AY 2024-25, SEM-II

COURSE STRUCTURE
AND
DETAILED SYLLABUS

CIVIL ENGINEERING

(I–IV Years Syllabus)

RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

Basar, Nirmal, Telangana – 504107

SEMESTER WISE COURSE STRUCTURE

FIRST YEAR (E1) – SEMESTER – II

Course Code	Course Title	Course Category	L-T-P	Credits
MA1201	Differential Equations and Vector Calculus	*BSC*	3-1-0	*4*
CE1201	Engineering Mechanics	ESC	4-0-0	4
CE1202	Engineering Geology	PCC	3-1-0	4
CS1202	Programming For Problem Solving	ESC	3-0-0	3
ME1802	Engineering Workshop	ESC	0-1-2	2
CY1201	Engineering Chemistry	*BSC*	*3-0-0*	*3*
CS1802	Programming For Problem Solving Lab	ESC	0-0-3	1.5
CY1801	Engineering Chemistry Lab	*BSC*	*0-0-3*	*1.5*

SECOND YEAR (E2) – SEMESTER – II

Course Code	Course Title	Course Category	L-T-P	Credits
CE2201	Hydraulic Engineering	PCC	4-0-0	4
CE2202	Surveying	PCC	3-0-0	3
CE2203	Structural Analysis-I	PCC	3-0-0	3
CE2204	Design of Concrete Structures	PCC	3-0-0	3
CE2205	Water Resources Engineering - I	PCC	3-0-0	3
BM2205	Constitution of India	MC	2-0-0	0
CE2801	Hydraulic Engineering Lab	PCC	0-0-2	1

CE2802	Computer Aided Drafting of Buildings Lab	PCC	0-0-3	1.5
HS2202	Effective Technical Communication - I	HSMC	0-0-2	1
CE2803	Surveying Lab	PCC	0-0-2	1
CE2002	Technical Seminar-II	SIP	0-0-2	0

THIRD YEAR (E3) – SEMESTER – II

Course Code	Course Title	Course Category	L-T-P	Credits
CE3201	Construction Planning and Management	PCC	3-0-0	3
CE3202	Environmental Engineering	PCC	3-0-0	3
CE3211	Professional Elective-I(Foundation Engineering)	PEC	3-0-0	3
CE3221	Professional Elective-II(Railway Airport Engineering)	PEC	3-0-0	3
HS3201	Essence of Indian tradition and knowledge	MC	2-0-0	0
BM3201	Managerial Economices and Financial analysis	HSMC	3-0-0	3
HS3206	Effective Technical Communication -II	HSMC	*0-0-2*	*1*
CE3801	Computational Analysis Lab	PCC	0-0-2	1
CE3802	Environmental Engineering Lab	PCC	0-0-2	1
CE3901	Theme based Project	SIP	0-0-2	1
CE3002	Technical Seminar-IV	SIP	0-0-2	0

FOURTH-YEAR (E4) – SEMESTER – II

Course Code	Course Title	Course Category	L-T-P	Credits
CE4252	Professional Elective-V(Environmental impact assessment)	PEC	3-0-0	3

	Open Elective-III	OEC	3-0-0	3
BM4414	Intellectual Property Rights			
BS4401	Sustainable Technologies			
	Open Elective-IV	OEC	3-0-0	3
BM4416	Entrepreneurship & New Ventures			
CE4902	Project –II	PROJ	0-0-6	6
CE4000	Comprehensive Viva	SIP		1

FIRST YEAR (E1) – SEMESTER – II

Category: **Basic Science Course** Subject Code**: MA1201**

Differential Equations and Vector Calculus

Internals: 40 Marks **L - T - P - C**

Externals: 60 Marks **3 - 1 - 0 - 4**

Objectives:

- Methods of solving the differential equations of first and higher order.
- To study the methods of solving improper integrals and the concepts of multiple integrals
- The basic properties of vector valued functions and their applications to line, surface and volume integrals
- To study numerical methods to analyze an experimental data.

UNIT-I

Ordinary Differential Equations of first order: Exact first order differential equation, finding integrating factors, linear differential equations, Bernoulli's, Riccati, Clairaut's differential equations, finding orthogonal trajectory of family of curves, Newton's Law of Cooling, Law of Natural growth or decay.

UNIT-II

Ordinary Differential Equations of higher order: Linear dependence and independence of functions, Wronskian of n- functions to determine Linear Independence and dependence of functions, Solutions of Second and higher order differential equations (homogeneous & non-homogeneous) with constant coefficients, Method of variation of parameters, Euler-Cauchy equation.

UNIT-III

Integral Calculus: Convergence of improper integrals, tests of convergence, Beta and Gamma functions - elementary properties, differentiation under integral sign, differentiation of integrals with variable limits - Leibnitz rule. Rectification, double and triple integrals, computations of surface and volumes, change of variables in double integrals - Jacobians of transformations, integrals dependent on parameters – applications.

UNIT-IV

Vector Differentiation: Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.

UNIT-V

Vector Integration: Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications. Numerical Methods: Introduction and motivation about numerical methods, True value, approximate value, error, error percentage, algebraic equations, transcendental equations, Newton-Raphson method, Bisection method.

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

- Solve first order linear differential equations and special nonlinear first order equations like Bernoulli, Riccati & Clairaut's equations
- Compute double integrals over rectangles and type I and II" regions in the plane
- Explain the concept of a vector field and make sketches of simple vector fields in the plane.

- Explain concept of a conservative vector field, state and apply theorems that give necessary and sufficient conditions for when a vector field is conservative, and describe applications to physics.
- Recognize the statements of Stokes' Theorem and the Divergence Theorem and understand how they are generalizations of the Fundamental Theorem of Calculus.
- Solve the problems in diverse fields in engineering science using numerical methods.

Suggested Reading:

1. Advanced Engineering Mathematics (3rd Edition) by R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, New Delhi
2. 1. Advanced Engineering Mathematics (8th Edition) by Erwin Kreyszig, Wiley-India.
3. Dr. M.D. Raisinghania, Ordinary and Partial differential equations S.CHAND,17th edition
4.

Category: Engineering Science Course **Subject Code: CE1201**

ENGINEERING MECHANICS

Internals: 40 Marks **L – T – P – C**
Externals: 60 Marks **4 – 0 – 0 – 4**

Course Objectives:

- To understand force, moment equilibrium and free body diagrams of variousstructural systems.
- Apply fundamental concepts of statics, kinematics and kinetics of particle to analyze simple,practical problems.

- To know basic concepts of loads, their behavior, analysis of bodies.
- To determine the work energy principles and impulsive momentum theory.

UNIT - I

Introduction to Engineering Mechanics - Force Systems: Basic concepts, Particle equilibrium in 2-D & 3-D; Rigid Body equilibrium; System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems; Static Indeterminacy.

UNIT - II

Friction: Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, ladder friction Centroid and Centre of Gravity -Centroid of Lines, Areas and Volumes from first principle, centroid of composite sections; Centre of Gravity.

UNIT - III

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections; Product of Inertia, Parallel Axis Theorem, Perpendicular Axis Theorem. Mass Moment of Inertia: Moment of Inertia of Masses - Transfer Formula for Mass Moments of Inertia – Mass moment of inertia of composite bodies.

UNIT - IV

Kinematics of Particles: Kinematics of particles – Rectilinear motion – Curvilinear motion – Projectiles. Kinetics of Particles: Kinetics of particles – Newton's Second Law – Differential equations of rectilinear and curvilinear motion – Dynamic equilibrium – Inertia force – D. Alembert's Principle applied for rectilinear and curvilinear motion.

UNIT - V

Work - Energy Principle: Equation of translation, principle of conservation of energy, work - energy principle applied to particle motion and connected systems, fixed axis rotation. Impulse – Momentum Principle: Introduction, linear impulse momentum, principle of conservation of linear momentum, elastic impact and types of impact, loss of kinetic energy, co efficient of restitution.

TEXT BOOKS:

1. Shames and Rao (2006), Engineering Mechanics, Pearson Education

2. Reddy Vijay Kumar K. and J. Suresh Kumar (2010)

Engineering Mechanics – Statics & Dynamics REFERENCE BOOKS:

1. Timoshenko S.P and Young D.H., "Engineering Mechanics", McGraw Hill International Edition, 1983.

2. Andrew Pytel, Jaan Kiusalaas, "Engineering Mechanics", Cengage Learning, 2014.

3. Beer F.P& Johnston E.R Jr. Vector, "Mechanics for Engineers", TMH, 2004.

4. Hibbeler R. C & Ashok Gupta, "Engineering Mechanics", Pearson Education, 2010.

5. Tayal A.K., "Engineering Mechanics – Statics & Dynamics", Umesh Publications, 2011.

6. Basudeb Bhattacharyya, "Engineering Mechanics", Oxford University Press, 2008.

7. Meriam. J. L., "Engineering Mechanics", Volume-II Dynamics, John Wiley & Sons,

2008.

8. P.C Dumir et al. “Engineering Mechanics”, University press

Category: Professional Core Course **Subject Code:CE1202**

ENGINEERING GEOLOGY

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-1-0-4**

Objectives:

- To understand all spheres of the Earth.
- To understand the formation of different types of rocks and rock-cycle.
- To assess the geological structures like faults, folds, joints etc.
- To study the concept of weathering, process of formation of soil
- To understand different Geological hazards like Earthquakes, Volcanoes, and Landslides.
- To conceptualize the site investigation methods to know the ground conditions for dam sites, tunnels and other structures.

Unit-I: (12 hours)

Introduction: Geology in Civil Engineering, Branches of Geology,Solid Earth:Shape, size, interior of the solid earth. Spheres of Earth (Lithosphere, Hydrosphere, Cryosphere and Atmosphere) and their interactions; Earth Processes and their interactions: Plate Tectonics, Volcanism.

Mineralogy: Definition, silicate and non silicate minerals, crystalline structure, physical properties in mineral identification, rock forming minerals and their identification.

Unit-II (12 hours)

Petrology: Formation and classification of rocks, Igneous rocks: mineral composition, textures, reasons of textural variation, classification of igneous rocks, Sedimentary rocks: rock weathering, decomposition and disintegration, textures of sedimentary rocks and classification. Metamorphic rocks: agents and types of metamorphism, metamorphic textures and structures their types, physical properties in rock identification, rock cycle. Engineering properties of rocks: Drilling, Core recovery, tests on rock samples - compression, tensile, shear and slake durability tests.

Structural Geology: Outcrop, Strike and dip, folds and types, faults and their types and classification, Geomorphology and their features of river water, ocean water.

UNIT-III (8 hours)

Geology of soils: Soil, Formation, Engineering and Genetic Classification of soils, types of Indian soils, description and engineering use of soils, soil development, clay mineralogy.

Hydro Geology: Hydrologic cycle, rock and water interaction, Water table, aquifers, occurrence of ground water in various lithological formations, ground water movement, springs, ground water exploration – surface and sub surface investigations, ground water provinces of India.

UNIT-IV (10 hours)

Geology of Dams and Reservoirs: Types of Dams, Engineering and Geological investigations for a dam site, Analysis of dam failure; Ground improvement techniques, Reservoir – site selection, leakages, detection, Engineering Geology of major Dam sites of India.

UNIT-V (10 hours)

Tunnels: Purpose of tunneling, problems in tunneling, Lining, Engineering and Geological investigations of tunnels in rock, Stand up time of different rocks, pay line and over break, logging of tunnels and geology of some well-known Indian tunnels.

Geological Hazards: Disaster management - prevention, mitigation and resource planning, Geological aspects of Earthquakes, tsunamis and Landslides

Outcomes:

- Global vision of spheres of Earth and their interactions.
- Understood the formation of different rocks and rock cycle in detail.
- Can identify the minerals and rocks based on their physical properties.
- Can assess and analyze the geological features like folds, faults etc.
- Understood the concept of Weathering and formation of soils.
- Knows the reasons for several geological disasters like Earthquakes, Landslides, Subsidence, Plate Tectonics and Volcanism.
- Understood the considerations for site selection for engineering projects.
- Knows the site investigation methods and the ground conditions to be considered for dam sites, tunnels and other structures

- Will gain knowledge about the groundwater availability zones and groundwater management.

References:

1. K.V.G.K. Gokhale, "Principles of Engineering Geology", BS Publications, Hyderabad, 2005.

2. David George Price, "Engineering Geology: Principles and Practice", Springer, 2009.

3. Chennakesavulu, N., "Text book of Engineering Geology", Mac Millan Ltd., New Delhi, 2009.

4. Parbin Singh., "Engineering and General Geology", Katson Publishers, 2009

Category: **Basic Science Course** Subject Code**: CY1201**

ENGINEERING CHEMISTRY

Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become aperfect engineer.
- To impart the basic knowledge of kinetic modifications which make the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
- To impart then knowledge of engineering materials especially focusing more into nanomaterials.

UNIT 1: (7 hours)

Spectroscopy: Introduction to spectroscopy, electromagnetic radiations, different types of spectroscopy, principle of spectroscopy, spectrophotometer Microwave spectroscopy: principle, microwave spectra of diatomic molecules, selection rules for microwave spectra, applications of microwave spectroscopy: determination of bond length, dipolemoment measurement,

determination of isotopic mass of an element. Infrared spectroscopy: introduction and principles of IR, types of vibrations: bending and stretching, Hooke's law for stretching vibrations, characteristic frequencies of common functional groups, IR instrumentation, interpretation and applications of IR spectrum with examples.

Ultra-violet spectroscopy: Introduction and principle of UV spectroscopy, color interpretation with VBT and MOT, types of electronic transitions, selection rules, chromophores and auxochromes with examples, conjugation effect, absorption and intensity shifts, applications of UV spectroscopy.

UNIT II: (14 hours)

Chemical kinetics: Complex reactions: definition and classification of complex reactions, definition of reversible reactions with examples, rate law derivation for reversible reactions.

Consecutive reactions: definition, rate law derivation and examples of consecutive reactions.

Parallel reactions: definition, rate law derivation and examples of parallel reactions.

Steady-state approximation: introduction, kinetic rate law derivation by applying steady state approximation in case of the oxidation of NO and pyrolysis of methane.

Chain reactions: introduction, types and mechanism of chain reactions, stationary and non-stationary chain reactions with examples, deriving the kinetic rate equation using a general chain reaction.

Photochemical reactions: introduction, Stark-Einstein law of photochemical equivalence, photophysical processes: IC, ISC, fluorescence and phosphorescence with examples, kinetic rate law derivation incase of photochemical decomposition of HI and photochemical combination of H_2 and Br_2.

Electrochemistry: Types of electrodes: introduction, metal-metal ion electrodes, metal-insoluble salt-anion electrodes, calomel electrode, gas-ion electrodes, hydrogen and chlorine electrodes, oxidation-reduction electrodes, amalgam electrodes.

Types of cells: classification into chemical and concentration cells, chemical cells with transference and without transference, classification of concentration cells into electrolyte and electrode concentration cells, electrolyte concentration cells with and without transference, amalgam and gas concentration cells, examples for these cells.

EMF and applications of EMF: determination of pH, determination of the valency of the ions, potentiometric titrations. pH: definition of pH and determination of pH by various methods, acid-base titrations.

Thermodynamic data: enthalpy and entropy of cell reactions, Gibbs-Helmholtz equation and applications.

UNIT IV: (14 classes)

Corrosion and its prevention: Mechanism of Dry and wet corrosion (rusting of iron),

Types of corrosion, galvanic corrosion, stress corrosion, pitting and crevice corrosion.

Factors affecting corrosion,

preventive measures(proper design, Cathodic and Anodic protection, Electroplating, tinning, galvanizing.

Water Chemistry: Water chemistry, Introduction to Hardness and alkalinity of water, degree of hardness, units of hardness, numerical problems, associated with it. Alkalinity: Causes, Determination and calculation of alkalinity, numerical problems associated. Disinfection, boiler feed water, priming and foaming and its treatment and related.

UNIT V:(9 classes)

Engineering Materials: Polymers-Types of Polymerization (Chain & Step growth) Plastics: Thermoplastic & Thermo setting resins; Preparation, properties, engineering applications of PVC, Teflon and Bakelite.

Lubricants: Classification with examples-Characteristicsof a good lubricant & mechanism of lubrication (thick film, thin film and extreme pressure) –properties of lubricants: viscosity , Cloud point, flash and fire points.

Refractories: Classification, characteristics of a good refractory and applications.

Cement: Classification, composition, preparation, applications

Nanomaterials: Introduction, preparation by sol-gel & chemical vapour deposition methods. Applications of nanomaterials.

Suggested Reading:

1. Engineering Chemistry, Jain & Jain
2. Engineering Chemistry, Shashi Chawla
3. Chemistry for Engineers, B. K. Ambasta
4. Engineering Chemistry, H. C. Srivastava

Category: **Engineering Science Course** Subject Code**: CS1202**

PROGRAMMING FOR PROBLEM SOLVING

Internals: 40 Marks **L - T - P - C**

Externals: 60 Marks **3 - 0 - 0 - 3**

Objectives: The course will enable the students

• To formulate simple algorithms for arithmetic and logical problems
• To translate the algorithms to programs (in C language)
• To test and execute the programs and correct syntax and logical errors
• To implement conditional branching, iteration and recursion
• To decompose a problem into functions and synthesize a complete program using divide and conquer approach

UNIT-I: Introduction to Programming & Arithmetic expressions and precedence, 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. Arithmetic expressions and precedence.

UNIT-II: Conditional Branching, Loops & Arrays, Writing and evaluation of conditionals and consequent branching, Iteration and loops, Arrays (1-D, 2-D), Character arrays and Strings.

UNIT-III: Function & Basic Algorithms, Functions (including using built in libraries), Parameter passing in functions, call by value,Passing arrays to functions: idea of call by reference, 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-IV: Recursion & Structure, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort, Structures, Defining structures and Array of Structures

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

Outcomes:

Upon completion of this course, the students should be able to

• To use arrays, pointers and structures to formulate algorithms and programs

• To apply programming to solve matrix addition and multiplication problems and searching and sorting problems

• To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Category: **Engineering Science Course** Subject Code**: ME1802**

Engineering Workshop

Internals: 40 Marks **L - T - P - C**

Externals: 60 Marks **0 - 1 - 2 - 2**

Course Outcomes: Upon completion of this laboratory course

- Students will be able to fabricate components with their own hands.

List of Experiments:

1. **Fitting –** To produce a Step Fit on the given work piece.

   - To produce a V Fit on the given work piece.

2. **Carpentry** – To produce a Half lap joint on the given wooden work part.

   - To produce a Dove tail joint on the given wooden work part.

3. **House Wiring** – To perform and understand the Series and Parallel wiring connections.

   - To perform and understand Staircase and Go down wiring connections.

4**. Tin Smithy** – To produce a Tray from the given sheet metal.

   - To produce a Cylinder from the given sheet metal.

5. **Welding** – To practice formation of a Bead on the given work piece.

   - To perform a Butt and a Lap joint on the given work piece.

6**. Foundry** – To prepare a Mold cavity using a Single piece pattern.

- To prepare a Mold cavity using a Split piece pattern.

7. **Machining** – To perform a Plain turning operation, Facing operation on the given workpiece.

- To perform a Step and a Taper turning operation on the given workpiece.

8. **Plastic molding** – Demonstration

9. **WIRE EDM, CNC, 3D Printer** – Demonstration

Category: **Engineering Science Course** Subject Code**: CS1802**

PROGRAMMING FOR PROBLEM SOLVING LAB

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-4-2**

List of experiments:

1.Problem solving using computers (Familiarization with programming environment)

2. Variable types and type conversions (Simple computational problems usingarithmetic expressions)

3. Branching and logical expressions(Problems involving if-then-else structures)

4. Loops, while and for loops (Iterative problems e.g., sum of series)

5. 1D Arrays: searching, sorting (1D Array manipulation)

6.2D arrays and Strings, memory structure (Matrix problems, String operations)
7. Functions, call by value (Simple functions)
8. Recursion, structure of recursive calls (Recursive functions)
9. Pointers, structures and dynamic memory allocation(Pointers and structures)
10. File handling (File operations)

Outcomes:

Upon completion of this lab, the students should be able

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self referential structures.

Textbooks:

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

Reference Books:

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

Category: **Basic Science Course** Subject Code**: CY1801**

ENGINEERING CHEMISTRY LAB

Internals: 40 Marks **L - T - P - C**

Externals: 60 Marks **0 - 0 - 3 – 1.5**

List of Experiments:

- Thin layer chromatography
- Ion exchange column for removal of hardness of water
- Determination of chloride content of water
- Preparation of Thiokol rubber
- pH Metry
- Synthesis of a drug-Aspirin
- Saponification/acid value of an oil
- Estimation of hardness of given water sample
- Estimation of alkalinity of given sample

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

- Estimate pH, chloride content and alkalinity of given water samples.
- TLC and Ion exchange columns for removal of hardness of water
- Synthesize a small drug molecule, soap and polymer

SECOND YEAR (E2) – SEMESTER – II

Category: **Professional Core Course** Subject Code**: CE2201**

HYDRAULICS ENGINEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-1-0-4**

Objectives:

- To study the concept of the flow through channels and economical design of channels.

- To know the basic concept of gradually varied flow, hydraulic jump and their applications
- To understand the boundary layer theory, concept of drag, lift of streamlined bodies
- To know different theories on dimensional analysis and model concept
- To understand the basic principles of hydraulic turbines, pumps and their hydraulic design

UNIT –I: (15hours)

Steady uniform flow through open channels: Descriptions and definitions, difference between pipe flow and channel flow, Classification of open channels and flows, velocity and pressure distributions in a channel cross section, energy and momentum correction coefficients, friction to flow in open channels, Uniform flow – Characteristics of uniform flow, Chezy's, Manning's and Bazin formulae for uniform flow – Factors affecting Manning's Roughness Coefficient"n". Most efficient channel section, Computation of Uniform flow, Normal depth.Critical Flow: Specific energy, specific energy curve, critical flow, discharge curve specific force specific depth, and critical depth. Channel transitions.

UNI T-II: (14 hours)

Gradually varied flow: Dynamic equation of gradually varied flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile, Computation of flow profile by direct step method.

Hydraulic jump: Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular channel, length and height of jump, location of jump, types, applications and location of jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges.

UNI T-III: (15 hours)

Dimensional analysis and model studies: Dimensional analysis as a tool in experimental hydraulics, Buckingham's theorem, applications, geometric, kinematic and dynamic Similarity laws, significance of Reynolds, Froude and Mach similarity laws, different types of models and their scale rations.

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular.

UNI T-IV: (12 hours)

Hydraulic turbines: Elements of a typical Hydropower installation, Heads and efficiencies, Classification of turbines, Pelton wheel, Francis turbine, Kaplan turbine, working, working proportions, velocity diagram, work done and efficiency, hydraulic design. Draft tube Classification, functions and efficiency, characteristic curves.

UNIT- V: (10 hours)

Centrifugal pumps and Reciprocating pumps: Pump installation details, classification, work done, Manometric head, minimum starting speed, losses and efficiencies, specific speed. Multistage pumps, pumps in parallel, performance of pumps, characteristic curves, NPSH, Cavitation.

Outcomes:

At the end of the course the student will able to

- Applytheirknowledgeoffluidmechanicsin addressingproblemsinopenchannels and hydraulic machinery.
- Understand and solveproblemsinuniform, graduallyandrapidlyvariedflows in open channel in steady state conditions.
- Apply dimensional analysis and to differentiate the model, prototype and similitude conditions for practical problems.
- Get the knowledge on different hydraulic machinery devices and its principles that will be utilized in hydropower development and for other practical usages

Text Books

1. Fluid Mechanics by Modi and Seth Standard Book House.
2. Fluid Mechanics and Hydraulic machines by Manish Kumar Goyal, PHI learning Private Limited,2015
3. Fluid mechanics & Hydraulic Machines, Domkundwar&DomkundwarDhanpat Rai

4. Fluid Mechanics by R.C. Hibbeler, Pearson India Education Services Pvt. Ltd
5. Fluid Mechanic & Fluid Power Engineering by D.S.Kumar (Kataria& Sons Publications Pvt. Ltd.).
6. Open channel flow by V.T. Chow (McGraw Hill Book Company).
7. Introduction to Fluid Mechanics and Fluid Machines by SK Som, Gautam Biswas, Suman Chakraborthy, McGraw Hill Education (India) Private Limited
8. Hydraulic Machines by Banga& Sharma (Khanna Publishers).

SURVEYING

Subject Code: CE2202

Externals: 60Marks

Internals: 40Marks **L-T-P-C**

3-0-0-3

Objectives:

- To study the basic concepts and principles of chain survey
- To know the importance of the compass survey and its practical applications
- To understand the basic methods and applications of plane table survey
- To know the field applications and concepts of leveling survey
    - To study the different methods of calculation of area, contouring and measurement ofvolumes
- To know the importance of theodolite total station and their practical applications.
- To study the basic concept of trigonometrical leveling, and field applications.
- To analyze the horizontal and vertical curves for survey work related to road and railways.
- To know the principles of aerial photogrammetry and its applications.
- To study the various applications of GPS, GIS and remote sensing for field work.

UNIT I: (7 hours)

Introduction to Surveying: Principles, classification, Conventional symbols and signals,accessories and phases of surveying.

Linear measurements: Survey stations, Survey lines- ranging, chains and tapes – Errors,corrections,

Compass surveying: Bearing of survey lines, included angles, Dip, Declination & LocalAttraction.

UNIT II: (10 hours)

Levelling: Principles of levelling- booking and reducing levels; differential, reciprocal levelling, profile leveling and cross sectioning. Digital and Auto Level, Errors in leveling, Adjustments; Concept of curvature of earth and refraction

Contouring: Characteristics, methods, uses;

Areas: Calculation of areas consisting of Regular & Irregular Boundaries

Volumes: Determination of volume of earth work in cutting and embankments for levelsections, Volume of borrow pits, Capacity of Reservoir.

UNIT II: (8 hours)

Triangulation &Trilateration-Theodolite survey: Types of Instruments, Measurement of horizontal and vertical angle; Horizontal and vertical control - methods -triangulation network-Signals. Baseline - choices - instruments and accessories - extension of base lines - corrections -Satellite station - reduction to centre - Intervisibility of height and distances - Trigonometric leveling- Axis single corrections.

UNIT IV: (14 hours)

Curves & Modern Field Survey Systems: Elements of simple and compound curves –Method of setting out–Elements of Reverse curve - Transition curve –Vertical curves Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station –Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; GlobalPositioning Systems-Segments, GPS measurements, errors and

biases, Surveying with GPS,Co-ordinate transformation, accuracy considerations.

UNIT V: (7 hours)

Photogrammetric survey & Remote Sensing: Introduction to Photogrammetry-BasicConcepts – Aerial photograph – Concept of Scale – Flying Height – Mosaics - mapping; Remote sensing- Definitions – Advantages - Electromagnetic Spectrum, Components ofRemote sensing, platforms and sensors; visual image interpretation; Introduction, Basics ofGIS.

Outcomes:

Upon completion of this course, the students should be able to

- Apply the knowledge, techniques, skills, and applicable tools of the discipline toengineering and surveying activities
- Translate the knowledge gained for the implementation of Civil infrastructurefacilities
- Relate the knowledge on Surveying to the new frontiers of science like HydrographicSurveying, Electronic Distance Measurement.

Text/Reference Books:

1. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS andRemote Sensing, Pearson India, 2006.
2. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
4. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited,2002.
5. Anji Reddy, M., Remote sensing and Geographical information system, B.S.Publications, 2001.
6. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
7. "Surveying (Vol – 1, 2 & 3), by B. C Punmia, Ashok Kumar Jain and Arun Kumar Jain -Laxmi Publications (P) ltd., New Delhi.
8. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi,2004.

9. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi

Category: **Professional Core Course** Subject Code**: CE2203**

STRUCTURAL ANALYSIS-I

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To solve the statically indeterminate structures by applying the principles of equilibrium and compatibility in deformation pertaining to the structure.
- Toanalyze the statically determinate arches and find the deflections in beams, frames using energy principles.
- ToDraw the Influence line diagrams for reaction, SF and BM
- To evaluate the displacements and redundant forces using energy methods.

UNIT - I: (12 hours)

Slope deflection method: Application of the method to continuous beams with and without sinking of supports, single bay-bay portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) and /or uniformly distributed load on whole span, shear force and bending moment diagrams.

UNIT - II: (8 hours)

Moment distribution method: Application of the method to continuous beams with and without sinking of supports, single bay-bay portal frames (Degree of freedom not exceeding three), loading on each span may be point load(s) and /or uniformly distributed load on whole span, shear force and bending moment diagrams.

UNIT – III: (8 hours)

Kani's method: Analysis of continuous beams –including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

Plastic Analysis: Introduction –Idealized stress –Strain diagram –shape factors for various sections –Moment curvature relationship –ultimate moment –Plastic hinge –lower and upper bound theorems –ultimate strength of fixed and continuous beams.

UNIT - IV: (12 hours)

Strain energy method: Deflections of statically determinate trusses and frames using unit load method.

Redundant trusses and frames: Analysis of plane trusses with one degree of redundancy(internal/external) and plane frames with one degree of redundancy, Lack of fit and temperature effect.

UNIT – V: (10 hours)

Three hinged Arches: Elastic theory of arches- Eddy's theorem- Determination of horizontal thrust, bending moment, normal thrust and radial shear for static loading-Effect of temperature

Two hinged Arches: Parabolic and segmental, determination of horizontal thrust, bending moment, normal thrust, and radial shear for static loading-Rib shortening-Effect of temperature.

Outcomes:

Upon completion of this course, the students should be able to

- Understand the advantage of statically indeterminate structure over the statically determinate structure.
- Sketch the SF and BM diagrams for determinate and indeterminate beams.
- Calculate the deflections in beams and pin jointed trusses.
- Evaluate the maximum SF and BM due to various types of moving loads.

Suggested Reading:

1. Structural Analysis by RcHibbeler, 6th Edition, Pearson Publications
2. Basic Structural Analysis - C.S. Reddy, Tata McGraw Hill.
3. Intermediate Structural Analysis - C. K. Wang, McGraw-Hill
4. Theory of Structures - Volumes 1 and 2, S P Gupta and G S Pandit, Tata McGraw Hill.
5. Structural Analysis - L.S.Negi& R.S. Jangid, Tata McGraw Hill.
6. Classical Structural Analysis - Anthony E. Armenikas, McGraw Hill.
7. S.B. Junakar and Shah, Mechanics of structures, Charotar Pub. House, 2001.

8. D.S. PrakashRao, Structural analysis – A Unified Approach, University Press, 1996.
9. B.C. Punmia and A.K. Jain, Theory of structures, Laxmi Publications, New Delhi, 2004.

Category: **Professional Core Course** Subject Code**: CE2204**

DESIGN OF CONCRETE STRUCTURES

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To know the IS codal provisions as applicable for the designs.
- To understand the design philosophies and basics of RCC structural designs.
- To understand the design principles in flexure, shear and torsion.
- To learn the design of various components of RCC structures.

UNIT – I: (14hours)

Design Philosophies: Development of design Philosophies-Working stress method, Ultimate load method, and Limit state method – Concepts, Characteristics loads and strengths, Partial safety factors, stress-strain relationship for concrete and steel, stress block parameters.

Working Stress Method: Design of RCC beams – Balanced, under – reinforced and over Reinforced sections – Rectangular, T and L sections, Design of singly and doubly reinforced Rectangular, T and L sections.

UNIT – II: (14hours)

Limit state of collapse in flexure: Assumptions, Design for flexure – Singly and doubly Reinforced rectangular, T and L sections.

Limit state of collapse in shear and torsion: Design for shear and torsion. Limit states of Serviceability: Check for deflection and cracking.

UNIT – III: (14hours)

Design of slabs (Limit state method): Design of one way and two way slabs – Simply supported and continuous slabs subjected to uniformly distributed loads, Detailing of reinforcement, Check for serviceability of slabs.

Design of stair cases (Limit state method): Types of stairs, Effective span, Distribution of Loading on stairs, Design and detailing of dog – legged stair cases.

UNIT – IV: (10hours)

Design of columns (Limit state method): Assumptions, Design of axially loaded circular Square and rectangular columns, Design of columns with Uni–axial and Bi–axial bending Interactions diagrams.

UNIT – V: (8hours)

Design of footings (Limit state method): Design of isolated footings of uniform depth and Sloped footing, Design of square, rectangular and circular footing as per IS code, Design of Combined rectangular slab footing, combined rectangular beam and slab footing for two columns.

Outcomes:

Upon completion of this course, the students should be able to

- Explain the general mechanical behavior of reinforced concrete
- Analyze and design reinforced concrete flexural members
- Design one way, two way slabs and columns
- Design footings and Summarize working stress method

Suggested Reading:

1. IS 456:2000/SP-16 Charts/IS-875:1987 part I-V
2. Punmia B.C., Jain A.K. And Jain A.K., RCC Designs, Laxmi Publications, 2006.

3. Krishna Raju N. And Pranesh R.N., Reinforced Concrete Design, New Age International Pvt, Ltd., 003.
4. Varghese P.C; Limit State Design of Reinforced Concreate, Prentice of India Pvt, Ltd., 2002.
5. Varghese P.C; Design of Reinforced Concrete, Foundations, PHI Learning Pvt. Ltd.,2009.
6.D.S. PrakashRao, Design Principles and Detailing of Concrete Structures, Tata McGraw Hill Publishing Co. Ltd., 1995.

CE2205

WATER RESOURCES ENGINEERING - I

Externals: 60Marks **L-T-P-C**

Internals: 40Marks

3-0-0-3

PreRequisites: Fluid Mechanics & HE

Objectives:

- To introduce the concepts of prediction, preservation, and vision about restoration of dwindling natural resources.
- To impart knowledge about the natural resources, their conservation, and efforts towards their sustainability.
- To understand the utility of Irrigation and crop requirements.

Proposed Syllabus:

Chapter 1: ***Introduction*** *(10hours):*

Hydrologic cycle, water-budget equation, history of hydrology, 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.

Chapter 2: ***Abstractions from precipitation*** *(7hours)*
Evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction,
Evapotranspiration, measurement, equations, potential evapotranspiration, actual evapotranspiration, interception, depression storage,
Infiltration, infiltration capacity, measurement of infiltration, modeling of infiltration capacity, classification of infiltration capacities, infiltration indices.

Chapter 3: ***Runoff & Floods*** *(10 hours)*
Runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve
Hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, Unit hydrograph and its derivation from isolated and complex storms, Concept of S-curve hydrograph, Synthetic Unit Hydrograph, IUH.

Floods:
Flood estimation by different methods, Risk and reliability - flood routing through reservoirs and channels, flood control measures.

Chapter 4: ***Ground water and well hydrology*** *(6 hours)*
Forms of subsurface water, saturated formation, aquifer properties, basic definitions; geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

Chapter 5: ***Water withdrawals and uses*** **(Irrigation Engineering)** *(10 hours)*
Irrigation-Necessity, Advantages and disadvantages, Quality of irrigation water;
Water requirement of crops-Crops and crop seasons in India, crop period, base period, Basic definitions; cropping pattern, duty and delta; Methods to Improve duty, Soil-water-plant relationships, root zone of soil water, Soil moisture stress, tension, consumptive use, irrigation requirement, frequency of irrigation, Various Irrigation Efficiencies;
Methods of applying water to the fields: surface, sub-surface, sprinkler and trickle / drip irrigation.

Text/Reference Books:

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.
3. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc-Graw Hill.
4. G L Asawa, Irrigation Engineering, Wiley Eastern
5. K. N. Duggal, J. P. Soni, Elements of Water Resources Engineering, New Age International Publishers.
6. J D Zimmerman, Irrigation, John Wiley & Sons
7. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology, Oxford.
8. VenteChow, Hand book of applied Hydrology,McGraw-Hill Book Company,New York,1964
9. H.M Raghunath, Hydrology-Principles,Analysis and Design,New Age International Publishers,1996.
10.Michael,A.M,'IrrigationTheory&Practice,Vikas Publishing House,New Delhi,1978.
11.Ray K.Linsley,Jr.,Max A. Kohler,JosephL.H.Paulhus,hydrology for Engineers,McGraw-Hill Book Company.

Outcomes:

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

- Understand the interaction among various processes in the hydrologic cycle
- Apply the application of fluid mechanics and use of computers in solving a host of problems in hydraulic engineering
- Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures
- Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions.

CONSTITUTION OF INDIA (COI)

Subject Code: BM2205 **L – T – P –C**

Externals: 60 marks **2 – 0 – 0– 0**

Internals: 40Marks

Course Out comes: At the end of the course the student will be able to

CO1: Understand the formation and principles of Indian Constitution.

CO2: Understand Fundamental Rights and its implications in life

CO3: Understand Fundamental Duties of Individual toward country and society

CO4: Understand Directive principles to govern the policy formation

CO5: Understand the Way of running the Government and basic Governance

UNIT-I

Introduction to Indian Constitution:

- Meaning of the term Constitution
- Historical background of Indian constitution
- Making of Indian constitution
- Constituent Assembly
- UNIT-II

Features of Indian Constitution

- Preamble of the Constitution , Importance, Scope, Relevance
- The Salient Features of Indian Constitution , Importance, Scope, Relevance

UNIT-III

Fundamental Rights:

- Fundamental Rights
- Importance and scope of fundamental rights
- Categorization of Fundamental Rights

UNIT-IV

Fundamental Duties & The Directive Principles of State Policy:

- Fundamental Duties
- Importance and scope of fundamental Duties
- The Directive Principles of State Policy - Importance, Scope, Relevance

UNIT-V

Union/Central Government: Union Government

- Union Legislature (Parliament)
- Lok Sabha and Rajya Sabha (with Powers and Functions)
- Electronics and Communication Engineering Page 27 Union Executive
- President of India (with Powers and Functions)
- Prime Minister of India (with Powers and Functions)

TextBooks:

1. 'Indian Polity' by Laxmikanth
2. 'Indian Administration' by Subhash Kashyap
3. 'Indian Constitution' by D.D. Basu
4. 'Indian Administration' by Avasti and Avast

Category: **Professional Core Course** Subject Code**: CE2801**

HYDRAULICS ENGINEERING LAB

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-2-1**

Objectives:

- To illustrate the students with the components and working principles of the Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- To analyze the laboratory measurements and to document the results in an appropriate format.

List of experiments:

1. Measurement of coefficient of discharge through notches (V notch and Rectangular notch).
2. To investigate the reaction forces produced by the change in momentum of a fluid flow.
3. To demonstrate ground water flow and the resulting hydraulic gradient between two different potentials.
4. To determine the Cone of Depression for a single/double well in an unconfined aquifer.
5. To obtain the characteristic curves for an Impulse turbine operating at a range of fluid flow rates.
6. To obtain the characteristic curves for Reaction turbine operating at a range of fluid flow rates.
7. To obtain the characteristic curves for Francis turbine operating at a range of fluid flow rates.
8. To determine Rainfall-runoff relationships (storm hydrographs), Generation of Overland Flow, sediment yield using Advanced Environmental Hydrology System.
9. Determination of efficiency of multistage Centrifugal pump.
10. Determination of Coefficient of Discharge through Sluice Gate.
11. Determination of Force on a Sluice Gate.
12. Determination of Critical Depth and Derivation of Specific Energy Equation for a Sluice Gate.
13. Determination of Energy loss due to Hydraulic Jump.

Outcomes:

Students who successfully complete this course will have demonstrated ability to:

- Discover the practical working of Hydraulic machines- different types of Turbines, Pumps, and other miscellaneous hydraulics machines.
- Compare the results of analytical models introduced in lecture to the actual behavior of real fluid flows and draw correct and sustainable conclusions.

COMPUTER AIDED DRAFTING OF BUILDINGS LABORATORY

Subject Code**: CE2802**

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-3-1.5**

Objectives:

- To apply the AutoCAD tools to create building plans, sections and elevations from a given line drawing and specifications.
- To use the Auto cad commands for drawing 2D & 3D building drawings required for different Civil engineering applications.
- To generate the structural drawings of structural elements.
- To plan and draw Civil Engineering Buildings as per aspect and orientation.

List of experiments:

Introduction to computer aided drafting and different coordinate system
Brick Bonds: English bond & Flemish bond –Odd & even courses for one, one and half, two, two and half brick walls.
Exercise on Modify tools & other tools (Layers, dimensions, texting etc.)
Drawing of plans of buildings using software
a) Single storied buildings b) multi storied buildings
Developing sections and elevations for given
a) Single storied buildings b) multi storied buildings
Detailing of singly reinforced rectangular beam section
Detailing of singly reinforced rectangular beam section
Detailing of simply supported one way and two way slab
Detailing of rectangular column and circular column with spiral stirrups
Detailing of isolated square and rectangular footing
Detailing of dog legged staircase
Detailing of Beam-column junction

Outcomes:

Upon completion of this course, the students should be able to

- Use different AutoCAD Commands to develop Plan, Section and elevation of Buildings.
- Draw and detail different Components of different types of doors and windows.
- Develop Working Drawings of Residential Buildings.
- Prepare structural drawings with details of Beam, Slab and Footing.

TEXT BOOKS

Civil Engineering Drawing-I by N. Sreenivasulu, S. Rama Rao –Radiant Publishing house, 2nd edition, 2013.

Civil Engineering Drawing II by N. Sreenivasulu – Radiant Publishing house, 2nd edition, 2013.

Computer Aided Design Laboratory by M. N. Sesha Praksh & Dr. G. S. Servesh – LaxmiPublications.

Engineering Graphics by P. J. Sha – S. Chand & Co.

REFERENCES

Engineering Graphics by P. J. Sha- S. Chand & Co, 2nd edition, 2013.

Civil Engineering Drawing-I by S. Mahaboob Basha –Falcon Publishers, 2nd edition, 2013.

Building drawing by M G Shah -Tata McGraw-Hill Education, 5th edition, 2012

Structural Engineering Drawing by S. Mahaboob Basha –Falcon Publishers, 2nd edition, 2013.

Category: **Humanities and Social Sciences including Management Courses**

Subject Code**:** **HS2202**

EFFECTIVE TECHNICAL COMMUNICATION –I

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-2-1**

Module 1: Information Design and Development- Different kinds of technical documents, Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Module 2: Technical Writing, Grammar and Editing- Technical writing process, forms of discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing, Localization.

Module 3: Self Development and Assessment- Self assessment, Awareness, Perception and Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem.

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

Text/Reference Books:

1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology)
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN: 07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH NewDelhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

THIRD YEAR (E3) – SEMESTER – II

Category: **Professional Core Course** Subject Code**: CE3201**

CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To know the Fundamentals of construction practices and procedure of construction
- To know about various methods and equipment, safety practices generally adopted in construction
- To understand the importance of contract management and different techniques
- To introduce the students about project management, techniques used, cost analysis with respect to civil engineering projects.

UNIT-I: (8 hours)

Introduction to constructiontechnology – Fundamentals- construction activities and schedules- construction records and documents- quality and safety- codes and regulations

Construction Equipment and Methods-factors effecting selection of construction equipment-technical and economic aspects-analysis of production outputs and costs-methods and equipment for earthmoving-lifting and erection-material transport –pile driving-dewatering-batching and mixing- transport and placement-finishing-formwork

UNIT-II: (6 hours)

Safety engineering – Principles on safety- personnel, fire and electrical safety-classification of construction accidents and causes- direct and indirect loss due to accidents- Local hazards and their elimination- safety in demolition of buildings- safety in storage and handling of materials and equipment

UNIT-III: (10 hours)

Project Management- Introduction to project management-Project planning-Scheduling and controlling-Objectives of planning-Stages in construction-Sequences of events in civil engineering projects-Construction schedule-Project management tools

UNIT-IV: (14 hours)

Project management and Techniques- Development of management techniques-bar charts-Gantt charts- CPM and PERT techniques-Problems on CPM and PERT – Network analysis-problems on Network analysis

UNIT-V: (12 hours)

Cost Analysis and Resources allocation- Introduction to cost analysis-cost reduction in construction management- cost time analysis- crashing the network-optimization –resource allocation –resource leveling and smoothing-introduction o project management software's-MS Project, Gantts charts etc.,

Outcomes:

At the end of the course students will be able to

- Understand the procedure to carry out the construction by selection of suitable method and equipment.
- Prepare the construction site with adopting suitable safety measures to avoid accidents
- Calculate the total cost, economy and time period needed for completion of project by contract management
- Evaluate the procedure of contract and tendering procedure in practice

Suggested Reading:

1. Construction Project Management -Kumar Neeraj Jha -Pearson Publication -2015
2. Puerifoy R.L. -Construction Planning Equipment & methods
3. Punmia and Khandelwal K.K. -Project Planning and Control -Laxmi Publ. Delhi.
4. Mahesh Varma -Construction Planning and Equipment -Metropolitan Co.
5. Choudhary S. -Project Management -Tata McGraw Hill Publishing Company Limited, New Delhi

Category: **Professional Core Course** Subject Code**: CE3202**

ENVIRONMENTAL ENGNEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To fill the gap between general introductory environmental science and the more advanced environmental engineering.
- To explain the different sequential unit operations of water and wastewater treatment processes.
- To provide necessary engineering principles for analyzing the environmental issues
- To motivate the present and future generations to take suitable care of sustainability of all existing resources

UNIT – I: (10 hours)

Water Supply and Natural Phenomenon: Objectives of protected water supplies; Rate of demand; Population forecasts; Surface and Groundwater sources of water; Water analysis; Self Purification of Streams.

UNIT – II: (12 hours)

Water treatment and Distribution: Classification, description and design of: Coagulation, Flocculation, sedimentation, filtration, disinfection and softening process; Methods of Layout of Distribution pipes; Design of Distribution by Hardy Cross method for simple networks.

UNIT – III: (10 hours)

Wastewater and Primary Treatment: Wastewater Characteristics; Standards of Disposal; Treatment Objective and, Strategies; Layouts of Primary, Secondary and Advanced Treatment Units; Design of Preliminary and Primary Treatment Operations: Screens, Grit Chambers, Skimming Tank, Primary and Secondary Sedimentation Tanks.

UNIT – IV: (10hours)

Biological Treatment: Classification and Design of: Activated Sludge Process; Oxygen and Nutrient Requirements; Principles of Trickling Filter Process, Oxidation Ponds, Lagoons.

UNIT V: (10 hours)

Sludge Treatment and Disposal: Sludge Thickening; Aerobic and Anaerobic Sludge Digestion Processes; Design of Digester Tank, Sludge Dewatering.

Outcomes:

Upon completion of this course, the students should be able to

- Assess characteristics of water and waste water and their impacts.
- Estimate the population of existing town and demand of water.
- Know the self purification of rivers thus standard of releasing the waste in to them.
- Estimate quantities of water and waste water and plan conveyance components.
- Design components of water and waste water treatment plants.

Suggested Reading:

1.Metcalf and Eddy, Wastewater Engineering - Collection, Treatment, Disposal and Reuse, McGraw Hill Pub. Co., 1995.

2.Nelson Leonard Nemerow, Industrial Waste Treatment, Butterworth-Heinemann, 2007.

3.Benefield L.D. and Randall C.D. Biological Process Designs for Wastewater Treatment, Prentice Hall Pub. Co., 1980.

4.P. N. Modi- Sewage Treatment Disposal and Waste Water Engineering.

Professional Elective-I

FOUNDATION ENGINEERING

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To enable application of soil mechanics principles learned in previous semester to the practice of foundation engineering
- To enable computation of stress distribution in soils due to applied loads
- To understand suitability of shallow/deep foundations and their Geotechnical design
- To learn about different methods of geotechnical investigations and its role in selection and design of foundation

UNIT - I

Earth Pressures: States of earth pressure – Active, passive, at rest condition; Rankine's theory computation of active and passive earth pressure in cohesion less and cohesive soils, smooth and

rough walls, inclined backfill, depth of tension crack, Earth retaining structures – gravity, cantilever, counter fort, reinforced earth, etc.

UNIT - II

Geotechnical Investigations: Necessity -Principles of exploration -objectives-Soil profile-collection of distributed & undistributed soil samples-samplers & quality of samples, In-situ tests -SPT, CPT, plate load test.

Stresses distribution in soils: Boussinesq's theory-Computation of increment in vertical stress due to application of a point load (its distribution on horizontal, vertical planes), uniformly distributed circular and rectangular areas -Pressure bulb -Significant depth Construction and use of Newmark's chart -Westergaard's theory -Validity of elastic theories -Contact pressure distribution.

UNIT - III

Introduction to foundations: Functional requirements- types- shallow and deep foundations-suitability

Shallow Foundations: Types of shear failures, Terazaghi's theory for safe bearing capacity of shallow foundations -Effect of type of shear failure/shape of the footing /water table, ultimate and allowable bearing capacity, Settlements of foundations- immediate, consolidation and creep settlements. Types of shallow Foundations-Isolated, combined, mat/raft foundations etc.

UNIT - IV

Pile Foundation: Piles, pile groups, Types of pile foundations based on load transfer mechanism, material type, mode of installation, functional use. Shaft and base resistances, down drag, negative skin friction, pile load tests, Estimation of vertical load carrying capacity of a single pile -static formulae/Dynamic formulae/Pile load tests-Cyclic pile load tests for separation of total capacity into bearing and friction components-Pile groups-necessity -efficiency of Pile groups-estimation of group capacity-Concept of Piled raft foundation.

UNIT – V

Cassions: Necessity -Types-Essential components of open(well)/ box(floating)/ Pneumatic cassions-Suitability-Sinking of caissons-correction for tilt &shift, dewatering.

Coffer dams: Necessity-types-suitability
Underpinning: Necessity-methods (pin/pile)-suitability
Geo-synthetics: classification-functions-applications.

Outcomes:

Upon completion of this course, the students should be able to

Understand how stress are transferred through soil and be able to compute both geostatic and induced stress due to point line and the area load

Basic understand of lateral earth pressure concept and theory including Rankine's theory of active and passive earth pressure with and without sloping backfill

Understand the basic concept of ultimate bearing capacity of shallow foundations including modification of bearing capacity equation of water table, factor of safety and eccentrically loaded foundations

Suggested Readings:

1. Principals of Geotechnical Engineering, By: Braja M. Das., Fifth edition, First reprint 2002, low price edition, Thomson learning Inc.
2. Foundation Analysis and Design, By: Joseph E. Bowles., Fifth Edition, 2001 print, The McGraw Hill Companies Inc.
3. Basic & Applied Soil Mechanics, By: GopalRanjan / Rao A.S.R. 2003 print, New Age International Pvt Ltd.
4. Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard publishers Distributors, revised and enlarged sixth edition,2007.

Professional Elective-II

RAILWAY AND AIRPORT ENGINEERING

Subject Code**: CE3221**

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To understand the geometric designing concepts in airport and railway engineering
  - This course imparts the student's knowledge of planning, design, construction, andmaintenance of railway tracks.
  - The student develops skills on airport planning and design with the prime focus onrunway and taxiway geometrics.

UNIT – I (12)

Railway Planning and Design: Introduction to Railways, permanent way component parts and its functions. Rails - various types, functions, creep in rails, creep measurement, coning of wheels and rail fixations. Sleepers - various types. Merits and demerits, ballast, various types and sub grade preparation. Railway alignment and geometric design - alignment. super-elevation, negative super elevation, cant deficiency. example problems.

UNIT – II (10)

Railway Track Construction, Maintenance and Operation: Points and crossing. layout ofleft and right hand turnouts. Signaling, Interlocking & Track Circuiting Construction and maintenance of permanent way.

UNIT –III (10)

Airport Planning: Introduction to air transportation, history and international organizations role in development of airports, air craft types and its characteristics. General lay-out of an airport and its component parts. Site selection of an airport as per ICAO

UNIT –IV (10)

Airport Design: Runway design**,** orientation of runway by wind rose diagrams, basic runway length determination, corrections to basic runway length,

geometric design, elements oftaxiway design, types of airports as per landing & take-off and dimensions, configuration & pavement design principles.

UNIT –V (10)

Airport Layouts, Visual Aids and Air Traffic Control: Apron, Terminal building, hangars, motor vehicle parking area and circulation pattern, principles of passenger flow, passenger facilities, visual aids, runway and taxiway markings, wind direction indicators, air traffic control, basic actions.

Outcomes:

- Gain Knowledge related to geometric design, operation and control of railways
- Gain Knowledge about different types of airports and airport runway design

References:

1. Khanna. S. K. .Arora, M. G. and Jain. S. S. (1994) "Airport Planning and Design"Fifth edition. Nem Chand & Bros, Roorkee, India.
2. Chandra, S and Agarwal, M. M. (2007) "Railway Engineering" Oxford HigherEducation, University Press New Delhi.
3. Principles of Traffic Engineering – Garber &Hoel, Cengage Learning.
4. L.R. Kadiyali, *Principles and Practice of Highway Engineering,* Khanna Publications,New Delhi, 2000
5 Haas and Hudson W. R., "Pavement Management Systems" Mcgraw Hill publications.

ESSENCE OF INDIAN TRADITION AND KNOWLEDGE

Subject Code: HS3201

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **2-0-0-0**

UNIT –I Basic Structure of Indian Knowledge System:

Veda –Definition – Kinds –Upavedas (Ayurveda, Gandhra veda, Shilpa veda, Artha veda)- Vedangas (Shiksha, Kalapa, Chhanda, Niruktha, Vyakarana, Jyothishya), Dharma Shastra, Mimansa, Purana, Tarka Shastra

UNIT – II Modern Science and Indian Knowledge System

Yoga Holistic Health Care

UNIT – III Indian Philosophical Tradition

A) Orthodox School: Samkya, Yoga, Nyaya, Vaisheshika, Purva Mimansa, Vedantha

B) Heterodox School: Jainism, Buddhism, Ajivika, Anjana, Charvaka

UNIT-IV

Indian Linguistic Tradition

UNIT –V Indian Artistic Tradition:

Chithra Kala (Painting), Sangeetha Kala (Music), Nruthya Kala (Dance)

Sub code: **BM3201**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Externals: **60Marks L-T-P-C**

Internals: **40Marks 3-0-0-3**

Course Objective:

- Enable the students to learn managerial economics principles applied in industries and equip them to handle the tasks in their career by making a real sense of what is happening economically in the organization.
- The course describes the Nature and Scope of Managerial Economics. It gives complete study on the demand and elasticity of demand and methods of demand forecasting.
- It provides a detailed structure on the pricing strategies and shows clear picture methods and sources of raising finance.
- It gives clear cut information of preparing final accounts and capital Budgeting techniques.

Course Outcome:

After the successful completion of this course, the learner will be able to know:

1. The dynamic game of demand and supply, and how the trinity of Economics i.e. Demand, Supply and Scarcity make the things move around the globe.
2. Principles of Microeconomics applied to industries.
3. Concept of forecasting and applying forecasting techniques to address the challenges and opportunities in the organization they work.
4. Cost and Production analysis, Break-Even analysis, Opportunity Cost, how to optimize organizational resources and how to minimize cost and maximize production, revenue and profit
5. Different pricing structure and discount mechanism suitable for business firms.
6. Market structure and how to exploit market structure for optimizing the benefits of organization.
7. Capital requirements and sources of capital.

UNIT I: Introduction to Managerial Economics:

Definition, Nature and Scope of Managerial Economics-Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Definition, Types, Measurement and Significance of Elasticity of Demand. Demand Forecasting, Factors governing demand forecasting, methods of demand forecasting.

UNIT II: Theory of Production and Cost Analysis:

Production Function - Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs. Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost. Fixed vs. Variable costs, Explicit costs Vs. Implicit costs. Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)- R22, Electronics and Communications Engineering Page 81 Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT III: Markets & Pricing Policies:

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Objectives and Policies of Pricing- Methods of Pricing: Cost Plus Pricing. Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing.

UNIT IV: Introduction to Financial Accounting:

Introduction to Financial Accounting: Double entry Book Keeping, Journal, Ledger, Trail Balance and Final Accounts (Trading account, Profit and Loss Account and Balance sheet with simple adjustments).

UNIT V: Capital and Capital Budgeting:

Capital and Capital Budgeting: Capital and its significance. Types of Capital. Estimation of Fixed and Working capital requirements. Methods and sources of raising finance. Nature and scope of capital budgeting, features of capital budgeting proposals. Methods of Capital Budgeting: Payback Method. Accounting Rate of Return (ARR) and Net Present Value Method, Internal Rate of Return (IRR).

Reference Books:

1. Aryasri: Managerial Economics and Financial Analysis, TMH,2009.
2. Varshney &Maheswari : Managerial Economics, Sulthan Chand,2009.
3. Raghunatha Reddy &Narasimhachary: Managerial Economics& Financial Analysis, Scitech. 2009.
4. V.Rajasekarn&R.Lalitha. Financial Accounting, Pearson Education. New Delhi. 2010
5. Suma Damodaran, Managerial Economics, Oxford University Press. 2009.

Category: **Humanities and Social Sciences including Management Courses**
Subject Code**: HS3206**

EFFECTIVE TECHNICAL COMMUNICATION –II

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-2-1**

Module 1: Managing Time; Personal memory, Rapid reading, taking notes; Complex problem solving; Creativity

Module 2: Communication and Technical Writing- Public speaking, Group discussion, Oral; presentation, Interviews, Graphic presentation, Presentation aids, Personality Development.

Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Module 3: Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes, Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

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

Text/Reference Books:
1. David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2. Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3. Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
AICTE Model Curriculum for Undergraduate degree in Civil Engineering (Engineering & Technology)
4. Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5. Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN:07828357-4)
6. Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH NewDelhi 2002.
7. Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

COMPUTATIONAL ANALYSIS LAB

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-2-1**

Objectives:
- Analysis and design of beamsusing STAAD PRO and validation by manual method

- Analysis and design ofcolumns,footingsand slabs using STAAD PRO
- Analysis and design of portal frameusing STAAD PRO and validation by manual method
- Analysis of beamsand slabs using ANSYSand validation by manual method

List of experiments:

1.Analysis and design of RCC beamsusing STAAD PRO and validation by manual method
2.Analysis and design of RCC columnsusing STAAD PRO and validation by manual method
3.Analysis and design ofRCCslabsusing STAAD PRO and validation by manual method.
4.Analysis and design of one storey RCC portal frame using STAAD PROand validation by manual method
5.Analysis and design of two storey RCC portal frame using STAAD PRO and validation by manual method
6.Analysis and design of isolatedRCCfootingsusing STAAD PRO and validation by manual method
7.Analysis and designof combined RCC footingsusing STAAD PRO and validation by manual method
8.Analysis and design of steel beamsusing STAAD PRO and validation by manual method
9.Analysis and design of steel columnsusing STAAD PRO and validation by manual method
10. Analysis of plane and space truss
11. Analysis of plane and space frame
12.Analysis of beamsusing ANSYS and validation by manual method
13.Analysis of slabs using ANSYS and validation by manual method

Outcomes:

After completion of this laboratory course, students will be able to

- Analyze and design beams using STAAD PRO and validate by manual method
- Analyze and design columns, footings and slabs using STAAD PRO
- Analyze and design portal frame using STAAD PRO and validate by manual method
- Analyze beams and slabs using ANSYS and validate by manual method

Laboratory Manual:

1. "Civil Engineering Software Applications LaboratoryManual", prepared by the faculty of Civil Engineering.

Textbooks:

1. Manual of STAAD.Pro V8i", Bentley software.
2. "Manual of ANSYS".
3.S. Unnikrishna Pillai andDevdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Limited, New Delhi, 3rdedn., 2011
.4.A.K. Jain, "Limit State Design", Nem Chand Brothers, Roorkee, 7thedn. 2012.

Category: Professional core course Subject Code**: CE3802**

ENVIRONMENTAL ENGINEERING LAB

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **0-0-2-1**

Objectives:

- To perform the experiments to determine water and waste water quality
- To understand the water & waste water sampling, their quality standards
- To estimate quality of water, waste water, Industrial water

List of experiments:

1. To determine Electrical Conductivity of water sample.
2. To determine the pH value of water sample by pH Meter.
3. To determine the Alkalinity of water sample.
4. To determine the Hardness value of water sample.
5. To determine the Turbidity water sample by Nephlometric method.
6. To determine the Sodium content of water sample.
7. To determine the Chloride content of water sample.
8. To determine the Bromide content of water sample.
9. To determine the Fluoride content of water sample.
10. To determine the Nitrogen, Nitrate content of water sample.
11. Determination of COD.
12. To determine the DO value of given water sample by DO meter.

13. Determination of BOD
14. To determine the Faecal Coliforms.
15. Determination of Total Suspended Solids (TSS) and Total Dissolved Solids (TDS) ingiven water sample.

Outcomes:

After the completion of the course student should be able to

- Understand about the equipment used to conduct the test procedures
- Perform the experiments in the lab
- Examine and Estimate water, waste water, air and soil Quality
- Develop a report on the quality aspect of the environment

FOURTH YEAR (E4) – SEMESTER – II

Professional Elective-V

ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-0-0-3**

Objectives:

- To appreciate the purpose and role of EIA in the decision –making process
- To understand strengths & limitations of Environmental management
- To plan and carry out an environmental impact assessment study

UNIT-1 (8 hours)

Introduction to EIA: The Need for EIA, Indian Policies Requiring EIA, The EIA Cycle and Procedures, Screening, Scoping, Baseline Data, Impact Prediction, Assessment of Alternatives, Delineation of Mitigation Measure and EIA Report, Public Hearing, Decision Making, Monitoring the Clearance Conditions, Components of EIA, Roles in the EIA Process. Government of India Ministry of Environment and Forest Notification (2000), List of projects requiring Environmental clearance, Application form, Composition of Expert Committee, Ecological sensitive places, International agreements.

UNIT-II (10 hours)

Identifying the Key Issues: Key Elements of an Initial Project Description and Scoping, Project Location(s), Land Use Impacts, Consideration of Alternatives, Process selection - Construction Phase, Input Requirements, Wastes and Emissions, Air Emissions, Liquid Effluents, Solid Wastes, Risks to Environment and Human, Health, Socio-Economic Impacts, Ecological Impacts, Global Environmental Issues.

UNIT-III (12hours)

EIA Methodologies: Criteria for the selection of EIA methodology, impact identification, impact measurement, impact interpretation & Evaluation, impact communication, Methods-Adhoc methods, Checklists methods, Matrices methods, Networks methods, Overlays methods, Environmental index using factor analysis, Cost/benefit analysis, Predictive or Simulation methods. Rapid assessment of Pollution sources method, predictive models for impact assessment, Applications for RS and GIS.

UNIT-IV (8 hours)

Reviewing the EIA Report: Scope, Baseline Conditions, Site and Process alternatives, Public hearing, Construction Stage Impacts, Project Resource Requirements and Related Impacts, Prediction of Environmental Media Quality, Socio-economic Impacts, Ecological Impacts, Occupational Health Impact, Major Hazard/ Risk Assessment, Impact on Transport System, Integrated Impact Assessment.

UNIT-V (8 hours)

Review of EMP and Monitoring: Environmental Management Plan, Identification of Significant or Unacceptable Impacts Requiring Mitigation, Mitigation Plans and Relief & Rehabilitation, Stipulating the Conditions, what should be monitored? Monitoring Methods, who should monitor? Pre-Appraisal and Appraisal.

Case Studies: Preparation of EIA for developmental projects- Factors to be considered in making assessment decisions, Water Resources Project, Pharmaceutical industry, thermal plant, Nuclear fuel complex, Highway project, Sewage treatment plant, Municipal Solid waste processing plant, Tannery industry, Thermal Power Projects, Port and Harbour Projects, Mining Projects.

Outcomes:

- Identify the environmental attributes to be considered for the EIA study
- Formulate objectives of the EIA studies
- Identify the methodology to prepare rapid EIA
- Prepare EIA reports and environmental management plans

Suggested Reading:

1. Jain, R.K., Urban, L.V., Stracy, G.S., Environmental Impact Analysis, Van Nostrand Reinhold Co., New York, 1991.

2. Barthwal, R. R., Environmental Impact Assessment, New Age International Publishers, 2002

3. Rau, J.G. and Wooten, D.C., Environmental Impact Assessment, McGraw Hill Pub. Co., New York, 1996.

4. Anjaneyulu. Y and Manickam. V., Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad, 2007.

5. Wathern. P Environmental Impact Assessment- Theory and Practice, Routledge Publishers, London, 2004.

INTELLECTUAL PROPERTY RIGHTS

Course code: BM4414

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **3-1-0-3**

Course Objectives

- Master fundamental legal principles of intellectual property.

Apply and assess these principles in real-world scenarios, while staying updated on evolving issues.

Course Outcomes

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

1. Understand the fundamental legal principles relating to confidential information, copyright, patents, designs, trademarks and unfair competition;

2. Understand and be able to identify, apply and assess principles of law relating to each of these areas of intellectual property.
3. Understand the legal and practical steps needed to ensure that intellectual property rights remain valid and enforceable
4. Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;

   Understand current and emerging issues relating to the intellectual property protection.

Detailed Contents

Unit-1:

Introduction to IPR: Definition of Intellectual Property, Meaning of Intellectual Property, Evolution of IPR, Kinds of Intellectual Property Rights - Patents, Trademarks, Copy Rights, Industrial Design, Trade Secrets, Geographical Indications, Agencies responsible for Intellectual Property Rights- USPTO, INTA, WIPO, TRIPS, International Conventions-Patent treaty, Madrid Protocol, Berne Convention.

UNIT-II:

Patent Rights: Introduction, Definition of Patent, Importance of Patents, Types of Patents, Patentable Inventions, Non- Patentable Inventions, Persons entitled to apply for Patent, Who can apply for a Patent, Expiry of a Patent, Rights of patentee, Registration of patent.

Unit-III:

Industrial designs: Definitions of Designs, Essentials of a Design, Who can file for Design Registration, Term of Design, Registration of Designs, Cancellation of a Registered designs, Restoration of a lapsed design.

Unit-IV:

Trademarks: Introduction to Trademark, Meaning of Trademark, Types of Trademark, Features of Trademarks, Functions of Trademarks, Objectives of Trademarks, What to avoid when selecting a Trademark, Trademark Registration procedure, Infringement of Trademarks, Passing off.

Unit-V:

Copy Right: Introduction, Subject matter of Copy Right, Objectives of Copy Rights, Rights of a copyright holder, Works covered under Copy Right, Works not covered under Copy Right, Duration of Copy Right, and Registration of Copy Right.

Case studies are discussed wherever applicable.

Text Books

- Dr. G.B. Reddy,Intellectual Property Rights and the Law 5th Ed. 2005 Gogia Law Agency

Cornish.W.R, "Intellectual Property Patents", Copy Right and Trademarks and Allied rights, Sweet&Maxwell 1993.

References

1. P. Narayanan: Intellectual Property Law, Eastern Law House, 2nd edition 1997.
2. Roy Chowdhary, S.K. & Other:Law of Trademark, Copyrights, Patents and Designs, Kamal Law House, 1999.

B.L. Wadhera: Intellectual Property Law, Universal Publishers, 2nd Ed. 2000

ENTREPRENEURSHIP AND NEW VENTURES

Course code: BM4416

Externals: 60Marks **L-T-P-C***

Internals: 40Marks **3-0-0-3**

Course Objective:.

- The course objective is to teach effective entrepreneurial and general management practice from the perspective of the founder and stakeholders.
- To apply the entrepreneurial perspective in order to approach business problems from a value creation framework.

LEARNING OUTCOMES :

1. Students will be able to understand the principles of Entrepreneurship management and growth through strategic plans, consulting projects and /or implementing their own businesses.
2. The Learner will understand the role of small scale industries and the institutional support provided by various organizations for business. Students will be able to identify the principles of preparing start-up business plan emphasizing financing, marketing and organizing.
3. After learning this, the students will be able to know the role of entrepreneurs in the development of a country and the needed capabilities of an Entrepreneur and develop the skill in Work analysis and material management that could help in efficient management of an enterprise and identify the models used in planning for new venture growth and internationalization.
4. Students will be able to identify and or apply the principles of viability of new business proposals and opportunities within existing businesses and understand the organizational challenges in launching & growing a new venture and how to plan & manage for growth and expansion.

Course Contents:

1. **Introduction to Entrepreneurship:** Learning objectives, Entrepreneurship in Indian Scenario and Future prospects, Emerging economies, Entrepreneurial traits, motivation and leadership (7Modules)

2. **Entrepreneurial Process:** Opportunity Identification, Idea Generation and Evaluation. (6 Modules)

3. **Business Model:** Business Plan, Business Models (Creating a business model with technology differentiators) (5 Modules)

4. **Financing Venture**: Funding, Valuation of a new company, Marketing, Company Growth, Acquisitions and Exit Strategies. (6 Modules)

5. **Building the Team and IPR:** Launching and managing venture, Human resource aspects. Intellectual Property and Corporate Law. (12 Modules)

Suggested Reference Books:

1. Kuratko & Hodgetts, *Entrepreneurship-Theory, Process Practice*, Thompson South-Western Publication, (2008).
2. Holt, *Entrepreneurship – New Venture Creation*, PHI Publication, (1992).
3. Kawasaki, *The Art of the Start*, Portfolio Publication, (2004).
4. Lusk & Harrison, *The Mouse Driver Chronicles: The True-Life Adventures of Two First-Time Entrepreneurs*, Perseus Books Group, (2002).
5. Dorf & Byers, *Technology Ventures: From Idea to Enterprise*, McGraw Hill Publication, (2010).
6. Kaplan, Startup: *A Silicon Valley Adventure*, Penguin Books, (2001).

SUSTAINABLE TECHNOLOGIES

Course code: BS4401

Externals: 60 Marks **L-T-P-C**
Internals: 40 Marks **3-0-0-3**

Learning objectives: To give an overview of existing technologies and their associated problems. The main objective of the course is to stress on the need of innovation in development of sustainable technologies.

Learning outcome: This paper sets out to discuss the commonalities that can be found for sustainable development. The commonalities include systemic or holistic thinking, the integration of different perspectives, skills such as critical thinking, diverse attitudes and values. Student will get the knowledge to resolve the environmental problems of the planet, work towards community-oriented problems with coherent and inferential problem solving skills.

UNIT 1: DRAW BACKS OF CURRENT TECHNOLOGIES

Environmental degradation, financial constraints, social issues with automation in technology, extinction of fossil fuels, risks involved in operations. Global environmental issues- Resource degradation, Climate change (Carbon credits and carbon trading, carbon foot print), Global warming, Ozone layer depletion, Regional and Local Environmental Issues.

UNIT 2: ENVIRONMENT REMEDIATION

Environment Impact Assessment (EIA) - Procedures of EIA in India, Physical and Chemical technologies for reclamation, Need for ecosystem restoration, Bioremediation.
Alternative Hirarchy Process (AHP), Selection of best technology using AHP, Alternative resources and technologies, resource recovery from waste, energy recovery from waste, Sustainable Development vs Environmental Engineering - Energy Issues.

UNIT 3: SUSTAINABLE TECHNOLOGIES

Sustainability - Introduction, Need and concept of sustainability; People, planet and profit; Social, environmental and economic sustainability concepts. Sustainable development, Nexus between Technology and Sustainable development, Challenges for Sustainable Development. Multilateral environmental agreements and Protocols - Clean Development Mechanism (CDM), Green technologies.

UNIT 4: BIOMIMICRY

Defining biomimicry, why biomimicry matters? Biomimicry examples - Bioplastics, biomaterials, bioluminescence for LED's, neural networks, swarm intelligence, aerodynamics for automobile engineering, DNA computing.

UNIT 5: BIOLOGICAL RESOURCES FOR SUSTAINABILITY

Organic Farming for sustainable agriculture, Microbial leaching of low grade mineral ores, Bioelectricity (Microbial fuel cells), Biomagnetism (for therapy), Biofuels (for energy), Microbial engineering for cleaning environmental pollution, biosynthesis of industrial products.

Reference:

1. *Perspectives on Sustainable Technology- M. Rafiqul Islam*
2. Sustainable Energy Consumption and Society- David L. Goldblatt
3. Sustainable development (energy, engineering and technologies, manufacturing and environment) - Chaouki Ghenai
4. Sustainability and Environmental Impact of Renewable Energy Sources - R. E. Hester,

R. M. Harrison
5. Sustainable Natural Resources Management - Prof. Abiud Kaswamila.
6. Sustainable Communities Design Handbook - Woodrow W. Clark
7. Handbook of Bioplastics and Biocomposites Engineering Applications - Srikanth Pilla
8. Modeling & Imaging of Bioelectrical Activity: Principles and Applications (Bioelectric Engineering) - Bin He
9. Handbook of Swarm Intelligence: Concepts, Principles and Applications – YuhuiShi, Meng-Hiot Lim, Bijaya ketan Panigrahi.
10. DNA Computing and Molecular Programming - DNA 16 – Yasubumi sakkibara, yongli Mi
11. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall.
12. Bradley. A.S; Adebayo,A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning .
13. Environment Impact Assessment Guidelines, Notification of Government of India, 2006
14. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998 .
15. ECBC Code 2007, Bureau of Energy Efficiency, New Delhi Bureau of Energy Efficiency Publications-Rating System, TERI Publications - GRIHA Rating System
16. Ni bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, McGraw-Hill Professional.
17. Twidell, J. W. and Weir, A. D., Renewable Energy Resources, English Language Book Society (ELBS).
18. Purohit, S. S., Green Technology - An approach for sustainable environment, Agrobios publication.
19. Biomimicry: Innovation Inspired by Nature by Janine Benyus.