



SGS Institute of Engineering & Technology, Nanded
Department of Civil and Water Management Engineering
(An Autonomous Institute of Government of Maharashtra)

DETAILED SY (CWM) SYLLABUS

CHOICE BASED CREDIT SYSTEM

2015-2016

DFB Members

Teaching & Examination Scheme
S.Y. B. Tech. (Civil & Water Management Engineering)
(From Academic Year 2015-16)

7/7/2015

Semester-I					
Course Code	Name of the Course	Lectures (per week)	Tutorials (per week)	Practical (per week)	Total Credits
MA201	Engineering Mathematics-III	04	--	--	04
CW201	Strength of Materials	04	--	02 (Audit)	04
CW202	Fluid Mechanics-I	04	--	02	05
CW203	Surveying-I	04	--	02 (Audit)	04
CW204	Building Construction	04	--	02	05
HU205	Professional Communication	02	--	02	03
Sub Total		22	--	10	25
Semester-II					
CW205	Engineering Mathematics-IV	04	--	--	04
CW206	Theory of Structures-I	04	--	--	04
CW207	Fluid Mechanics-II	04	--	02 (Audit)	04
CW208	Surveying-II	04	--	02 (Audit)	04
CW209	Building Planning and Drawing	04	--	02 (Audit)	04
CW210	Concrete Technology	03	--	02 (Audit)	03
UHS221	Human Values and Professional Ethics	02	--	--	02
Sub Total		25	--	08	25
Grand Total		47	--	--	50

SEMESTER-I

MA201: ENGINEERING MATHEMATICS-III (L-3, T-1, P-0) Credits 04

Second Order Differential Equation: Homogenous linear differential equations for real and complex roots. Modeling: free oscillations, Euler-Cauchy equation, Existence and Uniqueness theorem (without proof) and Wronskian, non-homogenous equations, solutions by undetermined coefficients and variation of parameter methods. Modeling: forced oscillations, resonance and electrical circuits, system of differential equations

(15 Hrs)

Laplace Transform (LT): Definition, existence theorem, linearity property of LT, LT of standard functions, theorems on LT, Inverse Laplace transforms (ILT), convolution theorem, unit step function, impulse function, LT of periodic functions, applications to initial and boundary value problems (15 Hrs)

Fourier Series: Periodic functions, Fourier theorem, Fourier series, Euler's formulas for the Fourier coefficients, convergence of Fourier series, Change of interval, even and odd functions, half range Fourier Series. (10 Hrs)

Partial Differential Equations: Separation of variables, Vibrations of string, One dimensional Heat Equation (10Hrs)

Reference Books:

1. Advanced Engineering Mathematics By Erwin Kreyszig. Pub. : John Wiley & Sons, (8th Edition)
2. Advanced Engineering Mathematics, By R. K. Jain and S. R. K. Iyengar, Narosa Publication House (2nd Edition)
3. Elementary Differential Equations and Boundary Value Problem By Boycs and DiPrima, John Wiley & Sons; (7th Edition)
4. Calculus By Thomos and Finney; (9th Edition)

CW201 STRENGTH OF MATERIALS (L: 04) Credits: 04

Objective:

- 1) To enables the student to understand various strength parameters of structural components.
- 2) To introduce basic knowledge of properties of engineering material, concept of stress, strain, their relationship, the types of stresses and the effects of stresses in engineering applications.

1. Stress and Strain: Simple stresses and strains due to tension, compression, thermal effects and shear elastic constants: Stress – Strain diagrams for brittle and ductile materials: Strain Energy under gradual and impact loads. Thin cylindrical shells with flat ends under internal fluid pressure stresses, strains and changes in dimensions.

2. Theory of Simple Bending: Assumptions, Theory of pure bending, Distribution of bending stress: Composite and built up beam sections

3. Shear Stress Distribution: Shear stress distribution in various shapes of cross section of beams.

4. Deflection of Beams: Slope and deflection of simply supported beams and cantilevers: Double Integration technique: Macaulay's method: Moment area method.

5. Torsion of Circular Shafts: Theory of pure torsion: solid and hallow circular sections: Torsional shear stresses: Power transmission.

6. Compound Stress and Strain: Analysis of biaxial stress at a point: Principal planes: Principal stresses and strains: Mohr circle: Application to different case.

7. Columns: Long columns subject to eccentric and lateral loads: Column with initial curvature.

Reference Books:

1. Strength of Materials by S. Rama Murtham, Dhanpat Rai and Sons
2. Solid Mechanics by S.M. A. Kazimi, Tata McGraw Hill.
3. Mechanics of Materials by E.P. Popov. SI version, Prentice Hall of India,
4. Elements of Strength of Materials by S.P. Timoshenko

STRENGTH OF MATERIALS LABORATORY (P: 02) Audit

Objective: It enables the student to assimilate various tests meant for determination of strength of materials.

TERM WORK: Term work shall consist of eight laboratory experiments to be conducted from the list given below.

1. Tension tests on mild steel to study stress – strain characteristics.
2. Bending test on timber / metal in a simply supported beam.
3. Torsion test on circular bars.
4. Impact test – Izod and Charpy.
5. Hardness test on steel brass and Aluminium.
6. Punching shear test on Hounsfield Tensiometer
7. Abrasion test on tiles.
8. Absorption and crushing test on bricks.
9. Absorption and transverse test on cement / mosaic floor tiles.
10. Strain measurements in beams using mechanical extensometer.

CW202 FLUID MECHANICS – I (L - 4) Credits: 04

Objective: To make the students to understand basics of fluid mechanics. At the end of the course the students should be able to appreciate the basic principles and understand the various type of fluids, concepts of fluids in statics, fluid kinetics and fluid kinematics, flow of liquid through pipes. Basics of Engineering concepts must have been made clear so that they will be able to use the knowledge for practical problems.

1. Introduction: Definition of fluid, Properties of fluids, dimensions and units, continuum concept of system and control volume.

2. Fluid Statics: Pressure at a point, Pascal's law, Hydrostatic pressure on plane and curved surfaces, Absolute, Gauge, Atmospheric and vacuum pressures, pressures, Measurement of pressure by manometers and gauges, Buoyancy, Centre of buoyancy, Stability of floating bodies, Metacentre, Metacentric height and its determination.

3. Fluid Kinematic: Types of fluid flows, continuity equation for one, two and three dimensional flows, Velocity and acceleration, Velocity potential function and stream function, vortex flow, flownets, velocity measurements (pitot tube, current meter, hot wire, hot film anemometer, float techniques: laser doppler velocimetry)

4. Fluid Dynamics: Equation of motion, Euler's equation, Bernoulli's equation, and practical applications of Bernoulli's equation: Venturi meter, orifice meter, Pitot tube, Momentum equation. Fluid mass subjected to uniform laminar and radial acceleration. Free and forced vortex flow, Radial flow.

5. Measurement of Flow: Orifice, mouth piece, notches, weirs - Classification, Hydraulic coefficients, Determination of hydraulic coefficients, time required to empty a reservoir and tank with triangular/rectangular notch.

6. Flow Through Pipes: Minor losses, Head loss due to friction, Darcy–Weisbach equation, H.G.L. and T.E.L., Pipes in parallel and series, Equivalent pipe siphon, Power transmission, Water hammer.

Laminar flow: Relation between shear and pressure gradient, Steady laminar flow through circular pipes, Hagen-Poiseuille law, Laminar flow through inclined pipes and between parallel plates, Flow through porous media, Laminar flow around spear.

Reference Books:

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| 1. Hydraulics and Fluid Mechanics | by Modi and Seth |
| 2. Fluid mechanics and Hydraulic Machines | by Dr. R. K. Bansal |
| 3. Theory and Application of Fluid Mechanics | by K. Subramanya |
| 4. Fluid Mechanics | by V.L. Streeter and E. Benjamin Wylie |

FLUID MECHANICS-I LABORATORY (P - 02) Credits: 01

Objective: This laboratory work aims at an experimental way of studying fluid flows, which deals with Bernoulli's theorem, Reynolds number, application of energy principle, forces on immersed bodies, hydraulic coefficients and also study of pressure measuring devices.

Competencies: At the end of the course students should be able to:

1. Understand Bernoulli's theorem
2. Understand Reynolds number
3. Understand application of energy principle
4. Understand buoyancy and metacentre
5. Understand hydraulic coefficients
6. Understand the pressure measuring devices.

TERM WORK: Term work shall consist of the record of following laboratory experiments.

1. Verification of Bernoulli's equation.
2. Laminar flow by Reynolds Experiment.
3. Discharge measurement by Pitot static tube.
4. Calibration of Venturimeter.
5. Determination of metacentric height
6. Determination of Hydraulic Coefficients for an orifice.
7. Calibration of rectangular / Triangular notch.
8. Study of pressure measuring devices.

CW203 SURVEYING – I (L: 04) Credits: 04

Objective: The scope of this course is to introduce the concepts of surveying techniques. The objective of this course is to make the students understand the principles of surveying with reference to layout for different civil engineering works. They should be able to understand the use of surveying equipments for linear, angular measurements and also the determination of features of ground terrain.

1. Chain Surveying: Introduction to principle, Classification, Linear measurements. Ranging of a survey lines, Different methods, Chaining on plane and sloping grounds, Obstacles in chaining, Chain triangulation, Well conditional and ill conditional triangles, Survey stations, Survey lines, Offsets, Field books, Conventional signs – Procedure of plotting, Cross staff and Optical square.

2. Compass Surveying: True, Magnetic and Arbitrary meridian, Bearing, Designation of bearing, Reduced bearing, F.B. B.B., Magnetic dip and delineation. Construction of angles from bearings and bearings from angles, Chain and Compass traversing, Traversing method, local attraction and correction of bearings, Field work and plotting of compass traversing, graphical method of compass traverse adjustments, sources of error in compass surveying.

3. Theodolite Survey: Construction, Types, Vernier, Micrometer Theodolites, Temporary adjustments, Measurement of horizontal angles, Different methods, Deflection angles, Vertical angles and bearing of a line. Traversing with theodolite. Field work, Traverse computation, Latitudes and Departure's, Balancing of traverse. Different rules, Gale's Traverse table, Sources of errors, Permissible errors and degree of accuracy, Computation of traverse areas, permanent adjustments, Omitted measurements.

4. Levelling: Definition, Construction details of dumpy and modern tilting level. Sensitivity of bubble tube, B.M. and its type, Levelling staff, target staff, self reading staff, Temporary adjustments of level, Types of leveling operation, Simple levelling, Differential leveling, Fly leveling, Check levelling, Profile leveling and cross – sectional levelling. Plotting of profiles, Booking field observations, Calculation of reduced level – different methods, Arithmetic check, Fundamental lines and permanent adjustments of dumpy level, Contouring characteristics of contour lines and their methods of contouring, interpolation of contours.

5. Plane Table Surveying: Introduction, Accessories used in plane table survey, adjustments of plane table, Methods of plane tabling, Traversing, Two point and three point problems. Advantages and disadvantages of plane table survey

6. Contouring of Areas and Volumes: Planimeter–Theory and its use, Types of cross sections, Derivation of equations for areas of cross sections for level, Two level, Three level, side hill two level and multi level sections. Prismoidal and Trapezoidal formula, Prismoidal correction, volume of cut and fills, with special reference to road, canal, railway and reservoirs, Haulage, lift, lead and mass diagram for economic grade line, use of earth work tables.

Reference Books:

1. Surveying and Leveling by Prof. T. K. Kanitkar and Prof. S.V. Kulkarni
2. Surveying Vol. I and II by Dr. B.C. Punmia
3. Surveying and Leveling by N.N. Basak

SURVEYING – I LABORATORY (P: 02) Audit

Objective: To understand the following surveying exercises and to prepare survey field record book.

LIST OF PRATICALS:

1. Locating objects from survey line, using various methods and instruments
2. Measuring bearings of traverse lines, calculation of included angles and check
3. Study of dumpy level and fly leveling, reduction of levels
4. Profile leveling and cross – sectional leveling practice
5. Measurement of areas by using planimeter
6. Solution of two point problem
7. Measurement of horizontal and vertical angles using theodolite
8. Measurement of horizontal angle by method of repetition using theodolite
9. Measurement of magnetic bearing and deflection angle using theodolite

LIST OF PROJECTS:

1. Chain and compass survey.
2. Profile and cross section leveling for road and its earth work computation
3. Block contouring project.
4. Plane table traversing.

CW204 BUILDING CONSTRUCTION (L: 04) Credits: 04

Objective:

The course is designed with an objective of making the student aware of various components in a building and also make him conversant with the technical terminology, specifications, and methods used in building construction, so as to enable him to supervise simple construction projects. It is also expected to gain understanding of the concepts of green building, energy efficient and intelligent building.

a) Building Components:

Foundations: Loads on buildings, Types of shallow foundations and selection criteria, Empirical design of shallow foundations, Foundations in expansive soils (B.C. soil), raft foundations, Types of deep foundations, Timbering of trenches and dewatering of foundations.

Doors and Windows: Technical terms, Classification and suitability of doors, Types of doors- Framed and Panelled, Flush, Revolving and Collapsible door, Classification and suitability of windows, Fixed, Pivoted, Casement, Louvered window, Fixtures and fastenings for doors and windows.

Arches and Lintels: Technical terms, Types of arches, Lintels: Reinforced concrete lintels with chajja.

Flooring: Ground and upper floors, Timber floors, concrete floor (IPS), RCC floors, Types of wearing surfaces, modern types ceramic and vitrified tiles

Vertical Transportation: Staircases, Technical terms, Requirements of good stair, Classification of stairs, Planning of layout of staircase, Ramps, Elevators/lifts, Escalators.

Roofs and Roof Covering: Technical terms in sloping roofs, Types of pitched roofs, Lean to roof, Steel trusses, Roof coverings for pitched roof and their selection, Details of fixing of roof coverings, Flat or terrace roofs, Shell roofs, Domes.

Temporary Support Structures: Formwork/Form/Shuttering, Requirements, Loads on formwork, Shuttering for columns, beams, and slab, Slip formwork, Types and uses of shoring, underpinning, and scaffolding.

Building Finishes: Plastering: Objective, Mortar and Tools for plastering, Methods of plastering, Use of lath in plastering, Fibrous plaster boards, Types of pointing, White washing, Coloring, Distempering, materials and methods of applying POP and putty to internal and external surfaces, Wall cladding with aluminum sheets.

b) Building Services:

Plumbing and Sanitation: Plumbing services, general principles of drainage, pipes, traps, and sanitary fittings, drainage plans

Damp and Fire Proofing: Causes, and effects of dampness, Materials and methods of damp proofing, Important consideration in fire protection, Fire resistant materials, General measures of fire safety in buildings

Ventilation and Air-Conditioning: Definition and necessity, Functional requirements and systems of ventilation and air-conditioning, likely problems

Reference Books:

1. Building Construction by B.C. Punmia
2. Building Construction by S.P. Arora and S.P. Bindra
3. Building Construction by Sushil Kumar
4. National Building Code of India. (SP 7)

BUILDING CONSTRUCTION LABORATORY: (P: 02) Credit: 01

Objective:

The set of practical and drawing assignment are designed to strengthen the conceptual understanding of the students regarding building components.

The students would perform following set of practical and drawing assignments

1. Measured drawing of a residential building
2. Drawing building component in AutoCAD
To have hands-on-experience in using 2-D feature of the drawing software
3. About 15 free hand proportionate sketches of various building components on quarter size drawing sheet
It is expected that the students should be able to draw various components free hand which would enable him to draw working drawing on site during supervising any construction activity
4. Assignments on topics of Modern Concepts in Building Design

HU205 PROFESSIONAL COMMUNICATION (L2-T0-P2): 3 Credit

Objectives of the course:

1. *To enable students to speak and write English with a good level of proficiency*
2. *To build confidence in students to face interview, deliver speech, make presentation and participate in meeting and discussion*
3. *To lay a strong foundation on the subject by revising and correcting the basics*

Unit 1: Functional Grammar

[10]

Building of a sentence and its components, Tense- the time sense: Present, Past and Future tense with uses and applications, Verbs, Noun, Pronoun, Adjective, Adverb, Prepositions and Conjunctions: classification, identifications, uses and applications Active & Passive voice, direct and indirect speech, clause, principles of effective communication.

Unit 2: Listening Skills

[3]

Requirements of listening skill, Phonetics and phonology, Articulation of consonants and vowels, Syllables, Weak form stress, Rhythm and intonation, Face to face conversation, Telephonic conversation.

Unit 3: Reading Skills [2]

Requirements of reading skill, Reading poetry, Reading prose, Reading article from standard news paper/ magazine

Unit 4: Writing Skill [5]

Paragraph, Resumes, Letters- formal and informal, Circular, Notice, Agendas, Minutes, Reports, E-mail and Blog writing

Unit 5: Speaking Skills [3]

Requirement of speaking skills, Grammatical difficulties, Practice of public speaking, Conversation between /among students or groups on given situations

Unit 6: Integration of skills [5]

Group discussion, Personal interview, Debate and Quiz competition, ppt Presentation,

Practicals and Assignments:

1. Practice of building of sentences and identification of components
2. Practice the uses and applications of tense
3. Identification of parts of speech and form changes- use in sentences
4. Identification of various clauses and their use in sentences
5. **Listening Skills:** Listen few BBC / Voice of America/ NDTV 24*7 or similar standard Television channel / Radio or any standard talk/discussion available in CD/DVD and answer the given questions/ write the summery
6. **Reading Skills:** Read few articles from standard news paper The Hindu/ The Times of India / magazine /books and answer the given questions /write the summery
7. **Writing Skills: (Assignments)**
 - a. Write your own CV
 - b. Write an E-mail
 - c. Write a blog on current topic of discussion
 - d. Write a technical report
 - e. Write a letter
 - f. Comprehension Tests
8. **Speaking and Integration of Skills:**
 - a. Converse on few given situations

- b. Group Discussions on a given topic
- c. Debate competition on a given topic
- d. Quiz competition among few groups of students
- e. ppt presentation

Suggested Readings:

1. Essential English Grammar, Raymond Murphy, Cambridge University Press, 1 December, 2007
2. Oxford English Grammar Course: Advanced, Michael Swan and Catherine Walter, Oxford, 24 February, 2012
3. Advanced English Grammar, Martin Hewings, Cambridge University Press, 1 December, 2007
4. *Developing Communication Skills*, Krishna Mohan and Meera Banerjee, Macmillan India Ltd, New Delhi, 2nd Edition, 2009
5. Oxford Advanced Learner's Dictionary, 8th Edition

SEMESTER-II

CW205: ENGINEERING MATHEMATICS – IV (L-3, T-1, P-0); Credits 04

Statistics and Probability Role of statistics in engineering

Moments: Moments about mean moments about the mean in terms of moments about any point, skewness and kurtosis, introduction of correlation, regression coefficients, lines of regressions. Probability distribution, discrete and continuous probability distribution, Binomial, Poisson and normal distribution and its applications and importance in engineering field. (20 Hrs)

Vector Calculus: Introduction of vector algebra, Limit, Continuity, derivative of a vector function, curves Tangents and arc lengths. Velocity and acceleration, radial and transverse components of velocity and acceleration, tangential and normal acceleration, scalar and velocity point functions, gradient of a scalar field, Directional derivative, divergence of a vector field, curl of a vector field. Line integrals, green's theorem in the plane, surface integrals, divergence theorem, Stoke's theorem. (20 Hrs)

Numerical Solution of Ordinary Differential Equations: Picard's Method, Euler's Method, improved and modified Euler's Method and Runge –Kutta Method (10 Hrs)

References:

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|---|---|
| 1. Advanced Engineering Mathematics | By Erwin Kreyszig. John Wiley & Sons, 8 th Edition |
| 2. Advanced Engineering Mathematics | By R. K. Jain and S. R. K. Iyengar; Pub. : Narosa Pub. |
| 3. Introductory Methods of Numerical Analysis | By S.S.Sastry, Prentice-Hall of India New Delhi |
| 4. Probability | By J.Pitman (1993) Narosa Publication House |
| 5. Applied Statistics and Probability For Engineers | Wiley & Sons (Asia) (3 rd Edition) 2003 |

CW206 THEORY OF STRUCTURES – I (L: 04) Credits: 04

Objective:

- 1) It enables the student to understand various structural analysis principles
- 2) To introduce of the basic principles of structural Analysis. i.e the behavior of a given structure under prescribed loads and/or other effects such as support movements and temperature changes.

- 1. Strain Energy:** Resilience of beams in bending: Deflection of beams from strain Energy, Castigliano's theorem and its application to beams and pin jointed trusses
- 2. Fixed Beams:** Analysis of fixed beams for shear force and bending moment: Effect of sinking of supports
- 3. Continuous Beams:** Clayperon's theorem of three moments: Analysis of continuous beam for shear force and bending moment: Effect of sinking of supports
- 4. Moving Loads:** Maximum bending moment, and shear force diagram for simply supported spans transversed by single point load: two concentrated loads and uniformly distributed loads: Enveloping parabola, Equivalent uniformly distributed load
- 5. Influence Lines:** Influence lines for reaction, shear force and bending moment in a simply supported beam: Influence lines for force in member of statically determinate trusses
- 6. Three Hinged Arches:** Action of an arch, Eddys theorem, Determination of horizontal thrust, Bending moment, Normal thrust and radial shear for parabolic and segmental arches, Influence lines, Temperature effects.
- 7. Three Hinged Suspension Bridges:** Forces in loaded cables and hanging chains, Length of cables, different support conditions, Simple suspension bridge with three hinged stiffening girder, Bending moment and shear force diagrams, Influence line for bending moment and shear force.

Reference Books:

1. Theory of Structures by S. Ramamurthum, Dhanpat Rai and Sons New, Delhi.
2. Theory of Structures by S.P. Timoshenko and Young, McGraw Hill publication.
3. Theory of Structures by Vazirani and Ratwani, Khanna Publication.

CW207 FLUID MECHANICS – II (L - 4) Credits: 04

Objective: To make the students to understand basics of fluid mechanics. At the end of the course the students should be able to appreciate the basic principles and understand the concept of flows in open channels, non-uniform flows, boundary layer theory, dimensional analysis and similarity, various types of pumps. Basics of Engineering concepts must have been made clear so that they will be able to use the knowledge for practical problems.

- 1. Flow in Open Channel:** Uniform flow, Chezy's and Manning's equation, Velocity distribution, hydraulically efficient section, Specific energy, Specific force, Critical, Subcritical and supercritical flows Nonuniform Flow: Energy equation for gradually varied flow, Types of channel slopes, water surface profiles, hydraulic jump, Channel Transitions, Venturi flume and standing wave flume
- 2. Flow Through Pipe:** Turbulent flow through pipes, Prandl's theory, velocity distribution equation for smooth and rough pipe, Mean velocity variation, Friction factor, three reservoir problems, Pipe network analysis by Hardy Cross method, Water hammer, Rigid and elastic water column theories, function and types of surge tanks
- 3. Boundary Layer Theory:** Concept of boundary layer theory, Thickness of boundary layer, separation of boundary layer, Forces on immersed body in flowing fluid, types of drag, pressure distribution about bluff and stream line body.
- 4. Dimensional Analysis and Similarity:** Dimensions of various physical quantities, Buckingham's-phi theorem. Types of similarities and distorted models, non-dimensional numbers and their significance
- 5. Centrifugal Pump:** Types, Construction and principle of similarity, pump Characteristics and specific speed under various operation, Conditions of self-priming, selection of pumps under various conditions, Installation and operation of pumps
- 6. Reciprocating Pumps:** Types, Work done, Effect of acceleration and frictional resistance, slip separation in suction and delivery pipes, Air vessel and its function, Multi-cylinder pumps.
- 7. Modern Pumps:** Drilling and flow estimation, Deep submersible pumps, Monoblock pumps, Jet pumps, Air lift pumps, turbine pumps, Selection of pumps and other hydraulic machineries.

Reference Books:

1. Fluid Mechanics by Som & Biswas, ISBN, 0-07-463371-6.

2. Theory and Applications of Fluid Mechanics by K. Subramanya
 3. Fluid Mechanics by V.L. Streeter and E. Benjamin Wylie
 4. Fluid Mechanics by Robert A. Granger

FLUID MECHANICS-II LABORATORY (P-02) Audit

Objective: This laboratory work aims at an experimental way of studying fluid flows, which deals with application of energy principle and momentum principle, friction in pipes, measurement and behaviour of open channel flows, impact of jet, pumps and their characteristics, hydraulic machines.

Competencies: At the end of the course students should be able to;

1. Understand Energy principle and its application.
2. Understand momentum principle and its application.
3. Understand friction in pipes.
4. Understand pumps and their characteristics.
5. Understand hydraulic machines.

TERM WORK: Term work shall consist of the record of the following laboratory experiments. At least eight experiments are to be performed.

1. Determination of coefficient of Venturi flume
2. Calibration of standing wave flume
3. Friction in pipes.
4. Determination of Chezy's and Manning's constants
5. Impact of Jet.
6. Study of Hydraulic jump.
7. Study if Impact of jet.
8. Characteristics of Centrifugal pump.
9. Characteristics on Reciprocating pump.
10. Study of other Hydraulic machines.

CW208 SURVEYING – II (L: 04) Credits: 04

Objective: The scope of this course is to introduce the concepts of geodetic and photographic surveying techniques. The objective of this course is to make the students understand the principles of Tacheometry, Trigonometrical Levelling.

1. Tacheometry: Tacheometer. The leveling staff and stadia rod, principle of fixed hair method, Theory and derivation of formula for analytic lens, Tangential and stadia fixed and movable hair methods of Tacheometry, Horizontal and inclined sights, Vertical and normal staff, Errors, Tacheometric contouring.

2. Trigonometrical Levelling: Single plane and double plane methods

3. Curves: Horizontal curves: Types simple; Reverse, Transition curve, Degree and radius of Curves, Geometry of simple curve, Compound curve. Method of setting out a simple curve and compound curve, by linear and angular methods. Vertical curves; Types – summit curve, sag curve, Method of setting it by tangent connection and chord gradient method. Transition curves: relation between length to radial acceleration, super elevation, Centrifugal ratio. Derivation of equation for ideal transition curve. Cubic parabola, Spiral and lemniscate as transition curve for road and railway curve.

4. Geodetic Surveying: Introduction, principles, triangulation, classification, selection of stations, station marks, towers, signals, phase correction, measurement of angles, satellite station, correction to base line measurement and extension of base

5. Triangulation Adjustment: Theory of errors, laws of weight, probable error, station adjustment, figure adjustment, triangle adjustment, various methods

6. Aerial Photogrammetry: Definitions, terms of vertical and tilted photogrammetry determination of ground co-ordinates from photo co-ordinates of ground points, determination of height of ground object, relief distance, parallax, plotting by radial line, flight planning, number of photograph.

Reference Books:

1. Surveying and Levelling Vol. I and II by Kanitkar T.P. and Kulkarni P.P.

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| 2. Surveying and Levelling Vol. I and II | by | Dr. Punmia B.C. |
| 3. Surveying and Levelling | by | Basak N.N. |

SURVEYING – II LABORATORY (P: 02) Audit

Objective: To understand the following surveying exercises and to prepare survey field record book.

The term work shall consist of field record book containing field exercises and a set of drawings of surveying projects mentioned below.

LIST OF PRATICALS:

1. Determination of tacheometric constants for theodolite
2. Determination of horizontal distance and RL of points by tacheometric observations with horizontal and inclined line of sight.
3. Setting out a simple circular curve by offsets from chord produced
4. Setting out a simple circular curve by deflection angle method
5. Setting out transition curve by deflection angle
6. Layout of a building on ground.
7. To carry out triangulation of a given area.
8. To compute the adjusted co ordinates of triangulation station.

LIST OF PROJECTS:

1. Theodolite traverse survey
2. Tacheometric contouring

CW209 BUILDING PLANNING AND DRAWING (L: 04) Credits: 04

Objective: The scope of this course is to introduce the concepts of building planning and drawing with emphasis on architectural planning. The objective of this course is to make the students understand the principles of architectural planning with reference to residential and public buildings. They should be able to understand the role of different agencies involved in a building project. They should be able to plan simple residential and public buildings with different requirements and prepare the line plans and detailed drawings for the same.

1. Introduction to Architecture and Building Planning: Sequence of activities in a building project, Functions and role of various agencies: Owner, Architect, Civil Engineer, Structural Engineer, Contractor. Building bye laws of municipal councils and corporations – scope and purpose.

2. Principles of Architectural Planning for Buildings: Orientation, aspect, prospect, grouping, circulation, functional relations of different units, roominess, flexibility, privacy, space utilization, sanitation, ventilation, strength and stability of structures, planning of living area, sleeping area, service area, circulations. Planning of residential buildings

3. Preparation of Submission and Working Drawing: Line plans and working drawings and submission plans to sanctioning authorities, checklist for planning a building project, site plan, utilities and services, legal documents budget restrictions

4. General Principles of Planning of Public Buildings: Educational institutes, markets, banks, hospitals, post offices, community centers, offices, canteens, hostels

5. Perspective Drawing: Principles of perspective drawing, parallel and oblique perspective.

6. Acoustics and Sound Insulation: Characteristics and behavior of sound reflection reverberation of sound - Absorption of sound – Acoustical defects. Acoustical design of halls, sound insulation.

7. Modern Concepts in Building Design:

a) Energy Efficiency in Buildings: Introduction to various aspects of energy efficient building design against conventional practices. Energy efficiency in buildings including, sizing and design of passive architectural concepts and cost effectiveness.

b) Concept of Intelligent Building: Use of leading-edge design and technology for development of intelligent facilities from business and environmental considerations. Introduction to the latest IT tools used in designing and implementing intelligent controls considering the needs of occupants, environment, energy usage, and cost effectiveness.

c) Green Building Concepts: Evaluation of sustainable/green buildings based on different rating systems. Introduction to the LEED rating system and energy conservation building codes (ECBC) compliance.

Reference Books:

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|--|----|--------------------------------------|
| 1. Building Drawing with Integrated Approach for Built Environment | by | Shah M.G., Kale C.M. and Patki S.Y., |
| 2. Building Planning | by | Sane Y.S. |
| 3. Building Construction | by | Sushil Kumar |

BUILDING PLANNING AND DRAWING PRACTICALS (P: 02) Audit

Objective: The scope of this laboratory course is to introduce the concepts of building planning and drawing with emphasis on architectural planning. The objective of this course is to make the students understand and practice the principles of architectural planning with reference to residential and public buildings. They should be able to plan simple residential and public buildings with different requirements and prepare the line plans and detailed drawings for the same.

TERM WORK: It shall consist of following drawings:

I Planning of residential buildings: Preparation of line plans on graph papers for residential buildings – two assignments on graph papers.

II Planning of public buildings: Preparation of line plans on graph papers for residential buildings – four assignments on graph papers.

III Building drawing:

1. Detailed drawing for one residential building on full imperial drawing sheet.
2. Detailed drawing for one Public building on full imperial drawing sheets.

IV Perspective Drawing: Concepts and method of drawing for two point perspective view. One assignment on full imperial drawing sheet to understand and practice the principles of perspective drawing.

CW210 CONCRETE TECHNOLOGY (L: 03) Credits: 03

Objective: To understand the construction material testing procedures and to acquire ability related to mix design of concrete.

1. Introduction: Role of building materials in construction, Classification, Properties, grades, advantages and Disadvantageous of Concrete, need of quality control of concrete.

2. Cement: Basic properties of cement compounds, Manufacturing Process, Hydration of cement, Physical Chemical properties and Types of cement, structure of cement paste and Testing of cement.

3. Aggregates: Role of aggregates, Classification, Properties of Aggregates (Strength, Particle shape and texture, Specific gravity, Bulk density, Voids, Porosity and Absorption, Bulking of sand, Deleterious substances, Fineness modulus, Maximum size of aggregates, Grading and surfaces area, Gap graded aggregates, Grading limits and Testing of aggregates.

4. Water: Effect of quality of mixing water on concrete properties, water for curing of concrete.

5. Admixtures: Definition, need, types of admixtures Retarders, accelerators, plasticizers, super plasticizers, air entraining agents.

6. Fresh Concrete: Manufacturing process of Concrete, Workability: Measurement, factors affecting workability, effect of time and temperature on workability, requirements of workability, Segregation and bleeding and harshness. Testing of fresh concrete.

7. Hardened Concrete: Strength of concrete, Types, Factors influencing strength, Stress-Strain characteristics of concrete, Shrinkage and temperature effects, Creep, Permeability and Durability of concrete. Destructive and Nondestructive testing of hardened concrete - Rebound hammer test, ultrasonic pulse velocity test

8. Special Concrete: Lightweight concrete, High-density concrete, Fly ash concrete, Ferro cement, Fiber reinforced concrete, Polymer concrete, Ready mixed concrete, Pumped concrete.

9. Concrete mix design: Variables in concrete mix design, Concept of mix design, variables in proportion, and statistical quality control of concrete, common terms, Different methods of concrete mix design, Trial and error, ACI method and IS code method.

Reference Books:

- 1) Concrete Technology by M. L. Gambhir; McGraw Hill Publishing Co. 2nd Edition
- 2) Properties of concrete by A.M. Neville, ELBS Publication, 3rd Edition
- 3) Concrete Technology by M.S. Shetty

CONCRETE TECHNOLOGY LABORATORY (P: 02) Audit

Objective: To assimilate the practices for carrying out mini field projects.

Term work shall consist of a journal based on the following practicals.

1. Tests on Cement:

Fineness, Standard Consistency, Setting time, Compressive strength, Soundness test

2. Tests on Aggregates:

Bulking of sand, Bulk density, Specific gravity, Finesses modulus, Aggregate crushing and impact values, Flakiness Index, Elongation Index.

3. Tests on Concrete:

Workability: Slump, Compaction factor, Vee –Bee, Compressive strength, Non destructive tests

UHS 221: HUMAN VALUES & PROFESSIONAL ETHICS (2 + 0 + 0) Credits: 2

Objectives of the course:

4. Making the students aware and sensitive to value system in real life situations.
5. To help the students to discriminate between ephemeral and eternal values
6. To discriminate between essence and form

Unit 1: Course Introduction

[5]

Need, Basic Guidelines, Content and Process for Value Education

- Understanding the need, basic guidelines, content and process for Value Education.
- A look at basic aspirations: Self Exploration, Happiness and Prosperity
- Fulfillment of human aspirations and harmony

Unit 2: Understanding the Harmony

[5]

- Thoughtful human being harmony, sentient, attitude and its importance in relationship

- Significance of restraint and health (*Yama and Niyama*)
- Human goal settings and life management techniques, existence and co-existence, trust, respect in universal order

Unit 3: Understanding professional Ethics [5]

- Harmony at various levels and understanding professional ethics
- Creating environmentally aware engineers
- Humanistic universal education, natural acceptance of human values, ethical human conduct

Unit 4: Competence of professional ethics [5]

- Management models for present technologies, strategies for integrating humans in family and at all levels of existence
- Relevance of the above strategies in becoming responsible engineers, technologists and managers

Unit 5: Motivation [2]

- Contribution of ancestors in science and technology development to raise self esteem in Indian context.

Suggested Readings / Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Value Education.
2. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
5. A.N. Tripathy, 2003, Human Values, New Age International Publishers
6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.