MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V., Bhopal MP)

Course Code: 110612
Course Name: Solid Waste Management

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of a solid waste management system in a city/town.
2) To understand the principles applied in solid wastemanagement.
3) To understand various ways to collect, treat & disposal ofwaste.
4) To understand various ways of energy recovery from waste.
5) To provide an insight into the principles of hazardous waste management.

Syllabus:

Unit I:

Functional Elements of Solid Waste Management, Objective of Solid Waste Management, Principle of Municipal Solid Waste Management, Classification of solid waste, composition, Physical, chemical & biological properties of municipal solid waste, Quantity of solid waste, Sampling & analysis of solid waste.

Unit II:

Collection, conveyance, separation & recycling of solid waste: Types of collection system, Collection routes, equipment's, transfer station, transport methods, material separation & recycling of MSW.

Unit III:

Disposal of solid waste by Land fill method: Classification, type, method, site consideration composition and control of gases, Leachate control inland fills, surface water management, landfill operation & care. Remediation of old landfill sites.

Unit IV:

Disposal of solid waste by other methods: Thermal conversion technologies, Incineration, Pyrolysis gasification, environmental control system. Biological & Chemical conversion technologies, aerobic composting, anaerobic digestion, other biological and chemical transformation.

Unit V:

Solid waste Management — legislative trend and planning issues: Major legislations, government agencies, future trend in planning. Hazardous solid waste management, handling & Disposal.Disposal of Biomedical Waste, Demolition waste, E-Waste & Plastic Waste etc.

Course Outcomes:

Upon completion of the course, the students will be able to·

CO 1: Explain the principles & concepts of waste management.
CO 2: Apply various techniques in collecting the waste.
CO 3: Apply various techniques of reducing the waste.
CO 4: Apply various techniques in disposal of waste.
CO 5: Plan an effective & efficient waste management system

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A, Vigil, GeorgeTchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications,2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi,2016
3. Solid waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

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Course Code: 110613
Course Name: Construction Planning & Management

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To make student conversant with the concepts and importance of the subject of construction planning & management.
2) To provide a broad knowledge on how to make bar chart, work break structure of a project, schedules.
3) To provide a broad knowledge on how to analyze a problem using various techniques of project management like CPM, PERT & optimization of time & cost of a project.
4) To provide an insight into various types of machinery used in construction works & various concepts of man & material management.

Syllabus:

Unit I

Modern management techniques: An overview of planning process, planning through Bar Charts and Milestone charts, Network techniques, Basic concept of network preparations, CPM and PERT techniques with network analysis.

Unit II

Construction management: Principles of construction management, Planning for Job Layout, Advantages of Job Layout, Scheduling Techniques of Construction Project.

Unit III

Construction equipment's: Factors affecting selection, investment and operating cost, Efficiency and capacity rating of various equipment's, study of equipment's required for various jobs such as earthwork, dredging, conveyance, concreting, hoisting, pile driving, compaction and grouting. Equipment Management.

Unit IV

Time & Cost Optimization using Network Techniques: Time computations using CPM & PERT, Probability of achieving completion time, Project cost, Direct & Indirect cost, Cost vs. Time curves, Total project cost & optimum duration, Contracting the network for cost optimization, Time cost optimization

Unit V

Site Organization & Manpower management: Introduction of site organization, types of organization, organization chart & manuals, Manpower Management, Labour laws (Compensation Act etc.) & Human relations, Welfare facilities, Safety Management.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of construction planning & management process.

CO 2: Describe various techniques used in construction planning & management.

CO 3: Apply techniques of project planning & management.

CO 4: Analyze various problems of time & cost optimization using network techniques like CPM & PERT.

CO 5: Plan effectively for manpower & material management in a project along with suitable safety measures.

Text Books:

1) K. K. Chitkara, Construction Project Management, McGraw Hill International Publishers.

2) B. C. Punmia & K. K. Khandelwal, Project Planning & Control with PERT & CPM, Laxmi Publishers.

3) U.K. Shrivastava, Construction Planning & Management.

4) Neeraj Kumar Jha, Construction Project Management, Pearson Publishers.

Reference Books:

1) Gahlot & Dhir, Construction Management, New Age International Publishers.

2) L.S. Srinath, PERT & CPM – Principles & Applications, East West Press.

3) Sengupta & Guha, Construction Management & Planning, McGraw Hill Publishers.

4) Peurify, Construction Equipment.

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Course Code: 110614

Course Name: Railway, Airport & Tunnel Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the requirements of airport, runway & taxi – way.
2) To understand the requirement of lighting & signal & traffic control at airports.
3) To understand the geometrical elements of railway track.
4) To understand the properties of good ballast.
5) To understand the track alignment, super elevation, turnout, yards.
6) To understand the principles of signalling & interlocking.
7) To understand the construction of tunnels.

Syllabus:

Unit-I Introduction to Railway Engineering

Tractive resistance & Permanent way, Principles of Transportation, Transportation by Road, Railways, Airways, Waterways, their importance and limitations. Route surveys and alignment, railway track, development and gauges. Hauling capacity and tractive effort.

(i) Rails- types, welding of rails, wear & tear of rails, rail creep ultrasonic Testing of Rails.
(ii) Rail fastenings- types – Fishplates, spikes bearing plates, chairs, keys, check and guard rails, Elastic Rail Clips (ERC), Vossloh fastening.
(iii) Sleepers, types & comparison, requirement of a good sleeper, sleeper density, Turnouts.
(iv) Ballast –Requirement of good ballast, various materials used as ballast, quantity of ballast, Ballast Cleaning.

Different methods of plate laying, material trains, calculation of materials required, relaying of track.

Unit-II

Track alignment, Geometrical Design, Gradient & gray compensation, Super Elevation, Equilibrium, Cant and Cant deficiency, relationship of super elevation, gauge, speed & radius of curves, speed on curves, Limits of super elevation, Cant deficiency, Negative super elevation, curves , transition curves, necessity of points and crossing. Turnouts, Points of switches, Types of switches, crossing, calculation of turnouts, sleepers at points &crossing, Types of Track junctions. Types, locations, general equipments, layouts, marshalling yards. Definition, layout details, designs of simple turnouts.

Stations and Yards: Site selection for a Railway stations, Requirements of railway stations, junction station &terminals, location, layout & details, Types of signals in stations and yards, principles of signaling and inter-locking, Modern development in railways, Modernization of track for high speed, Maintenance of track, Track drainage.

Unit – III Airport Planning, Runway & Taxiway

Airport site selection, air craft characteristic and their effects on runway alignments, wind rose diagrams, basic runway length and corrections, classification of airports, Geometrical elements: taxi ways and runways, pattern of runway capacity.

Unit – IV Airport, Obstructions, Lightning & Traffic control

Zoning regulations, approach area, approach surface-imaginary, conical, horizontal. Rotating beacon, boundary lights, approach lights, runway and taxiway lighting etc. instrumental landing system, precision approach radar.

Unit-V Tunnels

Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts , Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the elements of airport planning, bridges & tunnels.
CO 2: Design runway & taxiway system as per regulations.
CO 3: Explain various elements of railway tracks, signalling, yards, bridges & tunnels.
CO 4: Illustrate various gauge, signals, fasteners, turnouts, crossing etc.
CO 5: Apply construction methods of railway tunnels.

Text Books:

1. Airport Planning & Design, S. K. Khanna & M. G. Arora, Nem chand Publishers, 6th edition, 1999
2. Railway Engineering, Arora & Saxena, Dhanpat Rai & Sons, 2010

Reference Books:

1. Airport Planning, Froesch, Charles, Andesite Press, 2017
2. The Planning & Design of Airports, Horonjeff Robert, MHE, 5th edition, 2010
3. Railway Engineering, S.C. Rangwala, Charotar Publication House, Anand, 2012
4. Railway Tack, K.F. Antia, New Book Company, 5th edition, 1960

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Course Code: 900117

Course Name: Numerical Methods in Engineering

L	T	P	C
2	1	-	3

Course Objectives:

1. To learn about Basics of MATLAB programming
2. To perform Array operations in MATLAB
3. Working with files: Scripts and Functions. Plotting and program output
4. To understand water management and planning system in a building.
5. To learn maintenance of building services and management of related tasks.

Syllabus:

Unit I

SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS

Solution of algebraic and transcendental equations – Fixed point iteration method – Newton Raphson method – Solution of linear system of equations – Gauss elimination method – Pivoting -Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel – Eigenvalues of a matrix by Power method and Jacobi's method for symmetric matrices

Unit II

INTERPOLATION AND APPROXIMATION

Interpolation with unequal intervals – Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines – Difference operators and relations – Interpolation with equal intervals – Newton's forward and backward difference formulae.

Unit III

NUMERICAL DIFFERENTIATION AND INTEGRATION

Approximation of derivatives using interpolation polynomials – Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's Method – Two point and three point Gaussian quadrature formulae – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

Unit IV

INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS

Single step methods – Taylor's series method – Euler's method – Modified Euler's method – Fourth order Runge – Kutta method for solving first order equations – Multi step methods – Milne's and Adams – Bash forth predictor corrector methods for solving first order equations.

Unit V

BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS

Finite difference methods for solving second order two – point linear boundary value problems -Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) methods – One dimensional wave equation by explicit method

Course Outcome:

Upon completion of the course, the students will be able to:

CO1: Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions to otherwise intractable mathematical problems

CO2: Apply numerical methods to obtain approximate solutions to mathematical problems

CO3: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations

CO4: Evaluate the accuracy of common numerical methods & implement numerical methods in MATLAB.

Text Book:

1. Numerical Methods: For Scientific And Engineering Computation by M K Jain, Sixth Ed. 2012, New Age International Publishers.

Reference Books:

1. Fausett L.V.(2007) Applied Numerical Analysis Using MATLAB, 2nd Ed. Pearson Education
2. Chapra S.C. and Canale R.P.(2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill

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Course Code: 900118

Course Name: Maintenance Management

L	T	P	C
2	1	-	3

Course Objectives:

6. To learn about building services required in a building.
7. To learn about fire fighting systems in buildings.
8. To understand planning and maintenance requirements of lifts in high rise buildings.
9. To understand water management and planning system in a building.
10. To learn maintenance of building services and management of related tasks.

Syllabus:

Unit I

Introduction: Introduction to primary services in a building, Type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors. Outline of the concept of carbon trading and self sustainable zero carbon building. Importance

Unit II

Fire Fighting: Standard fire, fire resistance, classification of buildings. Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings, checklist for fire safety. Provision of NBC.

Unit III

Lifts/Elevators, Escalators: Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.

Unit IV

Plumbing Services Water Supply System: Basics of Plumbing systems. Requirement of Plumbing works, Agency, Activity flow chart for plumbing work. Quality checking of materials. Water supply and distribution system is high-rise building & other complexes, pumps and pumping mechanisms. Operation & maintenance of fittings & fixtures of water supply & sanitary. Do's & Don'ts for water pipe networks.

Unit V

Maintenance and management of services: Telecommunication network, computer network LAN, Electrical network & appliances. Basics of single phase & three phase electrification, precautions and safety measures during electrification. Indian standard codes for electrical appliances & wiring operations & maintenance of network & appliances. Landscaping & Horticulture. Building maintenance management, applications of computer in service management. Flowcharts of air conditioning & heating. Centralised systems, monitoring and working of the equipments, Checklist of inspection, Performance testing. Water proofing. Damp proofing & Termite proofing. Working procedure & stages of work of water proofing for W.C., Bathrooms. Terrace, sloping roof, Basements, tanks. Use of chemicals for water proofing treatment.

Course Outcome:

Upon completion of the course, the students will be able to:

CO1: Identify various services required in a building.

CO2: Carry out planning of fire fighting system for a building.

CO3: Develop a management strategy for maintenance of building services in a building.

CO4: Design a sustainable building services plan for a building.

Reference Books:

1. Building services Design and Management by Jakie Partman, Willey Blackwell 2014.
2. Building Services Engineering by David V .Chadderton, Routledge 2013.

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Course Code: 110211

Course Name: Building Planning & Design

L	T	P	Credit
3	0	0	3

Course Objectives:

1. To make aware the student with sustainability aspects of building.
2. To impart knowledge to students about significance of building bye-laws & rules & regulation regarding building planning.
3. To impact knowledge to students regarding specific consideration required to be considered under Indian condition for planning & designing of building.
4. To appraise students about the rules & consideration to get adequate ventilation, lighting & Sound insulation for improved energy efficiency of building.
5. To make students understand about various essential requirements of different type of building.
6. To make aware students about green building rating for enhanced sustainability.

Syllabus:

Unit I

Natural Environment & Built environment, Ecology, Ecosphere - sustainable development, Dimensions of sustainability. Built Environment & liveability, integrated approach in design, challenges in sustainable development.Green environment, expectations from green building, IGBC, USGBC, LEED- GRIHA, SVA, GRIHA.

Unit II

Building Bye – laws, Functions of local authority, Terminology i.e. (Building line, control line, FAR, light plane etc.) Principles underlying building bye- laws, classification of building, requirements of parts of Buildings, site section of building, orientation, factors affecting orientation, orientation criteria`s for Indian conditions, Provisions of NBC.

Unit III

Principles of planning of buildings (Aspects, prospect, Furniture requirement, rooming, grouping, privacy circulation etc.), Principles of architectural composition (Unity, contrast, scale, proportion, balance, Rhythm, character, etc.), Massing, Sun and the Building, Sun path, Sun shading & devices, Design of sun shades.

Unit IV

Thermal insulation, Heat transfer in building, Thermal insulation materials, methods of thermal insulation ventilation: natural & artificial, necessity & functional requirement of ventilation, system of ventilation, types of mechanical ventilation, air conditioning, functional requirement of air conditioning, Essentials of air conditioning, acoustic and sound insulation, Behavior of sound acoustical defects. Sabine formula, acoustical design of various spaces, sound insulation methods & materials, illumination (natural & artificial).

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Unit V

Design and planning consideration for various types of building i.e. Residential Building. Education buildings. Hospitals & Dispensaries. Hotels. Commercial building, recreational buildings. government offices & other, standards specified by Bye-laws, various aspects of sustainability & energy efficiency applied to various types of Building. green building concept applied to various types of building.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain basics of building planning & design.
CO2: Describe sustainability principle, by laws & characteristics of thermal and sound insulation.
CO3: Apply sustainability concepts & principles in planning & design of buildings.
CO4: Evaluate environmental, sustainable & safety aspects of a building.
CO5: Plan different types of buildings as per by laws &codal provisions.

Text Books:

1. Building Drawing (Built Environment), Sah, Kale and Pathi, Tata McGraw hill, 4th edition, reprint 2007
2. Building Planning, Designing and Scheduling, Gurucharan Singh, Standard Publisher, distribution, 2009
3. Building Design and Drawing, Mallik and Meo, Computech Publication Ltd New Asian; 5th edition 2009

Reference Books:

1. Building Design and drawing, Y.S.Sane, Standard Publisher, 2006
2. National Building Codes (LatestEdition), 2016 by Bureau of Indian Standards (Third Revision)
3. Building Construction, B.C.Punmia, Laxmi Publication, 11th edition, 2016

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Course Code: 100020

Course Name: Basic Civil Engineering & Mechanics

L	T	P	Credit
3	0	0	3

Course Objectives:

1. To understand the utility of various types of building materials.
2. To understand the location, construction detail and suitability of various building elements.
3. To determine the location of object on ground surface.
4. To stabilize the position of various object.
5. To understand the effects of system of forces on rigid body in static conditions.
6. Analysis of determinate structure (beam & truss)

Syllabus:

Unit- I

Building Materials: Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

Unit- II

Surveying & Positioning: Introduction to surveying, Survey stations, Measurement of distances- conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal leveling.

Unit- III

Mapping & Sensing: Mapping details and contouring, Plane tables and related devices. Introduction of theodolite.Measurement of areas and volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

Unit- IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent co-planner forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts: Analysis of plane Trusses, method of joints, method of Sections. Frictional force in equilibrium problems.

Unit -V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Composite section, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain concepts and terminologies of building materials, surveying and mechanics.

CO 2: Apply various methods for surveying and mechanics.

CO 3: Determine the location, area and volume of objects on ground surface.

CO4: Solve the problems of surveying and mechanics by using various methods.
CO5: Analyse the effects of system of forces on rigid bodies in static conditions.

Text Books:

1. Surveying, Vol. – I, Punmia B.C., Laxmi Publications, 17th edition, 2016
2. Building Material, B. C. Punmia, Laxmi Publications, 2016
3. A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013

Reference Books:

1. Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
2. Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
3. Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
4. Engineering Mechanics - Statics &Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
5. Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning, 1st edition, 2008.
6. Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

List of Experiments:

1. Study of various types of chain and tapes.
2. Measurement of distance involving direct and indirect ranging.
3. Chain and tape survey of given area
4. Study of prismatic and surveyors compass
5. Measurement of direction by prismatic compass
6. Calculation of distance between two inaccessible points by prismatic compass
7. Study of dumpy level, levelling staff and level field book
8. Exercise of differential levelling and flying levelling
9. Study of various types of a transits theodolite
10. Measurements of horizontal angle by repetition method.
11. Determining the resultants force of coplanar concurrent and non-concurrent system of forces by graphical method
12. Determine forces in members of a perfect frame by graphical method.

Upon completion of the practical course, the students will be able to:
CO1: Follow the guidelines for field surveying.
CO2: Follow the working principles of survey instruments for measurements.
CO3: Measure the horizontal distances, difference in elevation and angles of various points
CO4: Detect measurement errors and accordingly suggest corrections
CO5: Interpret survey data and compute areas

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Course Code: 100026

Course Name: Basic Civil Engineering Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

1. To perform the chain & tape surveying
2. To perform the survey work using various types of compass.
3. To determine the location of object on ground surface.
4. To determine the properties of cement
5. To determine the properties of concrete
6. To determine the properties of bricks.

List of Experiments:

1. Measurement of distance by chain or tape.
2. Chain and tape survey of givenarea
3. Measurement of direction by prismatic compass & surveyor's compass.
4. Calculation of distance between two in accessible points by prismatic compass
5. Chain & compass traverse
6. Exercise of differential leveling by dumpy level.
7. Exercise of flying levelling by dumpy level.
8. Demonstration of theodolite.
9. Measurement of horizontal angle by theodolite.
10. Determination of standard consistency of cement by vicat apparatus.
11. Determination of initial setting time & final setting time of cement.
12. Determination of workability of cement concrete by slump cone test.
13. Determination of compressive strength of cement concrete.
14. Determination of compressive strength of bricks.
15. Determination of water absorption of bricks.

Text Books:

1. Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
2. Building Material, B. C. Punmia, Laxmi Publications, 2016

Reference Books:

1. Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
2. Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Follow the guidelines for field surveying.

CO2: Follow the working principles of survey instruments for measurements.

CO3: Measure the horizontal distances, difference in elevation and angles of various points

CO4: Interpret survey data and compute areas

CO5: Determine various properties of cement, concrete & bricks.

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Course Code: 510112

Course Name: Construction Materials & Machines

L	T	P	C
3	-	-	3

Course Objectives:

1. To study the properties, design and production of various types of concrete i.e. cement
2. To understand the applications of polymeric materials, additives, admixtures.
3. To understand management of equipments used in construction industry.
4. To learn the design & methods of various foundations.
5. To study the design & manufacturing of various types of formwork and prefabricated components
6. To understand the concept of Modular coordination.

Syllabus:

Unit-I

Construction Materials & Concrete: Physical properties of construction materials and testing in field and laboratory as per IS code. Design and production of concrete its manufacture eg. Batching, Mixing, Transporting, Placing compacting and curing. Design and production of high strength Ready mix concrete.

Unit-II

New Construction Materials: Polymeric materials, Polymer concrete, Additives and admixtures in concrete, Light weight, Heavy and no fine concrete, Ferro cement and fiber reinforced concrete, high performance concrete and composite materials, roller compacted concrete.

Unit-III

Construction Equipments: Construction equipments and its characteristics, Operation and selection. Different types of construction equipments eg. Power shovels, drag lines, Scrapper, Bulldozer, Tractor, Rippers, Motor graders, aggregate processing and batching plants, Cycle time and capacity ratings, Sizing and matching, Hot Mix plant, RMC Plant.

Unit-IV

Foundations: Techniques of construction of piles, Cassions, Wells, Cofferdams and diaphragms, Drilling blasting, Underpinning, Shoring and shuttering of foundation.

Formwork: Design and construction of different types of formworks and temporary structures, Stationary and slip formwork techniques, Formwork of special structures eg. Shells, Bridges, Towers etc.

Unit-V

Steel Construction, Prefabrication & Prestressing: Fabrication and erection (Shop and in situ construction techniques). Erection of steel structures like bridges, Chimneys and trusses.

Application of prefabrication in construction Modular coordination and standardization; Special equipments and plants for industrial production of prefabricated components.

Prestressing methods, Special equipments and plants for industrial production of prestressed components.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the advanced elements of buildings, engg. materials & construction.

CO 2: Distinguish the suitability of different foundations in Civil Engineering structure.

CO 3: Evaluate the properties of various types of concrete in construction industry accordingly.

CO 4: Apply various techniques for prefabrication & pre-engineered elements of building and modular coordination and standardization.

CO 5: Design different types of formwork as per their suitability.

CO 6: Describe various methods for design mix of concrete & equipment management.

Reference Books:

1. D. G. Gransberg, C. M. Popescu and R. C. Ryan, Construction equipment management for engineers, estimators, and owners. Taylor & Francis, New York, 2006.
2. R. L. Peurifoy, C. J. Schexnayder, A. Shapira and R. Schmitt, Construction planning, equipment, and methods. 8th ed., McGraw Hill, New York, 2010.
3. V. Shantha Kumar, Concrete, Oxford University press.
4. A.M. Neville. Properties of concrete, Pearson
5. M.L. Gambhir, Concrete Technology, Tata Mc Graw Hill Pub. Co.
6. Soil Mechanics by Gopal Ranjan , New Age Publishers.
7. Mahesh Verma, Construction Equipment, its planning & Application, Metropolitan Book Co.(P) Ltd.,
8. Foundation Design Manual by Narayan V. Nayak
9. Prestressed concrete by Rajagopalan
10. Prestressed concrete by T.Y. Lin
11. Highway Engg by Justo and Khanna.

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Course Code: 510113

Course Name: Contract Management

L	T	P	C
3	-	-	3

Course Objectives:

1. To understand specification writing, rate analysis and estimating.
2. To understand necessity and methods of valuation.
3. To understand role of Architect, Engineer, Contractor and Owner in a construction project.
4. To know about different acts related to construction.
5. To know about various laws related to construction labour.
6. To know about important conditions of contract in construction.
7. To understand the construction contracts used in infrastructure projects.

Syllabus:

Unit-I

Quantity Surveying: Basic principles of estimating. Construction costs. Different methods and stages of estimating. Specification of construction items and method of statement. Principles of rate analysis and valuation.

Unit-II

Claims and Arbitration: Indian contract act and arbitration act. Variations in work and conditions. Claims and disputes. Liquidated damages. Rights. Responsibilities and duties of client (Owner). Architect. Engineer. Contractor etc. Purchase order as contracts insurance contract and claims.

Unit-III

Legal Frame Work of Construction: Contract labors act 1970 and other acts and laws relating to labors management. Wages. Bonus and Industrial disputes.

Unit-IV

Contract Conditions: Important contract clauses. Terms of payments. Retention. Acceptance and final payment. Time of completion. Extension of time. Maintenance period etc.

Unit-V

Construction Contracts: BOT projects. Variation in BOT projects. Infrastructural projects, International contract rules and regulation.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Write the specifications and perform rate analysis of various construction items.

CO2: Prepare estimate of building/road works and valuation.

CO3: Differentiate between rights and responsibilities of Architect, Engineer, Contractor and Owner in a construction project.

CO4: Apply the provisions of various acts and laws applicable in construction.

CO5: Draft tender document for construction project.

CO6: Identify the role of project participants and financing of infrastructure projects.

Reference Books:

1. Construction Engineering and Management by S. Seetharaman, Publisher Umesh Pub.
2. Construction Planning and Management by B. Sengupta, Pub. Tata McGraw-Hill Education
3. Construction and Project Management Theory And Practices by N.K. Jha, Pub. Pearson Education India
4. Construction Contracts by Jimmie Hinze, Publisher Tata McGraw-Hill Education
5. Estimating and Costing by B.N. Datta

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Course Code: 510114

Course Name: Maintenance Management

L	T	P	C
3	-	-	3

Course Objectives:

1. To learn about building services required in a building.
2. To learn about fire fighting systems in buildings.
3. To understand planning and maintenance requirements of lifts in high rise buildings.
4. To understand water management and planning system in a building.
5. To learn maintenance of building services and management of related tasks.

Syllabus:

Unit I

Introduction: Introduction to primary services in a building. Type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors. Outline of the concept of carbon trading and self sustainable zero carbon building. Importance

Unit II

Fire Fighting: Standard fire, fire resistance, classification of buildings. Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings, checklist for fire safety. Provision of NBC.

Unit III

Lifts/Elevators, Escalators: Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.

Unit IV

Plumbing Services Water Supply System: Basics of Plumbing systems. Requirement of Plumbing works, Agency, Activity flow chart for plumbing work. Quality checking of materials. Water supply and distribution system is high-rise building & other complexes, pumps and pumping mechanisms. Operation & maintenance of fittings & fixtures of water supply & sanitary. Do's & Don'ts for water pipe networks.

Unit V

Maintenance and management of services: Telecommunication network, computer network LAN, Electrical network & appliances. Basics of single phase & three phase electrification, precautions and safety measures during electrification. Indian standard codes for electrical appliances & wiring operations & maintenance of network & appliances. Landscaping & Horticulture. Building maintenance management, applications of computer in service management. Flowcharts of air conditioning & heating. Centralised systems, monitoring and working of the equipments, Checklist of inspection, Performance testing. Water proofing. Damp proofing & Termite proofing. Working procedure & stages of work of water proofing for W.C., Bathrooms, Terrace, sloping roof, Basements, tanks. Use of chemicals for water proofingtreatment.

Course Outcome:

Upon completion of the course, the students will be able to:

CO1: Identify various services required in a building.

CO2: Carry out planning of fire fighting system for a building.

CO3: Develop a management strategy for maintenance of building services in a building.

CO4: Design a sustainable building services plan for a building.

Reference Books:

1. Building services Design and Management by Jakie Partman, Willey Blackwell 2014.
2. Building Services Engineering by David V .Chadderton, Routledge 2013.

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Course Code: 510115

Course Name: Infrastructure Development

L	T	P	C
3	-	-	3

Course Objectives:

1. To make them understand the various aspects like operation, maintenance, sustainability, life cycle cost of infrastructure systems.
2. To make them able to develop infrastructure system plan considering various risks.
3. To make them develop disaster management plan for Infrastructure systems.
4. To illustrate use of I. T. Tools for various phases of Infrastructure system.

Syllabus:

Unit-I

Infrastructure and economic development: Energy needs, sources and management. Different types of build infrastructure systems, challenges and opportunities.

Unit –II

Strategic issues in Infrastructure development: Planning, Design and Construction of Infrastructure. Quality control in Infrastructure development. Role of Public PPP in Infrastructure development.

Unit-III

Performance monitoring: Maintenance, Rehabilitation and Renovation of Infrastructure. Life cycle cost analysis of Infrastructure.

Unit-IV

Risk management in Infrastructure projects: Basic components of risk, components of risk management – risk assessment, risk acceptance, treatment, monitoring and communication.

Unit - V

Disaster management of Infrastructure: Application of IT tools in various phases of Infrastructure development.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Develop plan for infrastructure considering operation, maintenance, sustainability and life cycle cost.

CO2: Identify various risks in Infrastructure projects.

CO3: Illustrate management and disaster management needs for Infrastructure systems.

CO4: Apply I. T. Tools in various phases of Infrastructure system.

Reference Books:

1. Infrastructure Develpoment and Financing in India by N Mani Publisher Rediff books,2012
2. Risk Management in Civil Infrastructure by Mohammed M. Ettouney, Shreenivas Alampalli. Publisher CRC Press Taylor and Francis group.2017.
3. Infrastructure Management: Integrating Design, Construction, Maintenance, Rehabilitation and Renovation by W. Ronald Mudson, Ralph Haas . Publisher Mc Graw-Hill.1997
4. Disaster Resillence Management of Infrastructure System: Computational modelingand Geospatial Technologies by W Waheed Uddin Publisher CRC Press LLC.

Course Code: 510116

Course Name: Formwork for Concrete Structures

L	T	P	C
3	-	-	3

Course Objectives:

1. To know about various formworks for concrete structure.
2. To know about various issues in formworks and subsequent solutions.

Syllabus:

Unit-1 Introduction
Introduction to Sheeting, Shuttering, Centering, Staging, Formwork, Scaffolding and False work, Mould. Formwork as a temporary structure. Requirements for a formwork. Classification (Types) of Formwork. Formwork Materials.

Unit-2 Formwork for building components
Formwork for raft foundation, pile foundation, footings, RCC columns, beams, slabs and wall. Formwork area calculation. Various loads and moments on formwork. Slip form and their types.

Unit-3 Formwork for special structure
Formwork for Highways. Formwork for Bridge structures. Formwork for Multi-Story Building Construction. Formwork for precast concrete. Formwork for pre-stressed concrete. Flying formwork and their advantages, disadvantages and limitations.

Unit-4 MIVAN Formwork
Introduction, materials used in MIVAN formwork, parts of MIVAN formwork, Procedure of MIVAN formwork construction, pin and wedge system in MIVAN formwork, Work cycle of MIVAN formwork, Comparison between MIVAN and traditional formwork, Technical specification of MIVAN formwork, advantages and disadvantages of MIVAN formwork

Unit-5 Issues and failure of Formwork
Causes of Formwork Failure. Common deficiency in design leading to formwork failure. A case study on formwork failure. Avoiding formwork failure. Pre-Award and Post -award Formwork Management Issues.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the concept of formworks.

CO2: Explain various types of formworks.

CO3: Evaluate the use of formworks in various structures.

CO4: Assess the failure issues in formworks.

Reference Books:

1. Jha, K.N., Formwork for Concrete Structures, First Edition, McGraw Hill. 2012
2. Austin, C.K., Formwork for concrete, Cleaver - Hume Press Ltd., London, 1996
3. Michael P. Hurst, Construction Press, London and New York. 2003

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Course Code: 510117

Course Name: Organizational Behaviour & Management

L	T	P	C
3	-	-	3

Course Objectives:

1. To know the environment levels in management.
2. To explore the organizational structure and its design.
3. To understand the stress management and communication.
4. To explore the leadership quality for updating the organisation structure.
5. To compare and explore the existing management activity in the world.

Syllabus:

Unit – I:

Nature of Management: Social Responsibilities of Business - Manager and Environment Levels in Management - Managerial Skills - Planning - Steps in Planning Process - Scope and Limitations - Short Range and Long Range Planning - Flexibility in Planning –Characteristics of a sound Plan - Management by Objectives (MBO) - Policies and Strategies.

Unit-II

Organisation: Organisation Structure and Design - Authority and Responsibility Relationships - Delegation of Authority and Decentralisation - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organisational design - Mechanistic vs Adoptive Structures - Formal and Informal Organisation.

Unit – III

Perception and Learning - Personality and Individual Differences - Motivation and Job Performance - Values, Attitudes and Beliefs - Stress Management - Communication Types-Process - Barriers - Making Communication Effective.

Unit – IV

Group Dynamics: Leadership - Styles - Approaches - Power and Politics - Organisational Structure - Organisational Climate and Culture - Organisational Change and Development.

Unit – V

Comparative Management Styles and approaches : Japanese Management Practices Organisational Creativity and Innovation - Management of Innovation - Entrepreneurial Management - Benchmarking - Best Management Practices across the world - Select cases of Domestic & International Corporations - Management of Diversity.

Course Outcomes:

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

- **CO1:** **Explain** the environment levels in management.
- **CO2:** **Analyse** the organizational structure and its design.
- **CO3:** **Apply** the stress management and communication in organization.
- **CO4:** **Develop** the leadership quality for updating the organisation structure.
- **CO5:** **Evaluate** the existing management activity in the world.

Recommended Books:

1. Kast & R. Seuwing : Organisation & Management
2. Singh & T. N. Chabra : Management Concepts & Practices
3. George R. Terry : Principles of Management
4. Anthony : Art of Japanese Management
5. Aswathapa K : Organisational Behaviour

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Course Code: ~~510118~~ 800109

Course Name: Safety & Quality Management

L	T	P	C
3	-	-	3

Course Objectives:

1. To study the basics of quality and safety management.
2. To learn the code of practice in design and construction for quality standards.
3. To understand and evaluate quality and safety management principles and best practices in construction.
4. To understand and evaluate safety management principles in construction;
5. To acquire good basic practices for quality system and progress for quality assurance and quality improvement for construction companies.

Syllabus:

Unit – I

Quality Management: Introduction – Definitions and objectives, Factors influencing construction quality; Responsibilities and authority; Quality plan; Quality Management Guidelines; Quality circles; cost of quality and safety; Quality transition - quality control and inspection; quality assurance; total quality management-principles, tools and techniques; Planning and control of quality during design of structures; Tools and techniques for quality management.

Unit – II

Quality Systems: Introduction - Quality system standard, ISO 9000 family of standards; Requirements-Preparing Quality System Documents; Quality related training; Implementing a Quality system; Third party Certification; Quality assurance in construction; Concepts of quality control- Objectives, definitions, and systems.

Unit – III

Quality Planning: Quality Policy, Objectives and methods in Construction industry; Consumers satisfaction, Ergonomics, Time of Completion, Statistical tolerance, Taguchi'sconcept of quality; Inspection procedures-Processes and products (materials and machinery); Total cost implication.

Quality Assurance and Quality Improvement Techniques:

Objectives of quality assurance; Methods, Techniques and needs of quality assurance; Different aspects of quality Appraisals; Critical, major failure aspects and failure mode analysis; Stability methods and tools; Reliability testing, Reliability coefficient and reliability prediction; Life cycle costing; Value engineering and value analysis; Quality Improvement Tools and Techniques.

Unit – IV

Safety management : Planning for safety provisions, budgeting for safety, safety policy, Safety audit, safety management practices, safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety; Construction hazards and safety guidelines; Overall accident investigation process; Risk management; Prevention techniques for construction accidents; Site management with regard to safety recommendations; Training for safety awareness and implementation; Construction safety and health manual.

Unit-V

Recent trends and Case studies: Quality and safety issues in steel construction, concrete construction (including pre-cast, and pre-stressed); computer aided hazard analysis.

Course Outcomes:

After this course, students will be able to:

CO 1: Explain the quality management systems and utilize the ISO 9000 family of standards.

CO 2: Improve the quality of the project through tools and techniques.

CO 3: Perform the environmental impact assessment (EIA) for construction projects towards quality.

CO 4: Analyse the quality assurance and quality control, quality improvement tools and techniques;

CO 5: Evaluate the contract and inspection procedures.

CO 6: Identify the safety management practices in construction industry.

Reference Books:

1. B. G. Dale, Managing quality,4th ed., Blackwell Publishing, Oxford, 2003.
2. D. Reese and J. V. Eidson, Handbook of OSHA construction safety and health, 2 n d ed., CRC Press, Bocaaton, 2006.
3. F. Harris, R. McCaffer and F. Edum-Fotwe, Modern construction management, 6 t h ed., Blackwell Publishing, Oxford, 2006
4. K. Knutson, C. J. Schexnayder, C. M. Fiori and R. Mayo, Construction management fundamentals, 2 nd ed., McGraw Hill, New York, 2008.
5. S. J. Holt, Principles of construction safety, Blackwell Publishing, Oxford, 2008.
6. The Management and Control of Quality: Sixth edition: James R.Evans, William M.Lindsay.
7. Safety management by John V.Grimaldi Rollin H.Simonds.
8. ISO 9000 family of standards.

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Course Code: 510119

Course Name: Construction Lab

L	T	P	C
-	-	4	2

Course Objectives:

1. To Study and understanding basic knowledge of building materials, such as their identification and classification, relationships between physical characteristics and mechanical properties experimentally measuring them.
2. To understand the role of water in soil and concrete behavior.
3. To understand the concrete mix design and testing; non-destructive testing methods; Studies on simple building system components

List of Experiments:

1. Mix Design of Concrete
2. Permeability Test of Concrete
3. Creep Test of Concrete
4. Measurement of In-situ Strength determination by Rebound Hammer and Moisture content in aggregates, soil and hardened concrete surface using NDT techniques.
5. Unconfined Compression Test
6. Direct Shear Test
7. Static Cone Penetration Test
8. Triaxial Shear Test

   (Unconsolidated Undrained, Consolidated Undrained, Consolidated Drained)
9. Vane Shear Test
10. C.B.R Test of Soil
11. Consolidation Test
12. SPT Test (Demonstration)
13. Marshall stability test of bitumen

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Check physical properties of soil, aggregate, and concrete.

CO2: Check strength properties of soil, aggregate, and concrete.

CO3: Differentiate the flow properties and stresses of soil.

CO4: Apply various non-destructive testing method on concrete.

Reference Books:

1. Metha P.K and Monteiro. P.J.M, " CONCRETE", Microstructure, Properties and Materials, Third Edition, Tata McGraw- Hill Publishing company Limited, New Delhi, 2006
2. Shetty .M.S., " Concrete Technology, Theory and Practice", Revised Edition, S. Chand & company Ltd., New Delhi,2006
3. Neville. A.M., " Properties of Concrete", 4th Edition Longman,1995
4. Soil Mech. & Found. Engg., Dr. K. R. Arora, Std. Publishers Delhi, 7th edition2014
5. Soil Mech. & Foundation, Dr. B. C. Punmia, Laxmi Publications, Delhi, 16th edition2017
6. Soil Mech. & Found Engg., S. K. Garg, Khanna Publishers, Delhi, 1st edition, 2003
7. Soil Testing for Engg., T.W. Lambe, John Wiley & Sons. Inc., 1969

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Course Code: 510211

Course Name: Projects Economics & Financing

L	T	P	C
3	-	-	3

Course Objectives:

1. To understand managerial economics.
2. To understand demand analysis and forecasting in construction industry.
3. To understand Time value of money and Cost of Capital.
4. To understand budgeting of construction projects.
5. To understand selection and evaluation of construction projects.
6. To understand project financing and risk.
7. To understand the accounting processes in construction industry.

Syllabus:

Unit-I

Basic Economic Theories: Principles of managerial economics. Economic theories. Demand analysis and forecasting. Demand elasticity. Cost and production analysis. Production function. Pricing decisions. Policies & practice.

Unit-II

Money: Time value of money. Different methods & comparisons. Cash flow, discounted cash flow, cash flow forecasting. Financial ratios and statements.Cost of Capital.

Unit-III

Capital Budgeting: Working capital. Capital budgeting and performance budgeting. Break even analysis. Project selection. Project appraisals

Unit-IV

Project Financing: Means of Finance, Financial institutions in India, Policies of financial institutions, Financial assistance, Special schemes, Project risk

Unit-V

Financial Accounting: Book keeping processes of construction industry. Accountancy cycle. Journals. Forms and ledgers etc. for accounting and monitoring labour, equipment and material costs. PWD accounting procedure and types of financial statements in Government.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Apply principles of managerial economics.

CO2: Perform demand analysis in construction sector.

CO3: Workout time value of money and cost of capital.

CO4: Analyze break-even point and appraisal of projects.

CO5: Determine appropriate means of financing a project.

CO6: Monitor the various cost components of construction projects by using accounting procedures.

Reference Books:

1. Project Planning, Analysis, Selection, Financing, Implementation & Review by Prasanna Chandra, Publisher Tata McGraw-Hill Education.
2. Engineering Economics & Analysis, by Donald G Newnan, Publisher Oxford University Press.
3. Economic Theory and The Construction Industry by P. Hillebrandt, Publisher Palgrave Macmillan UK
4. Construction Economics: A New Approach by Danny Myers, Publisher Routledge
5. Construction and Project Management Theory And Practices by K.N. Jha, Publisher Pearson Education India
6. Construction Project Management: Planning, Scheduling and Controlling by K.K. Chitkara, Publisher Tata McGraw-Hill Education

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Course Code: 510212

Course Name: Construction Cost Management

L	T	P	C
3	-	-	3

Course Objectives:

1. To know about the trade-offs in construction projects.
2. To explore the time cost trade-off.
3. To understand the multi-objective optimization techniques.
4. To discuss the MCDM methods.
5. To apply the value engineering and productivity in construction.

Syllabus:

Unit-I

Trade off Analysis in construction project: Development of Network. Time-cost trade off curves. Non – convex discontinuous and discrete cost time trade – off curves. Crashing of projects. Resource-constrained project scheduling. Multi-objective trade-off problems. Introduction to deterministic, heuristic and meta-heuristics methods for making multi-objective trade-off. Siemen's method of project cost curve.

Unit – II

Multi criteria Decision Making Methods: Analytical Hierarchy Process, and its application in planning and management, Introduction to Fuzzy Set Theory and its Application in MCDM.

Unit-III

Multi-objective optimization methods: Single and multi-objective optimization problems. Pareto-optimality. Introduction to NSGA. Selection. Crossover. Mutation. Non-dominated Sorting. Differences among GA, MOGA, NSGA, NSGA-II. Particle Swarm Optimization. Particle and its position. Local best and global best position. Updating the position of particle. Multi-objective PSO.

Unit-IV

Productivity in Construction: Definition of Productivity. Productivity measurements. Productivity of production components, Labors, Equipment and Material Capital Productivity. Need for Productivity Planning – Short term and long term productivity planning, Productivity improvement approaches, Productivity Improvement techniques – Technology based, Material based, Employee based and Product based

Unit-V

Value Engineering: Principles of value engineering in Project Management, Value engineering team, Value engineering technique, Job Plans, Role of value engineering in productivity, Life cycle costing and its applications.

Course Outcomes:

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

CO1: Explain the concept of trade-off in construction.

CO2: Analyze the trade-off phenomenon in construction using MCDM.

CO3: Evaluate the multi-objective trade-off problems using metaheuristic methods.

CO4: Apply the value engineering and LCC in construction projects.

CO5: Evaluate the labour, material and equipment in construction productivity.

Recommended Books:

1. **Golden**, Bruce L., **Wasil**, Edward A., **Harker**, Patrick T. (Eds.) The Analytic Hierarchy Process, Springer.
2. Joseph J. Moder., PROJECT MANAGEMENT with CPM, PERT and Precedence Diagramming.
3. S. Rajasekaran. and G.A. VijayalakshmiPai, "Neural Networks, Fuzzy Logic, and Evolutionary algorithms". Eastern Economic edition.
4. Kalyanamoy Deb, "Multi-objective optimization using evolutionary algorithms". Wiley.
5. Sumanth, D.J, Productivity Engineering and Management, TMH, New Delhi, 1990
6. Sudit, Ephraim F., "Productivity Based Management", Springer 1984
7. Alphonse Dell'Isola, "Value Engineering: Practical Applications for Design, Construction, Maintenance & Operations", R S Means Co., 1997.
8. Richard Park, "Value Engineering: A Plan for Invention", St. Lucie Press, 1999.

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Course Code: 510213

Course Name: Construction Project Management

L	T	T	C
3	-	-	3

Course Objectives:

1. To know about the basic of project management and project organization.
2. To understand the project planning process, project networks and its analysis through CPM.
3. To understand the method of PERT and Precedence Network analysis for scheduling of const.
4. To plan and manage the resources and discuss the cost control in project's perspective.
5. To discuss the material, inventory and risk management in construction.

Syllabus:

Unit-I

Project Management: Construction Project and its phases. Importance of construction and construction Industries. Construction Project Management and its Relevance. Stakeholders of construction project. Management Information System and its Application in Construction.

Project Organization: Construction Organizations and its forms. Structure of Construction Organization. Management Levels. Traits of a Project Manager. Ethical Conduct for Engineers. Factors behind the success of construction projects and construction organizations. Introduction to Claim, Dispute and Project Closure.

Unit – II

Project Planning and Network Analysis: Introduction to Project Planning Process. Types of Project Plans. Network techniques- Gantt Chart, Mile stone Chart, Work Breakdown structure, AOA & AON networks. Event and Activities. Numbering of events. Event times – Earliest events time and latest event time. Slack, critical events. Activity times – Earliest start time, Latest finish time, Float and critical activities. Network critical path and its significance. Network analysis by CPM – Defining scope of work, determining activities, preparation of network logic program and draft network. Development of structured network using network drawing rules, Numbering of events and computation of critical path. Numericalproblems.

Unit-III

PERT: Introduction to PERT. Difference between CPM and PERT. Uncertainty in project duration estimation. Three time estimate in PERT. Frequency distribution curves for activity duration. Computation of expected time, standard deviation and variance. Critical limit theorm and critical parth determination. Event time, slack and computation of completion probability of project.

Precedence Network (PN): Introduction to PN. Precedence relationship between activities. Precedence Network Analysis – Modeling procedure analysis of time in PN. Use of PN in repetitive works network. Difference between PN and CPM.

Unit-IV

Resource Planning: Planning construction Manpower, Scheduling Construction site workers. Planning Construction Materials quantity estimation. Constrained and unconstrained resource scheduling. Resource usage profile, Resource smoothing. Resource leveling.

Cost Control: Project cost, Direct and indirect, slope of direct cost curve, Total project cost and optimum duration, Contracting the network for cost optimization. Escalate & Variation in prices.

Unit-V

Materials & Inventory Management: Introduction to Material management. Material Procurement Process. Material Management Functions. Inventory management in construction.

Risk and Insurance in Construction: Introduction toRisk and Risk Management in construction. Risk Identification Process. Risk Analysis and Evaluation Process. Risk Treatment Strategies. Different Insurances in Construction Companies.

Course Outcomes:

After successful completion of the course, the students will be able to:

CO1: Identify the various approaches of project management and organization structure.

CO2: Classify the various project network techniques and its applicability in project management.

CO3: Analysis and schedule the project using PERT and PN method.

CO4: Determine the applicability of resources and finding the optimum cost and optimum project duration.

CO5: Apply the concepts of material, inventory and risk management tools in construction project.

Reference Books:

1. Construction Project Management by K.N Jha
2. C.P.M & PERT by L.S. Srinath.
3. Construction Management by Sen & Gupta.
4. Project Planning and control with PERT and CPM by BC Punmia, K. K. Khandelwal.
5. CPM & PERT by Weist& Levy
6. DDOT Construction management Manual.
7. Poject Management and design administration manual by Design construction division.
8. Construction Project Management Handbook: Federal Transit Administration -US

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Course Code: ~~5102**~~ 800208

Course Name: Sustainable Material & Green Building

L	T	P	C
3	-	-	3

Course Objectives:

1. To study the properties of various types of sustainable materials in construction.
2. To learn the code of practice and guidelines for green buildings.
3. To select of different types of sustainable construction practices.
4. To understand the alignment of the current practices with the sustainable development goals.
5. To learn the field problems of sustainability in the construction sector.

Syllabus:

Unit-I

Sustainable Materials: Sources, methods of production and environmental Implications of building materials; Embodied Energy in Building Materials: Transportation Energy for Building Materials; Maintenance Energy for Buildings; Material cycles in construction, life Cycle impacts of materials and products, life cycle assessment of buildings; Resources for Sustainable Building Materials.

Unit-II

Green Buildings: Concept of Green building, Principles of green buildings, Bureau of energy efficiency: Functions, policies, guidelines, Energy Conservation Building Code; Certification systems – Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED), transforming the existing buildings to sustainable buildings based on GRIHA EB Manual: Criteria and their weightage, site parameters, maintenance and housekeeping, energy, water efficiency, human health and comfort.

Unit-III

Green Construction Practices& Technologies: Comparative analysis between the traditional and sustainable construction practices, Concrete versus steel technology suitability; Life cycle analysis of technologies; Sustainable Construction Technologies; Waste-based /recycled materials and technologies.

Unit-IV

Sustainable Development Goals and Policies: Sustainable consumption and production (Goal 12), Sustainability issues for concrete, Operational energy in building role of materials and thermal

conductivity, Recycling of Industrial and Buildings Wastes, Biomass Resources for buildings, Need and framing of Policies and action plans to reduce construction and demolition waste.

Unit-V

Recent trends and Case studies:

Case studies and examples: Study of existing green buildings-Energy auditing; Green building approaches on field through case studies; Performance rating systems; Environmental impact studies of building projects.

Recent Trends: Introduction to softwares used in green buildings, carbon calculators, Role of Building Automation and performance enhancement, Integrated building management system.

Course Outcomes:

After this course, students will be able to:

CO 1: Explain the properties of various types of sustainable materials used in construction industry accordingly.

CO 2: Distinguish the suitability of sustainable and green practices in construction sector.

CO 3: Perform the environmental impact assessment (EIA) for construction projects towards quality.

CO 4: Assess an existing building on the norms available by GRIHA for transforming existing buildings to sustainable buildings.

CO 5: Examine the impact of building materials choices by auditing the resources used to maintain the materials in their building and discussing the economic, environmental, and health impacts.

CO 6: Identify the potential of construction and demolition wastes in order to meet the sustainable development goals.

Reference Books:

1. Green Rating for Integrated Habitat Assessment (GRIHA) guidelines
2. Energy Conservation Building Codes: www.bee-india.nic.in
3. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, Green Building, Handbook, Volume I, Spon Press, 2003
4. Kibert, C. "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2005
5. Chaturvedi, Swati, and John Ochsendorf. "Global Environmental Impacts due to Cement and Steel." *Structural Engineering International* (August 2004)
6. Jerry Yudelson Green building Through Integrated Design. McGraw Hill. 2009.
7. Fundamentals of Integrated Design for Sustainable Building by Marian Keeler, Bill

Burke

8. Renewable Energy and Environment -A Policy Analysis for India, H. Ravindranath, K Usha Rao, B Natarajan, P Monga, Tata McGraw Hill, 2000
9. Gambhir M.L., Neha Jamwal, Building Materials: Products, Properties and Systems, McGraw Hill Education(India) Private Limited, 2014.
10. Varghese P.C., Building Materials, PHI Learning Pvt. Ltd., Delhi, 2015.
11. Advances in Building Materials and Construction, Central Building Research Institute, Roorkee, 2004.
12. Duggal S.K., Building Materials, New Age Publishers, 2012
13. Rangwala, Engineering Materials, Charotar Publishers, 2015

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Course Code: 510219

Course Name: Computational Laboratory For Construction Management

L	T	P	C
-	-	4	2

Course Objectives:

1. To know and apply the use of software in construction projects such as MATLAB, Primavera, BIM 4D, MS PROJECT and Excel

List of Experiments:

1. Introduction to MATLAB and its application.
2. MS Project and its application.
3. Primavera and its application in networking and scheduling.
4. Basics of BIM 4D.
5. Excel and its application.
6. Case study analysis using Primavera, BIM 4D and MS Project.

Course Outcomes:

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

CO1: Apply MATLAB in Construction Projects

CO2: Apply Primavera and MS project in Construction Projects.

CO3: Apply BIM 4D in Construction Projects.

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Course Code: 530111

Course Name: Environmental Chemistry & Microbiology

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To impart knowledge of environmental chemistry and its concepts.
2) To apply concepts of environmental chemistry in various analysis of water and waste water.
3) To impart knowledge of environmental microbiology and its concepts.
4) To apply concepts of environmental microbiology in various analysis of water and waste water.

Syllabus:

Unit I:

Environmental Chemistry

Basic Principles: Physical and chemical properties of water and their significance in environmental engineering- Types of chemical reactions – stoichiometric calculations – solutions – chemical equilibrium. Acid-base equilibria – alkalinity, acidity, buffers and buffer index – Chemical thermodynamics – Oxidation-Reduction – Mass transfer and transport of impurities in water and air – diffusion, dispersion – Physical and chemical interactions due to various forces, suspensions and dispersions.

Unit II:

Analysis: Basic concepts of quantitative analytical chemistry – Instrumental methods of analysis – Determination of turbidity, colour, pH, acidity, alkalinity, hardness, residual chlorine and chlorine demand, chlorides, dissolves oxygen demand, nitrogen, solids, iron and manganese, fluoride, sulphate, phosphorous and phosphate, grease, volatile acids, gas analysis – Preparation of standard solutions – Drinking water and wastewater standards – Trace organics and inorganics.

Unit III:

Environmental Microbiology

Introduction: Microorganisms – Classification, prokaryotic and eukaryotic cells, structure, characteristics, nucleic acids, DNA and RNA, Viruses, their detection and quantification – Microscopy – Measurements and isolation of Microorganism – Different Cultures – Media and Techniques of Staining and Enumeration of microorganism.

Unit IV:

Microbial metabolism and growth: Enzyme and enzyme kinetics – Metabolism – Respiration – Fermentation – Glycolysis – Kreb's cycle – Carbohydrate – Protein, lipids, significance of energetic – Chemical composition of cell and nature of organic matter used by microorganisms – Metabolic classification of microorganisms: phototroph, chemotroph, applications in environmental engineering.

Unit V:

Microbiology of water and wastewater: Distribution of microorganisms in natural water – Indicator organisms – Coliforms – Faecal coliforms – E.coli, streptococcus faecalls – Differentiation of coliforms – Significance – MPN – M.F. techniques – Microbiology of waste-water treatment processes such as activated sludge process – Trickling filter – Anaerobic processes.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of environmental chemistry & microbiology.

CO 2: Apply the concepts of environmental chemistry in environmental engineering.

CO 3: Analyse water and waste water quality parameters using the concepts of environmental chemistry.

CO 4: Apply the concepts of environmental microbiology in environmental engineering.

CO 5: Explain the concepts of energy generation in cells.

Books Recommended:

1. Maier R.M. Pepper I.L and Gerba C.P. Environmental Microbiology, Elsevier- AP, New York 2009.
2. Pelczar Jr, M.J., Chan E.C.S., Krieg R.N., and Pelczar M.F., Microbiology, Tata McGraw-Hill, New Delhi, 1996.
3. Sawyer C.N., McCarty P. L., and Parkin G.F., Chemistry for Environmental Engineers, McGraw-Hill, New Delhi, 1994.
4. Benefield, Judkins and Weand – Process Chemistry for Water and Wastewater Treatment, Prentice Hall, New Delhi, 1996.
5. Rittman B. McCarty P.L., and McCarty P., Environmental Biotechnology: Principles and Applications, McGraw-Hill, New Delhi, 2000.

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Course Code: 530112

Course Name: Solid and Hazardous Waste Management

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of waste management system in a smart city/town.

2) To understand the principles applied in waste management.

3) To understand various ways to collect, treat & disposal of waste.

4) To understand various methods of energy recovery from waste.

5) To understand various aspects of hazardous waste management, E-waste management, biomedical waste management etc.

Syllabus:

Unit I:

Introduction: Introduction to waste management, classification of solid waste, objective of solid waste management. Solid waste sources – Nature and characteristics (physical, chemical & biological) – Quantities and Qualities – Generation rates – Potential of disease – Nuisance and other problems.

Unit II:

Collection and Storage: Solid waste management – Functional elements of solid waste – on – site storage – Collection and separation – Containers and its location – Collection systems and its example – Vehicle routing – Route balance – Transfer station – Processing – Recovery and reuse.

Unit III:

Processing of Municipal Solid Waste: Conveying and compacting waste – Shredding – Types of shredders – Material separation – Types – Devices for material separation – Thermal processing of municipal solid waste – incineration, pyrolysis, gasification – Refuse Derived fuel – Biological process like composting, Vermicomposting and biomethanation.

Unit IV:

Disposal: Disposal methods – Sanitary land filling – Planning – Site selection – Design – Landfill Process – Monitoring Closure – Post closure monitoring – leachate management & control of gases in landfills, environmental monitoring of landfills. MSW rules, Introduction to swachh bharat mission and smart cities program - current status, challenges and future trend of waste management.

Unit V:

Hazardous Waste Management: Introduction to hazardous waste - Definition – Characterization and composition – TCLP test – Storage and transportation of hazardous waste – Labeling of hazardous waste – Physical, Chemical and Biological treatment of hazardous waste – Bioremediation of hazardous waste – Treatment of Bio medical – Nuclear waste and Radio – Active waste – Fly ash management and E-waste management.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles & concepts of waste management.

CO 2: Apply various techniques of handling the waste.

CO 3: Apply various techniques of energy recovery from waste.

CO 4: Plan an effective & efficient waste management system.

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A, Vigil, George Tchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid Waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003
4. Charles A. Wentz, Hazardous Waste Management, McGraw Hill, New York. 1995.
5. David Rimbers, Municipal Solid Waste Management: Pollution Technologies Review, Noyes Data Corporation, London, 1990.
6. Michael D. Lagrega, Philip L. Buckingham, Jeffrey C. Evans. Hazardous Waste Management McGraw Hill, New York. 1994.

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Course Code: 530113

Course Name: Advanced Treatment Process – I (Waste Water Engineering)

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To impart basic knowledge on sewerage system including estimation of sewage quantity & design of sewers.
2) To provide a broad knowledge on sewage composition & its characteristics.
3) To provide information on disposal standards of effluents & also about various methods of sewage disposal.
4) To provide broad knowledge on various techniques of sewage treatment including advanced processes.

Syllabus:

Unit I:

Estimation of sewage flow, fluctuations in flow, estimation of storm water quantity, self cleansing velocity, systems of sewerage, design of sanitary sewer & storm water sewer, sewer materials, sewer appurtenances, construction & maintenance of sewer lines, sewage characteristics.

Unit II:

Conventional municipal waste water treatment flow sheet, functions of different unit process, unit operations, treatment requirements. Preliminary treatment: screening, grit removal, design of screen, grit chamber. Primary Treatment: principles of sedimentation, design of sedimentation tanks and skimming tanks. Biological Treatment: principles & objectives of biological treatment, types of biological treatment, fundamentals of process kinetics, kinetics of biological growth, reactors – classification, selection, aspects of reactor design.

Unit III:

Attached & suspended growth biological treatment system, design of activated sludge process, trickling filters, oxidation ponds, septic tanks, imhoff tanks, rotating biological contactors, aerated lagoon, oxidation ditch, anaerobic treatment – UASB process, anaerobic filters, anaerobic digester, anaerobic lagoons.

Unit IV:

Advanced waste water treatment: requirement of tertiary treatment, disinfection, nitrogen removal, phosphorus removal, adsorption, removal of dissolved inorganic substances using various filtration techniques like R.O., ultra filtration etc, electrodialysis. Recent techniques of waste water treatment – MBBR, MBR, SBR, constructed wetlands.

Unit V:

Sludge treatment: sources of sludge, sludge quantity & quality, sludge thickening and digestion, various methods of sludge treatment, sludge drying beds, sludge disposal.

Sewage disposal: stream & effluent standards for various purposes, dilution methods, natural purification of stream, oxygen sag curve & its analysis, disposal of sewage on land, methods of sewage farming.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of waste water engineering & treatment.

CO 2: Determine the requirements of safe disposal of sewage.

CO 3: Apply various techniques for treatment of sewage.

CO 4: Apply various techniques of sludge treatment and disposal.

CO 5: Design sewage system for safe disposal of sewage.

Text Books:

1. Sewage Disposal & Air Pollution Engineering, S. K. Garg, Khanna Publishers, 2016
2. Metcalf & Eddy, Inc. Wastewater Engineering, Treatment and Reuse. 3rd Edition, Tata McGraw-Hill, New Delhi, 2003.

Reference Books:

1. Waste Water Engineering, B.C. Punmia, Laxmi Publication.
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, New Delhi
3. Wastewater Treatment Plant, Planning Design & Operation, S.R. Qasim, CRC Press, 1998
4. CPHEEO, Manual on Sewerage and Sewage Treatment, Ministry of Urban Development, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2013.

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Course Code: 530114

Course Name: Industrial Waste Management

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To provide broad knowledge on various methods of sewage disposal, their effects on water pollution & also provide information on various disposal standards.
2) To learn the basics of sewage composition & its characteristics.
3) To provide knowledge on various waste water treatment techniques.
4) To provide broad knowledge on common effluent treatment plants, wastewater reuse, waste audit.
5) To provide information about various existing waste treatment & management techniques of various industries.

Syllabus:

Unit-I:

Effects of wastes on streams and sewage treatment plant, natural purification of streams, oxygen sag curve, allowable organic load on streams, classification of stream, stream standards and effluent standards requirement of water for different purposes.

Unit-II:

Sampling of waste waters, Grab, Composite and Integrated samples, analysis of waste water, Biochemical Oxygen Demand, Chemical Oxygen Demand and pH value of waste water, Toxicity of waste by Bioassay method.

Pre-treatment of Wastes: Volume and strength reduction, source reduction of wastes, salvage of materials, recovery of by products, reuse of waste water.

Unit-III:

Equalization, Neutralization, Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge treatment & disposal, Advance methods of treatment such as Adsorption, Reverse Osmosis, Ion Exchange Process, Electro Dialysis, etc.

Unit-IV:

Industrial Waste water and environmental impacts, Industrial waste survey, Industrial and common effluent treatment plants, zero effluent discharge systems, Waste management approach, Waste Audit – Evaluation of pollution prevention options.

Unit-V:

Brief study of industrial processes and treatment methods of waste water from common industries such as Textile, Dairy, Paper and pulp, Tannery, Distillery, petrochemicals, pharmaceuticals, fertilizers, cement & food processing.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain basic concepts of industrial waste management.

CO2: Evaluate the effects of industrial waste on streams as per the standards.

CO3: Determine the requirements for safe disposal of sewage.

CO4: Apply suitable techniques for reduction & treatment of industrial waste & sludge.

CO5: Explain waste management techniques of different industries.

Text Books:

1. Industrial Waste Water Treatment – A.D. Patwardhan, PHI, Delhi
2. Waste Water Engg. – Treatment Disposal & Reuse – Metcalf & Eddy – Tata Mc Graw Hill, New Delhi
3. Industrial Water Pollution Control – W.W. Eckenfelder, McGraw Hill, 1999.

Reference Books:

1. Wastewater Treatment – M.N. Rao & Dutta, Oxford & IBH Publishing House, New Delhi.
2. Waste Water Treatment – Arceivala – Tata Mc Graw Hill, New Delhi, 2006.
3. Industrial Waste Water Management hand book – N.S. Azad, Tata Mc Graw Hill, New Delhi
4. Pollution Control in Process Industries – Mahajan, Tata McGraw Hill, Delhi, 1984
5. Liquid Waste of Industries – Theories, Practice and Treatment – N.L. Nemerow, Wesley Publishing Co.

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Course Code: 530115

Course Title: Environmental Auditing & Management System

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To provide broad knowledge on various aspects of environmental management system.
2) To understand the principles of environmental auditing and complete process.
3) To apply the concepts of LCA in environmental management.
4) To understand the EMS approach and ISO.
5) To understand various concepts of social accountability.

Syllabus:

Unit I: Concepts of Environmental Audit, objectives of audit, types of audit, features of effective auditing, audit criteria, elements of audit process, planning and organizing audits, pre-visit data collection, audit protocol, onsite audit, data sampling, inspection, evaluation and presentation, exit interview, audit report, action plan, management of audits, waste management contractor audits, environmental statement.

Unit II: Environmental audit in Industrial projects, case studies of environmental audits, Life cycle assessment approach (LCA), life cycle costing, eco labeling, stages in LCA of product, procedures for LCA, applications of LCA, sustainable approach towards environment management, green building & green energy concepts and management.

Unit III: Environmental Management Systems Approach (EMS): Introduction, principles & elements of successful environmental management, basic concepts of EMS approach, ISO principles, essential elements of an EMS & ISO 14001, benefits of an environmental management system, creating an EMS in line with ISO 14000.

Unit IV: Environmental Management Planning, EMS development and implementation project and plan, measurement and evaluations required for an EMS, environmental management reviews and improvements, legal and regulatory concerns, Integrating ISO 9000 & ISO14000, EMAS.

Unit V: Social Accountability: requirements, social accountability (SA) 8000 certification, elements of social management system, social policy, planning, implementation, business benefits, corporate social responsibility (CSR), different models.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Illustrate the process of environmental auditing.

CO2: Demonstrate the environmental audit process in industry and other projects.

CO3: Explain the concepts of environmental management system approach through ISO guidelines.

CO4: Apply various environment management methodologies like LCA, social accountability.

CO5: Develop EMS in organizations and improve the existing EMS system.

Text Books:

1) A. K. Shrivastava, Environmental Auditing, APH Publishing, 2003.

2) T.V. Ramachandra, Vijay Kulkarni, Environmental Management, TERI Press, 2009

3) Richard Welford, Corporate Environmental Management, Universities Press (India), 1996

4) Christopher Sheldon, Environmental Management Systems, Routledge Edition, 2006

5) Mitlon P Dentch, ISO 14001:2015 Implementation Handbook, ASQ, 2017

Reference Books:

1) R. D. Tripathi, An Introduction to Environmental Audit, Alfa Publication.

2) Vasanthakumar, N.Bhat, Total Quality Environmental Management : An ISO 14000 Approach, Praeger publishers, 1998

3) Alan S. Morris, ISO 14000, Environmental Management Standards, Wiley International, 2003.

4) Syed Imtiaz Haider, Environmental Management System ISO 14001:2004, CRC Press, 2010

5) Deborah Leipziger, Social Accountability SA8000, Viva Books Private Limited, 2010

6) B Banerjee, Corporate Environmental Management, PHI Publications, 2009.

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Course Code: 530116

Course Name: Environmental Hydraulics

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To understand the concepts of fluid mechanics and apply them in pipe flow calculations.

2) To understand the principles of open channel flow and apply them in sewer system design.

3) To apply concepts of hydrology in estimation of storm water and its design.

4) To understand concepts of ground water hydraulics.

5) To understand concepts of pollutant transfer and estimation of pollution load in water bodies.

Syllabus:

Unit I:

Introduction to concepts of fluid flow – continuity equation, energy principle, momentum principle, frictional head loss, flow through pipes, major and minor energy losses in pipes, hydraulic gradient and total energy line, flow through pipe in series, parallel, equivalent pipe, water hammer pressure, design of water distribution pipe network using hardy cross method and equivalent pipe method.

Unit II:

Open channel flow and its classifications, critical flow computations, sub critical flow, super critical flow, uniform flow, gradually varied flow, most efficient/economical sections in channel, specific energy, hydraulic jump, hydraulic elements of sewer & design of sewers.

Unit III:

Introduction to Hydrology, Hydrological cycle, Precipitation measurement and analysis of data, runoff and its estimation, hydrograph – unit hydrograph, s-curve hydrograph, synthetic hydrograph, rational method, estimation of storm water quantity and design of storm water sewers.

Unit IV:

Ground water estimation & well hydraulics – confined & unconfined aquifers, governing equations for yield of well (Thiem's & Dupuit's), well loss & specific capacity, ground water recharge. Transport & transformation of contaminants in groundwater: processes, governing equations, and initial and boundary conditions, solution of simple cases.

Pumps and their classification, pump performance curves, selection of pumps, head, power & efficiency of pumps, economical diameter of rising main, pumping station and their designs.

Unit V:

Introduction to Pollutant transport process in surface water, standards for pollutant disposal in surface water, factors affecting pollutant transport and mixing in river – dilution, dispersion, oxidation, reduction etc., zone of pollution in river, mixing mechanism in river, sag curve, streeter phelps equation. Introduction to various software's for design of pipe networks & sewer lines.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Apply fluid mechanics principles in analysis and design of pipe flow.

CO 2: Apply principles of hydraulics for design of sewer lines.

CO 3: Apply principles of surface water hydrology for design of storm water sewer.

CO 4: Estimate groundwater quantity and pollution load on groundwater and surface water.

CO 5: Apply the principles of hydraulics in design of pumping stations and estimation of pollution load on rivers.

Text Books:

1. Sewage Disposal & Air Pollution Engineering, S. K. Garg, Khanna Publishers, 2016
2. Water Supply Engineering, S.K. Garg, Khanna Publishers, 2016
3. Hydraulics & Fluid Mechanics, P.N. Modi & S.M. Seth, Standard Publishers, 2017

Reference Books:

1. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, New Delhi
2. CPHEEO, Manual on Sewerage and Sewage Treatment, Ministry of Urban Development, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2013.
3. CPHEEO, Manual on Water Supply and Treatment, Ministry of Urban Development, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 1999.
4. Fluid Mechanics, A.K. Jain, Khanna Publishers, 2004.

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Course Code: ~~5301~~ 800110

Course Name: Sustainable Waste Management System

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To develop an understanding about the concepts of sustainability & sustainable development.

2) To understand the concepts of water conservation techniques.

3) To understand the concepts of wetlands & other natural wastewater treatment system.

4) To provide knowledge on various low cost sanitation methods & other sustainable waste management techniques.

5) To provide an insight into sustainable design of buildings.

Syllabus:

Unit I:

Introduction: Concept of sustainability in water and waste management, sustainable development, guidelines and strategies for implementing sustainable development, Pollution prevention & Cleaner production in achieving sustainability, Environmental indices - Bio remediation.

Unit II:

Water Conservation: Rainwater Harvesting – Roof water harvesting – Technology – Quality – Health issues – Groundwater recharge – Techniques – Case studies – Wastewater reuse and reclamation.

Unit III:

Natural Wastewater Treatment Systems: Centralized Vs decentralized – Natural and constructed wetlands – Different types – Mechanisms – Performance – Design – Case studies – Land treatment systems.

Unit IV:

Low-Cost Sanitation: Dry sanitation methods – Pit latrines – VIP latrines – Aquaprivy – Septic tank.

Organic Solid Waste Management Techniques: Composting/ Vermicomposting – Biogas technology – Plasma technology

Unit V:

Green Design: Green buildings - benefits and challenges; public policies and market-driven initiatives; Effective green specifications; Energy efficient design; Passive solar design; Green power; Green materials and Leadership in Energy and Environmental Design (LEED)

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Illustrate the concepts of sustainability & sustainable development.

CO2: Apply various methodologies of water conservation in field.

CO3: Apply various natural methodologies of wastewater treatment like wetlands.

CO4: Apply various low cost sanitation & other waste management techniques.

...ble and green design of buildings.

...ooks E.J., Reed S.C., Natural wastewater Treatment Systems, CRC Taylor ...

...Bradley R. Environmental Health Engineering in the Tropics; John Wiley & ...

...al Handbook on Public Health Engineering, Deep Publishers, Simla, 2003.

...ed, D.N and Harrison, S.L., Environmental Systems – An Introductory ..., Prentice Hall, London, 1994.

...cal Degradation of Wastes, Elsevier Appl. Science, New York, 1991.

...rgy Efficient Buildings in India, TERI

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Course Code: 530118

Course Name: Environmental Engineering Lab

L	T	P	Credit
0	0	4	4

Course Objectives:

1) To acquire knowledge of various types of sampling, its procedure including its preservation.
2) To acquire skills to determine various physical, chemical & biological characteristics of water.

Syllabus:

Introduction to Sampling Procedure, Types of Sampling, Collection of Samples & Preservation of Sample.

List of Experiments:

1. Determination of physical characteristics of water sample (pH, Turbidity, Total Solids (Suspended & Dissolved Solids), Electrical Conductivity)
2. Determination of Acidity & Total Alkalinity of water sample.
3. Determination of Total Hardness, Calcium Hardness, Magnesium Hardness of water sample.
4. Determination of Chloride of water sample.
5. Determination of Sulphate of water sample.
6. Determination of Available Chlorine in bleaching powder & Residual Chlorine of water sample.
7. Determination of Nitrate & Phosphate of water sample.
8. Determination of Optimum Dosage of Coagulants using Jar Test.
9. Determination of MPN of water sample.
10. Application of Plate Count Method for bacterial growth.
11. Study on Gram Staining Technique.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water samples.

CO 2: Check various water quality parameters.

CO 3: Improve the water quality by suggesting suitable corrective measures.

CO 4: Train others on various ways of improving the quality of water.

Reference Books:

1. Water Supply Engineering, S.K. Garg, Khanna Publishers, New Delhi, 2017.
2. Sawyer C.N., McCarty P. L., and Parkin G.F., Chemistry for Environmental Engineers, McGraw-Hill, New Delhi, 1994.

3. BIS 3025 Methods of Sampling & Test for Water & Waste Water, BIS 1622.
4. APHA Standard Methods for Examination of Water & Waste water, 2012.

Course Code: 530211

Course Name: Air Pollution & Noise Pollution

L	T	P	Credit
3	0	0	3

nowledge on various sources & effects of air pollution.

chniques to control air pollution and apply them.

e on air quality standards, monitoring of air quality.

nowledge on sources, effects of noise pollution & also how to reduce the

Introduction

Definition of Air Pollution, Sources and classification of air pollutants – Man made – Natural sources – Type of air pollutants – Pollution due to automobiles, Units of measurements of pollutants, Air quality criteria – emission standards – National ambient air quality standards – Air pollution indices – Air quality management in India, Air pollution survey, Air pollution from major industrial operations, Air pollution in Indian cities, Major Air pollution episodes, Air Act.

Pollution:

Analysis of air pollutants – Chemical, Instrumental and biological methods, Air pollution and its effects on human beings, plants and animals – Economic effects of air pollution – Effect of air pollution on meteorological conditions – Changes on the Meso scale, Micro scale and Macro scale, Global Warming, Acid Rain, Ozone Layer Depletion, Indoor Air Pollution & Occupational Diseases.

Sampling, **Meteorology and Air Quality Modeling:**

Sampling and measurement of particulate and gaseous pollutants – Ambient air sampling – Stack sampling, Environmental factors – Meteorology – temperature lapse rate and stability – Adiabatic lapse rate – Wind Rose – Inversion – Wind velocity and turbulence – Plume behavior – Dispersion of air pollutants, Air Quality Modeling.

Air Pollution Control Measures:

Control – Source correction methods – Control equipments – Particulate control methods – Bag house filter – Settling chamber – cyclone separators – inertial devices – Electrostatic precipitator – scrubbers – Control of gaseous emissions – Absorption – Absorption equipments – adsorption and combustion devices (Theory and working of equipments only), odour and its control, stack monitoring kit, auto exhaust analyser.

tion & its Control

Sources of noise – Units and Measurements of Noise – Noise Standards, Noise rating system, Classification of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non - auditory effects, Noise Menace– Prevention and Control of Noise Pollution – Control of noise at source,

..., protection of exposed person – Control of other types of Noise Sound ... level meter.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of air & noise pollution.

CO 2: Illustrate the effects of air & noise pollution on environment.

CO 3: Apply various techniques to measure air & noise pollution.

CO 4: Solve the air and noise pollution problems by devising solutions to the identified problems

CO 5: Apply various techniques used in reducing the environmental pollution.

Text Books:

1. ... Control, M. N. Rao & H. V. N Rao, Tata McGraw Hill Publications., 2017
2. ... Control Technologies, Dr. Y. Anjaneyulu, Allied publishers Pvt. Ltd., 2002.

Reference Books:

1. Sewage Disposal & Air Pollution Engineering, S.K. Garg, Khanna Publishers, 31st edition, 2008
2. Environmental Pollution Control Engineering, C. S. Rao, New Age Intl Pub., 3rd edition, 2018
3. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publication, 201...

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Course Code: 530212

Course Name: Advance Treatment Process – II (Water Supply Engg.)

L	T	P	Credit
3	0	0	3

Courses Objectives:

1) To understand the concepts of planning a distribution system & subsequently design the water distribution system.
2) To understand the operation & maintenance of water supply systems.
3) To determine the water quality parameters and also have knowledge on various standards of water quality.
4) To understand the concepts of various water treatment techniques.
5) To be able to plan & design water treatment plant for a city.

Syllabus:

Unit I:

Water supply, Components of distribution system, Principles and design of distribution system, Equivalent pipe method, Hardy Cross and Section method, Electrical network analogy method, Construction and maintenance of distribution system, Corrosion and methods of control, Computer applications in distribution network analysis.

Unit II:

Quality of water: Factors affecting water quality in various sources, Protection of water quality, Classification of natural water with reference to the best use, Bacteriological quality of water, Effect on health, Standards of water for various uses, Water quality index, Minimal National Standards (MINAS), their significance in relation to Industrial pollution control.

Unit III:

Preliminary Treatment and Sedimentation: Degree of treatment required, various operation and flow sheet, Preliminary treatment methods such as screening, coagulation, perikinetic and orthokinetic, flocculation, Coagulants and coagulants aids, Polyelectrolyte, Sedimentation, Class I and Class II clarification, Column settling test, zone and compression settling. Design of sedimentation tank – various types and their working, Tube settlers and their design.

Unit IV:

Filtration and Disinfection: Slow and rapid sand filters, Theory of filtration, Design, Operation, Performance and evaluation of filters, Pressure filter, Multi-media filter, Diatomaceous earth filter, Disinfection of water kinetics, Amount of chemicals required for disinfection, Free and combined chlorine, Fixed end disinfector.

Unit V:

Non – Conventional treatment units: Water softening, Methods of softening, Application of Membrane process, Reverse osmosis, Electro-dialysis, Various practices, Removal of fluorides, iron and manganese, Taste and odour removal, Industrial water conditioning, Langliear saturation index, Management of water

treatment plant residues, Design of complete treatment scheme.

Courses Outcomes:
Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of water distribution systems including its operation & maintenance.

CO 2: Design a water distribution scheme for an area / city.

CO 3: Evaluate the water quality of an area / city with the help of available standards & guidelines.

CO 4: Explain the concepts of various water treatment techniques.

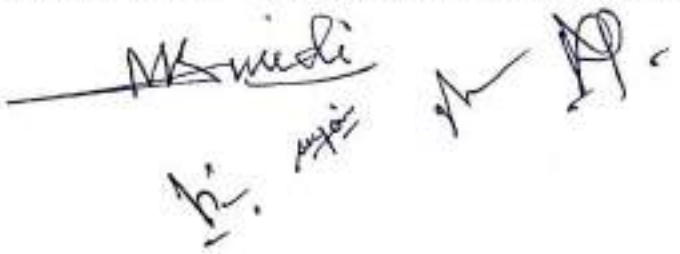
CO 5: Design a water treatment scheme for an area / city.

Text Books:

1. Water Supply Engg., S. K. Garg, Khanna Publishers New Delhi, 2017
2. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition, 2008
3. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009
4. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
5. Water Supply & Sanitary Engineering By S.K. Husain (Oxfosd & IBH Publishing Co. New Delhi, India)



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V., Bhopal MP)

Course Code: 530213

Course Title: Environmental Impact Assessment & Ethics

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To develop an understanding about the requirements of environment impact assessment in modern day.

2) To provide a broad knowledge on the process of environmental impact assessment.

3) To provide a broad knowledge on various methods used in impact assessment.

4) To provide a practical knowledge on how to carry out environmental impact assessment process through various case studies.

5) To provide an insight into various existing environmental laws in India

Syllabus:

Unit I: Environment and its components, Concept of Ecological imbalances, Carrying capacity and Sustainable development, EIA: Definitions, Necessity of EIA, Historical Evolution of EIA: Indian EIA rules 1994 & 2006, Environmental clearance process, Procedure for carrying out EIA in India, Post project monitoring, EIA documentation, EMP, EIS, Life Cycle Assessment, Risk Assessment.

Unit II: Environmental Impact Assessment Methodologies: Characteristics of EIA Methods, Ad-hoc method, Checklist, Matrices, Networks, Overlays, Environmental Quality Index, Predictive Models, Comparative study of EIA Methodologies.

Unit III: Prediction and assessment of impact on water & air environment: Basic information of air & water quality, Data requirements for impact assessment, Existing standards for air & water quality (surface & subsurface), Identification of impacts, Prediction & assessment of impacts, Mitigation measures. Case Studies - Environmental Impacts of Road, Rail, Dam and thermal power projects or any other major projects on water & air environment.

Unit IV: Prediction and assessment of impact on cultural & socio-economic environment: Basic information on cultural resources like archaeological, historical structures, Cultural system, Basic information of socio-economic environment, Description of existing socio-economic environment, Identification of impacts, Prediction & assessment of impacts, Mitigation measures, R & R study.

Unit V: Environmental Legislations: List of prevalent environmental acts in India, Brief about provisions in Water Act 1974, Air Act 1981, EPA 1986, International Environmental Laws & Protocols like Montreal Protocol, Rio Earth Summit, Kyoto Protocol, Objective of Ethics, Importance of Ethics, Code of Ethics, Environmental ethics in India, Environmental Audit: Introduction, Necessity, Types, and Process of audit.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Illustrate the concepts of EIA.

CO2: Apply various methodologies for carrying out EIA. & laws used in EIA studies.

CO3: Analyse impacts on various components of environment.

CO4: Apply various laws & ethical practices in environmental management.

CO5: Plan for mitigation of impact & accordingly monitor the mitigation measures through environmental audit.

Text Books:

1) Y. Anjaneyulu & Valli Manickam, Environmental Impact Assessment Methodologies, B S Publishers.

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

Reference Books:

1) L.W. Canter, Environmental Impact Assessment, Mc Graw Hill International Publishers International Edition.

2) O. V. Nandimath, Handbook of Environmental Decision Making in India: An EIA Model. Oxford University Press.

3) Ministry of Environment and forest, Government of India Environmental Impact Assessment Notification, New Delhi, 2006.

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V., Bhopal MP)

Course Code: ~~530216~~ 800209

Course Name: Global Climatic Changes & Disaster Management

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To understand the effects of climate change.
2) To get knowledge of various protocols & policies on global climate changes.
3) To understand various natural disasters.
4) To understand various techniques of disaster monitoring.
5) To plan for management of disasters and emergency situations.

Syllabus:

Unit-I

Climate, weather and Climate Change: Overview of Earth's Atmosphere; Layers of Atmosphere; Greenhouse Gases, Aerosols, Impact of CO_2 increase on climate change, Temperature, Radiation and Variation; Heat- Balance of Earth Atmosphere System; Temporal Variation of Air temperature; Hydrologic cycle; Climate Variability like Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

Recent Climate Change impact at local and global scale, Ecological Impacts of Climate change: Anthropogenic activities and climate change, Rising of sea level and consequences, Impact on biodiversity and extinction of endemic species, Changing of food chain, Agricultural shifts. Impact of climate change on health.

Unit-II

Policy and Legislative issues in Climate Change: The UNFCCC, The Montreal Protocol, From Kyoto to Copenhagen, Towards COP21, ICMR, ICAR & IARI.

Introduction to Climate Modeling (GCM and RCM Models) IPCC Scenarios, difference between climate change and climate variability Carbon trading and clean development mechanism, Role of countries and citizens in containing in global warming, The Role of Technology Roadmaps and Roundtables.

Unit-III

Overview of disaster, major natural disasters – flood, tropical cyclone, droughts, landslides, heat waves, earthquakes, fire hazards, tsunami, etc. – Factors for disaster – climatic change and global sea rise, erosion, environmental degradation, large dams and earthquakes, road building and landslides, Chemical and Biological weapons – case studies.

Unit-IV

Techniques of monitoring and design against the disasters, Management issues related to Disaster, Mitigation through capacity building, legislative responsibilities of disaster management; Disaster mapping, assessment, pre-disaster risk and vulnerability reduction, post disaster recovery and rehabilitation; disaster related infrastructure development. Disaster management plan, national crisis management committee, state crisis management group.

Unit-V

Water supply preparedness and protection, emergency water supply strategy, rural and urban emergencies. Assessment of damage. Emergency water supply schemes – Sources, quality, treatment, storage and distribution, operation and maintenance. Sanitation – Human waste and health, strategy for excreta disposal in emergencies, techniques for excreta disposal, disposal of wastewater, management of refuse.

Courses Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the basic concepts of climate change, the causes of climate change and its effect on environment.

CO 2: Determine the important climate variables and the predictions of the changes in the climate system.

CO 3: Analyse policy issues and mitigation strategies in response to climate change and other disasters.

CO 4: Design an emergency water supply and sewage system.

Reference Books:

6. Climate Change and India – Vulnerability Assessment and Adaptation; Edited by P. R. Shukla, Subodh K. Sharma, N. H. Ravindranath, Amit Garg, Sumana Bhattacharya, Universities Press, 2003
7. Global Warming – The Complete Briefing, third edition; John Houghton, Cambridge University Press, 2004,
8. Climate Change- Causes Effects and Solutions; John T. Hardy, Wiley
9. Alexander D, Principles of emergency planning and management, Oxford University Press, 2002.
10. Hallow G. and Bullock J. Introduction to Emergency Management: Elsevier, 2002.
11. Anil Markandya, Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002.
12. Jepma, C.J., and Munasinghe, M., Climate Change Policy - Facts, Issues and Analysis, Cambridge University Press, 1998.
13. R.B. Singh, Disaster Management, Rawat Publication, New Delhi, 2000
14. H.K. Gupta, Disaster Management, University's Press, India, 2003
15. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Course Code: 530217

Course Name: Advanced Environmental Engineering Lab

L	T	P	Credit
0	0	4	4

Course Objectives:

1) To acquire knowledge of sampling of air samples, solid waste samples & waste water samples.
2) To acquire skills to determine various characteristics of waste water.
3) To acquire skills to determine various characteristics of solid waste.
4) To acquires skills to determine various air pollutants.
5) To acquire skills to determine noise levels.

Syllabus:

1. Introduction to waste water sampling procedure.
2. Introduction to air sampling procedure.
3. Introduction to solid waste sampling procedure.

List of Experiments:

1. Determination of Solids (TS, TSS, VSS, FS) in waste water sample.
2. Determination of settling velocity of suspended solids in waste water sample.
3. Determination of D.O. in waste water sample.
4. Determination of B.O.D. in waste water sample.
5. Determination of C.O.D. in waste water sample.
6. Determination of Nitrates in waste water sample.
7. Determination of Oil & Grease in waste water sample.
8. Determination of Heavy Metals in waste water sample.
9. Analysis of solid waste sample (Proximate & Elemental).
10. Determination of calorific value of solid waste sample.
11. Determination of SPM, SO_x & NO_x in air using RSPM/HVS.
12. Monitoring of ambient & traffic noise levels using noise level meters.
13. Study of Stack Monitoring Kit.
14. Characterization of wastes from different industries.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of waste water, air &

Course Code: 110711

Course Name: Irrigation Engineering

L	T	P	Credit
2	0	0	2

Course Objectives:

1) To understand the water requirements of various types of crops.
2) To understand the different types of irrigation systems.
3) To plan the reservoir systems as per the requirements.
4) To understand various types of dam.
5) To understand the concepts of Khosla's and Bligh's theory & its applications.
6) To understand river training.
7) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
8) To understand the canal regulations.

Syllabus:

Unit-I Irrigation Water Requirement and Soil Water Crop Relationship:
Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.
Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.
Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit-II Reservoirs and Storage Works:
Types of reservoirs, Reservoir planning, Various investigations, estimation of storage capacity by mass curve analysis, Fixing of principal levels in a storage project, Economical height of dam, Reservoir sedimentation, Suitable site for a reservoir project.
Dams: Classification- gravity, earthen, rockfill, arch, buttress, steel & timber dam, Selection of suitable type of dam at a particular location.

Unit-III Diversion Works and River Training Methods:
Purpose, Selection of site, Layout and functions of component parts, Types of weirs and barrages, Weir design for surface and subsurface flows, Bligh's, Lane's and Khosla's theories, Silt excluders and silt ejectors.
River training methods – objectives, Design principles of levees, Guide bunds & launching aprons.

Unit-IV Canal Irrigation:
Types of canals, Alignment, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal sections, Canal losses, Linings-objectives, Materials used, Economics.

Unit-V

Introduction to Canal Regulation Structures: Head and cross regulators, Canal falls, Escape and outlets

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the concepts for planning an irrigation project.
CO2: Differentiate various theories used in planning of an irrigation project.
CO3: Analyse various requirements for an efficient irrigation project.
CO4: Design different components of irrigation system using different theories.
CO5: Plan an efficient, economical & safe irrigation system.

Reference Books:

1. Irrigation & Water Power Engg. – Dr. B.C. Punmia, Dr. Pane, B.B.Lal
2. Irrigation, Water Resources & Water Power by Dr. P.N. Modi
3. Irrigation Engineering by Varshney
4. Irrigation Engineering by Santosh Kumar Garg
5. Irrigation, Water Power & Water Resources Engg. By K.R. Arora

Course Code: 110712

Course Name: Industrial Waste Treatment

	L	T	P	Credit
	2	0	0	2

Course Objectives:

1) To provide broad knowledge on various methods of sewage disposal, their effects on water pollution & also provide information on various disposal standards.
2) To learn the basics of sewage composition & its characteristics.
3) To understand the 3R concepts and how to implement them.
4) To provide knowledge on various waste water treatment techniques.
5) To provide information on various rules & regulations regarding disposal of municipal wastes.
6) To provide information about various existing waste treatment & management techniques of various industries.

Syllabus:

Unit-I Problem of Water Pollution:
Effects of wastes on streams and sewage treatment plant, natural purification of streams, oxygen sag curve, allowable organic load on streams, classification of stream, stream standards and effluent standards requirement of water for different purposes.

Unit-II Sampling and Analysis of Wastewater:
Sampling of waste waters, Grab, Composite and Integrated samples, analysis of waste water, Biochemical Oxygen Demand, Chemical Oxygen Demand and pH value of waste water, Toxicity of waste by Bioassay method.
Pre-treatment of Wastes: Volume and strength reduction, salvage of materials, recovery of by products, reuse of waste water.

Unit-III Conventional Methods of Treatment of Waste Water:
Removal of suspended solids, removal of inorganic and organic dissolved solids, sludge disposal, Advance methods of treatment such as Reverse Osmosis, Ion Exchange Process, Electro Dialysis, Algal Harvesting etc.

Unit-IV Combined Treatment of Waste Water with Sewage:
Municipal regulations, Sewer rental charges, Instrumentation in waste water treatment plants, Operation and maintenance of plants, Role of water pollution control board. Low cost Treatment Plant Effluent Treatment Plant Design and Operation.

Unit-V
Brief study of industrial processes and treatment methods of waste water from common industries such as Textile, Dairy, Paper and pulp, Tannery & Distillery.
Hazardous wastes-Impact handling and disposal.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Evaluate the effects of waste on streams as per the standards.

CO2: Determine the requirements for safe disposal of sewage.

CO3: Apply suitable techniques for sewage treatment & disposal based upon the available data.

CO4: Apply municipal regulations in operation & maintenance of waste water treatment plant.

CO5: Explain waste management methods of different industries.

Reference Books:

1. Liquid Waste of Industries – Theories, Practice and Treatment – N.L. Nemerow, Wesley Publishing Co.
2. Treatment of Industrial Waste – E.B. Besselievre & Max Graw Hill Book Company
3. Waste Water Engg. – Treatment Disposal & Reuse – Metcalf & Eddy – Tata Mc Graw Hill, New Delhi
4. Waste Water Treatment – Arceivala – Tata Mc Graw Hill, New Delhi
5. Industrial Pollution Control hand book – Lund H.F. Tata Mc Graw Hill, New Delhi

Course Code: 110713
Course Name: Advanced Structural Design – I (R.C.C.)

L	T	P	Credit
2	0	0	2

Course Objectives:

1) To understand the behaviour of RCC structures like Retaining wall, Water tanks, Bridges and prestressed concrete.
2) To understand the Codal provision for design of RCC structures and prestressed concrete
3) To analyse the RCC structures subjected to various loads.
4) To analyse RCC bridges subjected to IRC loadings.
5) To learn Design of RCC and prestressed concrete structures as per Codal provisions.

Syllabus:

Unit-I

Design of Water Tanks:

Design requirements, Design of Tanks resting on ground and underground tanks, Rectangular and circular tanks.

Unit-II

Design of Over Head Water tanks:

Rectangular, Circular & intze type (Membrane analysis only), Design of staging.

Unit-III

Earth Retaining Structures:

Types of retaining walls, Stability of retaining walls, Design of retaining walls (Cantilever and counter fort type)

Unit-IV

Design of Bridges:

IRC loading for highway bridges, Slab bridges and T-beams bridges for highway loading (IRC Loads)

Unit-V

Prestressed Concrete:

Prestressing concepts, materials, and systems of prestressing & prestress losses. Introduction to working & limit state design method.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain behaviour of RCC and Prestressed concrete structures under loads.
CO2: Determine forces developed in RCC and Prestressed concrete structures under loads.
CO3: Compare designs of RCC and Prestressed concrete structures for given loadings.
CO4: Develop economic and safe designs of RCC and Prestressed concrete structures.

Reference Books:

1. Plain and Reinforced Concrete by O.P. Jain and Jai Krishna Vol. I & II
2. R.C.C. Structures by B.C. Punmia
3. Advance R.C. Design by N.K.Raju
4. Essentials of Bridge Engineering by D.J. Victor.
5. Design of Bridge Structures by T.R. Jagadeesh & M.A. Jayaram
6. Design of Bridges by N.K. Raju
7. Prestressed Concrete by N.K. Raju
8. Advanced Reinforced Concrete Design by PC Varghese

Course Code: 900201

Course Name: Integrated Waste Management for Smart City

L	T	P	Credit
2	1	0	3

Course Objectives:

1) To provide broad knowledge on various aspects of planning & implementation of waste management system in a smart city/town.
2) To understand the principles applied in waste management.
3) To understand various ways to collect, treat & disposal of waste.
4) To understand various methods of energy recovery from waste.
5) To understand various aspects of hazardous waste management, E-waste management, biomedical waste management etc.

Syllabus:

Unit I:

Introduction to waste management, classification of solid waste, objective of solid waste management, principles of integrated waste management, 3R policy, various laws & rules of waste management (MSW Rules, hazardous waste management rules, E-waste rules etc.), role of various agencies in planning of waste management system, swachh bharat mission and smart cities program – implementation, current status, challenges and future trend of waste management.

Unit II:

Municipal solid waste – generation, composition, characterization, handling of waste at source, collection of waste – collection system, collection routes, collection equipments, transportation of waste, transfer stations, segregation and recycling of waste, disposal of waste through landfills – types of landfills, planning & operation of landfills, leachate management & control of gases in landfills, environmental monitoring of landfills.

Unit III:

Energy recovery from municipal solid waste - thermal conversion technologies, incineration, pyrolysis, gasification, environmental control system, biological & chemical conversion technologies, aerobic composting, anaerobic digestion, refuse derived fuels, other biological and chemical transformation methods.

Unit IV:

Hazardous waste management – characteristics, source, health effects, physiochemical treatment methods of hazardous waste, disposal of hazardous waste, Biomedical waste management – sources, health effects, issues in India, challenges, handling of biomedical waste.

Unit V:

E-waste management – sources, heath effects, issues in India, challenges, handling of E-waste. Plastic waste management – types of plastics, sources of plastic waste, impacts of plastic waste,

plastic waste management practices. Management of construction & demolition wastes.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles & concepts of waste management.

CO 2: Apply various techniques of handling the waste.

CO 3: Apply various techniques of energy recovery from waste.

CO 4: Plan an effective & efficient waste management system.

Text Books:

1. Text Book of Solid Wastes Management. Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A. Vigil, George Tchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid Waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

Course Code: 900202

Course Name: Project Planning & Control

L	T	P	Credit
2	1	0	3

Course Objectives:

1) To know about techniques of project planning.
2) To develop the network of project's activities.
3) To understand the precedence network technique.
4) To discuss the resource utilization in project.
5) To understand the project cost control.

Syllabus:

Unit I:

Project Planning:

Introduction to Project Planning Process. Types of Project Plans-Project feasibility plan, Project preliminary plan. Introduction to network techniques – CPM, PERT and Precedence network. Project Work Breakdown – Levels of Project work breakdown. Identification of construction activities by work breakdown structure. Activity duration and methods of estimating activity duration – One time estimate three time estimates, trapezoidal distribution estimate. Duration estimation procedure.

Unit - II

Project Network Analysis:

Elements of Network, development of network, Numbering of events, Event times – Earliest events time and latest event time.Slack, critical events. Activity times – Earliest start time, Latest finish time, Float and critical activities. Network critical path and its significance. Network analysis by CPM – Defining scope of work, determining activities, establishing work package logic, preparation of network logic program and draft network. Numerical problems.

Unit-III

Precedence Network Analysis:

Precedence Network Analysis – Modeling procedure analysis of time in PN. Use of PN in repetitive works network.Difference between PN and CPM. Application of Network techniques and their limitations.

Unit-IV

Resource Planning:

Resources, Types of resources – renewable and non-renewable resources, Resource Histogram, Method of Resource allocation – resource smoothing and resource levelling.

Unit-V

Project Cost Control:

Direct and indirect cost, slope of direct cost curve, Total project cost and optimum duration, contracting the network for cost optimization. Escalate & Variation in prices.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Know the project planning and project network.

CO 2: Analyze the network by CPM & PERT.

CO 3: Analyze the project using precedence network.

CO 4: Analyze the effect of resource planning on project.

CO 5: Evaluate the cost of project during planning.

Recommended Books:

1. Project planning and Control with PERT and CPM by Dr. B.C. Punmia, K.K. Khandelawal
2. CPM & PERT by L.S. Srinath
3. Construction Management by Sen & Gupta
4. CPM & PERT by Weist & Levy

Course Code: 900213

Course Name: Urban Planning &Transportation Systems

L	T	P	Credit
3	0	0	3

Course Objectives:

1) To introduce the scope and nature of Urban Planning and Transportation Systems as disciplines.
2) To understand the objectives, domains and principles of town planning.
3) To study the urbanization trends in India - Issues, concerns and experiences; City planning process and implementation framework in Indian context
4) To differentiate between types of plans and concepts in planning.
5) To understand how urbanization and why migration takes place in an urban region.
6) To understand the traditional and current planning processes and techniques involved in the urban and transportation planning.
7) To understand the urban governance, policies and strategies of the government to tackle issues of an urban environment.
8) To understand the impact of technology in both urban and transportation planning.

Syllabus:

Unit-I Introduction to planning discipline

Defining planning as a discipline, it's multidisciplinary nature, role of a planner, Objectives and Principles of Urban planning.
Fields of planning - Urban, regional, environmental, transport and infrastructure.
Evolution of settlements- Settlement size, pattern and structure as a function of sociocultural, economic, military and religious factors in historical cities.
Concepts of different types of cities like garden city, linear city etc.
Contributions of eminent planners: Lewis Mumford, Ebenezer Howard, Patrick Geddes, Sir Arthur Clarence Perry, Charles Correa, Le-Corbusier.

Unit-II Urbanization

Definition of urbanization, rural-urban migration, various definitions of town and country planning, goals and objectives of planning, socio-economic impacts of growth of urban areas, significance of Census and Demographics, impacts of urbanization, impact of Government Policies on urbanization, urban structure and form - land use distribution, different Land use planning norms.
Overview of Urban Governance Definition, concepts, components, government and governance, hierarchy and structure, forms of governance, process of inclusion and exclusion, 73rd and 74th Constitution Amendment Acts.

Unit-III Transportation Systems

Evaluation of urban structure: Transport system, infrastructure and management, transport systems and their types, urban road hierarchy, planning, and management criteria for road and junction improvements, arterial improvement techniques.
Transport survey and studies: study area definitions, survey and their types, sampling methods,

survey techniques.

Transportation Planning Process and analytical techniques: Techniques for urban structures analysis, Urban travel characteristics,

Transport and environment: Traffic noise, factor affecting noise statement measures, standards, air pollution standards, traffic safety, accident reporting and recording systems, factors affecting road safety, transport planning for different target groups.

Unit-IV Planning in Indian Context

Introduction to types of plans with choice of appropriate scale- development plans, master plan, city development plan, structure plan, district plan, action area plan, subject plan, comprehensive planning, zonal plans etc., hierarchy of plans: regional plan, sub-regional plan, sector plans and spatial plans, town planning schemes, contents of base maps at various scales, notations, measurement of areas.

Database for planning and socio - economic surveys: data requirements for urban and regional planning, sources of primary and secondary data, questionnaire design, measurement scale and their application, sampling techniques; Objectives, types, and significance of planning surveys.

Role of URDPFI guidelines in Town planning, Urban Development Policies and Programmes at various levels.

Graphic presentation of statistical and spatial data.

Unit-V Current trends in urban planning and transportation systems

Indian scenario - Issues and Policies, Global scenario, Future trends of urbanization.

Review of existing traffic management schemes in Indian cities.

Impact of technology on urban forms and planning, role of disruptive innovations and disaster mitigation in urban planning, advanced transportation systems with their merits and demerits, Intelligent transport system (ITS) its types and applications.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the concepts for planning a city and land-use patterns.

CO2: Differentiate various theories used in urban planning.

CO3: Analyse various requirements for transportation systems.

CO4: Design approaches in addressing the issues and concerns of urban environment through planning.

CO5: Plan strategies for any project with an urban planning perspective as a member and/or leader in a team of planning projects.

Text Books:

1. A.B. Gillion and Simon Eisner, "The Urban Pattern", CBS Publishers and Distributors, Delhi.
2. Rishma A., "Town Planning in Hot Cities", Mir Publishers, Moscow.
3. Ward S (2002), "Planning the 20th Century City" John Wiler & Sons.
4. R. Ramachandran, "Urbanisation and Urban Systems in India", Oxford Publications.
5. K. C. Shivrama Krishnan, "Revisioning Indian Cities", Sage Publications.

6. ITPI reader
7. Bruton, M.J., "Introduction to Transportation Planning," Hutchinson Publication, London.
8. Kadiali, L.R., "Traffic and Transportation Planning", Khanna Publishers, Delhi.

Reference Books:

1. Broadbent, Geoffery: "Emerging Concepts in Urban Space Design", Van Nostand Reinhold, 1990.
2. Edmund Bacon, "Design of Cities", Penguin, 1976.
3. Francis Tibbalds, "Making people-friendly towns: improving the public environment in towns and cities", Longman, 1992.
4. Rob Krier, "Urban Space", Random House Incorporated, 1979.
5. Jonathan Barnett, "Urban design as public policy: practical methods for improving cities", Architectural Record Books, 1974.
6. Papacoster, C.S.And Prevendons,"Transportation Engineering and Planning" Prentice Hall of India.
7. Introduction to transport planning by Michael J Bruton
8. Principal of Urban transport system planning by Hutchinson

Course Code: 110706 701

Course Name: Software Application for Solving Civil Engineering Problems

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To practice various software's used in civil engineering design & analysis.
2) To practice MATLAB & QGIS.
3) To practice various other software's and its applications in civil engineering works.

List of Experiments:

1. Design and analysis of reinforced concrete beam using STADD software.
2. Design and analysis of reinforced concrete slab using STADD software.
3. Design MATLAB code to develop load-response curve for different load conditions for a beam designed of experiment 1.
4. Application of QGIS in preparation of vector map of major city and preparation of land use and land cover maps.
5. Determination of critical network for a construction project using PRIMEVERA/ MS-Project.
6. To prepare an estimation of Multi-storey building and Road using MS-Excel.
7. Design water supply networks through Hardy Cross method. (Loops, EPANET and other software's).
8. Design Sewer networks using Hidra software.
9. Development of Geo-contor map by total station.
10. Estimation of axel load (msa) through IRC 37: 2015 using MS Excel.
11. Design and analysis of multi-storey building using E-tabs software.

In addition to above, various available open source software's will be used.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Design various beams, slabs & multistorey building's using various software's.
CO 2: Design water supply & sewer networks using various software's.
CO 3: Practice MS Excel in estimation works.
CO 4: Produce land use land cover maps and geo contour maps using various software's.
CO 5: Practice Primavera and MS-Project softwares.

Course Code: 110707 707

Course Name: Summer Internship Project - III

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To develop an appreciation and importance of civil Engineering in developing the infra structure.

2) To develop an understanding regarding the various engineering principals to be used in the field Construction activities.

3) To emphasize on the use of the modern tools and plants used in the construction industry.

4) To build the necessary practical background and exposure to the field problems.

5) To develop a technical skill to prepare project documents.

Syllabus:

1. Each candidate shall go for 1 month (4 week) on field training at different organizations / sites of his / her choice after completion of their 6th Semester exams (in summer vacations) and shall submit a detailed report after completion of training.

2) Candidates will be taken to nearby places where civil engineering works are being carried out during the semester and they shall have to submit a detailed report of their visit.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Observe various activities of civil construction works.

CO2: Examine the utility of general and specific equipments for construction.

CO3: Differentiate the construction projects individually and in team.

CO4: Develop the writing and communication skills for various engineering problems.

CO5: Adapt lifelong learning for benefit of society.

Course Code: 110708- 703

Course Name: Creative Problem Solving

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To create an interest in students to provide solutions to various on field problems of civil engineering.
2) To provide solutions to various on field problems of civil engineering.

List of Experiments

1. Traffic Survey of Major Road's in the city.
2. Design of Traffic Signal.
3. Performance evaluation of new building materials.
4. Determination of residual life of structure.
5. Identification of occupational diseases.
6. Identification of solid waste collection problems in a locality and subsequent proposal of the solutions to those problems.
7. Determination of surface roughness index of road.
8. Use of waste materials for construction of pavement layers.
9. Creation of data bank of water resources in the city.
10. Industrial visit and joint solution of problems in industry.

Course Outcomes

Upon completion of the course, the students will be able to:

CO 1: Identify various on field problems.
CO 2: Practice various methods to solve problems.
CO 3: Produce solutions to various problems.
CO 4: Demonstrate various problems solving skills.

Course Code: 110501
Course Name: Estimating Costing & Contracting

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To work out the quantities of various items of civil works like buildings, culverts including steel girders etc.
2) To compute earthwork.
3) To understand detailed specifications and carry out analysis of rates.
4) To understand various methods of carrying out estimation.
5) To understand valuation process &fixation of rent.
6) To understand contracting procedures.

Syllabus:

Unit I Introduction of Estimating:

Purpose and importance of estimates, principles of estimating, methods of taking out quantities of items of work.Mode of measurement, measurement sheet and abstract sheet, bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit II: Details of Items:

Specifications of materials and works: Types of Specifications, General specifications for Class A, B & C type of building, Detailed specifications of important items of work.

Rate Analysis: Task for average artisan, various factors involved in the rate of item, material and labour requirement for various trades, preparation for rates of important items of work, current schedule of rates (C.S.R)

Unit III: Estimates

Preparing detailed estimates of various types of buildings, R.C.C Works, Culverts, earth work calculations for roads and Canals, contingencies and work charge establishment, use of computational tools for preparing estimates.

Unit IV: Valuation

Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate of interest, methods of valuation, rent fixation of buildings

Unit V: Contracting

Contract, Types of engineering contract, essentials documents of engineering Contract, Conditions of contract, Earnest Money Deposit, Security Deposit, Responsibility of Engineer, Contractor & Client.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the fundamentals of quantity estimation, costing & contracting.

CO 2: **Apply** methods to estimate area, volume & cost.

CO 3: **Evaluate** mathematical & numerical models for rate & quantity estimation.

CO 4: **Determine** rates & value.

CO 5: **Classify** different rates of items, contracts & measurement techniques.

Text Books:

1. Estimating & costing in civil engineering, B.N. Dutta, UBS Publishers, 28th revised edition 2016
2. Estimating & Costing, S.C. Rangwala, Charotar Publishing House, 17th edition 2017

Reference Books:

1. Estimating & Costing for Civil Engg., G.S. Birdie, Dhanpat Rai Publications, 6thedition 2014
2. Estimating & Costing specification & valuation in civil engineering, M. Chakraborti, 2006

Course Code: 110502

Course Name: Structural Design & Drawing (R.C.C.)

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the behavior of reinforced concrete components & systems subjected to gravity loads.
2) To study the stress strain behavior of steel and concrete.
3) To understand the concept of working stress & limit state method.
4) To provide knowledge on limit state design of beams, design for flexure, shear, torsion, bond & anchorage as per relevant IS codes.
5) To provide knowledge on design of slabs, columns, footings & staircases as per relevant IS codes.

Syllabus:

Unit-I Basic Principles of Structural Design:

Mechanism of load transfer, Introduction to working stress limit state and ultimate load methods of design. Introduction of IS Codes 456, 13920.

Design of Beams: Analysis and design of singly reinforced rectangular beams, Lintel, Cantilever, Simply supported and continuous beams.

Unit-II Design of Beams:

Doubly reinforced and Flanged Beam. Design for Shear and design for bond.

Unit-III Design of Slabs:

Slabs spanning in one direction, (Cantilever, Simply supported and Continuous slabs); Slabs spanning in two directions, Circular slabs.

Unit-IV Columns & Footing:

Short and long columns. Columns subjected to axial loads and bending moments (section with no tension). Isolated and combined footings, Strap footing. Raft foundation.

Unit-V Staircases:

Staircases with waist slab having equal and unequal flights with different support conditions, Tread-riser staircase.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Compare various design principles as applicable for design of RCC structures.

CO 2: Apply the concepts of working stress method & limit state method on RCC structures.

CO 3: Apply recommendations of SP 34 for detailing

CO 4: Analyse a given section of RCC structural elements using limit state method.

CO 5: Design different elements of RCC structures like beam, slab, column, footing, staircase using IS codes.

Text Books:

1. Reinforced Concerete Limit State Design, A.K. Jain, Nem Chand Pub.,7th edition, 2012
2. Reinforced Concrete, Pillai & Menon, Tata McGraw Hill, New Delhi, 3rd edition,2017
3. Limit State Design, P.C. Varghese, Prentice Hall of India, New Delhi, 2nd edition,2008
4. RCC Design, Neelam Sharma, Katson Publishers, 2014

Reference Books:

1. Reinforced Cement Concrete, P. Dayaratnam, Medtech Publishers, 5th edition, 2017.
2. Reinforced Concrete Design, S.N. Sinha, Tata McGraw Hill, 3rd edition, 2017
3. Plain and Reinforced Concrete, O.P. Jain and Jai Krishna, Nem Chand Pub.,8th edition, 2008
4. Reinforced Cement Concrete, Winter & Nelson, McGraw Hill, 11th edition, 1991

Course Code: 110503

Course Name: Fluid Mechanics - II

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To develop an understanding of fluid flows patterns and learn to use boundary layer theory and drag.
2) To apply theories of laminar & turbulent flow to solve typical pipe flow problems in the field.
3) To apply boundary layer theory to estimate drag &lift for various shapes of the objects.
4) To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
5) To study about non uniform flows in open channel and longitudinal slopes in open channel and also to learn about the characteristics of hydraulic jump.
6) To understand design philosophy of various types of pumps & turbines.

Syllabus:

Unit-I

Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically rough boundaries, velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes, aging of pipes.

Pipe Flow Problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, Concepts of equivalent length, Hydraulic and energy gradient lines, Siphon, Pipes in series, in parallel, Branching of pipes.(Hardy Cross method)

Pipe Network: Water hammer (only quick closure case) transmission of power.

Unit - II Forces on immersed bodies:

Introduction, Force Exerted by a flowing fluid on a stationary body, Expression for Drag & Lift, Drag on a sphere, Terminal velocity of a Body, Drag on a cylinder. Introduction to Development of Lift on a Circular Cylinder and an Airfoil

Unit – III Uniform Flow in open Channels:

Channel geometry and elements of channel section, Velocity distribution, Energy in open channel flow, Specific energy, Types of flow, Critical flow and its computations, Uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections.

Unit - IV Gradually varied flow

Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, Surges in open channels, Energy Dissipators.

Unit - V Introduction to Fluid Machinery: Turbines & Pumps

Turbines: Classifications, definitions, Similarity laws, Specific speed and unit quantities, Pelton turbine – their construction and settings, Speed regulation, Dimensions of various elements, Action of jet, Torque, Power and efficiency for ideal case, Characteristics curves, Reaction turbines construction & setting, Draft tube theory, Runaway speed, Simple theory of design and characteristic curves, Cavitation.

Pumps: Principle of working & criteria for selection of different types of pump, viz. Centrifugal, Reciprocating.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Differentiate different types of fluid flow & fluid machinery.

CO 2: Describe principles of analysis of fluid flow problem.

CO 3: Explain basic principles for measurement of different forces acting on fluid body.

CO 4: Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.

CO 5: Design open & closed conduit systems.

Text Books:

1. Fluid Mechanics, Modi & Seth, Standard Book house, Delhi, 21stedition, 2017
2. Open Chanel Flow, K. Subramanya, Tata McGraw Hill, New Delhi, 5thedition, 2019

Reference Books:

1. Open Channel Flow, Rangaraju, Tata Mc Graw Hill Publishing Comp. Ltd., New Delhi, 1stedition, 2001
2. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 1988
3. Fluid Mechanics, Hydraulics & Hydraulic Mechanics, K.R. Arora, Standard Publishers, 2009
4. Open Channel Hydraulics, Chow V.T., McGraw Hill, New York, 57thedition, 2009

List of Experiments:

1. To determine the performance characteristics of Pelton Wheel.
2. To determine the performance characteristics of Francis Turbine.
3. To determine the performance characteristics of Kaplan Turbine.
4. Calibration of multistage (Two) Pump & Study of characteristics of variable speed pump.
5. To determine the coefficient of discharge for rectangular notches.
6. To determine the coefficient of discharge for triangular notches.
7. To determine the characteristics of the Reciprocating pump at variable speed.
8. To prepare the calibration curve for rotameter.

Upon completion of the course, the students will be able to:

CO 1: Differentiate between turbines & pumps.

CO 2: Select the efficient turbines by studying the performance characteristics of various turbines.

CO 3: Distinguish the performance characteristics of various pumps.

Course Code: 110509
Course Name: Environmental Engineering

L	T	P	Credit
2	1	2	4

Courses Objectives:

Students will be able to understand

1) The structure of drinking water supply systems, including water transport, treatment and distribution.
2) Water quantity and water quality criteria and standards, and their relation to public health.
3) Operation and maintenance of water supply system components.
4) How to estimate water requirement of a city.
5) How to design water treatment plant for urban & rural areas.
6) How to design water distribution network including pipe appurtenances.
7) To impart basic knowledge on sewerage system including estimation of sewage quantity and design of sewer.
8) To provide a broad knowledge on sewage composition and its characteristics.
9) To provide information on disposal standard of effluents and also about various methods of sewage disposal.
10) To provide broad knowledge on various techniques of sewage treatment including and advanced treatment process.

Syllabus:

Unit-I

Water demand (types, variation, factors affecting it), Design period, Population forecasting methods, Intake structures (location, types), Characteristics of water, Water borne diseases, IS Standard of drinking water.

Unit-II

Water treatment plant flow diagram, Design, construction and working of Screens, Plain sedimentation tank, Clariflocculator, Filters (Slow sand filters, Rapid sand gravity filters and Pressure filters), Methods of disinfection, Hardness (causes and types), Methods of water softening, Removal of colour, odour and taste from water, Removal of iron and manganese, Algae removal, Fluoridation and De-fluoridation.

Unit-III

Distribution system (requirements, layout and methods of distribution), Distribution reservoir (types and its capacity determination), Fixing size of pipes, Analysis of pipe networks (Hardy cross method and Equivalent pipe method), Appurtenances used in distribution networks, Water supply & plumping system used in buildings, Rural water supply.

Unit – IV

Sewerage schemes & sewerage system and their importance, Collection & conveyance of sewage, Fluctuation in sewage flow, Design of sewer, Sewer appurtenances, Pumps & pumping stations,

Characteristics and analysis of sewage (physical, chemical, biological parameters), BOD & COD, Methods of sewage disposal i.e. on land or by dilution, Self-purification capacity of river/stream.

Unit-V

Treatment of sewage (preliminary, primary, secondary and tertiary treatment), Design and working principles of screens, Grit chamber, Primary settling tank, Sewage filtration, Activated Sludge Process, Oxidation pond, Aerated lagoon, Anaerobic lagoon, Septic tank &Imhoff tank, Rotating Biological Contactor, Removal of Nitrogen and Phosphorus, Source and treatment of sludge, Sludge thickening and digestion, Sludge drying beds, Sludge disposal, Sewage treatment plants using MBBR and SBR technology.

Courses Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of water supply and waste water engineering.

CO 2: Determine the requirements for safe supply of water and safe disposal of sewage.

CO 3: Apply suitable techniques for water & waste water treatment.

CO 4: Analyse a given water supply scheme and a given sewerage system.

CO 5: Design a water supply system based upon the needs of society and sewage system for safe disposal of sewage.

Text Books:

1. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Water Supply Engg. (Vol. I), S. K. Garg, Khanna Publishers, New Delhi, 2017
3. Sewage disposal and pollution Engg. (Vol. II). S.K. Garg, Khanna Publishers, New Delhi, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company,2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6thedition,2008
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication,2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009
5. Manual on Sewerage & Sewerage Treatment by CPHEEO, GOI, 2013.

List of Experiments:

1. Determination of pH of a given water sample and waste water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water and waste water sample.
3. Determination of Chloride concentration in water and waste water sample.
4. Determination of turbidity of water and waste water sample using turbidity meter.
5. Determination of acidity and alkalinity of the water and waste water sample.
6. Determination of Hardness of the water sample and waste water sample.
7. Determination of D.O. of the water and waste water sample.
8. Determination of optimum dose of coagulants required for the treatment of a given water sample.
9. Determination of MPN of the given water sample and waste water sample.

10. Determination of BOD of a given water and waste water sample.
11. Determination of COD of a given waste water sample.
12. Determination of sulfate and nitrate of given water and waste water sample.

Course Outcomes:

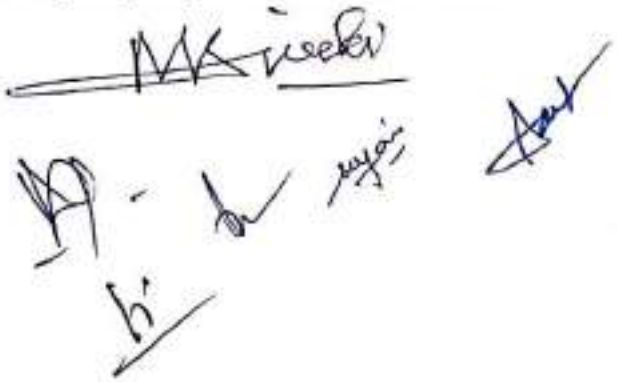
Upon completion of the course, the students will be able to:

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water and wastewater samples.

CO 2: Check various water and waste water quality parameters.

CO 3: Improve the water and waste water quality by suggesting suitable corrective measures.

CO 4: Train others on various ways of improving the quality of water and waste water.



Course Code: 110505

Course Name: Transportation Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To study the planning aspects of roads & highway.
2) To study the geometric design aspects of highway and road.
3) To know about pavement material and design.
4) To understand the construction process and methods of roads & highway.
5) To study about traffic characteristics and design of intersections.

Syllabus:

Unit – I Highway Development and Planning

Highway Development in India — Necessity for Highway Planning – Different Road Development Plans; Classification of Roads. Road Network Patterns — Highway Alignment- Factors affecting Alignment- Engineering Surveys.

Unit – II Highway Geometric Design

Importance of Geometric Design – Design controls and Criteria – Highway Cross Section Elements – Sight Distance Elements – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment - Gradients- Vertical curves.

Unit – III Traffic Studies

Spot Speed Studies and Volume Studies, Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies, Origin and destination Studies (O & D): Various methods, collection and interpretation of data, Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service, Parking Studies: Methods of parking studies, design of intersections at grade & grade separated.

Unit -IV

Highway Construction Materials: Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials.

Design of Flexible & Rigid Pavements: Introduction, flexible pavement, factors affecting design and performance, stress in flexible pavement, design of flexible pavement as per IRC, rigid pavements – components & functions, factors affecting design & performance of CC pavements, stress in rigid pavement, type of joints, dowel bar, tie bar and its functionalities.

Unit – V Evaluation and Maintenance of Pavements

Pavement distress in flexible and rigid pavements, Pavement evaluation, structural evaluation, evaluation by deflection measurements, Strengthening of pavements, Types of maintenance, Importance of highway drainage, Surface and sub-surface drainage arrangements.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the principles of highway planning & their geometrical design.

CO 2: Evaluate physical properties of suitable highway engineering materials with drainage provisions.

CO 3: Apply the concepts of traffic engineering in transportation planning.

CO 4: Design pavements as per regulations.

CO 5: Formulate the layers of pavement along with provisions of its drainage & maintenance.

Text Books:

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand Pub., 10th edition, 2018
2. Highway Engineering, Gurucharan Singh, Standard Publishers, 5th edition, 2006
3. Principles & Practices of Highway Engineering, L R Kadiyali, N B Lal, Khanna Publishers, 2016

Reference Books:

1. Principles of Pavement Design, E.J. Yoder & M.W. Witzech, Wiley India, 2ndedition, 2011
2. Highway Engineering, O' Flaherty, Butterworth-Heinemann, 4thedition, 2002
3. Principles of Practice of Highway Engg., Sharma & Sharma, Asia Publishing House, 1965
4. Analysis and Design of Pavements, Haung, Pearson, 2nd edition, 2004

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Upon completion of the course, the students will be able to:

CO 1: Select suitable aggregate material by testing the physical properties.

CO 2: Determine properties of bitumen and its grade.

CO 3: Determine CBR value of material for subgrade and subsequent layers of pavement.

CO 4: Design job mix formula for bituminous surface using Marshal Stability test.

Course Code: 110506

Course Name: Minor Project - I

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
3) To utilize the expertise in engineering to solve industry's technological problems.
4) To become innovative and professional in technology development, and system implementation.
5) To be able to function in their profession with social awareness and responsibility.
6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

Upon completion of the course, the studeats will be able to:

CO 1: Recognize various engineering problems and techniques to solve them.

CO 2: Reproduce the solution of the problems upon the need of society.

CO 3: Cooperate to work within group.

CO 4: Develop the writing and communication skills for various engineering problems.

CO 5: Display lifelong learning.

Course Code: 110507

Course Name: Summer Internship Project - II

L	T	P	Credit
0	0	6	3

Course Objectives:

1) To make student acquire good oral & written communication skills.
2) To promote the habit of lifelong learning.
3) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Each candidate shall have to undergo 15 days in house summer internship related to soft skills at the institute after the completion of their 4th Semester exams (in summer vacations) and after successful completion of internship they have to submit detailed report.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Develop the writing and communication skills for various engineering problems.

CO 2: Adapt lifelong learning for benefit of society.

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ANNEXURE – XI

Course Code: 11040

Course Name: Water Resources Engineering

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To understand the water requirements of various types of crops.
2) To understand the different types of irrigation systems.
3) To plan the reservoir systems as per the requirements.
4) To understand the concepts of Khosla's and Bligh's theory & its applications.
5) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
6) To develop an understanding of various components of hydrological cycle, their behaviors & factors affecting it & solve problems on measurement on rainfall, infiltration, evaporation.
7) To understand concepts of Hydrometry & ground water hydrology.
8) To discuss the importance of estimation of runoff, analysis of rainfall data and various hydrographs and analyze various problems off runoff using various hydrograph theories.
9) To develop an understanding of various methods of flood estimation in general & flood frequency.

Syllabus:

Unit-I Irrigation Water Requirement and Soil Water Crop Relationship:

Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.

Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit – II Reservoir Planning and Canal Irrigation

Types of reservoir, Reservoir planning, Estimation of storage capacity by mass curve analyses, Economical height of dam, Reservoir sedimentation, Canal systems, Planning and layout of canal systems, Regime concept and tractive force method of channel design, Channel losses, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal section, Water-logging: Causes and effects, Remedial measures, Salinity, Land reclamation and Drainage.

Unit – III Diversion works and Canal Regulation Structures

Elements of diversion works, Type of weirs and barrages, Weir design for surface and sub-surface flow, Bligh's, Lane's and Khosla's theories, Silt excluders and Silt ejectors.

Canal regulation structure like Head & Cross regulations, falls, Escapes, Outlets, Their Need, Functions sketches.

Unit – IV

Hydrology: Definition, Hydrological Cycle, Precipitation, Evaporation, Infiltration, Runoff, Estimation of Runoff, Empirical Formulae, Rainfall-Runoff relationships, Hydrometry, Methods of Stream Gauging, Rating Curves, Ground Water: Elements of Ground water Hydrology, Well Hydraulics, Equations of Ground Water flow, Solutions and applications.

Unit - V

Hydrographs & Hyetographs, Hydrographs analysis, Unit Hydrographs, Methods of constructing, Unit Hydrographs, S-curve Hydrograph, Synthetic unit Hydrograph, Flood and its estimation by different methods.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Analyse various requirements for an efficient irrigation project.
CO 2: Design different components of irrigation system using different theories.
CO 3: Plan an efficient, economical & safe irrigation system.
CO 4: Explain the concept of hydrology and hydrograph
CO 5: Apply basic principles for measurement & forecasting of rainfall & runoff.
CO 6: Analyse runoff hydrograph by various methods.

Text Books:

1. Engineering. Hydrology, K. Subhramanya, Tata McGraw Hill Publ. Co. 4th edition, 2013
2. Hydrology & Water Resources Engineering, S. K. Garg, Khanna Publishers, 2016
3. Irrigation Engineering & Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, 2017
4. Irrigation, Water Power & Water Resources Engg., K.R. Arora, Standard Publishers Distributors, 2010

Reference Books:

1. Engineering. Hydrology, J. NEMEC, Prentice Hall,1972
2. Hydrology for Engineers, Linsley, Kohler, Paulnus, Tata Mc GrawHill,2014
3. Engineering Hydrology, H. M. Raghunath, New Age International Publishers, 5th edition, 2015.
4. Irrigation, Water Resources & Water Power, Dr. P.N. Modi, Standard Book House, 9th edition, 2014
5. Irrigation Engineering by Varshney & Gupta, Vol I & II , Nem chand Publishers, 2007.

Course Code: 110302
Course Name: Building Planning & Design

L	T	P	Credit
3	1	0	4

Course Objectives:

1. To make aware the student with sustainability aspects of building.
2. To impart knowledge to students about significance of building bye-laws & rules & regulation regarding building planning.
3. To impact knowledge to students regarding specific consideration required to be considered under Indian condition for planning & designing of building.
4. To appraise students about the rules & consideration to get adequate ventilation, lighting & Sound insulation for improved energy efficiency of building.
5. To make students understand about various essential requirements of different type of building.
6. To make aware students about green building rating for enhanced sustainability.

Syllabus:

Unit I

Natural Environment &Builtenvironment, Ecology, Ecosphere - sustainable development, Dimensions of sustainability. Built Environment & liveability, integrated approach in design, challenges in sustainable development. Green environment, expectations from green building, IGBC, USGBC, LEED - GRIHA, SVA,GRIHA.

Unit II

Building Bye – laws, Functions of local authority, Terminology i.e. (Building line, control line,FAR, light plane etc.) Principles underlying building bye- laws, classification of building, requirements of parts of Buildings, site section of building, orientation, factors affecting orientation, orientation criteria's for Indian conditions. Provisions of NBC.

Unit III

Principles of planning of buildings (Aspects, prospect, Furniture requirement, rooming, grouping, privacy circulation etc.), Principles of architectural composition (Unity, contrast, scale, proportion, balance, Rhythm, character, etc.), Massing, Sun and the Building, Sun path, Sun shading & devices, Design of sun shades.

Unit IV

Thermal insulation, Heat transfer in building, Thermal insulation materials, methods of thermal insulation ventilation: natural & artificial, necessity & functional requirement of ventilation, system of ventilation, types of mechanical ventilation, air conditioning, functional requirement of air conditioning, Essentials of air conditioning, acoustic and sound insulation, Behavior of sound acoustical defects. Sabine formula, acoustical design of various spaces, sound insulation methods & materials, illumination (natural & artificial).

Unit V

Design and planning consideration for various types of building i.e. Residential Building, Education buildings, Hospitals & Dispensaries, Hotels, Commercial building, recreational buildings, government offices & other, standards specified by Bye-laws, various aspects of sustainability & energy efficiency applied to various types of Building, green building concept applied to various types of building.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain basics of building planning & design.

CO 2: Describe sustainability principle, by laws & characteristics of thermal and sound insulation.

CO 3: Apply sustainability concepts & principles in planning & design of buildings.

CO 4: Evaluate environmental, sustainable & safety aspects of a building.

CO 5: Plan different types of buildings as per by laws &codal provisions.

Text Books:

1. Building Drawing (Built Environment), Sah, Kale and Pathi, Tata McGraw hill, 4th edition, reprint 2007
2. Building Planning, Designing and Scheduling, Gurucharan Singh, Standard Publisher, distribution, 2009
3. Building Design and Drawing, Mallik and Meo, Computech Publication Ltd New Asian; 5th edition 2009

Reference Books:

1. Building Design and drawing, Y S Sane, Standard Publisher, 2006
2. National Building Codes (Latest Edition), 2016 by Bureau of Indian Standards (Third Revision)
3. Building Construction, B.C. Punmia, Laxmi Publication, 11th edition, 2016

Course Code: 110303
Course Name: Building Materials & Construction

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To study the properties of concrete ingredients i.e. cement. Sand and coarse aggregate by conducting different tests.
2. To select of different types of admixtures to improve the properties of concrete for different field applications.
3. To conduct the field and laboratory tests on concrete in fresh and hardened state.
4. To provide knowledge about various types of bricks, stones, woods &timber, ferrous & non ferrous construction material & their applications.
5. To provide knowledge on design of foundation, including selection of appropriate foundation.
6. To understand laying & construction of brick & stone masonry and various methods of damp proofing etc.
7. To provide knowledge about stairs, floors & roofs in various types of buildings.

Syllabus:

Unit-I

Types of Foundation & its design: masonry construction, masonry classification, stone v/s brick masonry, joints in stone masonry, brick masonry (bonds in brick masonry, characteristics of bonds, type of bonds), typical structures in brickwork, Damp prevention (causes, effects, control & prevention techniques, material used for damp proofing), Anti termite treatment, water proofing treatment, Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit – II

Ingredients of Concrete: Portland cement Chemical composition of cement, Hydration of cement, setting of cement, tests on physical properties of cement. Types of Portland cement – Ordinary Portland cement – Rapid Hardening Portland cement – low heat Portland cement- Sulphate Resisting cement – Portland Blast furnace cement- Super Sulphated cement- Portland Pozzolana cement and Pozzolanas: Fly ash; use of pozzolanas, white cement, Expansive cements – High alumina cement.

Aggregates: General classification of aggregates, natural and artificial aggregates, particle shape and texture, bond of aggregate, strength of aggregate, Mechanical properties of aggregate, specific gravity, Bulk density, porosity and absorption of aggregate, moisture content of aggregate, Bulking of sand deleterious substances in aggregates, organic impurities. Soundness of aggregates, Alkali-aggregate reaction, Alkali carbonate reaction, sieve analysis – Grading curves, Fineness modulus, Grading requirements, Grading of fine and coarse aggregates and Gap graded aggregates. Thermal properties of aggregates.

Admixtures: Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticizers.

Unit-III

Fresh and Hardened Concrete: Fresh Concrete, Workability of concrete, factors affecting workability, measurement of workability using slump test, Compaction factor test, Flow test, Vee-Bee Test, Ball penetration test, Nasser's "K- probe test, Segregation and Bleeding of concrete, Mixing of concrete, Vibration of concrete, Different types of mixers and vibrators. Concreting in Hot weather and Cold weather.

Hardened Concrete: Compressive & Flexural strength of concrete, Stress and strain characteristics of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Fire resistance of concrete, Thermal properties of concrete. Micro-cracking of concrete, methods of curing, Influence of temperature on strength, Fatigue & Impact strength of concrete.

Unit IV

Bricks (classification, characteristics, manufacturing, testing, and types). Stones (classification, Quarrying, seasoning characteristics, testing, selection & uses, preservation), Wood & Timber (Classification, Structure & characteristics, seasoning and its methods, defects & diseases, preservation & various treatment testing), wood products and their applications.

Unit V

Mortar (Classification, characteristics, functions of ingredients). Types of mortar and their uses grout, guniting, ferrous material (Pig iron, CI, Mild steel, wrought iron, stainless steel, compositions & proposition). Reinforced steel bars (classification, types, designation), Aluminium (its alloys & uses). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms), Paint varnishes & enamels (types, composition, method of application, defects)

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the basic elements of buildings, engg. materials & construction.

CO 2: Evaluate the properties of various materials like cement, aggregate, concrete, admixture, brick, stone etc.

CO 3: Distinguish the suitability of building materials in the construction of elements of buildings.

CO 4: Evaluate various types of concrete in building construction accordingly.

CO 5: Apply various techniques for finishing & protection works of various elements of building.

Text Books:

1. Concrete Technology, M. L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 5th edition 2013
2. Concrete Technology, M.S. Shetty, S. Chand Publications, 2006
3. Building Materials, M. L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 2017
4. Building Construction, B.C. Punmia, A.K. Jain, Laxmi Publishers New Delhi, 2016

Reference Books:

1. Properties of Concrete, Neville, ELBS, Pearson Education, 5th edition 2012
2. Building Material, S.K. Duggal, New Age Publishers, 4th revised edition 2012

List of Experiments:

1. Determination of properties of cement, sand & aggregate.
2. Determination of workability of concrete by slump test.
3. Determination of workability of concrete by compacting factor apparatus.
4. Determination of workability by Vee Bee consistometer.

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5. Water absorption & efflorescence of brick.
6. Field testing on bricks.
7. Crushing strength of bricks.

Upon completion of practical course, the students will be able to:

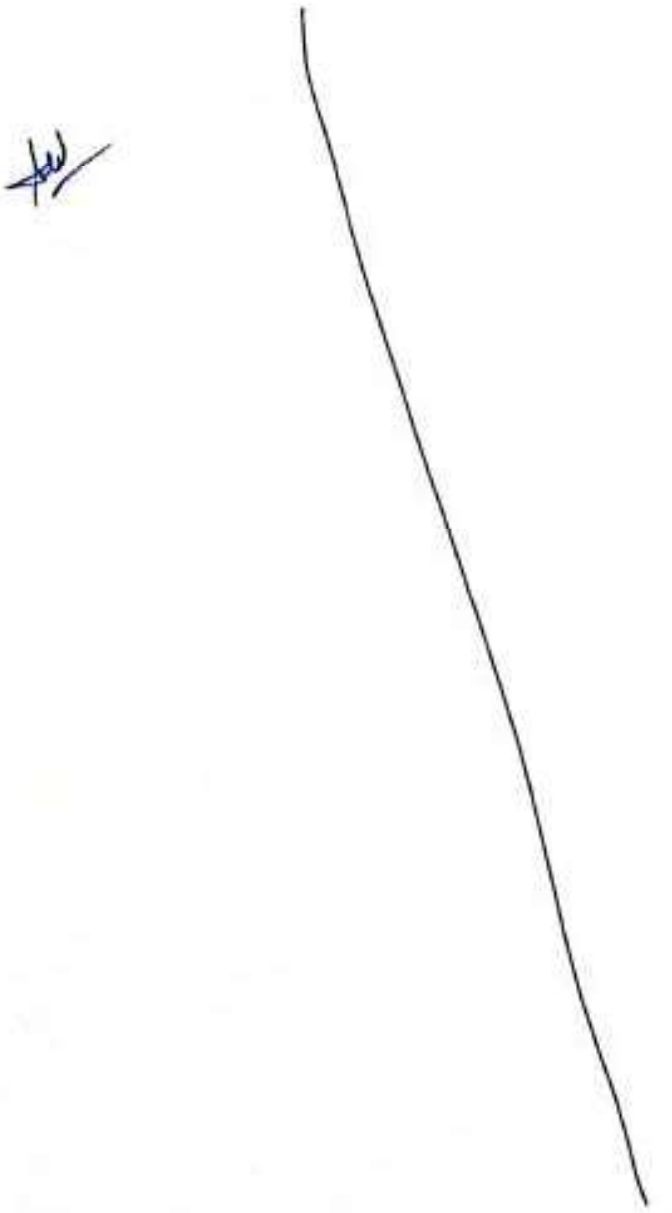
CO 1: Determine the properties of cement, sand & aggregate as per IS code.

CO 2: Determine the workability of concrete for suitability of concrete mix in different construction works.

CO 3: Evaluate compressive strength of various concrete mixes.

CO 4: Determine physical properties of brick by experiment and practice accordingly.

CO 5: Examine the properties of the cement mortar for various elements of the buildings



Course Code: 110304
Course Name: Surveying

L	T	P	Credit
3	0	2	4

Course Objectives:

1) To understand the working of theodolite.
2) To understand the determination of heights & distances by tacheometry.
3) To understand various types of curves used in practice.
4) To provide knowledge on setting out civil engineering works & detailed field surveying.
5) To understand the concepts of photographic surveying & GIS.

Syllabus:

Unit I

Traversing by theodolite, Fieldwork checks, traverse computations, latitude and departures, computations of co-ordinates, plotting & adjustment of traverse. Omitted measurements. Trigonometrical levelling, precise levelling.

Unit II: Tacheometry

Tacheometric systems and principles, stadia system, uses of anallactic lens, tangential system, substance system, instrument constant, field work reduction, direct reading tacheometers, use of tacheometry, accuracy.

Unit III: Curves:

Classification and use, elements of circular curves, setting out curves by offsets and by theodolites, obstacles and special problems, compound curves, reverse curves, transition curves, cubic spiral and lemniscate, vertical curves, computation and setting out.

Unit IV: Control Surveys

Providing frame work of control points, triangulation principle, forms of framework, reconnaissance survey, selection and making of stations, Control line, baseline measurement & corrections, flexible apparatus and corrections, computation of sides, precise traversing.

Unit V: Photographic Surveying & GIS:

Principles of photographic surveying – aerial photography, tilt and height distortions, uses. Basics of GIS & GPS.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the techniques used for linear & angular measurements in surveying.
CO 2: Analyse different geodetic methods of survey such as triangulation, trigonometric levelling, tachometry, photographic survey & GIS.
CO 3: Apply methods in control surveys.
CO 4: Apply tachometry in traverse computations.
CO 5: Apply various methods for setting curves, area & volume computations.

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Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition 1999

Reference Books:

1. Surveying theory & Practice, R.L. Devise, Mc Graw Hill, New York, 4th revised edition 2001
2. Plane & Geodetic surveying Vol. I & II, David Clark & J Clendinning, Constable & C. London, 2017
3. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016

List of Experiments:

1. Measurement of horizontal and vertical angle by Vernier Theodolite.
2. Theodolite, traversing.
3. Determination of R.L. of a point whose base is accessible by Trigonometrical levelling.
4. Determination of R.L. of a point whose base is inaccessible by Trigonometrical levelling.
5. Determination of tachometric contents in field.
6. Determination of height & distance by using Tangential tachometry.
7. Determination of height & distance by Stadia method of tachometry.
8. Measurement of base line by using Substance Bar.
9. Setting out of a simple circular curve by using Rankine's method.
10. Setting out of a simple circular curve by using Offset from the chord produced or deflection distance.
11. Determination of horizontal &vertical position of a point by Total Station.
12. Traversing by Total Station.

Upon completion of practical course, the students will be able to:

CO 1: Follow the guidelines for field surveying.

CO 2: Follow the working principles of survey instruments for measurements.

CO 3: Measure horizontal & vertical angle by theodolite for traversing and levelling.

CO 4: Determine tachometric constants for linear measurements by tacheometry.

CO 5: Create a simple circular curve by using Rankine's method for alignment

Course Code: 110305
Course Name: Strength of Materials

L	T	P	Credit
3	0	2	4

Course Objectives:

1) To understand the concepts of simple and compound stresses and strains.
2) To understand the behaviour of elastic materials in bending, shear and torsion.
3) To understand the stability behaviour of long columns under axial load.
4) To understand the power transmission by shift.
5) To understand stresses & strain developed in storage vessels
6) To calculate stresses / strain in statically indeterminate structures.

Syllabus:

Unit-I

Stress and Strains: Concept of Elastic body, stress and strain. Hooke's law various types of stress and strains. Elastic constants and their relation Stresses in compound bars, composite and tapering bars, temperature stresses.

Two-dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains. Mohr's circle of stresses. Strain energy and theories of failure.

Unit - II

Theory of simple bending: Concept of pure bending and bending stress, equation of bending, Neutral axis, Section-Modulus, Bending stress distribution across a section, Shear Stresses in Beams, beams of uniform strength, shear centre.

Unit-III

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow circular shafts. Combined bending and torsion. Open and closed springs, leaf spring and spiral spring.

Pressure Vessels: Thin cylinders and spheres. Stress due to internal pressure. Change in diameter and volumes.

Unit-IV

Columns and Struts: Euler's buckling load for uniform section, various end conditions. Slenderness Ratio. Merchant Ranking formulae, Eccentric loading on columns.

Unit-V

Deflection of statically determinate structure by Geometrical methods & Introduction of method of virtual work.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of stress, strains, bending, deflection, buckling & torsion.

CO 2: Explain various theories for determining stress, buckling of columns & deflections of structures.

CO 3: Apply various theories for determining stress, buckling of columns & deflections of structures.

CO 4: Evaluate the stresses in bending, shear and torsion.

CO 5: Analyse various sections for stresses, strain, bending, torsion, buckling & deflections.

Text Books:

1. Strength of Materials, Sadhu Singh, Khanna Publishing, 1st edition 2016
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 18th edition 2014
3. Strength of Materials, R. K. Bansal, Laxmi Publication; 6th edition 2018

Reference Books:

1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials, Higdon Style, Publisher Wiley, 3rd edition 1978
3. Strength of Materials Vol. I & II, B. C. Punmia, Laxmi Publication, 10th edition 2018
4. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 2016
5. Mechanics of Materials, J. M. Gere & B.J. Goodno, Cengage Publisher, 8th edition 2014

List of Experiments:

1. Impact Test
2. Brinell Hardness Test
3. Behaviour of columns with Different End Conditions
4. Tensile test
5. Compression test
6. Flexure test
7. Shear test

Upon completion of practical course, the students will be able to:

CO 1: Evaluate properties of material by impact test.

CO 2: Evaluate properties of material by hardness test.

CO 3: Evaluate properties of material by tensile test.

CO 4: Determine compressive & flexural strength of materials.

Course Code: 110306
Course Name: Software Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

1) To draw plan, elevation & section of various components of a building.
2) To prepare sketches of various components of building like doors, windows etc.
3) To expose students to use software's like AutoCAD in civil engineering drawing.

Syllabus:

List of Experiments:

1. One drawing sheet containing Foundations and Footing using AutoCAD
2. One drawing sheet containing Doors, Windows, Ventilators using AutoCAD
3. One drawing sheet containing Lintels, Trusses and Arches etc. using AutoCAD
4. One drawing sheet containing detailed planning of one/two room residential building (Common to all students)
5. Drawing sheets one each of residential building using AutoCAD
6. One Drawing sheet of Institutional / Commercial building / Hospital etc. using AutoCAD
7. Sketches of various building components i.e. masonry, brick / stone, floors, roof & roof covering

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Attempt to draw different components of a building.

CO 2: Produce plan, elevation & section of various components of a residential and institutional building.

CO 3: Use AutoCAD software in civil engineering drawing.

CO 4: Prepare drawing sheets of various types of buildings like residential, institutional, commercial etc

Course Code: 110308

Course Name: Summer Internship Project - I

L	T	P	Credit
0	0	4	2

Course Objectives:

1) To encourage students to read, study & understand different topics of civil engineering.
2) To make student acquire good oral & written communication skills.
3) To promote the habit of lifelong learning.

Syllabus:

Each candidate shall have to undergo 15 days in-house summer internship at the institute after the completion of their 2nd Semester exams (in summer vacations). Candidate can choose from various modules which are offered by the institute and after successful completion of internship they have to submit detailed report.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Observe various activities in field.
CO 2: Examine the utility of general and specific equipments for construction.
CO 3: Differentiate the construction projects individually and in team.
CO 4: Develop the writing and communication skills for various engineering problems.
CO 5: Adapt lifelong learning for benefit of society.

Course Code: 110402
Course Name: Geotechnical Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To inculcate the basic knowledge of soil such as its identification and classification, determination of various engineering properties and its suitability as a foundation/ subgrade material.
2) To develop an understanding of the relationships between physical characteristics and mechanical properties of soils by experimentally measuring them.
3) To explain role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated.
4) To determine shear parameters and stress changes in soil due to foundation loads & estimate the magnitude and time-rate of settlement due to consolidation.
5) To apply the principles of soil mechanics in stability analysis of slopes and settlement calculations.
6) To explain various types of foundations.

Syllabus:

Unit-I Basic Definitions & Index Properties:

Introduction–Types of soils, their formation and deposition, Definitions: soil mechanics, soil engineering, rock mechanics, geotechnical engineering. Scope of soil engineering. Basic Definitions and their relationships - Soil as three-phase system, Index properties and their determination. Consistency limits. Classification systems based on particle size and consistency limits.
Clay mineralogy & their Influence on engineering behavior, Expansive soils, their Characteristics & Challenges.

Unit-II Permeability, Seepage and Consolidation:

Darcy's law & its validity, Determination of coefficient of permeability: Laboratory methods: constant-head & falling-head method. Effective and total stresses, Effect of water table & capillary action. Seepage pressure, Quick sand condition.
Compressibility and consolidation, Relationship between pressure and void ratio, Theory of one-dimensional consolidation. Consolidation tests, Fitting of curves. Normally and over consolidated clays. Determination of consolidation pressure settlement analysis. Calculation of total settlement.

Unit-III Stress Distribution in Soils and Shear Strength of Soils:

Stress distribution beneath loaded areas by Boussinesq and Westerguard's analysis. Newmark's influence chart. Contract pressure distribution.
Mohr – Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Value shear test, Measurement of pore pressure, pore pressure parameters, critical void ratio, Liquefaction.

Unit – IV Stability of Slopes & Earth Pressure:

Infinite and finite slopes. Types of slope failure, Stress path. Stability curves. Effect of ground water, Analytical and graphical methods of stability analysis.
Earth Pressure at active, passive and at rest conditions. Rankine, Coulomb, Terzaghi and Culmann's

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theories. Analytical and graphical methods of determination of earth pressures on cohesionless and cohesive soils. Effect of surcharge, water table etc

Unit – V Soil Foundations

Shallow Foundation – Types of foundations. Bearing capacity of foundation on cohesionless and cohesive soils. General & local shear failures. Factors affecting bearing capacity. Theories of bearing capacity – Terzaghi, Vesic, Skempton, Meyerhof and I.S. code on bearing capacity.

Deep Foundation – Pile foundation. Types of piles, estimation of individual and group capacity of piles in cohesionless and cohesive soils. Static and dynamic formulae. Settlement of pile group. Negative skin friction. Under Ream Piles. Plate load test

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Evaluate different properties of soil, types of foundations and its classification.

CO 2: Examine the flow and shear parameters & their effects on various types of soil.

CO 3: Determine the stress distribution & shear strength parameters of soil by various methods.

CO 4: Analyse the stability of slopes, earth pressures & retaining walls using analytical methods.

CO 5: Evaluate suitable foundation system for various site conditions.

Text Books:

1. Soil Mech. & Found. Engg., Dr. K. R. Arora, Std. Publishers Delhi, 7th edition 2014
2. Soil Mech. & Foundation, Dr. B. C. Punmia, Laxmi Publications, Delhi, 16th edition 2017
3. Soil Mech. & Found Engg., S. K. Garg, Khanna Publishers, Delhi, 1st edition, 2003
4. Basic & Applied Soil Mechanics, Gopal Ranjan & ASR Rao, New Age International Publisher, 2016

Reference Books:

1. Modern Geotech Engg., Dr. Aram Singh, IBT Publishers, Delhi, 8th edition, 2016
2. Geotech Engg., C. Venkatramaiah, New Age International Publishers, Delhi, 16th edition, 2018
3. Soil Testing for Engg., T.W. Lambe, John Wiley & Sons. Inc., 1969

List of Experiments:

1. Moisture Content Determination. Oven Drying Method.
2. Grain Size Analysis – Mechanical Method.
3. Grain Size Analysis – Hydrometer Method.
4. Liquid & Plastic Limit Tests.
5. In-Place Density tests – Core Cutter Method, Sand Replacement Method.
6. Specific Gravity Tests.
7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (Demonstration)

Upon completion of practical course, the students will be able to:

CO 1: Check physical properties of soil.

CO 2: Check strength properties of soil.

CO 3: Differentiate the flow properties and stresses of soil.

CO 4: Check shear strength of soil.

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Course Code: 110403
Course Name: Fluid Mechanics - I

L	T	P	Credit
2	1	2	4

Course Objectives:

1) To understand fluid properties and concept of fluid continuum.
2) To understand the concepts of kinematics & dynamics of fluid flow.
3) To apply fluid flow principles to various fluid flow problems.
4) To understand the mechanism of fluid measurement.
5) To understand the method of simulation & dimensional analysis
6) To understand the concepts of laminar flow

Syllabus:

Unit I

Review of Fluid Properties: Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapour pressure.

Fluid Statics: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems – gravity dams and Tainter gates), buoyant force, Stability of floating and submerged bodies, Relative equilibrium

Unit II

Kinematics of Flow: Types of flow-ideal & real, steady and unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streamlines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets - their utility & method of drawing flownets.

Unit III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum equation, forces of fixed and moving vanes, velocity triangles.

Fluid Measurements: Velocity measurement, flow measurement (Orifices, nozzles, mouth pieces, orifice meter, Nozzle meter, venturimeter, weirs and notches).

Unit IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pie theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, etc.)

Unit V

Laminar Flow: Introduction to laminar, transition & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Define various fluid properties & states of fluid.

CO 2: Apply principles of fluid flow & dimensional analysis.

CO 3: Solve fluid flow problems.

CO 4: Analyze characteristics of fluid at rest, fluid at motion & dimensionless numbers.

CO 5: Discriminate different types of fluid flow, measurement techniques & principles.

CO 6: Apply the concepts of laminar flow in solving various fluid flow problems.

Text Books:

1. Fluid Mechanics, Modi& Seth, Standard Book House, Delhi, 21st edition, 2018.
2. Fluid mechanics, Girde & Mirazgaonkar, SCI Tech Publishers, 2019
3. Fluid Mechanics, R.K. Bansal, Laxmi Publishers, 2015

Reference Books:

1. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 2014
2. Fluid Mechanics, Streeter, McGraw Hill Publishers, 9th edition, 2017

List of Experiments:

1. Determination of viscosity of fluid by redwood viscometer
2. Determination of metacentric height of floating body
3. Calibration of Venturimeter
4. Determination of Cc, Cd, Cv of Circular Orifice
5. Calibration of Mouthpiece
6. Calibration of Orifice Meter
7. Reynolds experiment for demonstration of stream lined & turbulent flow
8. Determination of Friction Factor for a pipe
9. Verification of Stoke's law.

Upon completion of practical course, the students will be able to:

CO 1: Differentiate between different flow measurements devices.

CO 2: Notice flow through pipes & fall velocity of particle.

CO 3: Correct the instrumental errors.

CO 4: Apply Stoke's law to calculate terminal velocity.

Course Code: 110404
Course Name: Structural Analysis

L	T	P	Credit
3	1	0	4

Course Objectives:

1) To develop an understanding of the behavior of structure under serviceability load.
2) To understand the mechanics of the material behavior of different type of structures.
3) To understand the concepts of analysis of indeterminate structures by various classical methods.
4) To make student aware of different methods of structural analysis.

Syllabus:

Unit-I

Deflection of beams: Double Integration method. Area Moment Method and Slope - Deflection Method. Beam of variable cross section, M/EI diagram, Conjugate Beam Method.

Unit-II

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies. Maxwell's Reciprocal theorems, Energy theorems, Application to pin jointed frames only.

Unit – III

Indeterminate Structures – I: Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by Theorem of three moments, Effect of sinking and rotation of supports.

Unit-IV

Indeterminate Structures – II: Analysis of beams and analysis of frames (with and without sway) by slope Deflection method.

Unit-V

Moment Distribution Method: Moment distribution method for analysis of beams and analysis of frames (without sway) Three hinged arches of different shapes, Eddy's Theorem. Two Hinged and Fixed Arches.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Classify different type of structures based on support conditions.
CO 2: Explain various methods & principles for analysis of structures.
CO 3: Apply various methods & principles for structural analysis.
CO 4: Analyse various structures using various methods, principles & theorems.
CO 5: Evaluate different methods of structural analysis.

Text Books:

1. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
2. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9th edition, 2014
3. Theory of Structures, B.C. Punmia, Laxmi Publications, 2017

Reference Books:

1. Structural Analysis – A Unified classical and matrix Approach, Ghali A & Neville M, Chapman and Hall, New York, 6th edition, 2009

2. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
3. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
4. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017

Course Code: 110407
Course Name: Survey Practice Lab

L	T	P	Credit
0	0	4	2

Syllabus:

Field Work:

1. Profile leveling & cross sectioning
2. Prepare contour map by using Tachometric method
3. Locating details by Plane Table surveying
4. Setting out of simple circular curves
5. Triangulation – Adjustment of quadrilateral by least square method
6. Use of Total Station in surveying

Upon completion of the course, the students will be able to.

CO 1: Observe topographical characteristics.
CO 2: Differentiate methods to perform ground survey.
CO 3: Prepare longitudinal & cross section profiles
CO 4: Develop contour map by using tachometer & total station.
CO 5: Prepare the details of features using Plane table surveying.
CO 6: Produce a simple circular curve by using Rankine's method for alignment.

Reference Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2015
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 2015
3. Surveying theory & Practice, R.E. Devise, Mc Graw Hill, NewYork, 1997
4. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 2010

Course Code: 110602
Course Name: Structural Design & Drawing (Steel)

L	T	P	Credit
2	1	0	3

Course Objectives:

1)To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
2)To understand the behavior of steel structural components subjected to gravity loads.
3)To study the design of bolted and welded connections.
4)To study the behaviour and design of compression and tension members using simple and built-up sections.
5)To understand behaviour of flexural members and the design laterally restrained & unrestrained beams.
6)To design plate girders & stiffeners.

Syllabus:

Unit-I

Various loads, Partial Load factors, Structural properties of steel, Design of structural connections – Bolted and Welded connections, eccentric connection. Codal provision.

Unit-II

Design of Tension members. Codal provision. Lug angles & Tension splices.

Unit-III

Design of Compression member, Design of columns-simple and compound, Lacings & Battens. Design of footings for steel structures, Slab base, gusseted base. Codal provision.

Unit-IV

Design of built up beams, web buckling and crippling, curtailment of flanges. Design of Laterally supported and unsupported beams, web buckling and crippling. Codal provision.

Unit-V

Design of plate girder. Curtailment of flanges, Design of stiffeners (bearing, Vertical and horizontal), Codal provision.

Course Outcomes:

Upon completion of the course, the students will be able to:

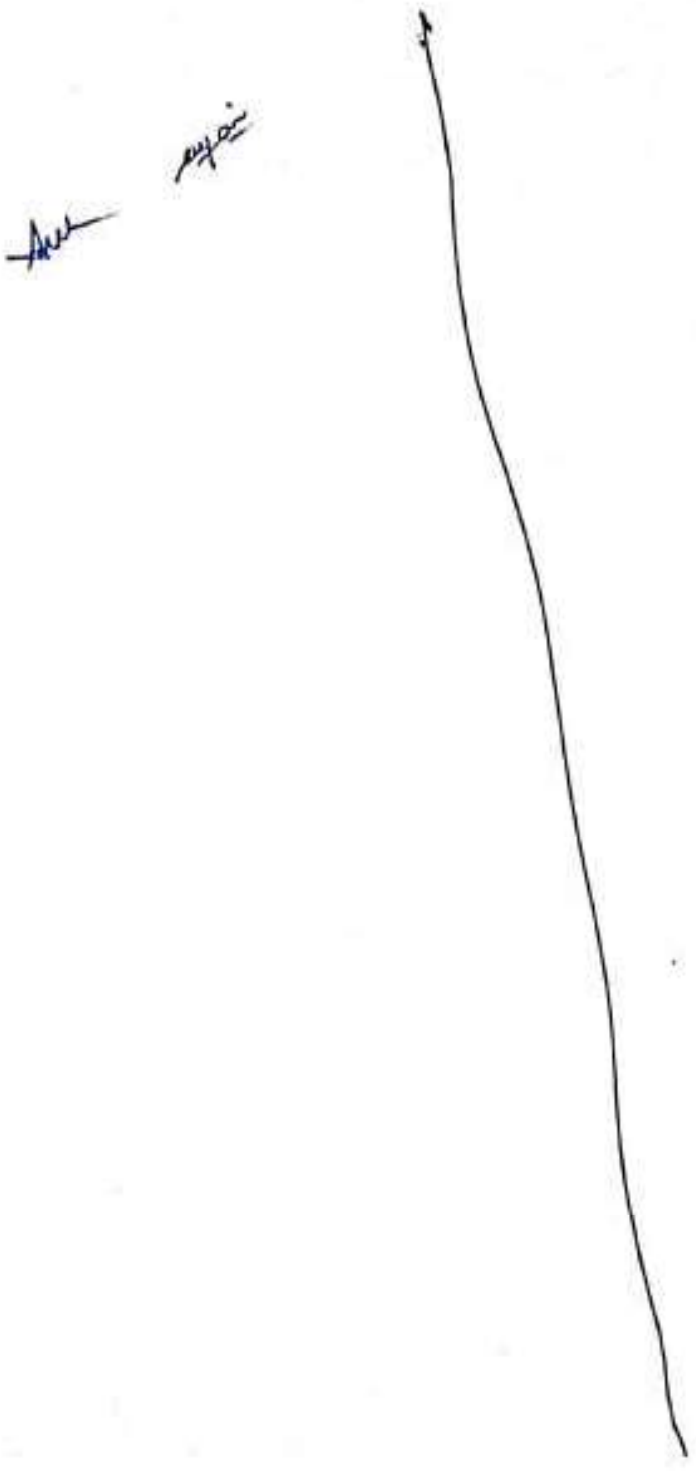
CO 1: Explain the principles of steel structural design using relevant IS Codes.
CO 2: Evaluate structural behaviour of different steel structural elements.
CO 3: Analyse a given section of steel structural element using IS codes.
CO 4: Design different elements of steel structure under various loading conditions using relevant IS codes.
CO 5: Design a structure/ component to meet desired needs within realistic constraints such as economy, safety, viable construction & its sustainability as per codal provisions.

Text Books:

1. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill Publication, 3rd edition, 2017

Reference Books:

1. Design of Steel Structures, S. S. Bhavikatti, International Publishing House, 2014
2. Design of Steel Structures, N. Subramanian, Oxford University Press India, 2008



Course Code: 100007

Course Name: Disaster Management

L	T	P	C
2	-	-	2

Course Objectives:

i) To understand basic concepts in Disaster Management
ii) To understand Definitions and Terminologies used in Disaster Management
iii) To understand Types and Categories of Disasters
iv) To understand the Challenges posed by Disaster
v) To understand Impact of Disasters key skills

Syllabus:

Unit 1: Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit 2: Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit 3: Disaster Impacts Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit 4: 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. Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit 5: Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Course Outcomes:

After successful completion of the course, the students will be able to

CO1: Identify disaster prevention and mitigation approaches.
CO2: Classify global and national disasters, their trends and profiles.
CO3: Determine the impacts of various disasters.
CO4: Apply Disaster Risk Reduction in management.
CO5: Infer the linkage between disasters, environment and development.

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Text Books:

1. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

2. Ghosh G K., 2006, Disaster Management, APH Publishing Corporation
3 Srivastava H H & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006

Reference Books:

1 http://nidm.gov.in (Home page of National Disaster Management Authority)
2 http://www.ndmindia.nic.in (National Disaster Management in India)
3 Singh B K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
4 National Disaster Management Policy, 2009, GOI
5 Inter Agency Standing Committee (IASC) (Feb 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting, Geneva: IASC

M.E. CTM.

510301 (A) Infrastructure Project Management

L	T	P	Credit
3	1	0	4

Unit-I

Nature & Type of Infrastructure Projects. Characteristics, Scope and Status of Infrastructure Projects in India.

Unit-II

Issues of Developing, Funding, Financing Infrastructure Projects. Various Construction Procurement Options.

Unit-III

Uncertainties & Risks in Large Scale Construction Projects.

Unit-IV

Development of sustainable Infrastructure. Environmental Impact assessment of Infrastructure projects.

Unit-V

Management of Infrastructure projects. Role of I.T. in Infrastructure development.

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M.E. C-T M.

510302 (A) Urban Hydrology & Waste Management

L	T	P	Credit
3	1	0	4

Unit-I

Utilization of industrial waste in construction industry, Flyash as building material, ceramic insulator scrap as aggregate in concrete. Use of cement stabilized soil block as an alternative to burnt clay brick, urban solid waste and sludge as building material. Cement and building material from industrial waste. Lal-G brick. Pollution free production of innovative building materials and components. Concrete aggregate from demolition waste. Structural concrete using industrial waste.

Unit-II

Industrial Waste: Problem associated with industrial waste. Equalization, neutralization, volume reduction. House keeping method and Advanced treatments like adsorption, ion exchange, Chemical oxidation, Phosphorus removal, Nitrification, chemical precipitation, Reverse-osmosis, Electrodialysis.

Unit-III

Wastewater Treatment: Waste water generation, Collection, Construction of sewer lines, Sewer appurtenances, Disposal of wastewater & refuse, Recycling and reuse.

Unit-IV

Surface & Subsurface Hydrology: Hydrological cycle & its application in engineering. Precipitation, its types, forms & measurements, Rainfall data, DAD curve, Methods of average rainfall and losses.

Ground Water: Aquifer properties, groundwater properties, types and problems, well hydraulics, well losses, ground water investigation.

Unit-V

Hydrographs: Run off-discharge measurement, stage discharges, runoff computation, runoff simulation model, concept of hydrograph, component of hydrograph, unit hydrograph and its derivation, S-hydrograph, IUH hydrograph and its derivation, Synthetic unit hydrograph, Flood estimation techniques.

Reference Books:

i) Engineering Hydrology by K. Subhramanya – Tata Mc Graw Hill Publ. Co

ii) Hydrology & Water Resources Engineering by S. K. Garg – Khanna Publishers

iii) Sewage Disposal & Air Pollution Engineering by S. K. Garg – Khanna Publishers.

iv) Waste Water Engineering Treatment, Disposal & Reuse by Metcalf & Eddy – TMH Publishers.

M.Tech Env.

530301 (A) Principles and Design of Biological Treatment Systems

L	T	P	Credit
3	1	0	4

Unit-1

Principles Objectives of Biological Treatment, significance, aerobic and anaerobic treatment kinetics of biological growth, factor effecting growth- attached and suspended growth.

Types of wastewater Constituents of wastewaters- Sources, Significant parameter Fundamentals of Proces- Kinetics, Zero order, First order Second order Reactions, Enzyme kinetics

Unit-2

Bio reactors: Types, Classification, Design principles, Design of wastewater treatment systems, Primary, secondary and tertiary treatments, Evaluation of Biokinetic Parameters

Unit-3

Biological Nitrification and denitrification Suspended Growth process- Activated Sludge process: Introduction, Modifications, Membrane bioreactors, Waste stabilization ponds and Lagoons, Aerobic pond, facultative pond, anaerobic ponds, aerated Lagoons

Unit-4

Attached Growth Biological Treatment Systems: Trickling Filters, Rotating Biological Contactors, Anaerobic processes -Process fundamentals, Standard, high rate and hybrid reactors

Unit-5

Anaerobic filters, Expanded /fluidized bed reactors, Up flow anaerobic sludge blanket reactors, Expanded granular bed reactors, Two stage/phase anaerobic reactors, Sludge Digestion, Sludge disposal.

Reference Books:

1. Benefield, L.D. and Randall C.W, Biological Processes Design for wastewaters, Prentice-Hall, Inc. Eaglewood Cliffs, 1982.
2. Grady Jr. C.P.L. and Lin H.C. Biological wastewater treatment: Theory and Applications, Marcel Dekker, Inc New York, 1980.
3. Metcalf & Eddy, Inc. Wastewater Engineering, Treatment and Reuse. 3rd Edition, Tata McGraw-Hill, New Delhi, 2003.
4. Quasim S.R. Wastewater Treatment Plant, Planning Design & Operation, Technomic Publication, New York 1994.
5. Manual on "Sewerage and Sewage Treatment CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.

M. Tech Env.

530302 (A) Urban Hydrology & Waste Management

L	T	P	Credit
3	1	0	4

Unit-I

Utilization of industrial waste in construction industry. Uses as building material: ceramic insulator scrap as aggregate in concrete. Use of cement stabilized soil block as an alternative to burnt clay brick, urban solid waste and sludge as building material. Cement and building material from industrial waste, Eal-G brick. Pollution free production of innovative building materials and components. Concrete aggregate from demolition waste. Structural concrete using industrial waste.

Unit-II

Industrial Waste: Problem associated with industrial waste. Equalization, neutralization, volume reduction. House keeping method and Advanced treatments like adsorption, Ion exchange, Chemical oxidation. Phosphorus removal, Nitrification, chemical precipitation, Reverse osmosis, Electrodialysis.

Unit-III

Wastewater Treatment: Waste water generation, Collection, Construction of sewer lines, Sewer appurtenances. Disposal of wastewater & refuse. Recycling and reuse.

Unit-IV

Surface & Subsurface Hydrology: Hydrological cycle & its application in engineering. Precipitation, its types, forms & measurements. Rainfall data, DAD curve. Methods of average rainfall and losses.

Ground Water: Aquifer properties, groundwater properties, types and problems, well hydraulics, well losses, ground water investigation.

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ii) Hydrology & Water Resources Engineering by S. K. Garg – Khanna Publishers.
iii) Sewage Disposal & Air Pollution Engineering by S. K. Garg – Khanna Publishers.
iv) Waste Water Engineering, Treatment, Disposal & Reuse by Metcalf & Eddy – TMH Publishers.

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