Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, 'The C Programming Language', Prentice Hall of India.

Course Outcomes:

The student will learn

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs (in Clanguage).
3. To test and execute the programs and correct syntax and logical errors.
4. To implement conditional branching, iteration and recursion.
5. To decompose a problem into functions and synthesize a complete program using divide and conque approach.
6. To use arrays, pointers and structures to formulate algorithms and programs.
7. To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
8. To apply programming to solve simple numerical method problems, namelyrot finding of function, differentiation of function and simple integration.

CHEMISTRY-I LAB.

Subject Code: BCHEM0-101 L T P C 0 0 2 1

Course Objectives:

1. To learn the preparation and standardization of solutions
2. To learn the estimation of various physical properties of given liquid samples
3. To estimate various crucial parameters for water sample
4. To learn the preparation of various molecules and detection of functional groups.

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layerchromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorine in water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of are action
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials andemfs
10. Synthesis of apolymer
11. Saponification /acid value of anoil
12. Detection and confirmation of organic functional groups.

13. Models of spatialorientation
14. TotestthevalidityofLambertBeerlaw/Determinationofλ_{max}/Determinationofunknown concentration of asolution.
15. Determination of the partition coefficient of a substance between twoimmiscible liquids
16. Adsorption of acetic acid bycharcoal
17. Synthesis of a drug – Acetaminophen, Aspirin

Laboratory Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products asa function oftime
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

ENGLISH LAB.

Subject Code: BHUMA0-102 **L T P C**
0 0 2 1

Oral Communication

(This unit involves interactive practice sessions in Language Lab.)

1. Listening Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues
4. Communication at Workplace
5. Interviews
6. Formal Presentations

PROGRAMMING FOR PROBLEM SOLVINGLAB.

Subject Code: BCSCE0-102 **L T P C**
0 0 4 2

NOTE: The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment
Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation
Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations
Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions
Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures
Tutorial 12: File handling:
Lab 12: File operations
Laboratory Outcomes:

1. To formulate the algorithms for simple problems
2. To translate given algorithms to a working and correct program
3. To be able to correct syntax errors as reported by the compilers
4. To be able to identify and correct logical errors encountered at runtime
5. To be able to write iterative as well as recursive programs
6. To be able to represent data in arrays, strings and structures and manipulate them through a program
7. To be able to declare pointers of different types and use them in defining self referential structures.
8. To be able to create, read and write to and from simple text files.

MANUFACTURING PRACTICES (THEORY & LAB.)

Subject Code: BMFPR0-101 **L T PC** **Duration: 80 Hrs.**
1 0 4 3

Lectures & Videos: (10 Hrs.)

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing Methods.
2. CNC machining, Additive manufacturing.
3. Fitting operations & power tools.
4. Sheet Metal Operations.
5. Electrical &Electronics.
6. Carpentry.
7. Plastic moulding (injection moulding, blow moulding, extrusion moulding), glasscutting.
8. Metal casting.
9. Welding (arc welding & gas welding), brazing.

Recommended Text/Reference Books:

1. S.K. Hajra Choudhury, A.K. Hajra Choudhury and S.K. Nirjhar Roy, 'Elements of Workshop Technology', Vol.-I, **2008** and Vol.-II **2010**, Media Promoters and Publishers Pvt. Ltd.,Mumbai.
2. S. Kalpakjian, Steven S. Schmid, 'Manufacturing Engineering and Technology', 4thEdn., Pearson Education India Edn.,**2002**.
3. Gowri P. Hariharan and A. Suresh Babu, 'Manufacturing Technology – I', Pearson,**2008**.
4. Roy A. Lindberg, 'Processes and Materials of Manufacture', 4thEdn., Prentice HallIndia, **1998**.
5. P.N. Rao, 'Manufacturing Technology', Vol.-I and Vol.-II, Tata McGraw HillHouse, **2017**.

Course Outcomes:

1. Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Workshop Practice: (70 Hrs.)

1. Machine shop **(10Hrs.)**
2. Fitting shop **(8Hrs.)**
3. Carpentry **(6Hrs.)**
4. Electrical & Electronics **(8 Hrs.)**
5. Welding shop **(8 Hrs. (Arc welding 4 Hrs. + Gas welding 4Hrs.)**
6. Casting **(8Hrs.)**
7. Sheet Metal Operations **(10 Hrs.)**
8. Smithy **(6Hrs.)**
9. Plastic moulding & Glass Cutting **(6Hrs.)**
10. Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Laboratory Outcomes:

1. Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
2. They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
3. By assembling different components, they will be able to produce small devices of their interest.

INTRODUCTION TO CIVIL ENGINEERING

Subject Code: BMNCC0-011 **L T P C** **Duration: 30 Hrs.**
2 0 0 0

NOTE: Only Basic Concepts are to be covered for all the topics.

Unit-I

1. **INTRODUCTION:** Civil Engineering, Scope of Civil Engineering, Branches of Civil Engineering, Applications of Civil Engineering to Allied Fields, Role of Civil Engineer in various Construction Activities, Applications in Industrial, Public and Residential Buildings.
2. **BUILDING TECHNOLOGY:** General Idea, Components of Sub-Structure and their Functions, Components of Super-Structure and their Functions, Foundation, Concept of Bearing Capacity, Super Structure, Building Plans and Sectional Details.

Unit-II

3. **BUILDING MATERIALS:** Basic Introduction to Stones, Bricks, Cement, Lime, Sand, Timber, Steel, Plastic, Aluminium, Glass, Roof Covering Materials, Asphalt and Bitumen, Smart and Intelligent Materials.
4. **BUILDING CONSTRUCTION:** Basic Introduction to Masonry, Stone Masonry, Brick Masonry, Mortar, Concrete, Types of Concretes, Reinforced Cement Concrete, Concrete Block Masonry, Reinforced Brick Masonry, Composite Masonry, Pre-stressed Concrete (Pre-Cast Concrete and Pre-Fabricated Construction), Steel Structures.

Unit-III

5. **TRANSPORTATION ENGINEERING:** Different Modes of Transportation, Comparison, Categories of Roads in India, Characteristics of Hill Roads, Rail Gauges used in India,

Elements of Railway Track, Airports, Runway, Terminal Building, Ports and Harbours, Tunnels, Integration of Transport Modes in Urban Areas.

Unit-IV

6. **ENVIRONMENTAL & WATER RESOURCES:** Basic Introduction, Water and Sewerage Management, Water Supply Engineering and Sanitary Engineering.
Basic Introduction to Hydraulic Structures, Hydrology and Water Resources, Construction Management.

Books:

1. An Introduction to Civil Engineering by R. Agor.
2. Basic Civil Engineering by G.K. Hiraskar, Dhanpat Rai Publications.

Total Credits= 24

Semester-III (B.Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-321	Surveying	3	0	0	40	60	100	3
BCIES1-322	Fluid Mechanics-I	3	0	0	40	60	100	3
BCIES1-323	Engineering & Solid Mechanics	3	1	0	40	60	100	4
BCIES1-324	Building Materials & Construction	3	0	0	40	60	100	3
BMATH4-301	Mathematics-III (Transform & Discrete Mathematics)	2	0	0	40	60	100	2
BHSMC0-022	Civil Engineering- Societal & Global Impact	2	0	0	40	60	100	2
BCIES1-325	Engineering & Solid Mechanics Lab	0	0	2	60	40	100	1
BCIES1-326	Fluid Mechanics Lab	0	0	2	60	40	100	1
BCIES1-327	Surveying Lab	0	0	4	60	40	100	2
BCIES1-328	Computer-aided Civil Engineering Drawing-I	0	0	2	60	40	100	1
BMNCC0-002	Environmental Science (Mandatory Course)	2	0	0	---	---	---	0
BCIES1-329	Training-I*	0	0	0	60	40	100	2
BMNCC0-052	The Maharaja of People	2	-	-	100	-	100	-
Total		**20**	**1**	**10**	**640**	**560**	**1100**	**24**

*Training will be imparted in the institution at the end of 2nd semester for 4-6 week duration.

SURVEYING					
Subject Code: BCIES1-321	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	**0**	**0**	**3**	

Course Objective

1. To understand the importance of surveying in the field of civil engineering
2. To learn the basic of linear/angular measurement methods.
3. To know the basics of levelling and Theodolite survey in elevation and angular measurements.
4. To understand Tacheometric surveying in distance and height measurements.
5. To get knowledge about the different types of curves used in highway and railway etc.

Course outcomes: On completion of the course, the students will be able to:

1. Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering plan a survey.
2. Taking accurate measurements, field booking, plotting and adjustment of traverse use various conventional instruments involved in surveying with respect to utility.
3. Precisely plan a survey for applications such as road alignment and height of the building undertake measurement and plotting in civil engineering.

Unit–I (11 Hours)

1. Fundamental Concepts & Horizontal Measurement: Definitions, Different types of surveys, Scale of map, Principles of Surveying. Distances with chain and tape, Direct & Indirect ranging, Offsets, Selection of stations and base line, Corrections for base line.

2. Compass Surveying: Definitions, Types of compass, Temporary adjustments of compass Designation of bearings, , included angles from bearing of lines and vice versa, Declination, Dip of magnetic needle, local attraction**.**

Unit-II (10 Hours)

3. Theodolite: Introduction, Definitions, Temporary and permanent Adjustments, Measurement of horizontal and vertical angle.

4. Traversing: Closed & Open traverse, Consecutive and independent co-ordinates, Latitudes and Departures, Closing error, balancing a traverse**:** Bowditch & Transit Rules**.**

Unit–III (12 Hours)

5. Measurement of Vertical Distance: Introduction, Definitions, Temporary and permanent Adjustments of level, Principle of levelling, Booking and reducing the levels by Rise & Fall method and Height of instrument method. Corrections due to Curvature and Refraction.

6. **Tachometry:** Determine tachometer constants, Measurement of horizontal & vertical distances with tachometer.

7. Plane Table Surveying: Principle of plane table survey, setting up the plane table and Methods of plane tabling.

Unit–IV (12 Hours)

8. Contouring: Definition**,** Characteristics of Contours and Methods of Contouring and Uses of Contour maps.

9. Curves: Elements of curves, Types of curves, Different methods of setting out of curves.

10. Total Station Survey: Features, Setting up and Orientation, characteristics and field procedure of Total Station.

Recommended Books:

1. B.C. Punmia, A. K. Jain, and Arun Kumar Jain, Surveying', Vol. I, II, Laxmi Publications.

2. S.K. Duggal, Tata McGraw Hill. Vol-I

3. R. Agor, Surveying, Khanna Publishers**.**

4. S.S. Bhavikatti, Surveying & Levelling Vol. I, II.

5. Narinder Singh, Surveying, Tata McGraw Hill.

6. N.N. Basak, Surveying and leveling', Tata McGraw Hill, New Delhi.

FLUID MECHANICS-I

Subject Code: BCIES1-322 | **L T P C** 3 0 0 3 | **Duration: 45 Hrs.**

Course Objectives:

The course should enable the students to:

1. The broad principles of fluid statics, kinematics and dynamics.
2. The definitions of the basic terms used in fluid mechanics.
3. The classifications of fluid flow.
4. To apply the continuity, momentum and energy principles.
5. Dimensional analysis.
6. Flow past immersed bodies.

Course Outcomes:

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

1. Understand the broad principles of fluid statics, kinematics and dynamics.
2. Understand definitions of the basic terms used in fluid mechanics.
3. Understand classifications of fluid flow.
4. Be able to apply the continuity, momentum and energy principles.
5. Understand dimensional analysis.
6. Understand flow past immersed bodies.

UNIT-I (13 Hours)

1. 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; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.

2. Fluid Statics - Fluid Pressure: Pressure at a point, Pascal's law and its engineering hydrostatic paradox, pressure variation with temperature, density and altitude. Piezometer, U- Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micro manometers. Pressure gauges, orifices, mouthpieces, notches (rectangular and V-notches) and weirs (sharp crested weirs).

UNIT-II (13 Hours)

3. Hydrostatic pressure and force: (horizontal, vertical and inclined) Submerged surfaces, force on a curved surface due to hydrostatic pressure. Buoyancy and floatation and stability of floating and submerged bodies. Meta-centric height and its determination.

4. 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; Velocity and acceleration of a fluid particle, local and convective acceleration. Streamline, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three-dimensional continuity equations in Cartesian coordinates.

UNIT-III (13 Hours)

5. 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; Vortex Flow – Free and Forced.

6. Dimensional Analysis and Dynamic Similitude: Fundamental and derived units and dimensions, dimensional homogeneity, Rayleigh's and Buckingham's Pi method for dimensional analysis, dimensionless numbers and their significance, geometric, kinematic and dynamic similarity, model studies.

UNIT-IV (06 Hours)

7. Flow Past immersed bodies: Drag and lift deformation Drag and pressure drag. Drag on a sphere, cylinder and Airfoil: lift-Magnus Effect and circulation lift on a circular cylinder.

Recommended Text Books / Reference Books:

1. Fluid Mechanics & Hydraulic Machines: Dr. R.K. Bansal.
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010
3. Hydraulics and Fluid Mechanics, P. N. Modi and S. M. Seth, Standard Book House.
4. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
5. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

ENGINEERING & SOLID MECHANICS

Subject Code: BCIES1-323	L	T	P	C	Duration: 60 Hrs.
	3	1	0	4	

Course Objectives:

1. To introduce to continuum mechanics and material modeling of engineering materials based on first energy principles, deformation and strain, momentum balance, stress and stress states, elasticity and elasticity bounds, plasticity and yield design.
2. To develop the ability of the student to analyze the engineering objects subjected to different types of forces using the basic principles of statics.

3. To involve analytical methods for determining the strength, stiffness (deformation characteristics), and stability of the various members in a structural system.

Course Outcomes:

The student will be able to:

1. Describe the concepts and principles, understand the theory of elasticity including strain / displacement and Hooke's law relationships, and perform calculations, relative to the strength and stability of structures and mechanical components.
2. Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures, analyze solid mechanics problems using classical methods and energy methods.
3. Analyze various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress, locate the shear centre of thin wall beams, and
4. Calculate the deflection at any point on a beam subjected to a combination of loads, solve for stresses and deflections of beams under unsymmetrical loading, apply various failure criteria for general stress states at points and solve torsion problems in bars and thin walled members.

UNIT-I (15 Hours)

Module1: Simple Stresses and Strains: Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic modulii and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience Gradual, sudden, impact and shock loadings – simple applications.

Module 2: Compound Stresses and Strains: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain, Relationship between elastic constants.

UNIT-II (15 Hours)

Module 3: Shear Force and Bending Moment Diagrams: Shear force diagrams (SFD) and Bending moment diagrams (BMD). SFD and BMD for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum SF and BM and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.

Module 4: Flexural Stresses-Theory of Simple Bending: Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections.

UNIT-III (15 Hours)

Module 5: Shear Stresses: Derivation of formula –Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

Module 6: Slope and deflection: Relationship between moment, slope and deflection, Double Integration method, Macaulay's method, Use of these methods to calculate slope and deflection for determinant beams.

UNIT-IV (15 Hours)

Module 7: Torsion: Derivation of torsion equation and its assumptions, Applications of the equation for hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stresses and maximum shear stresses under combined loading of bending and torsion, Analysis of closely-coiled-helical springs. [7]

Module 8: Thin Cylinders and Spheres: Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.

Recommended Text Books / Reference Books:

1. Timoshenko, S. and Young, D. H.,–Elements of Strength of Materials, DVNC, New York, USA.
2. Kazmi, S. M. A., –Solid Mechanics‖ TMH, Delhi, India.
3. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall.
4. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd edition New York, NY: McGraw Hill, 1979
5. Laboratory Manual of Testing Materials - William Kendrick Hall
6. Mechanics of Materials - Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf, TMH
7. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

BUILDING MATERIALS & CONSTRUCTION

Subject Code: BCIES1-324	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

The course should enable the students to:

1. Develop knowledge of material science and behaviour of various building materials used in construction.
2. Identify the construction materials required for the assigned work.
3. Provide procedural knowledge of the simple testing methods of brick, cement, lime and concrete etc.
4. Understanding of brick & stone masonry, damp proofing course, finishing, plastering, painting and building floor.

Course Outcomes:

1. Predict the properties of building stones and its classifications.
2. Understand the concept of various methods of manufacture of bricks.
3. Obtain differentiate the fine aggregates and coarse aggregates under various views.
4. Explain various types of cements and their applications in construction. Various field and laboratory tests on cement

5. Analyze the importance of mineral and chemical admixtures, requirements of the concrete in construction
6. Explain the suitability of floors in buildings like mosaic flooring, terrazzo flooring, rubber flooring, asphalt flooring.
7. Explain the foundations and uses of different types of foundations.
8. Explain the classification of various types of woods. State the properties, seasoning of timber.

UNIT-I (11 Hours)

Bricks: General terms, Composition of good brick earth, Harmful ingredients in brick earth, qualities of good bricks, tests for bricks, classification of bricks

Timber: Definition, classification of trees, structure of a tree, seasoning of timber, defects in timber, market forms of timber

Building Stones: General terms, Uses of stones, qualities of a good building stone, deterioration of stones, preservation of stones, artificial stones, common building stones of India and their uses

UNIT-II (12 Hours)

Lime: Introduction, definitions: calcination, Hydraulicity, setting, slacking, sources of lime, classification of limes & their uses, tests for lime stones.

Cement: Different types of cement, Constituents of cement, manufacturing of Portland cement, hydration of cement, tests for cement, uses of different types of cement.

Concrete: Introduction, Constituents of concrete, batching of materials, manufacturing process of cement concrete, workability and factors affecting it, methods to determine workability, segregation and bleeding of concrete, strength of concrete and factors affecting it, tests for concrete.

Miscellaneous Materials: Admixtures, Paints, Plastics.

UNIT-III (11 Hours)

Foundation and Walls: Definition, types of foundations, Types of walls and thickness considerations.

Brick and Stone Masonry: Terms used, Types of bonds & their merits and demerits, rubble and ashlar joints in stone masonry, cement concrete hollow blocks and their advantages & disadvantage.

UNIT-IV (11 Hours)

Damp Proofing: Causes and bad effects of dampness, preventive measures for dampness in buildings.

Plastering and Pointing: Objectives, Methods of plastering, Materials and types, Defects in plastering, special material for plastered surface, distempering, white washing and colour washing.

Floors: Introduction, Types of floors used in building & and their suitability, factors for selecting suitable floor for building.

Recommended Text Books / Reference Books:

1. M.S. Shetty, ‘Concrete Technology’, S. Chand Publication.
2. S.P. Bindra, S.P. Arora, ‘Building Construction’, Dhanpat Rai Publication.
3. S.K. Duggal, ‘Building Materials’, New Age International Publishers.

4. Rangwala, 'Engineering Materials', Charotar Publication House.
5. B.C. Punmia, 'Building construction', Laxmi Publication.
6. Parbin Singh, 'Civil Engineering Materials', S K Kataria and Sons
7. Sushil Kumar, 'Building Construction', Standard Publishers Distributors.

MATHEMATICS-III (Transform & Discrete Mathematics)

Subject Code: BMATH4-301	**L**	**T**	**P**	**C**	**Duration: 30 Hrs.**
	2	0	0	2	

Transform Calculus

Unit-I

Module 8a: *Transform Calculus* -1

Polynomials – Orthogonal Polynomials – Lagrange's, Chebysev Polynomials; Trigonometric Polynomials, Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions, Finding inverse Laplace transform by different methods, convolution theorem, Evaluation of integrals by Laplace transform, solving ODEs and PDEs by Laplace Transform method. (6)

Module 8b: *Transform Calculus*-2

Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications. (4)

Discrete Mathematics

Unit-II

Module 9a: *Sets, relations and functions*:

Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. (4)

Module 9b: *Propositional Logic:*

Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, Decision problems of propositional logic, Introduction to first order logic and first order theory. (3)

Unit-III

Module 9c: *Partially ordered sets:*

Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices, Boolean and pseudo Boolean lattices. (3)

Module 9d: *Algebraic Structures:*

Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations-ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only). (3)

Unit-IV

Module 9e: ***Introduction to Counting:***

Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions. (4)

Module 9f: ***Introduction to Graphs:***

Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees. (3)

Recommended Text Books / Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
4. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
5. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
6. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
7. R. L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., Addison-Wesley, 1994.
8. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
9. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010.
10. N. Deo, Graph Theory, Prentice Hall of India, 1974.
11. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.
12. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

CIVIL ENGINEERING- SOCIETAL & GLOBAL IMPACT

Subject Code: BHSMC0-022	**L**	**T**	**P**	**C**	**Duration: 30 Hrs.**
	2	0	0	2	

Course Objectives:

The course should enable the students to:

1. Awareness of the importance of Civil Engineering and the impact it has on the Society and at global levels.
2. Awareness of the impact of Civil Engineering for the various specific fields of human endeavor
3. Need to think innovatively to ensure Sustainability.

Course Outcomes:

1. The impact which Civil Engineering projects have on the Society at large and on the global arena and using resources efficiently and effectively.

2. The extent of Infrastructure, its requirements for energy and how they are met: past, present and future.
3. The Sustainability of the Environment, including its Aesthetics.
4. The potentials of Civil Engineering for Employment creation & its Contribution to the GDP.
5. The Built Environment and factors impacting the Quality of Life
6. Applying professional and responsible judgment and take a leadership role;

UNIT-I (07 Hours)

Module1: Introduction to Course and Overview, Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature, Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis.

Module2: 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; Future Vision for Civil Engineering.

UNIT-II (08 Hours)

Module 3: Infrastructure- Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Awareness of various Codes & Standards governing Infrastructure development; Innovations and methodologies for ensuring Sustainability in civil engineering.

UNIT-III (07 Hours)

Module 4: Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Environmental Metrics & Monitoring; Innovations and methodologies in civil engineering for ensuring Sustainability.

UNIT-IV (08 Hours)

Module 5: Built Environment- Energy efficient built environments and LEED ratings, Recycling, Temperature/ Sound control in built environment, Intelligent/ Smart Buildings; Conservation, Repairs & Rehabilitation of Structures.

Module 6: Civil Engineering Projects – Environmental Impact Analysis procedures; Waste(materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment(projects, facilities management), Innovations and methodologies for ensuring Sustainability during Project development.

Recommended Text Books / Reference Books:

1. NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
2. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120th ASEE Annual Conference and Exposition
3. Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure, Review of Current Knowledge, Foundation for Water Research
1. Blackmore J M., Plant R A J. (2008). Risk and resilience to enhance sustainability with application to urban water systems. J. Water Resources Planning and Management. ASCE.
2. http://www.thamestunnelconsultation.co.uk/consultation-documents.aspx

ENGINEERING & SOLID MECHANICS LAB

Subject Code: BCIES1-325	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

1. To deal with an experimental determination and evaluation of material behavior in order to explain the deformation and fracture behavior of structural materials.
2. To determine the mechanical and structural properties of materials from the laboratory.
3. To test the materials under accurately known forces or loads.
4. To study the material behavior by careful observations and measurements.
5. To provide students with all information concerning principle, way of measurement, as well as practical application of mechanical behavior of materials.

Course Outcomes:

1. Students will be able to operate the laboratory equipment, interpret the laboratory data including conversion of measurements into engineering values.
2. They will be able to find the deviation of material properties (strength and stiffness) from the engineering values,
3. They will be able to observe various modes of failure in compression, tension, and shear.
4. They will be able to observe various types of material behavior under similar loading conditions.
5. They will be able to observe material behavior under repeated loading.

Laboratory Experiments:

1. To determine Impact Strength of Mild Steel.
2. To determine the spring constant / stiffness of the given spring.
3. To determine Brinell and Vicker's Hardness numbers of mild steel.
4. To determine the Rockwell Hardness number of metals.
5. To determine the Fatigue Strength of mild steel.
6. To determine Torsional Strength of mild steel and cast iron.

7. To determine Tensile Strength of mild steel.
8. Determination of shear forces in beams.
9. Determination of bending moments in beams.
10. Measurement of deflections in statically determinate beams.

Recommended Books / Manuals:

1. Experimental methods in Structural Mechanics by C.B. Kukreja and V.V. Sastry, Standard Publishers Distributors, Delhi.
2. Laboratory Manual of Testing Materials - William Kendrick Hall
3. Analysis of Structures, Volume – I, by V. N. Vazirani & Ratwani.

FLUID MECHANICS LAB

Subject Code: BCIES1-326	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

The course should enable the students to:

1. To determine the various parameters related to fluid flow in Pipe and in open channels.
2. The Fluid Mechanics laboratory is used to examine the properties of fluids and to conduct experiments involving both in incompressible and compressible flow.
3. Facilities are available for investigating the fundamentals of fluid statics as well as kinematics & Kinetics of fluid flow to enhance the hands-on experience of our students.
4. The laboratory is also equipped to conduct experiments on open channel flow, centrifugal pumps and groundwater flow.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Predict the met centric height of floating vessel and utility in vessel design.
2. Calibrate various flow measuring devices (venturimeter, orifice meter and notches).
3. Authenticate the Bernoulli's theorem experimentally.
4. Assess the discharge of fluid over broad crested weir.
5. Compute various losses and velocity in pipe flow in field.
6. Predict the coefficient of discharge for Broad Crested Weir.
7. Determine the hydraulic coefficients for flow through an orifice.
8. Determine the friction coefficient for pipes of different diameter.

Laboratory Experiments:

1. To determine the metacentric height of a floating vessel under loaded and unloaded conditions.
2. To study the flow through a variable area duct and verify Bernoulli's energy equation.
3. To determine the coefficient of discharge for an obstruction flow meter (venturimeter /orifice meter).
4. To determine the discharge coefficient for a V-notch or rectangular notch.

5. To determine the coefficient of discharge for Broad crested weir.
6. To determine the hydraulic coefficients for flow through an orifice.
7. To determine the friction coefficient for pipes of different diameter.
8. To determine the head loss in a pipe line due to sudden expansion / sudden contraction/ bend.
9. To determine the velocity distribution for pipe line flow with a pitot static probe.
10. To study the transition from laminar to turbulent flow and to ascertain the lower critical Reynolds number.

Recommended Books / Manuals:

1. Practical Fluid Mechanics for Engineering Applications (Mechanical Engineering (Marcell Dekker) By John J. Bloomer
2. Fluid Mechanics Practical Manual by S. Sarabjit Singh

SURVEYING LAB

Subject Code: BCIES1-327	L	T	P	C	Duration: 60 Hrs.
	0	0	4	2	

Course Objectives:

To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

Course Outcomes:

At the end of the course, the student will practically be able to draw plans & maps to determine the areas before taking up any civil engineering works.

1. Surveying of an area by chain survey (closed traverse) & plotting.
2. Survey of a given area by prismatic compass and surveyor compass and plotting after adjustment.
3. Radiation method, intersection methods by plane table survey.
4. Two point and three point problems in plane table survey.
5. Levelling – Longitudinal and cross-section and plotting
6. Trigonometric levelling using Theodolite
7. Height and distances using principles of tacheometric surveying
8. (a) Measurement of Horizontal angle & vertical angle
   (b) Distance between inaccessible points by theodolite.

Laboratory Experiments:

1. Measurement of distance, ranging a line.
2. Measurement of bearing and angles with compass, adjustment of traverse by graphical method.
3. To find the level of different points by height of instrument, rise & fall methods.

4. Measurement of horizontal and vertical angle by Theodolite.
5. Determination of tachometric constants and determination of reduced levels by tachometric observations.
6. Plane table survey, different methods of plotting, two point & three point problem.
7. Determination of height of an inaccessible object.
8. Setting out of circular curves, transition curve in the field using different methods.
9. Working of Total Station.

Recommended Books / Manuals:

1. B.C. Punmia, A. K. Jain, and Arun Kumar Jain, Surveying, Vol. I, II, Laxmi Publications
2. S.K. Duggal, Tata McGraw Hill. Vol.-I
3. R. Agor, Surveying', Khanna Publishers**.**
4. S.S. Bhavikatti, Surveying & Levelling Vol. I, II.
5. Narinder Singh, Surveying, Tata McGraw Hill.
6. N.N. Basak, Surveying and leveling, Tata McGraw Hill, New Delhi.

COMPUTER-AIDED CIVIL ENGINEERING DRAWING-I

Subject Code: BCIES1-328	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

The students will be able to:

1. Develop structural designs.
2. Understand design procedures and ways- The student learn to interpret drawings, and to produce designs using Civil Engineering software.

Course Outcomes:

1. Design and draw working structural drawings of various concrete structures and their members.
2. Understand and interoperate design aids and handbooks.
3. Use of relevant Indian Standard specifications applicable to Reinforced concrete structures.

Laboratory Drawing Works:

1. Basic Structural Drawings of concrete & steel elements such as plan, Elevation, side plans of beams, columns, slabs, Connections, Tension Members, Compression Members, steel Beams, Foundations, Roof Trusses, etc.

ENVIRONMENTAL SCIENCE

Subject Code: BMNCC0-002	L	T	P	C	Duration: 30 Hrs.
	2	0	0	0	

Course Objectives:

1. To identify and understand the importance and related problem of natural resources.

2. To realize the importance of ecosystem and biodiversity for maintaining ecological balance.

3. To identify the major pollutants and abatement devices for environmental & waste management and sustainable development.

4. To understand the conceptual process related with the social issues, various climatologically associated problems, and their possible solutions.

Course Outcomes: Based on this course, the students will understand/evaluate/develop:

1. Technologies based on ecological principles and environmental regulations, which in turn helps in sustainable development.
2. Conceptualize the processes and various factors involved in the formation of environment.
3. Recognize the importance of environment and the sustainable natural resources.
4. Use scientific reasoning to identify and understand environment problems and evaluate potential solution.
5. Identify the impacts of human activities on environment and role of society in these impacts.

UNIT-I (07 Hours)

Natural Resources: Renewable and Non-renewable Resources: Natural resources and associated problems. (a) Forest resources: Use and over-exploitation, deforestation. Timber extraction and their effects on forests, tribal people and case studies. (b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits & problems and case studies. (c) Mineral resources: Use and over-utilization, environmental effects of extracting and using mineral resources.

UNIT-II (08 Hours)

Ecosystems: (a) Concept of an ecosystem. (b) Structure and function of an ecosystem. (c) Producers, consumers and decomposers. (d) Energy flow in the ecosystem. (e) Ecological succession. (f) Food chains, food webs and ecological pyramids.

Biodiversity and its Conservation: Introduction – Definition: genetic, species and ecosystem diversity (b) Bio-geographical classification of India (c) Value of biodiversity: consumptive use, productive use, social and ethical aesthetic.

UNIT-III (08 Hours)

Environmental Pollution: Definition (a) Causes, effects and control measures of: i) Air pollution ii) Water pollution iii) Soil pollution iv) Marine pollution v) Noise pollution vi) Thermal pollution vii) Nuclear pollution

(b) Solid Waste Management: Causes, effects and control measures of urban and industrial waste.

UNIT-IV (07 Hours)

Social Issues and the Environment: (a) From unsustainable to sustainable development (b) Urban problems and related to energy (c) Water conservation, rain water harvesting, Watershed Management (d) Resettlement and rehabilitation of people; its problems and concerns. (e) Environmental ethics: Issues and possible solutions (f) Climate change, global warming, acid rain,

ozone layer depletion, nuclear accidents and holocaust.

Recommended Text Books / Reference Books:

1. C.P. Kaushik, 'Environmental Science'.
2. J.G. Henry and G.W. Heinke, 'Environmental Sc. & Engineering', Pearson Education, 2004.
3. G.B. Masters, 'Introduction to Environmental Engg. & Science', Pearson Education, 2004.
4. Erach Bharucha, 'Textbook for Environmental Studies', UGC, New Delhi.

THE MAHARAJA OF PEOPLE

Subject Code: BMNCC0-052 **L T P C** **Duration: 30 Hrs.**
2 0 0 0

UNIT-I (8 Hrs)

The Early Life: Early life of Maharaja Ranjit Singh, First battle, Death of Father, Act of bravery, Unifying Punjab, Coronation

UNIT-II (8 Hrs)

Conquests: Jhang, Kasoor, Multan, Peshawar, Naushehra, Annexation of Peshawar into Sikh Kingdom, Jamraudh, Kashmir, Ladakh, Tibbet, Formation of State of J & K

UNIT-III (8 Hrs)

Administrative Capabilities
Administration: Central Govt., Provincial & local Govt., Financial Administration, Judicial systems, Secular State, Military System, Creation of a regular force, Organization of Army, Recruitment & Payment, Education System, Pattern of the arts, a unique portrait, Touchstone, The court of Maharaja Ranjit Singh, Europeans at Sikh Court

UNIT-IV (6 Hrs)

The Legacy: Diamond Kohinoor, Love for common Folk, A ruler much ahead of his times, Graciousness of Maharaja, True Nationalist, Maharaja's Notion of Nationalism & Secularism, the last journey, The enduring legacy of Maharaja, Secrets of popularity of Maharaja, Nature of Maharaja's polity.

Recommended Books:

1. Rajmohan Gandhi: Punjab: A History from Aurangzeb to Mountbatten, 2013.
2. Grewal, J.S.: The Sikhs of the Punjab, Cambridge University Press, 1968.
3. Khushwant Singh: A History of the Sikhs Vol. 1 1469-1839, Oxford University Press, 1963.
4. Untold story of Maharaja Ranjit Singh

Total Credits= 20

Semester-IV (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-421	Structural Analysis-I	3	0	0	40	60	100	3
BCIES1-422	Design of Concrete Structures-I	3	0	0	40	60	100	3
BCIES1-423	Transportation Engineering-I	3	0	0	40	60	100	3
BCIES1-424	Environmental Engineering-I	3	0	0	40	60	100	3
BCIES1-425	Engineering Geology	2	0	0	40	60	100	2
Departmental Elective-I (Select any one)		3	0	0	40	60	100	3
BCIED1-451	Geomatics Engineering							
BCIED1-452	Numerical Methods in Civil Engineering							
BCIED1-453	Concrete Construction Technology							
BCIES1-426	Concrete Technology Lab-I	0	0	2	60	40	100	1
BCIES1-427	Structural Analysis Lab	0	0	2	60	40	100	1
BCIES1-428	Transportation Engineering Lab	0	0	2	60	40	100	1
BHSMC0-026	Universal Human values – II Understanding Harmony	2	1	0	40	60	100	3
Total		**-**	**-**	**-**	**460**	**540**	**1000**	**23**

*There will be 4-weeks Internship as per AICTE Internship Policy after 4th semester.

STRUCTURAL ANALYSIS-I

Subject Code: BCIES1-421 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To provide students with a solid background on principles of structural analysis by exposing them to the theories and concepts of analyzing the civil engineering structures.
2. To cover the analysis of statically determinate structures.

Course Outcomes:

1. The students will possess the skills to solve statically determinate problems of structural analysis dealing with different loads.
2. They will be able to apply their knowledge of structural analysis to address structural design problems.

UNIT-I (12 Hours)

1. Slope & Deflection of Beams & Frames: Review of Double Integration Method and Macaulay's Method, Moment Area Method, Conjugate Beam Method, Strain Energy / Real Work Method, Virtual Work / Unit Load Method, Castigliano's Method & Maxwell's Reciprocal Theorem.

2. Structural Stability: Introduction, Stability of Columns, Axially loaded Columns, Euler's Theory of Long Columns and Euler's Formula, End Conditions & Effective Length Factor, Equivalent Length, limitations of Euler's Theory, Columns with Eccentric and Lateral Load, Rankine Gordon Formula.

UNIT-II (11 Hours)

3. Analysis of Determinate Trusses: Introduction, determination of forces in member of trusses by method of joints, method of sections, Tension Coefficient Method, Deflection of Joints of plane frames by Castigliano's first theorem and unit load method, Effect of Lack of Fit & Temperature Change.

4. 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 (11 Hours)

5. Simple Cable & Arch Structures: Introduction, shape of a loaded cable, cable carrying point loads and UDL, cables with ends at different level, cable subjected to temperature stresses, Analysis of Cables, Analysis of three hinged (Parabolic and Circular) Arches for Horizontal Thrust, Bending Moment, Normal Thrust and Radial Shear.

6. Suspension Bridges: Introduction, Analysis of suspension bridges with two hinged and three hinged stiffening girders, Temperature Stresses in Three Hinged and Two Hinged Stiffening Girders.

UNIT-IV (11 Hours)

7. 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.

8. Influence Lines: Construction of Influence lines for reaction, shear forces and bending moment for beams, influence lines for girders with floor beams, Influence lines for forces in members of frames. Influence lines for Three Hinged Arches & Stiffening Girders.

Recommended Text Books / Reference Books:

1. C.S. Reddy, 'Basic Structural Analysis'.
2. Vazirani & Ratwani, 'Analysis of Structures', Vol. - I, -II.
3. C.K. Wang, 'Intermediate Structural Analysis'.

DESIGN OF CONCRETE STRUCTURES-I

Subject Code: BCIES1-422	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

1. Learn the behaviour of structural concrete components and Ability to perform analysis and design of concrete members.

Course Outcomes:

1. Identify the different failure modes and determine their design strengths.
2. Select the most suitable section shape and size for beams according to specific design criteria.

Note: 1. IS 456, Indian Standard. Plain and Reinforced Concrete -Code of practice is permitted in examination.
2. Examiner requested to provide requisite data for Mix Design Problems; if any.

UNIT-I (05 Hours)

Concrete Mix Design: Introduction, Selection of mix proportions, Durability of concrete, Quality Control of concrete, Introduction of various mix proportion methods, Proportioning of concrete mixes by BIS method of mix design.

UNIT-II (07 Hours)

RCC Design Philosophies: Introduction, Objectives & methods of analysis & Design, Properties of Concrete and Steel. Philosophies of Working Stress Methods (WSM) & Limit State Method (LSM) in RCC design.
Shear, Torsion & Bond (Only Theory/Concept): Types of shear & torsion, importance in RCC Design Structures, IS Provisions for Shear & Torsion, Bond-types of bonds, Anchorage Bond, Development length & its determination.

UNIT-III (21 Hours)

RCC Beams: Types of beams, Behaviour in Flexure-Singly reinforced beam, Doubly reinforced beam, Flanged beam, Cantilever beam, Neutral Axis, Neutral Axis Depth, Moment of Resistance, Design of beams- Singly reinforced beam, Doubly reinforced beam, Flanged beam, Cantilever beam.

UNIT-IV (12 Hours)

RCC Slabs: Types of slab systems, Guidelines for Design, Design of One Way and Two Way

Slab.
Columns: Classifications (According to Shape, Length and Loading Conditions), Assumptions, Behaviour and Design of Axially Loaded Columns.

Recommended Text Books / Reference Books:

1. M.S. Shetty, 'Concrete Technology', S. Chand & Co.
2. A.M. Neville, 'Properties of Concrete', Prentice Hall.
3. M.L. Gambhir, 'Concrete Technology', Tata McGraw Hill Publishers, New Delhi.
4. Pillai & Menon, 'Reinforced Concrete Design', Tata McGraw Hill Education.
5. N. Krishna Raju, 'Advanced Design of Structures'.

TRANSPORTATION ENGINEERING-I

Subject Code: BCIES1-423 **L T P C** **Duration: 45 hrs.**

3 0 0 3

Course Objectives:

1. The objective of this course is to acquaint the students about highway planning and development in India.
2. The course will cover selection of highway alignment, design of geometric elements of highways, carry out traffic studies and implement traffic regulation and control measures and intersection design.
3. The characteristic properties of road construction materials and design of flexible and rigid pavements as per IRC guidelines shall also be covered in this course.

Course Outcomes:

1. The student will learn about essentials of highway planning and features of highway development in India.
2. The student will learn how to do selection of highway alignment and design the geometric elements of highways.
3. The student will learn how to carry out traffic studies and implement traffic regulation and control measures and intersection design.
4. The student will know about characteristic properties of road construction materials and design the flexible and rigid pavements as per IRC guidelines.

UNIT-I (12 Hours)

Highway Development and Planning: Classification of roads, road development in India, current road projects in India, highway alignment and project preparation.
Geometric Design of Highways: Highway cross section elements, sight distance, design of horizontal alignment, design of vertical alignment.

UNIT-II (11 Hours)

Traffic Characteristics & Studies: Road user characteristics, driver characteristics, vehicular characteristics. Volume studies, speed studies, O-D survey, parking study.
Traffic Safety and Control Measures: Traffic signs, markings, islands, signals, cause and type of accidents, use of intelligent transport system.

UNIT-III (11 Hours)

Pavement Materials: Materials used in highway construction- soils, stone aggregates, bituminous binders, desirable properties, tests, requirements for different types of pavements.
Paving Mixes: Marshall method of bituminous mix design, Super pave and Concrete mix design for rigid pavements.

UNIT-IV (11 Hours)

Design of Pavements: Pavement types, factors affecting design and performance of pavements, flexible pavements- components and functions, stresses in flexible pavements, design of flexible pavements as per IRC.
Rigid Pavements- components and functions, stresses in rigid pavements, design of cement concrete pavements as per IRC.

Recommended Text Books / Reference Books:

1. Khanna, S.K., Justo, C.E.G and Veeraragavan, A, 'Highway Engineering', Nem Chand & Bros., Roorkee.
2. Kadiyali, L.R., 'Traffic Engineering and Transport Planning', Khanna Publishers, Delhi.
3. Partha Chakraborty, ' Principles of Transportation Engineering, PHI Learning, New Delhi.
4. S.K. Sharma, 'Principles, Practice & Design of Highway Engineering', S. Chand & Company Ltd., New Delhi.
5. Fred L. Mannering, Scott S. Washburn, Walter P. Kilareski, 'Principles of Highway Engineering and Traffic Analysis', John Wiley& Sons, USA.
6. Paul H. Wright and Karen K. Dixon, 'Highway Engineering', Wiley Student Edition, USA.
7. C.A.O. Flaherty, 'Highway Engineering', Vol. 2, Edward Arnold, London.

ENVIRONMENTAL ENGINEERING-I

Subject Code: BCIES1-424	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:
The course should enable the students to:
1. Inculcate the basics of water demand, supply, source & future demand estimation.
2. The applicability of concepts of water quality & its examinations.
3. Inculcate the basic concepts of water treatment, its design and management.
4. Extensive knowledge of sources, conversion, distribution & maintenance of water supply system.
5. Modern low cost water treatment techniques for rural supply system.

Course Outcomes:
1. An ability to design a system, component, or process to meet desired needs.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, welfare, and environmental factors.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data for future demand & supply.

UNIT-I (11 Hours)

Introduction: Beneficial uses of water, water demand, per capita demand, variations in demand, water demand for firefighting, population forecasting and water demand estimation.
Water sources and development: Surface and ground water sources; Selection and development of sources; intakes and transmission systems.

UNIT-II (11 Hours)

Pumps and pumping stations: Types of pumps and their characteristics and efficiencies; Pump operating curves and selection of pumps; pumping stations.
Quality and Examination of Water: Impurities in water, sampling of water, physical, chemical and bacteriological water quality parameters, drinking water quality standards and criteria.

UNIT-III (12 Hours)

Water treatment: Water treatment schemes; Basic principles of water treatment; Design of Plain sedimentation, coagulation and flocculation, filtration – slow, rapid and pressure; Disinfection units; Fundamentals of water softening, fluoridation and deflouridation, water desalination and demineralization, taste and odour removal.

UNIT-IV (11 Hours)

Water Supply Systems: Pipes for transporting water and their design, water distribution systems and appurtenances; Water supply network design and design of balancing and service reservoirs; operation and maintenance of water supply systems.
Rural water supply: Principles, selection of source, rain water harvesting, quantitative requirements, low cost treatment techniques.

Recommended Text Books / Reference Books:

1. Water Supply Engineering- Environmental Engg. (Vol. – I) by B.C. Punmia, Ashok Jain, Arun Jain, Laxmi Publications, New Delhi.
2. Environmental Engg. - A design Approach by Arcadio P. Sincero and Gregoria P. Sincero, Prentice Hall of India, New Delhi
3. "Environmental Engg." By Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, McGraw Hill, International Edition
4. Water Supply Engineering- Environmental Engg. (Vol. – I) by S.K. Garg, Khanna Publishers, Delhi
5. Water Supply and Sewerage by Steel EW and McGhee, Terence J.; McGraw Hill.

ENGINEERING GEOLOGY

Subject Code: BCIES1-425	L	T	P	C	Duration: 30 Hrs.
	2	0	0	2	

Course Objectives:

1. The principal objective of the engineering geologist is the protection of life and property against damage caused by various geological conditions.
2. Engineering geologists provide geological and geotechnical recommendations, analysis, and design associated with human development and various types of structures.

Course Outcomes:

1. It will provide the students with basic knowledge and understanding in the most central part of engineering geology, rock and soil.
2. The course will give students an overview & an understanding of the engineering properties of rock and soil materials, debris generation and distribution, engineering geological investigations, slope stability, geological factors affecting the stability of a facility on and in the soil, engineering, stability and protection of underground facilities, etc.
3. Students will develop the ability to perform basic engineering geological assessments and analyses, and to understand the relevance of engineering geology in complex projects in and on solid rock.

UNIT-I (07 Hours)

General Geology: Scope of geology in Civil Engineering - the earth, its structure and environment - Standard geological time scale, unit & fossils, physiographic, stratigraphic and tectonic divisions of India - geomorphologic (surface) processes – weathering – types , weathered products, Fluvial processes, Glacial Deposits, wind action, and their significance in Civil Engineering.

UNIT-II (08 Hours)

Mineralogy and Petrology: Physical properties of minerals – classification - study of important rock forming minerals – Quartz family, feldspar family, Mica family, calcite, Iron oxide minerals, Clay minerals and their behaviour and significance in the field of Civil Engineering. Classification of rock - mode of formation - distinction between igneous, sedimentary and metamorphic rocks. Characteristic of rocks. Study of important rocks: granite, syenite, diorite, gabbro, pegmatite, dolerite, basalt, sand stone, limestone, shale, quartzite, marble, slate.

UNIT-III (07 Hours)

Structural Geology and Geophysical Methods: Attitude of beds - out crops, study of structures such as folds, faults, joints, unconformities, in-lier and out-lier - their brief classification and their bearing on engineering construction. Principles of geophysical methods, electrical resistivity method, seismic method and its applications in civil engineering.

UNIT-IV (08 Hours)

Geology and Construction: Role of geology in site investigation, Geotechnical classification of rock, geological considerations in open excavation, tunnels and dam site, reservoir site, buildings, road cuttings, landslides and land subsidence its causes, classification and preventive measures, groundwater- types of aquifers, properties of geological formations affecting groundwater and its role as a geological hazard.

Recommended Text Books / Reference Books:

1. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons
2. A Text Book of Engineering Geology, N. ChennaKesavulu, 2nd Edition (2009), Macmillan Publishers India.
3. Reddy D.," Engineering Geology for Civil Engineers", Oxford & IBH , 1995
4. Blyth, F.G.M., "A Geology for Engineers", Arnold, Londo, 2003.
5. Bell. F.G, "Fundamentals of Engineering Geology" Butterworth, 1983.

GEOMATICS ENGINEERING

Subject Code: BCIED1-451	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

1. Have the basic math & science knowledge and technical skills of the Geomatics Engineering Technology discipline appropriate to enter careers in the geospatial community, for example, boundary surveying and legal principles, route and construction surveying, survey measurement analysis and adjustments, Global Positioning System (GPS), Photogrammetry, geodesy, land/Geographic Information Systems (GIS), and 3D scanning.
2. Have the ability to execute Geomatics project activities for delivery in response to the needs of private and public industry.
3. Have appropriate understanding of standards and specifications of Geomatics practices in analyzing positional accuracy of measurement systems and in preparing land records and plats by meeting legal requirements.
4. Have the knowledge to pass the national Fundamentals of Surveying and PS exams, and after gaining experience, be qualified to take the Professional Surveying License Exams with an understanding of continued lifelong learning.
5. Have an understanding of the professional, ethical and social issues with commitment to quality and dependability.

Course Outcomes:

1. An ability to apply knowledge, techniques, skills and modern tools of mathematics, science, engineering, and technology to solve broadly-defined engineering problems appropriate to the discipline.
2. An ability to design systems, components, or processes meeting specified needs for broadly-defined engineering problems appropriate to the discipline;
3. An ability to apply written, oral, and graphical communication in broadly-defined technical and non-technical environments; and an ability to identify and use appropriate technical literature.
4. An ability to conduct standard tests, measurements, and experiments and to analyze and interpret the results to improve processes; and an ability to function effectively as a member as well as a leader on technical teams.

UNIT-I (12 Hours)

Photogrammetry: Introduction, Basic Principles, Photo-Theodolite, Elevation of a Point by Photographic Measurement, Aerial Camera, Vertical Photograph, Tilted Photograph, Scale, Crab and Drift, Flight Planning for Aerial Photography, Ground Control for Photogrammetry, Photomaps and Mosaics, Stereoscopic Vision, Stereoscopic parallax, Stereoscopic Plotting Instruments, Applications.

UNIT-II (11 Hours)

Remote Sensing: Introduction, Basic Principles, Electromagnetic Energy Spectrum, Interaction of EM Energy with Matter, Effect of Atmosphere on EMR, Interaction of EM radiations with Earth‘s Surface, Remote sensing Sensor systems, Remote Sensing Observation Platforms, Ideal and Real Remote Sensing Systems, Data Acquisition and Interpretation, Resolution Concept, Applications

of Remote Sensing. Methodology for Land Use /Land Cover Analysis and Mapping, Remote Sensing in India. Satellite Data products.

UNIT-III (11 Hours)

Geographical Information System (GIS): Introduction, Sub system of GIS, Hardware of GIS, Data and Data structure for GIS, Representation of features, Vector data & Raster data structure, Data format conversions, Capabilities/Functionalities of GIS, Neighborhood Functions, Map Overlay Analysis, Data Quality, Sources of Errors, Applications of GIS, GIS Software.

UNIT-IV (11 Hours)

Global Positioning System (GPS): Introduction, GLONASS system, GALILEO System, NAVIC system, GPS over view, Space Segment, Control segment, User segment, Principle of position determination, Determining Satellite-to-User Range, Calculation of user position, GPS system time, Carrier phase measurement techniques, Indian Coordinate system for using GPS, Uses and Applications of GPS.

Recommended Text Books / Reference Books:

1. Arora, K.R., 2007: Surveying Vol.-III, Standard Book House.
2. Duggal, S.K Higher.; Surveying Vol.-II, Tata McGraw Hill.
3. Campbell, J.B.2002: Introduction to Remote Sensing. Taylor Publications.
4. Chang,T.K. 2002: Geographic Information Systems, Tata McGraw Hill.
5. Joseph George, 2003: Fundamentals of Remote Sensing. Universities Press.
6. Punmia, B.C., Jain A.K., 2005: Higher Surveying, Luxmi Publications.

NUMERICAL METHODS IN CIVIL ENGINEERING

Subject Code: BCIED1-452	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

The course should enable the students to:

1. Provide the numerical methods of solving the linear, non-linear & transcendental equations, interpolation, integration and differential equations.
2. Improve the student's skills in numerical methods by using the numerical analysis facilities.
3. Help in solving complex mathematical problems using only simple arithmetic operations.
4. Approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.
5. Approach for fitting the polynomials using raw data.
6. Ability to implement the basic principles of numerical techniques in day to day application of Civil Engineering.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Identify the application potential of numerical methods
2. Solve Civil engineering problems using numerical methods

3. Demonstrate application of numerical methods to civil engineering problems
4. Apply differential equations and integration to solve civil engineering problems
5. Outline and Propose the finite difference techniques
6. Apply the concept of partial differential equations and Solve practical problems

UNIT-I (12 Hours)

Equation: Roots of algebraic transcendental equations using bisection, Regula-Falsi, Secant & Newton's method, Solution of linear simultaneous equations by different methods using Elimination, Iteration (Gauss Seidal & Gauss Jacobi), Gauss-Jordan method, Homogeneous and Eigen Value problem, Non-linear equations.

UNIT-II (11 Hours)

Finite Difference Technique: Initial and Boundary value problems of ordinary and partial differential equations, Solution of Various types of plates and other civil engineering related problems.

UNIT-III (11 Hours)

Numerical Integration: Numerical Integration by trapezoidal and Simpson's rule.
Statistical Methods: Method of correlation and Regression analysis for fitting a polynomial equation by least square.

UNIT-IV (11 Hours)

Initial Value problem: Galerkin's method of least square, Initial Value problem by collocation points, Runge-Kutta Method for first and higher order differential equations.
Interpolation: Newton's Backward, Forward and Lagrange's Interpolation methods.

Recommended Text Books / Reference Books:

1. Numerical Methods by B.S. Grewal, Khanna Publishers.
2. Numerical Mathematical Analysis: James B. Scarborough Oxford and IBH Publishing
3. Introductory Methods of Numerical Analysis: S.S. Sastry, PHI Learning (2012).
4. Introduction to Computer Programming and Numerical Methods by Xundong Jia and Shu Liu, Dubuque, Iowa: Kendall/Hunt Publishing Corporation.
5. Numerical Methods, J.B Dixit, USP Laxmi publication.
6. Numerical Methods by C.P. Gandhi.

CONCRETE CONSTRUCTION TECHNOLOGY

Subject Code: BCIED1-453 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. Understand properties of concrete and types of concrete
2. Know the procedure to determine the properties of fresh and hardened of concrete.
3. Understand properties of cement and aggregate and types of cement.
4. Gives ideas on the construction and inspection requirements the buildings

Course Outcomes:

Based on this course, the students will understand/evaluate/develop

1. To understand the behaviour of fresh and hardened concrete.
2. To make aware the recent developments in concrete technology.
3. To understand factors affecting the strength, workability and durability of concrete.
4. To impart the methods of proportioning of concrete mixtures.

UNIT-I (11 Hours)

Introduction of Concrete materials: Admixtures, Fly Ash, Polymers, Early Age Properties, Strength, Permeability & Durability. Principles of Concrete mix design, Concrete Mix Design procedure by: IS/ACI/British Standards.

UNIT-II (11 Hours)

Concreting Operations: Practices and Equipment, batching; Mixing; Transporting; Placing and Compacting; curing. Properties and technique of construction for concrete, Fibre reinforced concrete, light weight concrete, Heavy weight concrete, High performance Concrete.

UNIT-III (12 Hours)

Special Concrete Operations: Shot Crete, grouting, Grunting, under water concreting, hot and cold weather concrete, pump able concrete. Construction techniques for reinforced concrete elements, design and fabrication of form work for R.C.C. elements.

UNIT-IV (11 Hours)

Introduction to Pre-stressed concrete Construction: Principle, methods, materials, Tools and equipment used in Pre-stressed construction.

Inspection and Quality Control of Concrete Construction: Stages, Principles, Checklist, Statistical Controls, procedures.

Recommended Text Books / Reference Books:

1. M.L. Gambhir, 'Concrete Technology', McGraw Hill Education.
2. M.S. Shetty, 'Concrete Technology', S. Chand.
3. Neville and Brooks, 'Concrete Technology', Prentice Hall.

CONCRETE TECHNOLOGY LAB-I

Subject Code: BCIES1-426 **L T P C** **Duration: 30 Hrs.**

0 0 2 1

Course Objectives:

The course should enable the students to:

1. Give practical exposure of laboratory testing of different kinds of building construction materials such as brick, cement, lime, aggregate, etc.
2. Check the suitability for different materials used in civil construction works.
3. Determine the engineering properties in terms of strength, strain, fatigue, creep, elasticity, stiffness, durability and workability.
4. The knowledge of these tests is very essential to choose appropriate construction material to exercise better quality control in a civil construction project.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Determine the consistency, setting time and fineness of cement.
2. Determine the specific gravity, soundness and compressive strength of cement
3. Determine the fineness modulus, grading, density & specific gravity of aggregates.
4. Determine the shape & size, compressive strength and water absorption of bricks.
5. Determine the compressive strength and water absorption of interlocking Pavers.
6. Determine the yield Stress, ultimate Stress, elongation of Steel bars.

Laboratory Experiments:

1. To Determine the Specific Gravity of cement.
2. To Determine the Soundness of cement.
3. To Determine the Standard Consistency, Setting Times (Initial and Final Setting Time) of Cement.
4. To Determine the Compressive Strength of Cement.
5. To Determine the Fineness Modulus & Grading of Fine and Coarse Aggregates.
6. To Determine the Bulk Density, Water Absorption and Specific gravity of Fine and Coarse Aggregates.
7. To Determine the Compressive strength, Efflorescence and Water absorption of Bricks as per IS standard.
8. To perform Shape and Size test on Bricks.
9. To Determine the Compressive strength and Water absorption of interlocking Pavers as per IS standard.
10. To Determine the Yield Stress, Ultimate Stress and Elongation of Steel bars.
11. To Perform Bend & Rebend test on Steel bars.

Recommended Books / Manuals:

1. M.L. Gambhir, 'Building and Construction Materials: Testing and Quality Control', TMH.
2. Concrete Lab Manual by NITTTR Chandigarh.
3. Concrete Technology, Theory and Practice by M.S. Shetty, S. Chand & Company.

STRUCTURAL ANALYSIS LAB

Subject Code: BCIES1-427	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

1. To introduce engineering students to the theory and experimental techniques of structural mechanics.
2. To experimentally illustrate, in a comprehensive way, the basic principles of structural analysis and their applications.
3. To prepare the students learn best by doing.
4. To familiarize them, through the laboratory exercises, with the model behavior and practical limitations of each set-up and to get opportunity to critically examine and developing various skills in them for structural analysis of theoretical concepts, data handling and decision making.

Course Outcomes:

1. Students will be able to effectively link the theory / analytical concepts.
2. They will be able to demonstrate the background of the theoretical aspects, with practice and application.
3. They will be able to generate and analyze data using experiments and develop observational skill by the exposure to equipment and machines.
4. They will be able to use computing tools in analyzing and presentation of the experimental data.

Laboratory Experiments:

1. To study the behavior of different types of struts.
2. Deflection of a simply supported beam and verification of Clark-Maxwell's theorem.
3. To determine the Flexural Rigidity of a given beam.
4. To verify Moment- Area Theorems for slope and deflection of a given beam.
5. To determine the Carry over Factor (C.O.F.) for beams with rigid connections.
6. Experiment on three-hinged arch and influence line diagram for horizontal thrust.
7. Experiment on two-hinged arch.
8. To determine the deflection of a Pin-connected truss.
9. Forces in members of a redundant frame.

10. Experiment on curved beams.
11. Unsymmetrical bending of a cantilever beam.
12. Influence line diagrams for BM of a beam with one end hinged and the other fixed.

Recommended Books / Manuals:

1. Experimental methods in Structural Mechanics by C.B. Kukreja and V.V. Sastry, Standard Publishers Distributors, Delhi.
2. Laboratory Manual of Testing Materials - William Kendrick Hall
3. Laboratory Manual on Structural Mechanics by Harvinder Singh.

TRANSPORTATION ENGINEERING LAB					
Subject Code: BCIES1-428	**L**	**T**	**P**	**C**	**Duration: 30 Hrs**
	0	0	2	1	

Course Objectives:

1. The main objective of this course is to give practical exposure of laboratory testing of different kinds of highway construction materials such as Soil, Aggregate and Bitumen to check their suitability for their use in road construction.
2. The knowledge of these tests is very essential for a civil engineer to choose appropriate construction material to exercise better quality control in a road construction project.

Course Outcomes:

1. The student will learn the laboratory testing of different kinds of highway construction materials such as Soil, Aggregate and Bitumen.
2. The student will learn to check the suitability of highway construction material so as to exercise better quality control in a road construction project.

Tests on Sub-Grade Soil:

1. Proctor's Compaction Test
2. California Bearing Ratio Test

Tests on Road Aggregates:

1. Crushing Value Test
2. Los Angles Abrasion Value Test
3. Impact Value Test
4. Shape Test (Flakiness and Elongation Index)

Tests on Bituminous Materials:

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Flash & Fire Point Test

Recommended Books / Manuals:

1. S.K. Khanna and C.E.G. Justo, 'Highway Material & Pavement Testing', Nem Chand and Brothers, Roorkee.
2. Ajay K. Duggal, Vijay P. Puri, 'Laboratory Manual in Highway Engineering', New Age Publications, New Delhi.

UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY

Subject Code: BHSMC0-026	L	T	P	C	Duration: 45 Hrs.
	2	1	0	3	

Course Objectives

This course is intended to provide a much needed orientational input in value education to the young enquiring minds.

Course Outcomes

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understandingof the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

UNIT I (09 Hrs.)

Introduction to Value Education Lecture: Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Right Understanding, Relationship and Physical Facility, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations

UNIT II (12 Hrs.)

Harmony in the Human Being: Understanding Human being as the Co-existence of the Selfand the Body Lecture 8: Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health

UNIT III (09 Hrs.)

Harmony in the Family and Society : Harmony in the Family – the Basic Unit of Human Interaction, Values in Human-to-Human Relationship, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Exploring the Feeling of Respect, Understanding Harmony in the Society, Vision for the Universal Human Order

UNIT IV (15 Hrs.)

Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

Implications of the Holistic Understanding – a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

Suggested Readings:

Text Book and Teachers Manual

a. The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur,R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
b. The Teacher's Manual Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978- 93-87034-53-2 3.2

Recommended Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J CKumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Total Credits= 23

Semester-V (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-521	Structural Analysis-II	3	0	0	40	60	100	3
BCIES1-522	Geotechnical Engineering	3	0	0	40	60	100	3
BCIES1-523	Environmental Engineering-II	3	0	0	40	60	100	3
BCIES1-524	Design of Steel Structures-I	3	0	0	40	60	100	3
Departmental Elective-II (Select any one)		3	0	0	40	60	100	3
BCIED1-551	Fluid Mechanics-II							
BCIED1-552	Maintenance of Building Structures							
BCIED1-553	Rural Water Supply and Onsite Sanitation Systems							
Departmental Elective-III (Select any one)		3	0	0	40	60	100	3
BCIED1-561	Construction Engineering & Management							
BCIED1-562	Repair & Rehabilitation of Structures							
BCIED1-563	River Engineering							
BCIES1-525	Geotechnical Engineering Lab	0	0	2	60	40	100	1
BCIES1-526	Engineering Geology Lab	0	0	2	60	40	100	1
BCIES1-527	Environmental Engineering Lab	0	0	2	60	40	100	1
BCIES1-528	Training-II*	0	0	0	60	40	100	2
Total		**-**	**-**	**-**	**480**	**520**	**1000**	**23**

*Internship will be imparted at the end of 4thsemesteras per AICTE Internship Policy.

Total Credits= 22

Semester-VI (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-621	Design of Concrete Structures-II	3	0	0	40	60	100	3
BCIES1-622	Foundation Engineering	3	0	0	40	60	100	3
BCIES1-623	Professional Practice & Law	3	1	0	40	60	100	4
BCIES1-624	Irrigation Engineering	3	0	0	40	60	100	3
XXXXX	Open Elective**	3	0	0	40	60	100	3
Departmental Elective-IV (Select any one)		3	0	0	40	60	100	3
BCIED1-651	Matrix Methods of Analysis							
BCIED1-652	Solid & Hazardous Waste Management							
BCIED1-653	Pavement Design							
BCIED1-654	Ground Improvement Techniques							
BCIES1-625	Soil Mechanics& Foundation Engineering Lab	0	0	2	60	40	100	1
BCIES1-626	Concrete Technology Lab-II	0	0	2	60	40	100	1
BCIES1-627	Computer-aided Civil Engineering Drawing-II	0	0	2	60	40	100	1
BMNCC0-001	Constitution of India (Mandatory Course)	2	0	0	100	---	100	0
Total		**-**	**-**	**-**	**520**	**480**	**1000**	**22**

*There will be 4-6 weeks Internship as per AICTE Internship Policy after 6thsemester.

**Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

STRUCTURAL ANALYSIS-II					
Subject Code: BCIES1-521	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	0	0	3	

Course Objectives:

1. To provide students with a solid background on principles of structural analysis by exposing them to the theories and concepts of analyzing the civil engineering structures.
2. To cover the analysis of statically indeterminate structures.

Course Outcomes:

1. The students will possess the skills to solve statically indeterminate problems of structural analysis dealing with different loads.
2. They will be able to apply their knowledge of structural analysis to address structural design problems.

UNIT-I (11 Hours)

1. Analysis of Statically Indeterminate Structures: Degree of static and kinematic indeterminacies, analysis of indeterminate beams, rigid frames and trusses by method of consistent deformation, law of reciprocal deflections, method of least work, induced reactions on statically indeterminate beams & rigid frames due to yielding of supports.

2. Fixed & Continuous Beams: Introduction, Analysis of fixed beams by moment-area theorem and strain energy method, fixed end moments due to different types of loadings, sinking and rotation of supports, bending moment and shear force diagrams for fixed beams, slope and deflection of fixed beams, analysis of continuous beams by the Three moment equation (Clapeyron's theorem) due to different types of loadings, effect of sinking of supports, BMDs.

UNIT-II (12 Hours)

3. Slope-Deflection Method: Introduction, slope-deflection equations, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements.

4. Moment-Distribution Method: Introduction, absolute and relative stiffness of members, stiffness and carry-over factors, distribution factors, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements, symmetrical beams and frames with symmetrical, skew-symmetrical and general loading.

UNIT-III (11 Hours)

5. Rotation Contribution Method: Introduction, basic concept, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loadings and yielding of supports, symmetrical beams and frames, general case-storey columns unequal in height and bases fixed or hinged.

6. Approximate Methods of Structural Analysis: Introduction, Vertical and lateral load analysis of multistory frames, portal, cantilever and substitute-frame methods and their comparison.

UNIT-IV (11 Hours)

7. Two Hinged Arches: Introduction, Analysis of two hinged arches for Horizontal Thrust,

Bending Moment, Normal Thrust, and Radial Shear, Settlement (Foundation Yielding) and Temperature Effects, Rib Shortening and Shrinkage, Influence Lines for Two Hinged Arches.

8. Influence Lines for Statically Indeterminate Structures: Muller- Breslau principle for statically determinate and indeterminate beams, trusses and rigid frames, influence lines for reactions, shear force and bending moment for statically indeterminate beams, trusses and rigid frames.

Recommended Text Books / Reference Books:

1. C.S. Reddy, 'Basic Structural Analysis'.
2. C.K. Wang, 'Intermediate Structural Analysis'.
3. J. Sterling Kinney, 'Indeterminate Structural Analysis'.
4. B.C. Punmia, 'Theory of Structures'.

GEOTECHNICAL ENGINEERING

Subject Code: BCIES1-522 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To understand the various phase diagrams and derive various phase relationships of the soil.
2. To understand of index properties,
3. To understand the engineering properties of soil.
4. To understand of stability of slopes.

Course Outcomes:

1. The students will be able to apply their knowledge ofvarious phase diagrams and derive various phase relationships of the soil.
2. The students will be able to apply their knowledge of index properties,
3. The students will be able to apply their knowledge of the engineering properties of soil.
4. The students will be able to apply their knowledge of stability of slopes.

UNIT-I (12 Hours)

Types of Soils, Their Formation and Deposition, Definitions: soil mechanics, soil engineering, geotechnical engineering. Scope of soil engineering. Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity and their relationships, Determination of various parameters such as: Moisture content, oven dry method, Specific gravity by density bottle method, Unit weight by core-cutter method, sand-replacement method.

Plasticity Characteristics of Soil: Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity and consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit and shrinkage limit. Use of consistency limits. Particle size classification, textural classification, Indian standard soil classification system.

UNIT-II (11 Hours)

Compaction: Compaction, Concept of O.M.C. and zero Air Void Line, Standard and Modified proctor test, Factors affecting compaction, Effect of compaction on engineering soil properties, Field compaction methods their comparison of performance and relative suitability, Field control of compaction by proctor needle.

Permeability of Soil: Concept of effective stress principle, Critical hydraulic gradient and quick sand condition, Capillary phenomenon in soil, Darcy's law and its validity, Co-efficient of permeability and its determination by Constant Head Permeability test and Variable Head Permeability test, Average permeability of stratified soils, Factors affecting coefficient of permeability.

UNIT-III (10 Hours)

Consolidation: Consolidation, Difference between compaction and consolidation, Concept of various consolidation characteristics, Primary and secondary consolidation, Terzaghi's theory for one-dimensional consolidation, Consolidation test, Determination of coefficient of consolidation from curve fitting methods, Normally consolidated and over consolidated clays, Importance of consolidation settlement in the design of structures, e-logσ curve.

UNIT-IV (12 Hours)

Shear Strength: Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, tri-axial compression tests, test behavior of UU, CU and CD tests, pore-pressure parameters, computation of effective shear strength parameters. Unconfined compression test, vane shear test.

Stability of Slopes: Introduction, types of slopes and their failure mechanisms, factor of safety, analysis of finite and infinite slopes, wedge failure Swedish circle method, friction circle method, stability numbers and charts.

Recommended Text Books / Reference Books:

1. K.R. Arora, 'Soil Mech. & Foundation Engg', Standard Publishers Distributors.
2. P. Purshotama Raj, 'Geotechnical Engineering', Tata McGraw Hill.
3. V.N.S. Murthy, 'Soil Mech. & Foundation Engg', CBS Publishers & Distributors.
4. B.M. Das, 'Principle of Geotechnical Engineering', Cengage Publisher.
5. Gopal Ranjan and A.S.R. Rao, 'Basic and Applied Soil Mechanics', New Age International.
6. Joseph E. Bowle 'Physical & Geotechnical Properties of Soil'.

ENVIRONMENTAL ENGINEERING-II

Subject Code: BCIES1-523	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	0	0	3	

Course Objectives:

The course should enable the students to:

1. Extensive knowledge of sources, distribution & maintenance of sewerage system.

2. Emphasizes on design criteria, design equations, kinetics and hydraulic diagrams for the design of unit operations and processes for wastewater treatment systems.
3. Deals with biological sludge handling and treatment.
4. Analyse the importance of rural sanitation systems and natural and constructed wetlands.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Estimate sewage generation and design sewer system including Sewage pumping stations.
2. Required understanding on the characteristics and composition of sewage, self Purification of streams.
3. Perform basic design of the unit operations and processes for sewage treatment.
4. An ability to develop and conduct appropriate experimentation, analyze and interpret data for future sewage generation & handling.

UNIT-I (10 Hours)

Introduction: Terms & definitions, types of sewage, system of sewerage, choice of sewerage system and suitability to Indian conditions.

Sewerage Systems: Generation and estimation of community Sewage, flow variations, storm water flow, types of sewers. Design of sewers and storm water sewers, construction &maintenance of sewers, sewer appurtenances, sewage pumping and pumping stations.

UNIT-II (11 Hours)

House Drainage: Principles of house drainage, traps, sanitary fittings, systems of plumbing, drainage lay out for residences.

Characteristics of Sewage: Composition of domestic and industrial sewage, sampling, physical, chemical and microbiological analysis of sewage, biological decomposition of sewage, BOD and BOD kinetics, effluent disposal limits.

UNIT-III (14 Hours)

Treatment of Sewage: Introduction to unit operations and processes – Primary treatment: screening (theory), grit chamber (theory and design), floatation units, sedimentation tanks(theory and design), Secondary treatment units: ASP (theory and design), Sequencing batch reactors (theory and design), Trickling filters (theory and design) Anaerobic systems; Anaerobic filters (theory), UASB (theory), Anaerobic lagoons (theory), Sludge Handling and disposal; thickening, stabilization, dewatering, drying and disposal.

UNIT-IV (10 Hours)

Low Cost Sanitation Systems: Imhoff tanks (theory and design), septic tank (theory and design), soakage pit/soil absorption systems; stabilization ponds (theory and design); oxidation ponds (theory and design); and constructed wetland systems.

Wastewater Treatment Plants and Advanced Wastewater Treatment: Treatment Plants; site selection, operation and maintenance aspects, advanced wastewater treatment for nutrient removal, disinfection for sewage.

Recommended Text Books / Reference Books:

1. Waste Water Engg. (Environmental Engg.-II) by B.C. Punmia, Ashok Jain, Laxmi Publications.
2. Environmental Engg. – A design Approach by Arcadio P. Sincero and Gregoria P. Sincero, Prentice Hall of India, New Delhi
3. "Waste Water Engineering – Treatment and Reuse" by Metcalf & Eddy, TMH, New Delhi.
4. "Environmental Engg." By Howard S. Peavy, Donald R. Rowe & George Tchobanoglous, McGraw Hill, International Edition
5. Environmental Engineering (Vol. II) by S.K. Garg, Khanna Publishers, Delhi.

DESIGN OF STEEL STRUCTURES-I

Subject Code: BCIES1-524	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

1. Learn the behaviour of structural steel components Ability to perform analysis and design of steel members and connections.
2. Ability to design steel structural systems learns the behaviour of structural steel components.

Course Outcomes:

1. Identify the different failure modes of bolted and welded connections, and determine their design strengths.
2. Identify the different failure modes of steel tension and compression members and beams, and compute their design strengths.
3. Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria.

Note: IS 800:2007, General construction in Steel-Code of practice is permitted in examination.

UNIT-I (11 Hours)

Introduction: Properties of structural steel, I.S. rolled sections, I.S. specifications.
Connections: Riveted, bolted and welded connections for axial and eccentric loads (Type-I & II).

UNIT-II (12 Hours)

Tension Members: Introduction, Mode of Failure, IS Specifications, Design of members subjected to axial tension using bolts and welds.
Compression Members: Introduction, buckling, effective length, slenderness, effects of end supports, Design of axially loaded members, built-up columns, laced and battened columns including the design of lacing and battens using bolts and welds.

UNIT-III (12 Hours)

Flexural Members: Plastic behavior, beam types, Shear in beam, bending, splices, Design of laterally restrained and un-restrained rolled and built-up sections using bolts and welds.
Foundation: Types, Anchor bolts, bearing plate, Design of slab base, gusseted base and grillage foundation using bolts and welds.

UNIT-IV (10 Hours)

Roof Truss: Introduction, Terminology, types & uses, types of load, purlins, Design of roof truss using bolts and welds.

Recommended Text Books / Reference Books:

1. S.K. Duggal, 'Limit State Design of Steel Structures', McGraw Hill.
2. N. Subramanian, 'Design of Steel Structures', Oxford Higher Education.
3. 'Design of Steel Structures', Vol. -1, Ram Chandra Standard Book House – Rajsons.
4. S S Bhavikatti, 'Design of Steel Structures' (by limit state method as per IS: 800-2007)', I.K. International Publishing House.
5. IS 800: 2007 (General construction in Steel-Code of practice).

FLUID MECHANICS-II

Subject Code: BCIED1-551 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The students should be able:

1. To have understanding of Laminar and turbulent flows.
2. To understand concepts of boundary layer theory.
3. To understand concepts of open channel flows, hydraulic jump, surges, Momentum principles, specific energy and GVF.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Understand laminar and turbulent flows.
2. Learn about concepts of boundary layer theory.
3. Design open channels for most economical sections.
4. Will be able to understand surges, momentum principles, specific energy and GVF profiles.

UNIT-I (11 Hours)

Laminar Flow: Navier-stokes equations in Cartesian coordinates (no derivation), meaning of terms, Flow through circular section pipe, flow between parallel plates, stokes law. Flow through porous media, Transition from laminar to turbulent flow, Critical velocity and critical Reynold number.

Turbulent Flow: Turbulent flows and flow losses in pipes, Darcy equation minor head losses in pipe fitting, Hydraulic and energy gradient lines. Definition of turbulence, scale and intensity, Effects of turbulent flow in pipes. Equation for velocity distribution in smooth and rough pipes (no derivation). Resistance diagram.

UNIT-II (13 Hours)

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.

Uniform Flow in Open Channels: Flow classifications, basic resistance Equation for open channel flow. Chezy, Manning, Bazin and Kutter formulae. Variation of roughness coefficient, conveyance and normal depth. Velocity Distribution. Most efficient flow sections; rectangular, trapezoidal and circular.

UNIT-III (13 Hours)

Energy and Momentum Principles and Critical Flow: Energy and specific Energy in an open channel; critical depth for rectangular and trapezoidal channels. Alternate depths, applications of specific energy to transitions and Broads crested weirs. Momentum and specific force in open channel flow, sequent depths.

Gradually Varied Flow: Different Equation of water surface profile; limitation, properties and classification of water and surface profiles with examples, computation of water surface profile by graphical, numerical and analytical approaches.

UNIT-IV (08 Hours)

Hydraulic Jump and Surges: Theory of Jump, Elements of jump in a rectangular Channel, length and height of jump, location of jump, Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

Recommended Text Books / Reference Books:

1. Fluid Mechanics : Dr. R.K. Bansal
2. Fluid Mechanics: Dr. Modi & Dr. Seth.
3. Fluid Mechanics : Dr. Jagdish Lal
4. Flow in open channels by S. Subraminayam, Tata McGraw Hill.

MAINTENANCE OF BUILDING STRUCTURES

Subject Code: BCIED1-552 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. Diversified skills needed to maintain and renovate commercial and residential properties.
2. To learn the skills of the maintenance management.
3. To learn the defects, Investigation & Inspection etc.
4. To learn various repair steps for different elements of building.

Course Outcomes:

Based on this course, the students will understand/evaluate/develop

1. Assess the health condition of structures.
2. Inspect and evaluate damage structures.
3. Implement the techniques for repairing of concrete structures.
4. Test to assess the conditions of properties of existing concrete structures.

UNIT-I (11 Hours)

Maintenance of Buildings: Introduction, Importance of maintenance, Types of Maintenance –

Daily, Weekly, Monthly, Annually, General importance – Painting and home electricity system.
Repair Strategies: Causes of distress in structures Construction and design failures, Condition assessment and distress-diagnostic techniques, Inspection and evaluating damaged structure.

UNIT-II (12 Hours)

Durability and Serviceability of Concrete: 1. Quality assurance for concrete construction based on concrete properties like: (a) strength (b) Permeability (c) Thermal properties (d) cracking
2. Effects due to: (a) climate (b) temperature (c) chemicals (d) corrosion
3. Design and construction errors 4. Effects of cover and cracks.

UNIT-III (11 Hours)

Materials for Repair: Special concretes and mortar, concrete chemicals, construction chemicals, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete, Rust eliminators and polymers coating for rebar, foamed concrete, dry pack, vacuum concrete, asphalt sheeting.
Techniques for Repairs: Guniting, grouting and Shotcrete, Epoxy injection, Jacketing, shoring and underpinning. Methods of corrosion protection: (a) corrosion inhibitors (b) corrosion resistant steels (c) coating and Cathodic protection.

UNIT-IV (11 Hours)

Repair: Repair of – stone, brick and block masonry (Cracks, dampness, efflorescence, joint separation, etc.), Flooring, Roofs (sloping, flat, pitched, etc.), Concrete members due to Steel Corrosion, Lack of Bond & shear, tension, torsion, compression failure. Estimation of Repair.

Recommended Text Books / Reference Books:

1. A.C. Panchdari, 'Maintenance of Buildings', New Age International (P) Limited Publishers.
2. P. S. Gahlot, 'Building Repair and Maintenance Management', CBS Publishers and Distributors Pvt. Ltd.
3. B. L. Gupta, 'Maintenance & Repair of Civil Structures', Standard Publications.
4. W.H. Ransom, 'Building Failures: Diagnosis and Avoidance', New Age Publications (P) Ltd.
5. Housing Defects Reference Manual, 'The Building Research Establishment E. & F.N. Spon'.

RURAL WATER SUPPLY AND ONSITE SANITATION SYSTEMS

Subject Code: BCIED1-553 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:
The course should enable the students to:
1. Learn about water supply in rural areas
2. Learn about environmental sanitation methods in rural areas
3. Comprehend the global picture of water/sanitation/hygiene and health
4. Understanding the principles of operation of a range of appropriate water and sanitation technologies, and to be able to critically evaluate them with respect to multiple criteria

5. Investigate the concept of community participation and its role in enabling project success and sustainability.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Knowledge about water supply scheme in rural areas.
2. Knowledge about environmental sanitation methods and design in rural areas.

UNIT-I (11 Hours)

Sanitation in Rural Area: Concept of environmental and scope of sanitation in rural areas, Magnitude of problem of water supply and sanitation – population to be covered and difficulties National policy, Various approaches for planning of water supply systems in rural areas, Selection and development of preferred sources of water, springs, wells and infiltration galleries, collection of raw water from surface source.

UNIT-II (12 Hours)

Water Treatment for Rural Areas: Specific problem in rural water supply and treatment e.g. iron, manganese, fluorides etc., Low cost treatment, appropriate technology for water supply and sanitation, Compact system of treatment of surface and ground waters such as MB settlers, slow and sand filter, chlorine diffusion cartridge etc.

UNIT-III (11 Hours)

Waste Water Treatment & Distribution: Planning of distribution system in rural areas, Water supply during fairs, festivals and emergencies, Treatment and disposal of wastewater/sewage, various method of collection and disposal of night soil.

UNIT-IV (11 Hours)

Onsite Sanitation System for Rural Areas: On site sanitation system and Disposal of solids waste: Simple wastewater treatment system for rural areas and small communities such as stabilization ponds, septic tanks, soakage pits, surface drains, onsite sanitation systems etc., composting, land filling, Biogas plants.

Recommended Text Books / Reference Books:

1. Low cost on site sanitation option, Hoffman & Heijno Occasional Nov.1981 paper No. 21, P.O. Box 5500 2280 HM Rijswijk, the Netherlands offices, J.C. Mokeniaan
2. Rijswijk (the Haque), Wagner, E.G. and Lanoik, J.N. water supply for rural areas and Small communities, Geneva: W.H.O.1959.
3. Manual of water supply and treatment, 3rd edition, CPHEEO, GOI, New Delhi.
4. Water Supply and Pollution Control by Warren Viessman Jr. And Mark J. Hammer, 7th Edition 2005, Pearson Education.
5. Wastewater Engineering; Treatment, Disposal, Reuse, by Metcalf & Eddy,Tata McGraw-Hill.

CONSTRUCTION ENGINEERING & MANAGEMENT

Subject Code: BCIED1-561 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

To give an exposure of management skills and familiarization with various aspects of management related to various construction projects, to the students.

Course Outcomes:

1. Students will be able to develop basic ability to plan, control and monitor construction projects with respect to time and cost.
2. Students will be able to develop an idea of how to optimize construction projects based on costs.
3. Students will be able to develop an idea how construction projects are administered with respect to various contract systems and issues.
4. They will be able to develop an ability to put forward ideas and understandings to others with effective communication processes.

UNIT-I (10 Hours)

Basics of Construction: Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution.

Brief Introduction of Construction Project Planning: Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules.

UNIT-II (12 Hours)

Introduction: Need for project planning & management, time, activity & event, bar chart, Milestone chart, uses & draw backs.

PERT Technology: Construction of PERT network, time estimates, network analysis, forward pass & backward pass, slack, critical path, data reduction, suitability of PERT for research project.

UNIT-III (12 Hours)

CPM Technology: Definitions, network construction, critical path, fundamental rules, determination of project schedule, activity time estimates, float types, their significance in project control.

Construction Methods Basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with block work walls; Modular construction methods for repetitive works.)

UNIT-IV (11 Hours)

Construction Equipment: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment for Productivities.

Contracts Management Basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to precede, rights and duties of various parties, notices to be given, Contract Duration and Price; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination. Changes & variations, Dispute Resolution methods.

Recommended Text Books / Reference Books:

1. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education
7. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications.

REPAIR & REHABILITATION OF STRUCTURES

Subject Code: BCIED1-562 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

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.

Course Outcomes:

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

1. Know the strategies of maintenance and repair.
3. Understand the properties of repair materials.
4. Understand the various properties of concrete.
5. Get an idea of repair techniques.
6. Understand the retrofitting strategies and techniques.

UNIT-I (09 Hours)

Maintenance and Repair Strategies: Definitions: Maintenance, Repair and Rehabilitation. Facets of Maintenance, Importance of Maintenance and Daily, Weekly, Monthly, Yearly Routine Maintenance, Various aspects of Inspection, stages of inspection, Assessment procedure for Evaluating a damaged Structure, Causes of deterioration.

UNIT-II (13 Hours)

Materials for Repair: Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fibre reinforced concrete.

Strength and Durability of Concrete: Quality assurance for Concrete: Strength, Durability and Thermal properties, Cracks: Different types, Causes, Effects due to climate, Temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness.

UNIT-III (13 Hours)

Techniques for Repair and Protection Methods: Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques: Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, Cathodic protection.
Demolition Techniques: Engineered demolition methods and Case studies.

UNIT-IV (10 Hours)

Repair, Rehabilitation and Retrofitting of Structures: Evaluation of root causes, Under pinning & shoring some simple systems of rehabilitation of structures; Guniting, shortcreting, Non-destructive testing system; Use of external plates, carbon fibre wrapping and carbon composites in repairs. Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake.

Recommended Text Books / Reference Books:

1. A.C. Panchdari, 'Maintenance of Buildings', New Age International (P) Limited Publishers.
2. Gambhir.M.L., "Concrete Technology", McGraw Hill, 2013.
3. Ravishankar.K., Krishnamoorthy.T.S, " Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
4. R. Chudley, 'Building Finishes, Fittings and Domestic Services', Longman Technical Services.
5. G. Szechy, D. SC; 'Foundation Failures', Concrete Publications Limited, 14 Dartmouth Street, London.
6. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa Publishers, 2008.
7. W.H. Ransom, 'Building Failures: Diagnosis and Avoidance', New Age Publications (P) Ltd.

RIVER ENGINEERING

Subject Code: BCIED1-563 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Mechanics of river flow, aggradations and degradation, measurements in rivers,
2. Physical river models,
3. River training works.
4. Design of river training and flood protection structures.

Course Outcomes:

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

1. Mechanics of river flow, aggradations and degradation, measurements in rivers.
2. Physical river models.
3. River training works.
4. Design of river training and flood protection structures.

UNIT-I (11 Hours)

River Morphology: Bars; Bends and Meanders, Thalweg; Braiding; Bifurcations etc.
Sediment Transport Mechanics: Incipient Motion of Sediment Particles, Critical tractive force, Ripple and dune regime, antidune regime, importance of regimes of flow, Bed forms, Bed Load transport, Transport of suspended sediment, Critical Shear stress, Sediment Transport Equations.

UNIT-II (11 Hours)

Aggradation and Degradation: Local Scour at Bridge Piers and other Hydraulic Structures.
Measurements in Rivers: Stage measurements, Channel geometry, Discharge, Sediment samplers and suspended and bed load measurement.

UNIT-III (13 Hours)

Physical River Models: fixed and movable bed models; sectional models, distorted Models, Mathematical models for aggradations, degradation and local scour.
River Protection and Training Works: Revetments, Dikes, Gabions, Spurs, Bank Protective measures and Bed control structures.

UNIT-IV (10 Hours)

Design of River Training and Flood Protection Structures: Diversion and Cofferdams; River regulations systems; Dredging and Disposal, River restoration.

Recommended Text Books / Reference Books:

1. Irrigation & Water Power Engg. B.C. Punmia, Pande B.B.Lal.
2. Mechanics of Sediment Transportation and Alluvial Stream Problems, R.J.Garde, K.G. Ranga Raju.

GEOTECHNICAL ENGINEERING LAB

Subject Code: BCIES1-525 | **L T P C** 0 0 2 1 | **Duration: 30 Hrs.**

Course Objectives:

1. To understand the laboratory tests used for determination of physical, index and Engineering properties of soil.
2. Expose the students to different types of soils.
3. Experience the concepts of soil mass, soil solids, and soil structure.
4. Make the students to relate theoretical concepts in doing lab tests.

Course Outcomes:

1. Have thorough knowledge about the procedures of laboratory tests used for determination of physical, index and engineering properties of soils.
2. Have the capability to classify soils based on test results and interpret engineering behaviour based on test results.
3. Be able to evaluate the permeability and shear strength of soils.
4. Be able to evaluate settlement characteristics of soils
5. Be able to evaluate compaction characteristics required for field application.

Laboratory Experiments:

1. Determination of natural moisture content by oven drying method.
2. Determination of field dry unit weight using core cutter method.
3. Determination of field dry unit weight using sand replacement method.
4. Determination of specific gravity of Soils.
5. Grain size distribution analysis by sieve analysis.
6. Grain size distribution by hydrometer analysis.
7. Determination of liquid limit by Casagrande apparatus.
8. Determination of plastic limit
9. Determination of shrinkage limit.
10. Determination of coefficient of permeability using Constant-head test method.
11. Determination of coefficient of permeability using Falling-head method.
12. Compaction of soil by standard proctor test.
13. Compaction of soil by modified proctor test.
14. Determination of relative density of soil.
15. Consolidation Test.
16. Unconfined Compression Strength Test.
17. Direct Shear Test
18. Triaxial Test (UU)

Recommended Books / Manuals:

1. Soil Mechanics by Craig R.F., Chapman & Hall.
2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons.
3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall.
4. Principles of Geotechnical Engineering, by Braja M. Das, Cengage.
5. Learning Principles of Foundation Engineering, by Braja M. Das, Cengage Learning.

ENGINEERING GEOLOGY LAB

Subject Code: BCIES1-526	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

1. To understand the role of geology in the design and construction process of underground openings in rock
2. To apply geologic concepts and approaches on rock engineering projects.
3. To identify and classify rock using basic geologic classification systems.

Course Outcomes:

1. Ability to categorize rocks and minerals by their origin and engineering properties.
2. Ability to apply geological principles to rock masses and discontinuities for use in engineering design e.g. rock slopes, foundation.
3. Gain an understanding of the societal relevance of Geological system.
4. Life-long learning of students about the identification of minerals and rocks.

Laboratory Experiments:

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase, Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff; Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shale and its varieties.
7. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps, Identification of symbols in maps.

Recommended Books / Manuals:

1. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons.
2. Text Book of Engineering Geology, N. Chenna Kesavulu, 2ndEdition (2009), Macmillan Publishers India.
3. Geology for Geotechnical Engineers, J.C. Harvey, Cambridge University Press (1982).

ENVIRONMENTAL ENGINEERING LAB

Subject Code: BCIES1-527	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

1. To make the students good aware about water and its importance to human survival.
2. Understand how to classify and analyse various quality parameters of raw water & waste water.

3. To make the students to prepare water quality & sewage quality assessment report.
4. To make the students as to suggest required type of treatment to purify raw water.
5. To make the students as to suggest required type of treatment for waste water.
6. To make the students as analysts to differ quality requirements for industrial waters and domestic waters.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Discuss about importance of water and its quality analysis.
2. Analyse various 18hysic-chemical and biological parameters of water in case of quality requirements.
3. Assess complete water quality assessment for EIA and domestic supplies.
4. Suggest various types of treatment methods required to purify raw water with different contaminants.
5. Assess complete waste water quality assessment for their disposal.

Laboratory Experiments:

1. To measure the Ph value of a water and waste water samples.
2. To determine optimum Alum dose for Coagulation.
3. To find MPN for the bacteriological examination of water.
4. To find the turbidity of a given waste water and water samples.
5. To find B.O.D. of a given waste water sample.
6. To measure D.O. of a given sample of water.
7. Determination of Hardness of a given water sample.
8. Determination of total solids, dissolved solids, suspended solids of a given water sample.
9. To find chlorides in given samples of water and waste water.
10. To find acidity and alkalinity of water samples.
11. To determine the COD of a wastewater sample.

Recommended Books / Manuals:

1. Chemistry for Environmental Engg. & Science by Sawyer & McCarty, TMH, New Delhi.
2. Water & Waste Water Testing by Mathur, Nem Chand & Bros.
3. Manual on Sewage and Sewerage treatment by Central Public Health and Environmental Engineering Organisation (CPHEEO), GOI.
4. IS 10500: 2012, Code for Drinking Water by Bureau of Indian Standards (BIS), GOI.

6th SEMESTER

DESIGN OF CONCRETE STRUCTURES-II

Subject Code: BCIES1-621 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. Learn the plastic behaviour of concrete in flexure.
2. Learn the behaviour of different types of concrete structures.

Course Outcomes:

1. Identify and compute the design loads on RCC components.
2. Able to analyze and design with detailing RCC members.
3. Ability to design and check for serviceability (crack and deflection) and ultimate limit state conditions.
4. Apply relevant Indian Standard provisions to ensure safety and serviceability of RCC structural elements.

Note: Indian Standards-IS 456, IS 3370 and Design Aid SP-16 are permitted in examination.

UNIT-I (12 Hours)

Design of Foundations: Concept, Application, Types, Components of Footing, Design of Isolated Footing (Square, Rectangular), Combined Footing (Rectangular, Trapezoidal & Strap footing) and Raft Foundation.

Design of Stairs: Introduction, Elements of Stairs-Tread, Rise, Flight, Landing, Types of Stairs, Design and Reinforcement detail of Stairs.

UNIT-II (11 Hours)

Design of Compression Members: Classifications (According to Shape, Length and loading conditions), Assumptions, Guidelines as per Indian Standards, Behavior of Compression Members, Short Compression Members under Axial Load with Uni-axial and Bi-axial Bending, Design of Slender (Long) Columns.

UNIT-III (12 Hours)

Design of Beams (Continuous and Curved): Definition, Behavior, Design of Continuous beams and Curved beams, Reinforcement detailing.

Design of Retaining Walls: Classification, Elements-Stem, Base, Heel, Toe, Behavior and design of Cantilever and Counter fort type retaining wall.

UNIT-IV (10 Hours)

Design of Domes: Types, Components, Design of Spherical and Conical Dome.

Water Tanks: Introduction, Types & uses of Underground water tanks, ground water tanks, Design of Circular and Rectangular water tanks resting on ground.

Recommended Text Books / Reference Books:

1. N. Subramanian, 'Design of Reinforced Concrete Structures', Oxford University Press.
2. Pillai & Menon, 'Reinforced Concrete Design', Tata McGraw Hill Education.
3. P.C. Varghese, 'Limit State Design of Reinforced Concrete', Prentice Hall of India Pvt. Ltd.

4. Raju N. Krishna 'Reinforced Concrete Elements'.
5. Mallick and Rangasamy, 'Reinforced Concrete', Oxford-IBH.

FOUNDATION ENGINEERING

Subject Code: BCIES1-622 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. Analyse earth retaining structures to determine earth pressures.
2. Analyse bearing capacity of soils under shallow footings.
3. Design shallow footings based on dimensions, thickness, area and length.
4. Determine the bearing capacities of single pile in sand and clay using static method and the distribution of load in group piles as well as their efficiencies.
5. Conduct basic technical investigations, compile and analyse information, and produce a brief and concise report with an appropriate conclusion.

Course Outcomes:

After successful completion of this course, the students would:

1. Learn about types and purposes of different foundation systems and structures.
2. Have an exposure to the systematic methods for designing foundations.
3. Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.
4. Have necessary theoretical background for design and construction of foundation systems.

UNIT-I (11 Hours)

Soil Investigation: 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 various types of samplers, Geophysical exploration by seismic and electrical resistivity methods, Standard Penetration Test and Plate load test, Bore hole log.

Stresses in Soil: Boussinesq's equation for a point load, uniformly loaded circular and rectangular area, pressure distribution diagrams, Isobars, New mark's chart and its construction, Approximate method of load distribution, Comparison of Boussinesq's & Westergaard analysis for a point load.

UNIT-II (10 Hours)

Earth Pressure: Terms and symbols used for a retaining wall, Movement of wall and the lateral earth pressure, Earth pressure at rest, Rankine states of plastic equilibrium, Coefficient of active and passive earth pressures for horizontal backfills, Rankine's theory both for active and passive earth pressure for Cohesion-less and cohesive soil, Coulomb's method for cohesion less backfill, Merits and demerits of Ranking and Coulomb's theories, Culmann's graphical construction (without surcharge load).

UNIT-III (12 Hours)

Shallow Foundation: Type of shallow foundations, Factors affecting choice of foundation, Factors

affecting the depth of foundation. Definition of ultimate bearing capacity, safe bearing capacity and allowable bearing capacity, Terzaghi's analysis. Types of failures, Factors affecting bearing capacity, Skempton's equation, B.I.S. recommendations for shape, depth, inclination factors and water table corrections, Causes of settlement of structures, 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, Introduction of rafts and floating foundation.

UNIT-IV (12 Hours)

Pile Foundations: Types, Necessity and uses of piles, Classification of piles, Types of pile driving hammers & their comparison, Determination of load carrying capacity of driven piles by dynamic formulae, Cyclic Pile Load Test, Determination of point resistance and frictional resistance of a single pile by Static formulas in sand and clay, Spacing of piles in a group, Group action of piles, Calculation of settlement of friction pile group in clay, Settlement of pile groups in sand, Negative skin friction.

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, Forces acting on a well foundation, Computation of scour depth.

Recommended Text Books / Reference Books:

1. K.R. Arora, 'Soil Mech. & Foundation Engg,' Standard Publishers Distributors.
2. V.N.S. Murthy, 'Soil Mech. & Foundation Engg.'
3. Gopal Ranjan and A.S.R. Rao, 'Basic and Applied Soil Mechanics', New Age International.
4. Muni Budhu, 'Soil Mech. & Foundations', Wiley, John Wiley & Sons.
5. Gulhati and Datta, 'Geotechnical Engineering', Tata McGraw Hill Education.

PROFESSIONAL PRACTICE & LAW

Subject Code: BCIES1-623	L	T	P	C	Duration: 60 Hrs.
	3	1	0	4	

Course Objectives:

The course should enable the students to:

1. Provide the ability to estimate the quantities of item of works involved in buildings, water supply & sanitary works, road works and irrigation works etc.
2. Equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.
3. Understand the technical specifications for various works to be performed for a project.
4. Impact the cost of a structure and also able to understand how competitive bidding works
5. How to submit a competitive bid proposal.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Understand the preparation of an abstract estimate for a residential building, roads,

irrigation projects, bridges, etc.

2. Analyse the units for various quantities of items of work & also evaluate the rates for various items of work
3. Design and prepare bar bending schedule for reinforcement works.
4. Evaluate the valuation of buildings & preparation of standard specifications for different items.

UNIT-I (16 Hours)

Estimating: Different types of estimates, methods of estimating and scheduling quantities for the following works: Building, culverts, bridges, irrigation works, steel structures, road works, canal works, sanitary and water supply works, roofs, R.C.C. work, cost sensitive index.

Analysis of Rates: Schedule of rates (As per CSR Punjab-2016), Analysis of rates: earth work, brick masonry, stone masonry, cement concrete, RCC work, iron work, plastering, flooring, white washing, painting, wood work, Road work.

UNIT-II (15 Hours)

Specifications: Detailed specifications of the following: earth work in foundation, lean concrete in foundation, cement concrete, RCC, brick work, plastering, painting, C.C. floor, mosaic floor, white washing, distempering, varnishing, painting, doors and windows, DPC, centering and shuttering, cement mortar, brick ballast and sand.

UNIT-III (15 Hours)

Valuation: Gross income, net income, outgoing, scrap value, salvage value, obsolescence, annuity, capitalized value, year's purchase, sinking fund, depreciation, book value, valuation of building, determination of depreciation, method of valuation, life of various items of works, different types of lease, fixation of rates, plinth area required for residential & commercial building, Arbitration, Introduction to Acts pertaining to-Minimum wages, Workman's compensation.

UNIT-IV (14 Hours)

Accounts Procedures: Regular and work charged establishment, pay bill, ACR, classifications of works, contract, tender, tender notice, earnest money, security money, arranging contract, power of accepting tender, daily labour, muster roll, classification of contracts, penalty, measurement book, account procedures of stores, stock accounting, Introduction to forms and bills, Advance payment, hand receipt, refund of security money, cash book, imprest, deposit works, temporary advances, treasury challan, inventory, administrative approval, competent authority, building bye laws.

Recommended Text Books / Reference Books:

1. Estimating & Costing in Civil Engineering: Theory & Practice by B.N. Dutta, UBS Publishers Distributors Ltd.
2. Estimation and Costing in Civil Engineering, by Birdie, G.S., Dhanpat Rai Publishing Co. Ltd, New Delhi, 2011.
5. Estimation, Costing, Specifications and Valuation in Civil Engineering, Chakraborti M, National Halftone Co. Calcutta
4. Estimating and Costing for Building & Civil Engineering Works by P.L. Bhasin.

5. Standard Schedule of rates and standard data book by Public Works Department.
6. National building code of India.
7. I.S. 1200 (Parts I to XXV – 1974/method of measurement of building and Civil Engineering works – B.I.S.

IRRIGATION ENGINEERING

Subject Code: BCIES1-624 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. The concepts, techniques and modernization of irrigation.
2. Design lined and un-lined canals for irrigations.
3. Different theories/ methods to design lined and un-lined canals.
4. Losses in canals and its control measures.
5. Construction of well and tube well.
6. River training works.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Recognize the concepts, techniques and modernization of irrigation.
2. Plan and design lined and un-lined canals for irrigations.
3. Apply different theories/ methods to design lined and un-lined canals.
4. Learn losses in canals and its control measures.
5. Design and construction of well and tube well.
6. Learn about river training works.

UNIT-I (10 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, relation between delta, duty and base period, Soil crop relation-ship and soil fertility.

UNIT-II (16 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, suspended and bed loads.

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 (10 Hours)

Losses in Canals, Water Logging and Drainage: Losses in canals-Evaporation and seepage, water logging, causes and ill effects of water logging- anti water logging measures. Drainage of land, classification of drains – surface and subsurface drains Design considerations for surface drains, Advantages and maintenance of tile drains.

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 design Considerations.

UNIT-IV (09 Hours)

Tube Well Irrigation: Types of tube – wells – strainer type, cavity type and slotted 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. Interference of tube wells with canal or adjoining tube-wells, optimum capacity, causes of failure of tubewells. Duty and delta of a tube well. Rehabilitation of tube well.

Recommended Text Books / Reference Books:

1. Principles & practice of Irrigation Engg. S.K. Sharma.
2. Irrigation & Water Power Engg. B.C. Punmia, Pande B.B. Lal
3. Fundamentals of Irrigation Engg. Dr. Bharat Singh
4. Irrigation Engg. & Hydraulic Structure S.R. Sahasrabudhe.
5. Irrigation Engg. & Hydraulic Structure Varshney, Gupta & Gupta
6. Irrigation Engg. & Hydraulic Structure Santosh Kumar Garg

MATRIX METHODS OF ANALYSIS

Subject Code: BCIED1-651 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To provide a reasonably comprehensive treatment of matrix methods in structural analysis of skeletal i.e. framed structure in recent years.
2. To develop the elegant finite element method this is nothing but the extension of it.
3. To give engineering students and practicing professionals the fundamentals of the background theory necessary in commercial frame analysis program.

Course Outcomes:

1. Students will be able to analyze skeletal i.e. framed structures.
2. They will be able to differentiate between the flexibility and stiffness methods of structural analysis.
3. They will be able to access computers that permit the use of the stiffness method for analyzing traditional civil engineering structures, air frame, space structures etc.

UNIT-I (12 Hours)

Basic Concepts of Structural Analysis: Introduction, Types of Framed Structures, Deformations in Framed Structures, Equilibrium, Compatibility, Static and kinematic indeterminacies of beams, rigid-jointed plane and space frames, pin-jointed plane and space frames and hybrid structures, Structural Mobilities, Principle of Superposition, Equivalent Joint Loads, Energy Concepts and Virtual Work.

Flexibility & Stiffness Matrices: Actions and Displacements, Action and Displacement equations, Generalized System of Coordinates, Slope-Deflection equations in Generalized Coordinates, Axes and Coordinates, Flexibility and Stiffness Influence Coefficients, Flexibility Matrix, Stiffness Matrix, Relation between Flexibility and Stiffness Matrices, Basic definitions and types of matrices, matrix operations, matrix inversion, solution of linear simultaneous equations, matrix partitioning.

UNIT-II (11 Hours)

Flexibility Matrix (Physical Approach): Development of flexibility matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using physical approach.

Stiffness Matrix (Physical Approach): Development of stiffness matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using physical approach, reduced stiffness matrix, total stiffness matrix, translational or lateral stiffness matrix.

UNIT-III (11 Hours)

Flexibility Matrix (Element Approach): Transformation of system forces to element forces through force transformation matrix, Development of flexibility matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using Element Approach.

Stiffness Matrix (Element Approach): Transformation of system displacements to element displacements through displacement transformation matrix, Development of stiffness matrices for statically determinate and indeterminate beams, rigid-jointed plane frames and pin-jointed plane frames using Element Approach.

UNIT-IV (11 Hours)

Flexibility Method of Analysis: Analysis of continuous beams, rigid-jointed plane frames and pin-jointed plane frames using the physical and element approaches, effect of support settlements, temperature stresses and lack of fit.

Stiffness Method of Analysis: Analysis of continuous beams, rigid-jointed plane frames and pin-jointed plane frames using the physical and element approaches, effect of support settlements, temperature stresses and lack of fit, comparison of flexibility and stiffness methods of analysis.

Recommended Text Books / Reference Books:

1. G.S. Pandit and S.P. Gupta, 'Structural Analysis, A Matrix Approach'.
2. William Weaver, Jr. James M. Gere, 'Matrix Analysis of Framed Structures'.

3. C.S. Reddy, 'Basic Structural Analysis'.
4. C.S. Krishnamurthy, 'Finite Element Analysis'.
5. O.C. Zeincwicz, 'Finite Element Methods'.

SOLID & HAZARDOUS WASTE MANAGEMENT

Subject Code: BCIED1-652 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Understanding of problems of municipal waste, biomedical waste, hazardous waste, E-waste, industrial waste etc.
2. Knowledge of legal, institutional and financial aspects of management of solid wastes.
3. Become aware of Environment and health impacts of solid waste mismanagement
4. Understand engineering, financial and technical options for waste management.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Do sampling and characterization of solid waste.
2. Analysis of hazardous waste constituents including QA/QC issues
3. Apply steps in solid waste management like waste reduction at source, collection techniques, recycling, transport, optimization of solid waste.
4. Analyse treatment & disposal techniques and economics of the onsite vs. Offsite waste management.

UNIT-I (12 Hours)

Sources and Composition of Solid Waste: Solid Waste Introduction, Sources of solid waste, types & classification of solid waste, Composition of solid waste & its determination, Types of materials recovered from MSW.

Properties of Municipal Solid Wastes: Physical properties of Municipal Solid Waste, Chemical properties of Municipal Solid Waste, Biological properties of Municipal Solid Waste, Transformation of Municipal Solid Waste.

UNIT-II (12 Hours)

Solid Waste Generation and Collection: Quantities of Solid Waste, Measurements and methods to measure solid waste quantities, Solid waste generation and collection, Factors affecting solid waste generation rate, Quantities of materials recovered from MSW.

Handling, Separation and Storage of Solid Waste: Handling and separation of solid waste At site, Material separation by pick in, screens, float and separator magnets and electromechanical separator and other latest devices for material separation, Waste handling and separation at Commercial and industrial facilities, Storage of solid waste at the sources.

UNIT-III (12 Hours)

Processing of Solid Waste: Processing of solid waste at residence e.g. Storage, conveying,

compacting, Shredding, pulping, granulating etc., Processing of solid waste (Size & volume reduction)

Disposal & Treatment of Solid Waste: Combustion and energy recovery of municipal solid waste, effects of combustion, Sanitary landfill: Classification, planning, landfill processes, landfill design, landfill operation & bioreactors, Compositing, Incineration, Pyrolysis & gasification, Landfill leachate & gas management.

UNIT-IV (09 Hours)

Solid Waste Management: Solid waste (management and handling) rules, hazardous waste (management and handling) rules, biomedical waste handling rules, Fly ash management & handling rules, recycled plastics usage rules, e-waste management rules, batteries (management and handling) rules, solid waste management in rural area, Recent advances in solid waste management.

Recommended Text Books / Reference Books:

1. Environmental Engineering (Vol. II) by S.K. Garg, Khanna Publishers, New Delhi.
2. Vesilind P.A., Worrell W. And Reinhart D.R., "Solid Waste Engineering", Thomson Books.
3. Bhide A.D. and Sundaresan B.B., "Solid Waste Management, Collection, Processing and Disposal", Nagpur.
4. Tchobanoglous G., Theisen H. And Vigil S.A., "Integrated Solid Waste Management", McGraw-Hill International editions.
5."Manual on Municipal Solid Waste Management", CPHEEO, Ministry of Urban Development, Government of India.
6. Management and Handling Rules for: municipal solid waste, biomedical waste, hazardous waste and radioactive wastes, Government of India Publications.

PAVEMENT DESIGN

Subject Code: BCIED1-653 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. The objective of this course is to train the students about how to design the crust thickness of highway and airfield pavements.
2. To introduce and practice the design principles and methods of flexible and rigid pavements being used worldwide.
3. To give special emphasis on design methods prescribed by the Indian Roads Congress for flexible and rigid pavements in India
4. To acquaint the students about strengthening of existing pavement structures and some modern pavement design concepts.

Course Outcomes:

1. The students will learn about how to design the crust thickness of highway and airfield pavements.

2. They will learn the design principles and methods of flexible and rigid pavements being used worldwide.
3. They will learn in detail the design methods prescribed by the Indian Roads Congress for flexible and rigid pavements in India.
4. The students will get exposure to methodology of strengthening of existing pavement structures and some modern pavement design concepts.

UNIT-I (10 Hours)

Introduction: Desirable characteristics of pavement, types and components, difference between highway and airfield pavement, functions of pavement components, comparison between rigid and flexible pavement.

Fundamentals of Design of Pavements: design life, traffic factors, climatic factors, subgrade strength and drainage, stresses and deflections; Burmister's two layered analysis.

UNIT-II (12 Hours)

Flexible Pavement Design Factors: Design wheel load, contact pressure, ESWL concept, determination of ESWL by equivalent deflection criteria, stress criteria, soil subgrade strength using CBR value.

Flexible Pavement Design Methods: Group Index method, McLeod method, Kansas method, California Resistance Value method, IRC: 37-2018 method.

UNIT-III (12 Hours)

Rigid Pavement Design: Principles, factors - wheel load and its repetition, properties of sub grade, properties of concrete. Westergaard's analysis – critical stresses, wheel load stresses, warping stress, frictional stress, and combined stresses.

Design Methods of Rigid Pavements: Design of cement concrete pavements by IRC:58-2015, PCA method, AASHTO method, reinforcement in slabs, requirements of joints, types of joints – expansion joint, contraction joint, warping joint, construction joint, longitudinal joint.

UNIT-IV (11 Hours)

Strengthening of Existing Pavements: Pavement overlays, types, design equations, flexible pavement overlay design as per IRC: 81-1997 using Benkelman beam.

Modern Pavement Design Concepts: Bituminous pavement with cemented base, interlocking concrete block pavement, roller compacted concrete pavement, full depth bituminous pavement, ultrathin white topping, perpetual pavement.

Recommended Text Books / Reference Books:

1. E.J. Yoder & M.W. Witczak, 'Principals of Pavement Design', Wiley Publication, New York.
2. S.K. Khanna and C.E.G. Justo, 'Highway Engineering', Nem Chand & Bros., Roorkee.
3. S.K. Sharma, 'Principles, Practice and Design of Highway Engineering', S. Chand & Co.
4. P. Chakraborty & A. Das, "Principles of Transportation Engg", Prentice Hall India, New Delhi.
5. Yang H. Huang, 'Pavement Analysis and Design', Pearson Publishers.

GROUND IMPROVEMENT TECHNIQUES

Subject Code: BCIED1-654 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To understand the objectives, necessity and scope of ground improvement techniques.
2. To learn different methods of in-situ densification of cohesive, cohesion-less soils.
3. To learn the classification, functions and applications of Geo-synthetics in ground improvement.
4. To learn the process of identification of necessity for ground improvement, finding alternative methods and recommendation of the ideal technique through case studies.

Course Outcomes:

1. Ability to understand the necessity of ground improvement and potential of a ground for improvement.
2. To gain comprehensive understanding about the improvement of in-situ cohesive soils as well as Cohesion less soils.
3. Competence to analyse an in-situ ground, identification of ground improvement techniques feasible, selection of the ideal method, its planning, design, implementation and evaluation of improvement level.

UNIT-I (12 Hours)

General : Formation of rock, soils and soil profiles, soil distribution in India and other countries - marine, black cotton soils (expansive)., lateritic, alluvial, desert soils peat etc., factors affecting the alteration of ground after formation – natural and man-made – reclaimed soils – methods of Geotechnical processes.

Compaction Methods: moisture density relations – compactive efforts – field methods – surface compaction, deep compactions- vibro compaction methods, vibro-probes, stone columns, sand compaction, stone column piles, selection of methods – quality control – specifications for compaction process for solving field problems.

UNIT-II (11 Hours)

Drainage Methods: seepage, ground water seepage control – filter requirements methods of dewatering – well point methods of discharge computations – design of steps for dewatering – design of well screens selection of pumps and accessories – deep bored wells. Pre-compression methods: compressibility and consolidation properties of soils estimation of rate of consolidation settlements – accelerating methods monitoring compressions – design of vertical drains – consolidation by electro osmosis and vacuum compression methods.

UNIT-III (11 Hours)

Grouting and Injection Methods: principles, design methods, selection of methods and requirements. Aspects of grouts, types of grouts and chemical applications, seepage control, solidification and stabilization – equipment and accessories used – quality control – specifications for achieving satisfactory results.

UNIT-IV (11 Hours)

Stabilization Methods: Mechanical, cement, lime, chemical methods of stabilization of soils – use of admixtures – polymers – geosynthesis –reinforcements thermal slurry trenches, void filling – prewetting –improving rock stability methods – exercise quality control to achieve desired results.

Recommended Text Books / Reference Books:

1. J.E. Bowles – Foundation Design & Analysis, McGraw-Hill Edition.
2. Ground improvement techniques by P. Purushottam Raj, Laxmi Publication.
3. F. S. Fang Handbook of Foundation Engg. CBS Publication, 1985.

SOIL MECHANICS & FOUNDATION ENGINEERING LAB

Subject Code: BCIES1-625 **L T P C** **Duration: 30 Hrs.**

0 0 2 1

Course Objectives:

1. To carry out all foundation engineering experiments according to standards.
2. Analyze and interpret experimental data.
3. To understand the techniques, skills and modern engineering tools necessary for engineering practice.
4. Knowledge of site specific field investigations including collection of soil samples for testing and observation of soil behaviour.

Course Outcomes:

1. Be able to perform and evaluate un-soaked and soaked California bearing ratio (CBR) tests used to estimate subgrade behaviour.
2. Be able to perform and evaluate load carrying capacities of piles.
3. Be able to perform and evaluate load carrying capacities of shallow foundation
4. Be able to perform and evaluate permeability of soil.

Laboratory Experiments:

1. Determination of soaked and un-soaked CBR value of soil in laboratory
2. Determination of soaked and un-soaked CBR value of soil in field
3. Determination of shear strength by vane shear test
4. Determination of coefficient of permeability in the field by pumping in method.
5. Determination of bearing capacity of soil by standard penetration test.
6. Determination of bearing capacity of soil by dynamic cone penetration test.
7. Determination of bearing capacity of soil by plate load test.
8. Determination of vertical load carrying capacity of a pile.
9. Determination of lateral load carrying capacity of a pile.
10. Determination of uplift capacity of a pile.

11. Determination of coefficient of sub grade reaction for the design of pavements.

12. Determination of load carrying capacity of soil by static cone penetration test.

Recommended Books / Manuals:

6. Soil Mechanics by Craig R.F., Chapman & Hall.
7. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons.
8. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall,
9. Principles of Geotechnical Engineering, by Braja M. Das, Cengage.
10. Learning Principles of Foundation Engineering, by Braja M. Das, Cengage Learning.
11. Relevant IS Codes.

CONCRETE TECHNOLOGY LAB-II

Subject Code: BCIES1-626	L	T	P	C	Duration: 30 Hrs.
	0	0	2	1	

Course Objectives:

The course should enable the students to:

1. Give practical exposure of laboratory testing & mix design of different kinds of concrete.
2. Determine the engineering properties of concrete & tile in terms of strength, strain, fatigue, creep, elasticity, stiffness, durability and workability.
3. Use of different chemical admixtures with concrete to enhance its properties.
4. Exercise better quality control in a civil construction project.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Analyze & describe the properties of hardened concrete.
2. Knowledge of concrete mix design philosophy & analysis of these philosophies.
3. Design concrete mixes which fulfils the required properties for fresh and hardened concrete for sustainable development.
4. Test of different concrete property to specify quality of concrete.
5. Give practical exposure for laboratory testings and make their effective reports & presentations.

Laboratory Experiments:

1. To determine the workability of Concrete by Slump Cone & Vee-Bee Time Method.

2. To determine the workability of Concrete by Compaction Factor Method.

3. To test the different properties of Concrete Admixtures as per IS 9103.

4. Design Mixes of Concrete by IS methods.

5. Design Mixes of Concrete with admixture by IS methods.

6. To determine the Compressive Strength of Concrete by Cube test.

7. To determine the Compressive Strength of Concrete by Cylinder test.

8. To determine the Flexural strength of Concrete.
9. To determine the Split Tensile strength of Concrete.
10. To determine the Permeability of Concrete.
11. To determine the Compressive strength, Water Absorption & Specific Gravity of polished building stones (Granite).
12. Size & Load Test of Manhole Covers as per IS method.

Recommended Books / Manuals:

1. M.L. Gambhir, 'Building and Construction Materials: Testing and Quality Control', TMH.
2. Concrete Lab Manual by NITTTR Chandigarh.
3. Concrete Technology, Theory and Practice by M.S. Shetty, S. Chand & Company.

COMPUTER-AIDED CIVIL ENGINEERING DRAWING-II

Subject Code: BCIES1-627	**L**	**T**	**P**	**C**	**Duration: 30 Hrs.**
	0	0	2	1	

Course Objectives:

The students will be able to

1. Develop structural designs.
2. Understand design procedures and ways- The student learn to interpret drawings, and to produce designs using Civil Engineering software.

Course Outcomes:

1. Ability to use the software packers for drafting and modelling.
2. Design and draw working structural drawings of various concrete, steel, hydraulic, etc. structures and their components & members.
3. Understand and interoperate design aids and handbooks.
4. Use of relevant Indian Standard specifications applicable to reinforced concrete, steel, hydraulic and other structures.

Laboratory Experiments:

1. Advanced Structural Drawings of concrete elements.
2. Advanced Structural Drawings of steel elements.
3. Hydraulic Structures: Canal sections, Guide Bank, Weir/Barrage, Head/ Cross regulators, Canal falls, Cross Drainage works.
4. Structural drawings of R.C.C. building (Single & multi storey).

Recommended Books / Manuals:

1. Engineering graphics with Auto CAD- R.B. Choudary, Anuradha Publishes.
2. Computer Aided Drafting & Modeling Lab by K. Venugopal, Raja, Scitech Publications.
3. Computer Aided Design Laboratory by M.N. Shesha Prakash, G.S. Suresh, Laxmi Publications.

CONSTITUTION OF INDIA

Subject Code: BMNCC0-001	L	T	P	C	Duration: 30 Hrs.
	2	0	0	0	

Course Objectives:

The objective of this non-credit but mandatory course is:

1. To apprise the students about the Constitution of India which provides the framework for the structure, procedure, power and duties of the government, judiciary, institutions and agencies involved in all spheres of public life in India.
2. To enable the student to understand the importance of constitution.
3. To understand the structure of executive, legislature and judiciary.
4. To understand philosophy of fundamental rights and duties.
5. To understand the central and state relation, financial and administrative relations.

Course Outcomes:

1. Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administrations.
2. Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
3. Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.
4. Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions like SC/ST/OBC and women.

Course Contents:

1. Meaning of the constitution law and constitutionalism
2. Historical perspective of the Constitution of India.
3. Salient features and characteristics of Constitution of India.
4. Scheme of the fundamental rights.
5. The scheme of the fundamental Duties and its legal status.
6. The directive Principles of State Policy – its importance and implementation.
7. Federal structure and distribution of legislative and financial powers between the Union and the States.
8. Parliamentary Form of Government in India – The constitution powers and the status of the president of India.
9. Amendment of the constitutional Powers and Procedure.
10. The historical perspectives of the constitutional amendments in India.

11. Emergency Provisions: National emergency, President Rule, Financial Emergency.
12. Local Self Government – Constitutional Scheme in India.
13. Scheme of the Fundamental Right to Equality.
14. Scheme of the Fundamental Right to certain Freedom under Article 19.
15. Scope of the Right to Life and Personal Liberty under Article 21.

Recommended Text Books / Reference Books:

1. Our Constitution by Subhash C. Kashyap.
2. An Introduction to the Constitution of India by M.V. Pylee.
3. An Introduction to the Constitution of India by Dr. Durga Das Basu.
4. The Indian Constitution: Cornerstone of a Nation by Granville Austin.

Total Credits= 21

Semester-VII (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-721	Transportation Engineering-II	3	0	0	40	60	100	3
BCIES1-722	Earthquake Engineering	2	0	0	40	60	100	2
Departmental Elective-V (Select any one)		3	0	0	40	60	100	3
BCIED1-751	Water Recourses Engineering							
BCIED1-752	Air & Noise Pollution and Control							
BCIED1-753	Pipeline Engineering							
Departmental Elective-VI (Select any one)		3	0	0	40	60	100	3
BCIED1-761	Prestressed Concrete							
BCIED1-762	Pavement Construction and Management							
BCIED1-763	Soil Reinforcing Techniques							
XXXXX	Open Elective**	3	0	0	40	60	100	3
BCIES1-723	Software Lab	0	0	2	60	40	100	1
BCIES1-724	Project-I	0	0	6	60	40	100	3
BCIES1-725	Training-III*	0	0	0	60	40	100	3
Total		**-**	**-**	**-**	**380**	**420**	**800**	**21**

*Internship will be imparted at the end of 6thsemesteras per AICTE Internship Policy.

**Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

Total Credits= 16

Semester-VIII (B. Tech Civil Engg.)		Contact Hours			Max Marks		Total Marks	Credits
Subject Code	Subject Name	L	T	P	Int.	Ext.		
BCIES1-821	Design of Steel Structures-II	3	0	0	40	60	100	3
Departmental Elective-VII (Select any one)		3	0	0	40	60	100	3
BCIED1-851	Bridge Engineering							
BCIED1-852	Design of Industrial Structures							
BCIED1-853	Disaster Management							
Departmental Elective-VIII (Select any one)		3	0	0	40	60	100	3
BCIED1-861	Engineering Hydrology							
BCIED1-862	Port and Harbour Engineering							
BCIED1-863	Geotechnical Design							
XXXXX	Open Elective**	3	0	0	40	60	100	3
BCIES1-822	Project-II	0	0	6	60	40	100	3
BCIES1-823	Advanced Testing Lab	0	0	2	60	40	100	1
BMNCC0-006	Essence of Indian Knowledge Tradition(Mandatory Course)	2	0	0	100	---	100	0
Total		**-**	**-**	**-**	**380**	**320**	**700**	**16**

**Open Elective Subjects may also be chosen from the list of Open Electives-I, II and III offered by other departments of university.

Overall Marks / Credits

Semester	Marks	Credits
1st	900	19
2nd	900	20
3rd	1100	24
4th	900	20
5th	1000	23
6th	1000	22
7th	800	21
8th	700	16
Total	**7300**	**165**

7th SEMESTER

TRANSPORTATION ENGINEERING-II					
Subject Code: BCIES1-721	**L**	**T**	**P**	**C**	**Duration: 45 Hrs.**
	3	0	0	3	

Course Objectives:

1. The objective of this course is to acquaint the students about highway planning and development in India.
2. The course will cover selection of highway alignment, design of geometric elements of highways, carry out traffic studies and implement traffic regulation and control measures and intersection design.
3. The characteristic properties of road construction materials and design of flexible and rigid pavements as per IRC guidelines shall also be covered in this course.

Course Outcomes:

1. The student will learn about essentials of highway planning and features of highway development in India.
2. The student will learn how to do selection of highway alignment and design the geometric elements of highways.
3. The student will learn how to carry out traffic studies and implement traffic regulation and control measures and intersection design.
4. The student will know about characteristic properties of road construction materials and design the flexible and rigid pavements as per IRC guidelines.

UNIT-I (12 Hours)

Railway Track: Rail gauge, alignment, engineering surveys, track stresses, rails, sleepers, ballast, formation, track fittings and fastenings, rail joints and welding of rails, creep of rails, track drainage, track maintenance, high speed tracks.

Geometric Design of Track: Curves and super-elevation, gradients, points and crossings, track junctions and simple track layouts, level crossing.

UNIT-II (11 Hours)

Railway Stations & Yards: Classification & layout of stations, Marshalling yard, Locomotive yard, equipment at railway stations & yards.

Signalling and Interlocking: Objectives, classification of signals, types of signals in stations and yards, principles of interlocking.

UNIT-III (11 Hours)

Airport Planning: Aircraft characteristics, airport site selection, airport classification, general layout of an airport, approach zones and turning zones.

Runway Orientation and Design: Head wind, cross wind, wind rose diagram, basic runway length, corrections, geometric design elements, runway configuration.

UNIT-IV (11 Hours)

Taxiway and Aircraft Parking: Aircraft parking system, main taxiway, exit taxiway, separation clearance, holding aprons.

Visual Aids: Marking and lighting of runway and taxiway, landing direction indicator, and wind direction indicator, IFR/VFR.

Recommended Text Books / Reference Books:

1. S. Chandra and M Aggarwal, 'Railway Engineering', Oxford University Press, New Delhi.
2. S.C. Saxena and S.P. Arora, 'A Textbook of Railway Engineering', Dhanpat Rai and Sons.
3. J.S. Mundrey, 'Railway Track Engineering', McGraw Hill Publishing Co, New Delhi
4. S.K. Khanna, M.G. Arora and S.S. Jain, 'Airport Planning and Design', Nem Chand & Bros.
5. R. Horenjeff, and F. McKelvey, 'Planning and Design of Airports', McGraw Hill Company.

EARTHQUAKE ENGINEERING

Subject Code: BCIES1-722	L	T	P	C	Duration: 30 Hrs.
	2	0	0	2	

Course Objectives:

1. The primary objective of earthquake resistant design is to prevent building collapse during earthquakes thus minimising the risk of death or injury to people in or around those buildings.
2. The potential consequences of strong earthquakes on urban areas and civil infrastructure.
3. Design, construct and maintain structures to perform at earthquake exposure up to the expectations and in compliance with building codes.

Course Outcomes:

1. The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
2. The students will get a diverse knowledge of earthquake engineering practices applied to real life problems.
3. The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects.

UNIT-I (05 Hours)

Introduction to Earthquakes: Causes of earthquakes, basic Terminology, Magnitude, Intensity, Peak ground motion parameters, Seismic Zoning Map of India, Seismograms and Accelerogram. Past earthquakes and Lessons learnt.

UNIT-II (10 Hours)

Introduction to Dynamics: Theory of Vibrations, Sources of Vibrations, Types of Vibrations, Degree of Freedom, spring action and damping, Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion –Undamped and damped free vibration –Damping –Response to harmonic excitation –Concept of response spectrum. Multi-Degree of Freedom (MDOF) Systems: -Formulation of equations of motion –Free vibration –Determination of natural frequencies of vibration and mode shapes –Orthogonal properties of normal modes –Mode superposition method of obtaining response.

UNIT-III (08 Hours)

Lateral Force Analysis: Lateral Strength, stiffness, ductility and structural configuration, Floor Diaphragm action, Moment resisting frames, shear walls.

Codal Design Provisions: Review of the latest Indian seismic code IS:1893 (Part-I) provisions for buildings –Earthquake design philosophy.

UNIT-IV (07 Hours)

Codal Detailing Provisions: Review of the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings –Beam, column and joints, Design of Shear walls as per IS: 13920 –Detailing of reinforcements.

Recommended Text Books / Reference Books:

1. Earthquake Resistant Design of Structures, Pankaj Aggrawal, Manish Shrikhande, PHI Learning
2. Dynamics of Structures: Theory and Applications to Earthquake Engineering, AK Chopra, Prentice Hall
3. Dynamics of Structures, R.W. Clough and Joseph Penzien, McGraw-Hill Education
4. Structural Dynamics by Mario & Paz, Springer.
5. Earthquake Resistant Design by David J. Dowrick, Wiley India Pvt. Ltd.
6. Elements of Earthquake Engg. by Jai Krishna, A.R. Chandrasekaran, Brijesh Chandra,
7. IS 1893-2016 Indian Standard Criteria for Earthquake Resistant Design of Structures
8. IS 4326-1993 Indian Standard for Earthquake Resistant Design and Construction of Buildings
9. IS 13920:2016- Ductile design and detailing of Reinforced Concrete Structures subjected to Seismic Forces

WATER RESOURCES ENGINEERING

Subject Code: BCIED1-751 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Types of diversion headworks, seepage theories.
2. Design of weirs.
3. Spillways
4. Design of canal regulators, canal falls, cross drainage works.
5. Classification of canal outlets, design of types of outlets.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. To study types of diversion headworks, seepage theories
2. To design weirs
3. To learn about spillways
4. Design of canal regulators, canal falls, cross drainage works
5. Classify canal outlets, design outlets.

UNIT-I (12 Hours)

Head Works: Types of head works, Functions and investigations of a diversion head work: component parts of a diversion head work and their design considerations, silt control devices.

Theories of Seepage: Seepage force and exit gradient, assumptions and salient features of Bligh's Creep theory, Limitations of Bligh's Creep theory, salient features of Lane's weighted Creep theory and Khosla's theory, Comparison of Bligh's Creep theory and Khosla's theory, Determination of uplift pressures and floor thickness.

UNIT-II (13 Hours)

Design of Weirs: Weirs versus barrage, types of weirs, main components of weir, causes of failure of weir and design considerations with respect to surface flow, hydraulic jump and seepage flow. Design of barrage or weir.

Spillways: Components of spillways, types of gates for spillway crests, creagers profiles neglecting velocity of approach, profile taking velocity of approach into account, upstream lip and approach ramp, advantages of gated spillways, discharge characteristics of spillways.

UNIT-III (08 Hours)

Canal Regulators: Offtake alignment, cross-regulators – their functions and design, Distributory head regulators, their design, canal escape.

Canal Falls: Necessity and location, types of falls and their description, selection of type of falls, Principles of design, Design of Sarda type, straight glacis and Inglis or baffle wall falls.

UNIT-IV (12 Hours)

Cross-Drainage Works: Definitions, choice of type, Hydraulic design consideration, Aqueducts their types and design, siphon aqueducts – their types and design considerations, super passages, canal siphons and level crossing.

Canal Outlets: Essential requirements, classifications, criteria for outlet behaviors, flexibility, proportionality, sensitivity, sensitiveness, Details and design of non-modular, semi-modular and modular outlets.

Recommended Text Books / Reference Books:

1. Irrigation Engg. & Hydraulic Structures by Santosh Kumar Garg, Khanna Publishers.
2. Design of Irrigation Structures by R.K. Sharma, Oxford IBH Pub.
3. Irrigation Engg. & Hydraulics Structures by S.R. Sahasrabudhe, Katson Publishing.
4. Irrigation Practice and Design Vol. I to VII by K.B. Khushlani. Oxford IBH Pub.
5. P.N. Modi; Irrigation with Resources and with Power Engineering, Standard Book House.
6. Irrigation Engg. Vol. I & II by Ivan E. Houk, John Wiley and sons.

AIR & NOISE POLLUTION AND CONTROL

Subject Code: BCIED1-752 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Understanding of basic concepts of air pollution & noise pollution.
2. Study of air & noise pollution, identification of the parameters, conditions, mechanisms.
3. Study of sampling types and methods for ambient air and stack.
4. Study of macro and micro meteorology for understanding the dispersion of pollutants.
5. Study of pollution control methods, mechanism and devices.

Course Outcomes:

1. Explain basic principles on various aspects of atmospheric chemistry.
2. Identify the major sources, effects and monitoring of air and noise pollutants.
3. Understand the key transformations and meteorological influence on air and noise.
4. Relate and analyse the pollution regulation on its scientific basis.

UNIT-I (12 Hours)

Air Pollution: Composition and structure of atmosphere, global implications of air Pollution, Classification of air pollutants: Particulates, hydrocarbon, Carbon monoxide, Oxides of sulphur, Oxides of nitrogen and photo chemical oxidants. Indoor air pollution, Effects of air pollutants on humans, animals, property and plants.

Air Pollution Chemistry: Meteorological aspects of air pollution dispersion; temperature lapse rate and stability, wind velocity and turbulence, plume behaviour, dispersion of air pollutants, the Gaussian Plume Model, stack height and dispersion.

UNIT-II (11 Hours)

Air Sampling & Measurement: Ambient air quality and standards, air sampling and measurements; ambient air sampling, Collection of gaseous air pollutants, collection of particulate air pollutants, stack sampling, Control devices for particulate contaminants: gravitational settling chambers, cyclone separators, wet collectors, fabric filters (Bag-house filter), electrostatic precipitators (ESP).

UNIT-III (10 Hours)

Control of Gaseous Contaminants: Absorption, Adsorption, Condensation and Combustion, Control of sulphur oxides, nitrogen oxides, carbon monoxide, and hydro carbons, automotive emission control, catalytic convertor, Euro-I, Euro-II and Euro-III specifications, Indian specifications.

UNIT-IV (12 Hours)

Noise Pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psycho-acoustics and noise criteria, effects of noise on health, annoyance rating schemes; special noise environments: Infra-sound, ultrasound, impulsive sound and sonic boom; noise standards and limit values; noise instrumentation and monitoring procedure, Noise indices.

Recommended Text Books / Reference Books:

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering.
2. Environmental Engineering (Vol. II) by S.K. Garg, Khanna Publishers, Delhi

3. Martin Crawford: Air Pollution Control Theory.
4. Warkand Warner: Air Pollution: Its Origin and Control.
5. Rao and Rao: Air Pollution Control Engineering.
6. K Kant and R. Kant, "Air Pollution and Control Engineering", Khanna Publishers House.
7. Environmental Pollution Control Engineering-CS Rao, Wiley Eastern Ltd., New Delhi,
8. Environmental Noise Pollution – PE Cunniff, McGraw Hill
9. Nevers: Air Pollution Control Engineering.
10. M. P. Poonia and S C Sharma," Environmental Engineering, Khanna Publishing House.

PIPELINE ENGINEERING

Subject Code: BCIED1-753 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Transmission of water in pipelines.
2. Rehabilitation of pipeline systems.
3. Software for WDN analysis.
4. Pipe burst and leak control.
5. Appurtenances and pipe materials.

Course Outcomes:

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

1. Design and operation of pipeline.
2. Rehabilitation of pipeline systems.
3. Software for WDN analysis.
4. Pipe burst and leak control detection.
5. Appurtenances and pipe materials.

UNIT-I (11 Hours)

Designing and operating pipelines for transmission and distribution of water, Analysis of flow in water transmission and water distribution systems (pump & gravity), optimal design and operation of systems for achieving different goals (including latest tools available for optimization).

UNIT-II (12 Hours)

Extended period simulations, Software for WDN analysis and design, Rehabilitation of pipeline systems.

UNIT-III (11 Hours)

Water auditing, online monitoring and control, leak and burst detection, transient analysis and surge protection.

UNIT-IV (11 Hours)

Appurtenances (valves / flow meters etc.), Selection of pipe material, Jointing details, Pipe laying and testing, Structural design for buried and surface mounted pipes.

Recommended Text Books / Reference Books:

1. Fluid Mechanics & Hydraulic Machines: Dr. R.K. Bansal.
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010.
3. Hydraulics and Fluid Mechanics, P. N. Modi and S. M. Seth, Standard Book House.
4. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
5. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

PRESTRESSED CONCRETE

Subject Code: BCIED1-761	L	T	P	C	Duration: 45 Hrs.
	3	0	0	3	

Course Objectives:

The objectives of the course are:

1. The intention of Prestressing is to permanently keep all (significant) parts of a concrete element in compression.
2. The benefit of that arises from the fact that concrete as a material is relatively poor when viewed as a tensile member. On the other hand, its compressive strength may be around ten times the tensile strength.
3. In simple terms it essentially clamps the concrete together in the area that will undergo the highest tensile forces.

Course Outcomes:

1. Students will understand the general mechanical behaviour of prestressed concrete.
2. Students will be able to analyze and design prestressed concrete flexural members.
3. Students will be able to analyze and design for vertical and horizontal shear in prestressed concrete.

Note: IS 1343 Code of Practice is permitted in the examination.

UNIT-I (09 Hours)

Materials for Prestressed Concrete and Pre-stressing Systems: High strength concrete and high tensile steel, tensioning devices, pre-tensioning systems, post tensioning systems.

UNIT-II (13 Hours)

Analysis of Pre-stress and Bending Stresses:-Analysis of pre-stress, resultant stresses at a sector, pressure line or thrust line and internal resisting couple, concept of load balancing, losses of pre-stress, deflection of beams.

UNIT-III (12 Hours)

Strength of Pre-Stressed Concrete Sections in Flexure, Shear and Torsion:-Types of flexural failure, strain compatibility method, IS: 1343 code procedure, design for limit state of shear and torsion.

UNIT-IV (11 Hours)

Design of Pre-Stressed Concrete Beams and Slabs: Transfer of prestress in pre tensioned and post tensioned members, design of anchorage zone reinforcement, End zone, design of simple beams, cable profiles.

Recommended Text Books / Reference Books:

1. N. Krishna Raju, Prestressed concrete, Tata McGraw Hill.
2. T.Y. Lin, Ned H. Burns, Design of Prestressed Concrete Structures, John Wiley & Sons.
3. P. Dayaratnam, Prestressed Concrete, Oxford & IBH.
4. R. Rajagopalan, Prestressed Concrete.
5. Code of Practice for Prestressed Concrete (IS 1343: 2012).

PAVEMENT CONSTRUCTION AND MANAGEMENT

Subject Code: BCIED1-762 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. The main objective of this course is to acquaint the students about various engineering methods used for construction and maintenance of different types of pavement structures.
2. To familiarize the students about the methods of evaluation of pavement structures to undertake various types of maintenance management strategies.
3. To introduce the concept of pavement management system and pavement performance prediction, this ensures timely maintenance of pavements with rational utilization of available budget.

Course Outcomes:

1. The students will learn about various engineering methods used for construction and maintenance of different types of pavement structures.
2. The student shall get familiar with the methods of evaluation of pavement structures to undertake various types of maintenance management strategies.
3. They will learn the concept of pavement management system and pavement performance prediction, which will not only help them in field applications but also in research at the postgraduate level after completion of their graduation.

UNIT-I (11 Hours)

Introduction: Types of highway construction, materials for construction, construction procedure of different highways: Earth roads, Gravel roads, WBM roads, Bituminous pavements, Cement Concrete pavements. Equipment used for highway construction.

Soil Stabilization for Pavements: Principles of proportioning of soil-aggregate mixes and compaction, mechanical, soil-cement, soil-bitumen and soil-lime stabilization methods; construction control and quality control checks.

UNIT-II (12 Hours)

Bituminous Pavement Construction: Earthwork, compaction and construction of embankments, specifications of materials, construction methods and field control checks for various types of

flexible pavement materials in sub-base, base, binder and surface course layers.

Cement Concrete Pavement Construction: Specifications and method of cement concrete pavement construction; Quality control tests; Construction of various types of joints, Construction of interlocking block pavements.

UNIT-III (11 Hours)

Pavement Maintenance: Need for maintenance, Pavement failures, causes and remedial measures. Types of highway maintenance, Materials used for maintenance of different pavements, Maintenance and rehabilitation techniques.

Pavement Evaluation: Pavement distresses, functional condition evaluation of pavements-Roughness, Skid Resistance. Structural evaluation of pavements – non-destructive testing, Benkelman beam and Falling Weight Deflectometer.

UNIT-IV (11 Hours)

Pavement Management Systems: Concept, components, structure, data requirements, Project level and Network level needs.

Pavement Performance Prediction: Modeling techniques – AASTHO, CRRI and HDM models, Budget forecasting for maintenance and rehabilitation, Ranking and optimization methodologies, life cycle costing.

Recommended Text Books / Reference Books:

1. S.K. Khanna and C.E.G. Justo, 'Highway Engineering', Nem Chand & Bros., Roorkee.
2. S.K. Sharma, 'Principles, Practice and Design of Highway Engineering', S. Chand & Co.
3. Ralph C. G. Haas, W. Ronald Hudson, 'Pavement Management Systems', McGraw-Hill Book Company.
4. M. Y. Shahin, 'Pavement Management for Airports, Roads, and Parking Lots' Kluwer Academic Publishers.

SOIL REINFORCING TECHNIQUES

Subject Code: BCIED1-763 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

5. To understanding the necessity and scope of geo-synthetics in ground improvement.
6. To gain comprehensive understanding about different types of geo-synthetic products their functions, application and suitability.
7. To learn the analysis and design of reinforced soil walls.

Course Outcomes:

1. Competence in identification of ideal geo-synthetic function and ability to select the ideal product to serve the function.
2. Ability to analyse and design the application of geo-synthetics.
3. Competence construction practices and evaluation of post construction improvement.

UNIT-I (10 Hours)

Reinforced Earth Retaining Wall: Principles, concepts and mechanism of reinforced earth – design consideration of reinforced earth retaining wall.

UNIT-II (12 Hours)

Geo-membrane: Physical, mechanical, chemical, biological, thermal and identification properties.
Designing with Geo-membranes: Liquid containment liners, covers for reservoirs, canal liners, landfill liners, caps & closures, underground storage tanks etc.

UNIT-III (11 Hours)

Geotextile: Physical, mechanical, hydraulic, endurance and degradation properties, designing with geotextiles, geotextile functions and mechanisms, designing for separation, designing for reinforcement, designing for stabilization, designing for filtration, designing for drainage, designing for multi functions.

UNIT-IV (12 Hours)

Geogrid: Physical, mechanical, endurance and environmental properties, designing for geogrid reinforcement
Geonets: Physical, mechanical, hydraulic, endurance and environmental properties, designing for geonet drainage
Geo-composites: Geo-composites for separation, reinforcement, filtration, drainage, liquid, vapour barriers.

Recommended Text Books / Reference Books:

1. Hausman, M. R. (1990). " Engineering Principles of Ground Modification" McGraw-Hills
2. Moseley, M.P. (1193), "Ground Improvement" Chapman and Hall.
3. Koener, R.M. (2012), "Designing with Geo-synthetics, Vol.1 & 2, Xlibriss Corporation.
4. Rao, G.V. and Raju, G.V.S.S. (1995) "Engineering with Geo-synthetics", TMH.
5. Purushothama Raj, P. (2014). "Ground Improvement Techniques". Laxmi Publishers.

SOFTWARE LAB

Subject Code: BCIES1-723 | **L T P C** | **Duration: 30 hrs.**

0 0 2 1

Course Objectives:

1. To obtain the knowledge of software's related to civil engineering.
2. To learn how to analyze and design complex Civil engineering problems with software.
3. To learn how to manage/optimize the project with time and resource with the help of software.

Course Outcomes:

On completion of this course the student will be able:

1. To design the whole project like roads, building etc. with the help of softwares.
2. To deal with project management in real time.

Student can choose anyone software according to their choice:

1. STAAD-PRO

2. E-TAB
3. ARC VIEW GIS
4. MX ROAD
5. PLAXIS
6. PRIMA VERA

PROJECT-I					
Subject Code: BCIES1-724	**L**	**T**	**P**	**C**	**Duration: 90 hrs.**
	0	0	6	3	

Course Objectives:

1. To make student synthesis and use knowledge of various disciplines gained during entire study in a civil project of his choice.
2. Demonstrate the personal abilities and skills required to produce and present an extended piece of work.
3. Engage in personal inquiry, action and reflection on specific topics and issues.
4. Focus on, and demonstrate an understanding of, the areas of interaction.
5. Reflect on learning and share knowledge, views and opinions.

Course Outcomes:

1. Identify, describe & analyze the steps followed to achieve the chosen area(s) of interaction or stated goal.
2. Analyze & choose techniques relevant to the project's goal.
3. Respond thoughtfully to ideas and inspiration by using modern tools & techniques.
4. A fully worked-out design proposal-including consideration of site planning, structure, services, and any other aspect/specific to the project.
5. Assess the achieved results in terms of the initial goal and the focus on the chosen area(s) of interaction with future meets.

PROJECT WORK:

Students are required to work on practical projects in the field of Civil Engineering (Project work, seminar and internship in industry or at appropriate work place). The students have to work for 6 hrs per week with his / her supervisor(s).

8th SEMESTER

DESIGN OF STEEL STRUCTURES-II

Subject Code: BCIES1-821 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

3. Learn the plastic behaviour of steel in flexure.
4. Learn the behaviour of different types of steel bridges during different type of loading and design of steel structures.
5. Ability to design industrial steel structures systems.
6. Familiarity with professional and contemporary issues.

Course Outcomes:

5. Identify and compute the design loads on a typical steel building.
6. Able to analyze and design with detailing of steel flexural members.
7. Ability to design and check for serviceability (crack and deflection) and ultimate limit state conditions.
8. Apply relevant Indian Standard provisions to ensure safety and serviceability of structural steel elements.

Note: IS 800:2007, General Construction in Steel-Code of practice is permitted in examination.

UNIT-I (12 Hours)

Plastic Analysis: Introduction, flexural behavior, shape factor, plastic moment capacity of beams, Design of Beams.

Plate Girder: Elements of a plate girder, economical depth, IS recommendations, design of a plate girder, curtailment of flanges, various types of stiffeners using bolts and welds.

UNIT-II (11 Hours)

Foot Bridge: Elements of Foot Bridge, types, moving load behaviour, Design of steel foot bridge with welded joints.

UNIT-III (11 Hours)

Industrial Buildings: Introduction, Terminology, types & uses, types of load, Design of elements of industrial buildings: Gantry girder, Column bracket using weld.

UNIT-IV (11 Hours)

Railway Bridge: Design of single track Railway Bridge with lattice girders having parallel chords (for B.G.)- Stringer, Cross girder, Main girders with welded joints, Portal sway bracings, Rocker and rollers bearings.

Recommended Text Books / Reference Books:

1. S.K. Duggal, ‘Limit State Design of Steel Structures’.
2. N. Subramanian, ‘Design of Steel Structures’.
3. Ram Chandra, ‘Design of Steel Structures’, Vol. 2.
4. L.S. Negi, ‘Design of Steel Structures’.
5. S.S. Bhavikatti, ‘Design of Steel Structures (by limit state method as per IS: 800-2007).

6. IS 800: 2007 (General Construction in Steel-Code of Practice)
7. SP: 6(1) (Handbook for Structural Engineers-Structural Steel Sections)

BRIDGE ENGINEERING

Subject Code: BCIED1-851 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. The objective of this course is to apprise the students about the planning and construction of bridges, which is one of the most important components of the transportation infrastructure.
2. To learn about different types of bridges, their choice, site selection, loads, with special emphasis on RCC and steel bridges.
3. To learn about components of sub-structure and super-structure of the bridges along with construction and maintenance aspects of bridges.

Course Outcomes:

1. The students will learn about the planning and construction of bridges, which is one of the most important components of the transportation infrastructure.
2. They will learn about different types of bridges, their choice, site selection, loads, with special emphasis on RCC and steel bridges.
3. They will also learn about components of sub-structure and super-structure of the bridges along with construction and maintenance aspects of bridges.

UNIT-I (11 Hours)

Introduction: Definition and components of a bridge, Classification of bridges, Choice of a bridge type, Investigation for bridges, Selection of bridge site, design discharge for river bridge, linear waterway, economical span, vertical clearance, scour depth, afflux.

Standard Specifications for Road Bridges: IRC Bridge Codes, Width of carriageway, Dead load, I.R.C. standard live loads, Impact effect, Wind load, Longitudinal forces, Centrifugal forces, Horizontal forces due to water current, Buoyancy effect, Earth pressure, Deformation stresses, Erection stresses, Temperature effects and Seismic forces.

UNIT-II (12 Hours)

Reinforced Concrete Bridges: Types of RCC bridges; Culverts - Box Culvert, Pipe Culvert, Solid slab bridge, T-beam girder bridges, Hollow girder bridges, Balanced cantilever bridges, Continuous girder bridges, Rigid frame bridges, Arch bridges, Prestressed concrete bridges.

Steel Bridges: Types of Steel bridges; Beam bridges, Plate girder bridges, Box girder bridges, Truss bridges, Arch bridges, Cantilever bridges, Cable stayed bridges, Suspension bridges.

UNIT-III (12 Hours)

Sub-structure and Foundation: Piers and abutments, materials for piers and abutments, Types of foundations; Shallow, Pile, and Well foundations. Relative merits of piles and well foundations, Pneumatic Caissons, Box Caissons.

Bearings: Importance of Bearings, Different types of bearings, Expansion Bearings, Fixed Bearings, Elastomeric Bearings.

UNIT-IV (10 Hours)

Joints & Appurtenances: Expansion joints, Wearing Course, Approach Slab, Footpath, Handrails.

Construction and Maintenance of Bridges: Methods of construction of concrete and steel bridges. Formwork and false work for concrete bridges, Causes of Bridge failures, Inspection and maintenance, Bridge Management System.

Recommended Text Books / Reference Books:

1. Johnson, Victor, 'Essentials of Bridge Engineering', Oxford University Press.
2. C.H. Khadilkar, 'A Text book of Bridge Construction', Allied Publishers.
3. S.C. Rangwala, 'Bridge Engineering', Charotar Publishing House Pvt. Ltd.
4. V.K. Raina, 'Concrete Bridges Handbook, Shroff Publishers and Distributors.
5. S. Ponnuswamy, 'Bridge Engineering', McGraw Hill Education.

DESIGN OF INDUSTRIAL STRUCTURES

Subject Code: BCIED1-852 **L T P C** **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To learn various distress and damages to concrete and masonry structures.
2. To understand the importance of maintenance of structures.
3. To study the various types and properties of repair materials.
4. To assess the damage to structures using various tests.
5. To learn the importance and methods of substrate preparation.
6. To learn various repair techniques of damaged structures & corroded structures.

Course Outcomes:

By the end of this course students will have the capability/knowledge of:

1. Various distress and damages to concrete and masonry structures, the importance of maintenance of structures, types and properties of repair materials etc.
2. Assessing damage to structures and various repair techniques.

UNIT-I (05 Hours)

Introduction: Role of Design Engineer, properties of structural steel, merits and demerits of structural steel over reinforced concrete structures.

UNIT-II (15 Hours)

Steel Structure Design: Design of tension members, compression members, and flexure members and beam-columns junctions, adopting Codal provisions of IS: 800 components & its terminology, load estimation, choice of sections, analysis and design for gantry girders.

Industrial structures with steel trusses and portal frames. Typical configuration with various elements, load assessment (deal load, live load, wind load and earthquake load).

UNIT-III (15 Hours)

Industrial Design: Different roofing and cladding alternatives and their design, types of purlins and their design, analysis and design of a trusses and portal frames, design of base plate, pedestal and footing considering both hinged and fixed support conditions, design of bracing and preparation of construction drawings.

UNIT-IV (10 Hours)

Welded Connections: Advantages of welding, fundamentals and methods of welding, types of joints, welding symbols and inspection of welding, Codal provisions, and design of typical welded connections. Bolted connections, Types of bolts, Codal provisions, design of typical bolted connections.

Recommended Text Books / Reference Books:

1. Design of Steel Structures by Bresler & Lin.
2. Theory of Modern Steel Structures by Linton Grinter.
3. Design of Steel Structures by P. Dayaratnam.
4. Reinforced Concrete Structural Elements (behavior, analysis & design) by P. Purushothoman.
5. Practical Design of Reinforced Concrete by Russell S. Fling.
6. Design of Reinforced Concrete Structures by Ashok Kumar Gupta.
7. Structural Condition assessment by Robert T. Ratay.
8. Repairs and rehabilitation of concrete structures by P. I. Modi & C. N. Patel, PHI Publication.

DISASTER MANAGEMENT

Subject Code: BCIED1-853 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. To understand basic concepts in Disaster Management.
2. To understand Definitions and Terminologies used in Disaster Management
3. To understand Types and Categories of Disasters
4. To understand the Challenges posed by Disasters
5. To understand Impacts of Disasters Key Skills.

Course Outcomes:

1. Understanding foundations of hazards, disasters and associated natural/social phenomena.
2. Familiarity with disaster management theory (cycle, phases).
3. Knowledge about existing global frameworks and existing agreements.
4. Humanitarian Assistance before and after disaster.
5. Technological innovations in Disaster Risk Reduction: Advantages and problems.
6. Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.

UNIT-I (11 Hours)

Introduction: Concepts and definitions -disaster, hazard, vulnerability, risks-severity, frequency

and details, capacity, impact, prevention, mitigation, Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

UNIT-II (11 Hours)

Disaster Impacts: Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

UNIT-III (12 Hours)

Disaster Risk Reduction (DRR): Disaster management cycle –its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

UNIT-IV (11 Hours)

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

Recommended Text Books / Reference Books:

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

ENGINEERING HYDROLOGY

Subject Code: BCIED1-861 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

The course should enable the students to:

1. Interaction among various processes in the hydrological cycle.
2. Average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapo-transpiration etc.
3. The various components of hydrographs and to estimate the run-off.
4. Estimation of peak flows by rational method, unit hydrograph theory, Gumbels's method.

5. Flood routing.

Course Outcomes:

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

1. Understand the interaction among various processes in the hydrological cycle.
2. Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapo-transpiration etc.
3. Understand the various components of hydrographs and to estimate the run-off.
4. Estimation of peak flows by rational method, unit hydrograph theory, Gumbels's method.
5. Understand flood routing.

UNIT-I (10 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 (11 Hours)

Abstractions from Precipitation: Evaporation process, Evaporimeters, Analytical methods of Evaporation Estimation, Reservoir Evaporation and Methods for its Reduction, Evapo-transpiration, Interception, Depression storage.

Infiltration: Definition, Infiltration capacity, measurement of infiltration, Modeling infiltration capacity, Classification of Infiltration capacities, Infiltration Indices.

UNIT-III (14 Hours)

Runoff: Run-off volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting run-off hydrograph, components of hydrograph.

Hydrographs: Base flow separation, effective rainfall, unit hydrograph, S-curve hydrograph, Snyder's synthetic unit hydrograph, surface water resources of India.

UNIT-IV (10 Hours)

Peak Flows: Estimation of peak flow-rational formula, use of unit hydrograph, frequency analysis, Gumbel's method, design flood and its hydrograph.

Flood Routing: Definition, Introduction to hydraulic and hydrologic routing- The Saint- Venant equations for open channel flow, flood wave propagation, kinematic diffusion wave approximations.

Recommended Text Books / Reference Books:

1. Engineering Hydrology - J. Nemec, Prentice Hall.
2. Engineering Hydrology by K Subramanya.
3. Engineering Hydrology by Stanley Buttler, John. Wiley.
4. Ground Water Hydrology by TODD, John Wiley.
5. Engineering for Dams Vol. II & III by Creager Justin & Hinds. John. Wiley

6. Hydrology by. S.K. Garg, Khanna Publications.
7. Hydrology Principles, Analysis and Design by. Raghunath, H M, New Age Int. Publications.

PORT AND HARBOUR ENGINEERING

Subject Code: BCIED1-862 | **L T P C** | **Duration: 45 Hrs.**

3 0 0 3

Course Objectives:

1. The objective of this course is to acquaint the students about fourth major mode of transportation, i.e., waterways, after covering highways, railways, and airports in the previous semesters.
2. To understand the need for providing various civil engineering structures at the ports and harbours, construction, maintenance, and navigational aspects.
3. To learn about the functions of different components of harbours and ports for the purpose of safe and efficient water transportation.

Course Outcomes:

1. The students shall learn about the importance and application of fourth major mode of transportation, i.e., waterways, after covering highways, railways, and airports in the previous semesters.
2. They will understand the need for providing various civil engineering structures at the ports and harbours, and their construction, maintenance, and navigational aspects.
3. They will come to know about the functions of different components of harbours and ports for the purpose of safe and efficient water transportation.

UNIT-I (09 Hours)

General: History, Advantages and disadvantages of water transportation, Modern trends in water transportation, Elements of water transportation, Historical development in India.
Natural Phenomena: Tides, Wind, Water waves, Currents phenomena, Characteristics and effects on marine structures, Littoral drift.

UNIT-II (12 Hours)

Marine Structures: General design aspects, Breakwaters - function, types general design principles, Wharves, Quays, Jetties, Piers, Pier heads, Dolphin, Fenders, Mooring Accessories.
Harbours: Classification of harbours, Selection of site and planning of harbours, Ship characteristics, Characteristics of good harbour, Size of harbour.

UNIT-III (12 Hours)

Docks and Repair Facilities: Harbour docks, Wet docks, Repair docks, Lift docks, Floating docks, Slipways
Port Facilities: Port building facilities, Transit sheds, Warehouses, Cargo handling facility, Services for shipping terminals, Inland port facilities planning.

UNIT-IV (12 Hours)

Dredging: General, Classification of dredging works, Types of dredgers, Uses of dredged

material, Execution of dredging work.

Navigation Aids: Necessity, Types of navigation aids, Requirement of signals, Fixed and floating navigation aids.

Recommended Text Books / Reference Books:

1. S. P. Bindra, 'A Course in Docks and Harbour Engineering', Dhanpat Rai & Sons, New Delhi.
2. R. Srinivasan and S. C. Rangwala, 'Harbour, Dock and Tunnel Engineering', Charotar Publishing House, Anand.
3. Alonzo Quinn, 'Design and Construction of Ports and Marine Structure', McGraw Hill Book Company, New York.

GEOTECHNICAL DESIGN

Subject Code: BCIED1-863	L	T	P	C	Duration: 45 Hrs.
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Course Objectives:

1. To understand the objectives, necessity and scope of different underground structures.
2. To learn about different types of forces acting on sub structures.
3. To know the behaviour of soil beneath and surrounding the underground structure
4. To learn the design and construction of sub structures

Course Outcomes:

1. Learn about types and purposes of different underground structures.
2. Have an exposure to the systematic methods for designing foundations.
3. Be able evaluate the feasibility of foundation solutions to different types of soil conditions considering the time effect on soil behaviour.
4. Have necessary theoretical background for design and construction of foundation systems.

UNIT-I (12 Hours)

Sheet Piles: Introduction, sheet pile structures, free cantilever sheet pile walls, cantilever sheet pile, depth of embedment of cantilever walls in sandy soils, depth of embedment of cantilever walls in cohesive soils, anchored bulkhead: free-earth support method, depth of embedment of anchored sheet piles in granular soils, design charts for anchored bulkheads in sand, moment reduction for anchored sheet pile walls, anchorage of bulkheads.

UNIT-II (11 Hours)

Braced Cuts and Coffer Dams: Lateral earth pressure distribution on braced-cuts, stability of braced cuts in saturated clay, Bjerrum and Eide method of analysis, piping failures in sand cuts, arching action of soil and its application, coffer dams.

UNIT-III (11 Hours)

Drilled Pier Foundations: Introduction, types of drilled piers, load transfer mechanism, vertical bearing capacity of drilled piers, the general bearing capacity equation for the base resistance, bearing capacity equations for cohesive soil and granular soil, ultimate skin resistance of cohesive cohesion-less soil and gravelly sands, ultimate side and total resistance in rock, estimation of

settlements of drilled piers at working loads, uplift capacity of drilled piers, lateral bearing capacity of drilled piers.

UNIT-IV (11 Hours)

Well Foundations: Forces acting on wells, components of well foundation, bearing capacity, settlement and lateral resistance, tilts and shifts design and construction, types of caissons, advantages and disadvantages of each type of caisson, forces acting on the caissons and design of caissons.

Recommended Text Books / Reference Books:

1. J.E. Bowles – Foundation Design & Analysis, McGraw-Hill Edition 1995.
2. Ground improvement techniques by P. Purushottam Raj, Laxmi Publication.
3. F. S. Fang Handbook of Foundation Engg. CBS Publication, 1985.

PROJECT-II

Subject Code: BCIES1-822	L	T	P	C	Duration: 90 hrs.
	0	0	6	3	

Course Objectives:

1. To make student synthesis and use knowledge of various disciplines gained during entire study in a civil project of his choice.
2. Demonstrate the personal abilities and skills required to produce and present an extended piece of work.
3. Engage in personal inquiry, action and reflection on specific topics and issues.
4. Focus on, and demonstrate an understanding of, the areas of interaction.
5. Reflect on learning and share knowledge, views and opinions.

Course Outcomes:

1. Identify, describe & analyze the steps followed to achieve the chosen area(s) of interaction or stated goal.
2. Analyze & choose techniques relevant to the project's goal.
3. Respond thoughtfully to ideas and inspiration by using modern tools & techniques.
4. A fully worked-out design proposal-including consideration of site planning, structure, services, and any other aspect/specific to the project.
5. Assess the achieved results in terms of the initial goal and the focus on the chosen area(s) of interaction with future meets.

PROJECT WORK:

Students are required to work on practical projects in the field of Civil Engineering (Project work, seminar and internship in industry or at appropriate work place) (May be continued from VII Semester, Project work, seminar and internship in industry or at appropriate work place). The students have to work for 6 hrs per week with his / her supervisor(s).

ADVANCED TESTING LAB

Subject Code: BCIES1-823 | **L T P C** | **Duration: 30 hrs.**

0 0 2 1

Course Objectives:

The course should enable the students to:

1. Gain experience with and understanding of the types, advantages and applications of various non-destructive testing (NDT) methods.
2. Equip the student with the ability of advance testing procedures.
3. Analyse recent techniques used by industry to evaluate the properties of a material, component, structure or system for characteristic differences or defects.
4. Assessment of existing structure for rehabilitation planning.
5. Monitoring of changes with passage of time.

Course Outcomes:

Upon successful completion of this course, student will be able to:

1. Knowledge of different NDTs for concrete & highway works.
2. Improve quality of work during construction by identify & analyze the problems.
3. Improve product reliability, strength, etc. by conducting investigations.
4. Predict accident prevention analysis for safety and to reduce costs.
5. Solutions on repair criteria using modern techniques & tools for long term sustainability.

Laboratory Experiments:

1. Rebound Hammer Test
2. Ultrasonic Pulse Velocity Test
3. Reinforced Bar Locator Test
4. Cut and Pull Out (CAPO) Test
5. Fifth Wheel Bump Integrator Test
6. Benkelman Beam Deflection Test
7. Vehicular Speed Radar Test
8. Bitumen Extraction Test
9. Standard Penetration Test (SPT)

Recommended Books / Manuals:

1. M.L. Gambhir, ‘Building and Construction Materials: Testing and Quality Control’, TMH.
2. Concrete Lab Manual by NITTTR Chandigarh.
3. Concrete Technology, Theory and Practice by M.S. Shetty, S. Chand & Company.
4. Khanna S.K. and Justo, C.E.G. "Highway Material & Pavement Testing", Nem Chand.

ESSENCE OF INDIAN KNOWLEDGE TRADITION					
Subject Code: BMNCC0-006	**L**	**T**	**P**	**C**	**Duration: 30 Hrs.**
	2	0	0	0	

COURSE OBJECTIVE:

The course is introduced

1. To get a knowledge in Indian Philosophical Foundations.
2. To Know Indian Languages and Literature and the fine arts in India & Their Philosophy.
3. To explore the Science and Scientists of Medieval and Modern India

COURSE OUTCOMES:

After successful completion of the course the students will be able to

1. Understand philosophy of Indian culture.
2. Distinguish the Indian languages and literature among difference traditions.
3. Learn the philosophy of ancient, medieval and modern India.
4. Acquire the information about the fine arts in India.
5. Know the contribution of scientists of different eras.
6. The essence of Yogic Science for Inclusiveness of society.

COURSE CONTENTS:

UNIT – I

Introduction to Indian Philosophy: Basics of Indian Philosophy, culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian culture, Ancient Indian, Medieval India, Modern India.

Indian Philosophy & Literature: Vedas Upanishads, schools of Vedanta, and other religion Philosophical Literature. Philosophical Ideas the role of Sanskrit, significance of scriptures to current society, Indian Philosophies, literature of south India.

UNIT – II

Religion and Philosophy: Religion and Philosophy in ancient India, Religion and Philosophy in Medieval India, Religious Reform Movements in Modern India (selected movements only)

UNIT – III

Indian Fine Arts & Its Philosophy(Art, Technology & Engineering): Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in Indian, development of science in ancient, medieval and modern Indian.

UNIT – IV

Education System in India: Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Scientists of Medieval India, Scientists of Modern India. The role Gurukulas in Education System, Value based Education.

RECOMMENDED BOOKS:

1. Kapil Kapoor, "Text and Interpretation: The India Tradition'', ISBN: 81246033375, 2005
2. "Science in Samskrit", Samskrita Bharti Publisher, ISBN-13:978-8187276333,2007
3. NCERT, "Position paper on Arts, Music, Dance and Theatre'', ISBN 81-7450-494-X, 2006
4. S. Narain, "Examination in Ancient India", Arya Book Depot, 1993
5. Satya Prakash, "Founders of Sciences in Ancient India", Vijay Kumar Publisher, 1989
6. M.Hiriyanna, "Essentials of Indian Philosophy", Motilal Banarsidass Publishers, ISBN-13: 978-8120810990,2014
7. Chatterjee. S & Dutta "An Introduction to Indian Philosophy".