

**Swami Ramanand Teerth Marathwada University, Nanded**  
**SCHEME AND DETAIL SYLLABUS OF S.E. CIVIL**

Teaching and Evaluation Scheme for  
**Second Year Program in Civil Engineering**

**Semester III**  
**Effective from 2015-2016**

Course Code	Course Name	Teaching Scheme			Credit Structure		
		L	T	P	T	P	Total
CE201	Engineering Mathematics III	03	01	--	04	--	04
CE202	Strength of Materials	04	-	02	04	01	05
CE203	Fluid Mechanics I	04	-	02	04	01	05
CE204	Surveying	04	-	02	04	01	05
CE205	Building Construction	04	-	02	04	01	05
<b>Total</b>		<b>19</b>	<b>01</b>	<b>08</b>	<b>20</b>	<b>04</b>	<b>24</b>

**Total Credits : 24**  
**Total Contact Hours/Week: 28**

Evaluation Scheme					
Theory Credit Course		Theory Audit Course		Practical / Workshop	
MSE	ESE	MSE	ESE	Continuous Evaluation	ESE
20 M	80 M	20 M	80 M	30 M	70 M
Minimum for Passing in Theory, Audit and Practical / Workshop : 40 Each MSE: Mid Semester Exam , ESE: End Semester Exam					

**BOS Members (Ad Hoc): Civil Engineering**

## Swami Ramanand Teerth Marathwada University, Nanded

### Teaching and Evaluation Scheme for Second Year Program in Civil Engineering Semester IV Effective from 2015-2016

Course Code	Course Name	Teaching Scheme			Credit Structure		
		L	T	P	T	P	Total
CE206	Fluid Mechanics II	04	-	02	04	01	05
CE207	Advanced Surveying	04	-	02	04	01	05
CE208	Concrete Technology	04	-	02	04	01	05
CE209	Theory of Structure I	04	-	-	04	-	04
CE210	Building Planning and Drawing	04	-	02	04	01	05
CE211	Professional Communication Skill	02 AUDIT	-	02	-	-	-
<b>Total</b>		22	00	10	20	04	24

**Total Credits : 24**  
**Total Contact Hours/Week: 32**

Evaluation Scheme					
Theory Credit Course		Theory Audit Course		Practical / Workshop	
MSE	ESE	MSE	ESE	Continuous Evaluation	ESE
20 M	80 M	20 M	80 M	30 M	70 M
Minimum for Passing in Theory, Audit and Practical / Workshop : 40 Each MSE: Mid Semester Exam , ESE: End Semester Exam					

**Total credits of S.E. Civil :48**

**DETAILED SYLLABUS**  
**PART-I**  
**CE 201- Engineering Mathematics – III**

**Course Objective**

- i) To develop logical understanding of the subject.
- ii) To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from engineering fields.
- iii) To make aware students about the importance and symbiosis between Mathematics and Engineering.

**Unit-I Linear Differential Equation of Higher order (08Hrs)**

Introduction to Linear Differential Equation of  $n^{\text{th}}$  order with constant coefficients

Methods of solving Linear Differential Equation with constant coefficients

- a) Shortcut Methods
- b) Method of Variation of Parameters.

Equation reducible to Linear Differential Equation with constant coefficients

- a) Cauchy's Equation
- b) Legendre's Equation

Applications of Linear Differential Equation to Beams and columns.

**Unit-II Vector Differentiation (07 Hrs)**

Vector and Scalar point function, Differentiation of vector point function, vector differential operator, gradient of scalar point function, directional derivative, divergence of vector point function, solenoidal vector field, irrotational and conservative field, second order differential operator and vector identities (only problems).

**Unit-III Vector Integration (07 Hrs)**

Line integral in Cartesian, polar and parametric form, work done, line integral independent of path, Green's theorem (without proof), its verification and application, surface integral, Stoke's theorem (without proof) and applications, volume integral, Gauss divergence theorems (without proof), and applications.

**UNIT VI Numerical Solution Of Ordinary Differential Equation (07 Hrs)**

- 1) Picard's Method
- 2) Taylor's Series Method
- 3) Euler's Method & Euler's Modified Method
- 4) Runge-Kutta Method

### **Unit-V Partial Differential Equation**

**(07 Hrs)**

Introduction to partial differential equation, Solution of partial differential equation by Method of Separation of Variables, Application of partial differential equation to 1) one dimensional Wave Equations. ii) One dimensional heat flow equations

### **Unit –VI Statistics & Probability Distribution**

**(09 Hrs)**

Corelation: Scatter diagram, Types of correlations,

Karl Pearsson's coefficient of correlation, Regression, Lines of regressions.

Random variables, discrete probability distribution continuous probability distribution.

**Probability distribution:** Poisson distribution, Fitting of poisson distribution & its application.

Normal Distribution & its application.

### **Course Outcomes**

- i) Student will demonstrate basic knowledge of L.D.E., Vector, P.D.E., F.T. & Probability.
- ii) Student will show the understanding of impact of Engineering Mathematics on Civil.
- iii) Student will demonstrate their understanding of mathematical ideas from multiple perspectives, such as by (a) using the internal connections between geometry, algebra, and numerical computation, (b) applying the connections between theory and applications, or (c) distinguishing between a formal proof and a less formal arguments and understanding the different roles these play in mathematics.

**B.S.Grewal, Higher Engineering Mathematics, 43<sup>rd</sup> edition, ISBN 9788174091955.**

**Elementary Differential Equations and Boundary Value Problems By William E. Boyce, Richard C. DiPrima (9<sup>th</sup> Edition)**

**Jain and Iyenger, Advanced engineering Mathematics, Narosa Pub. House, New Delhi.**

**E. Kreszig, Advanced Engineering Mathematics, 6th edition, Wiley Eastern publication.**

**PART-I**  
**CE 202- STRENGTH OF MATERIALS**

**Unit I : 1. Shear force and Bending moment :**

Relation between rate of loading, shear force & bending moment. Shear force and bending moment diagrams for statically determinate beams including beams with internal hinges subjected to point loads, uniformly distributed loads, uniformly varying loads and couples

**2. Simple Stresses and strains :**

Stress, Strain, Hooke's law, modulus of elasticity, Simple Stresses and strains due to tension, compression and shear, modulus of rigidity.

(08 Hrs.)

**Unit II: 1. Simple Stresses and Strains :** Continued....

Bars of varying sections, composite sections, temperature stresses, stress-strain diagrams for brittle and ductile materials, working stress, factor of safety, linear strain, lateral strain and Poisson's ratio, normal stress and volumetric Strain, Bulk modulus, Relationship between elastic constants.

2. Strain energy due to various types of axial loads.

(06 Hrs.)

**Unit III: 1. Bending stresses in beams :**

Moment of inertia , transfer theorem, polar moment of inertia , determination of moment of inertia for various cross sections, Theory of simple bending, derivation of flexure formula, section modulus, distribution of bending stresses for various sections, flitched beams.

**2. Shear stresses in beams :**

Distribution of shear stresses in beams of various commonly used section such as rectangular, circular, triangular, channel, T-section, I-section, & L-sections.

(10 Hrs.)

**Unit IV: 1. Principal stresses and strains :**

Normal and shear stresses on any oblique planes, concept of Principal planes, derivation of expression for Principal stresses and maximum shear stress, Positions of principal planes and planes of maximum shear, Graphical solutions using Mohr's circle of stresses.

**2. Direct and bending stresses :**

Direct and bending stresses for eccentrically loaded short struts, distribution of pressure at the bases of chimneys and dams, Core of a rectangular, square and circular section.

(10 Hrs.)

**Unit V: 1. Theory of torsion :**

Theory of pure torsion, Polar modulus, Stresses in solid and hollow circular shaft, Power transmitted by shaft, close coiled helical springs with axial load.

**2. Columns and struts :**

Euler's theory of long columns, buckling load for different end conditions, limitation of Euler's theory, Rankine's formula.

(8 Hrs)

**Unit VI: 1. Thin cylinders :**

Thin cylinders subjected to internal pressures, change in length, diameter & volume.

**2. Deflection of beams :**

Slope and deflection in statically determinate beams subjected to point loads, uniformly distributed loads and couples by

- a) Macaulay's method.
- b) Moment area method.
- c) Conjugate beam method.

(6 Hrs)

**Reference Books :**

- 1) Strength of Materials.-- S. Ramamrutham
- 2) Strength of Materials.-- B.C. Punmia.
- 3) Strength of Materials.-- F.L. Singer.
- 4) Elements of Strength of Materials. --Timoshenko & Young.
- 5) Mechanics of Structures VOL – I. S.B. Junnarkar.

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**PART-I**  
**STRENGTH OF MATERIALS LABORATORY**

**Term work:**

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

**List of Experiments:**

- 1) Tension test on mild steel bars (stress-strain behaviour, young's modulus determination)
- 2) Tension test on Tor steel bar (stress-strain behaviour)
- 3) Compression test on mild steel
- 4) Flexural test on timber beam (central point load) (plotting of load – deflection curve and finding value of E)
- 5) Shear test on mild steel
- 6) Torsion test on mild steel rod
- 7) Impact test on metals. (Charpy and Izod)
- 8) Brinell and Rockwell hardness test on metals.
- 9) Water absorption and crushing test on bricks.
- 10) Water absorption and transverse test on cement / mosaic floor tiles.
- 11) Strain measurements in beam using mechanical extensometer.

## PART-I

### CE 203- FLUID MECHANICS-I

**Course Objective :** In civil engineering the branch of hydraulics & fluid mechanics has wide range importance & field significance. Water cycle with its all dimensions requires comprehensive study of fluid characteristics in different areas as Hydrology , Open channel flow , Water resources , Oceanography , Ground water , Hydro power , Hydraulic structures & allied fields. This course aims to enable the students to develop basic understanding , analysis and insight into course content for further and higher areas of study.

#### **UNIT I:**

##### **INTRODUCTION :**

States of matter ; Fluid description ; Fluid forms & Graphical study ; Fluid properties ; Mass density ; Specific weight ; Specific gravity ; Specific volume ; Viscosity ; Compressibility ; Bulk modulus ; Surface tension ; Capillarity. (04 hrs)

##### **FLUID STATICS :**

Pressure; Pressure intensity; Pressure forms (Atmospheric, Absolute, Gauge, Vacuum, Barometric). Pressure measurement; Reference datums ; Pressure diagrams & Properties; Various forms of manometers & pressure gauges; Their construction, functions & equations. Hydrostatic pressure; Total characteristics of pressure forces on plane surfaces & curved surfaces. (05 hrs)

#### **UNIT II :**

##### **BUOYANCY & FLOATATION :**

Archimedes' principle; Law of floatation; Positions of C.G. & C.B.; Meta centric parameters; Stability of floating bodies; Determination of meta centric height ( Theoretical & experimental methods ) & applications. (04hrs)

##### **FLUID KINAMETICS :**

Fluid domain ( Stream line, streak line, path line & stream tube ); Fluid flow & forms (Steady & unsteady, Uniform & non-uniform, Laminar & turbulent, Rotational & irrotational , Dimensional, Compressible & incompressible); Fluid particle velocity & acceleration, components, forms; Velocity potential & stream function ; Rotation component; Flow net, construction , properties & applications. (05hrs)

#### **UNIT III :**

##### **FLUID DYNAMICS :**

Fluid flow ; Dominant forces & combinations; Equations of motion; Euler's equation of motion; Force potential; Bernoulli's theorem, principle , equation & practical applications; Study of Pitot tube, Venturimeter , Orificemeter (construction, function & equations) ; Flow lines (Datum , Centre line , HGL , TEL ). (05 hrs)



#### **UNIT IV:**

##### **FLOW MEASUREMENT :**

**Orifices :** Classification; Hydraulic coefficients & relationship; Determination of  $C_v$  ;  
Study of large & submerged orifices. **(03 hrs)**

**Mouth pieces :** Classification; Hydraulic coefficients & relationship; Determination of  $C_v$ ; Internal & external mouthpieces; Absolute pressure at vena contracta ; Convergent & divergent mouthpieces; Range for values of  $C_d$ . **(04hrs)**

#### **UNIT V:**

##### **FLOW MEASUREMENT :**

**Notches :** Classification; Discharge measurements through rectangular, Triangular & trapezoidal notches; Measurements of errors in head & discharge. **(03hrs)**

**Weires :** Classification; Discharge measurements through rectangular, triangular & trapezoidal weirs; Approach velocity ; End contraction & corrections; Cipoletti weir; Measurements of errors in head & discharge; Other forms of weirs . **(04hrs)**

#### **UNIT VI:**

##### **FLOW THROUGH PIPES:**

Head losses (various minor losses, major losses); Laws of fluid friction ( for turbulent flow); Darcy-Weisbach equation; Representation of datum, C.B.L.; Pipe centre line, H.G.L. & T.E.L.; Pipe systems ( long, parallel, series, equivalent); Siphon system ; Two & three reservoir inter connections. **(06 hrs)**

##### **ALLIED STUDIES:**

Power (forms, equations, units) & various efficiencies; Computation of machine power; Bore-well yield measurement; Flow rate & inter conversion; Power transmission ; Pipe networking & basic equations . **(03 hrs)**

##### **TEXT BOOKS :**

1. Hydraulics & Fluid Mechanics .....– Dr. P. N. Modi & Dr. S. M. Seth.
2. Fluid Mechanics .....– Dr. Jagdish Lal.

##### **REFERENCE BOOKS :**

1. Fluid Mechanics & Hydraulic Machines – Dr. R. K. Bansal.
2. Fluid Mechanics .....– Dr. S. Ramamrutham.
3. Fluid Mechanics .....– Dr. K. Subramanya.
4. Fluid Mechanics .....– Dr. K. L. Kumar.
5. Fluid Mechanics .....– V. L. Streeter & E. Benjamin Wylle.

PART-I  
**FLUID MECHANICS-I LABORATORY**

The term work based on practical shall consist (at least **Six** ) of the following experiments:

1. Study of pressure measuring devices.
2. Determination of meta centric height
3. Verification of Bernoulli's principle
4. Calibration of Venturimeter.
5. Determination of hydraulic coefficients of circular orifice.
6. Determination of hydraulic coefficients of external cylindrical mouthpiece
7. Calibration of rectangular notch.
8. Calibration of triangular notch.
9. Determination of friction factor for pipe flow.

**NOTE :** The practical based oral examination shall be conducted on the term work performed.

## PART-I

### CE 204- SURVEYING

#### **Objective**

This is an course based on SURVEYING, It introduces various basic concepts in Surveying through theory and series of practical's based on theory.

#### **Unit I: Compass Traversing & Leveling**

Local attraction & Correction of Bearings, Magnetic Declination, Calculation of True Bearings, Sources of Errors.

Instruments for measurement of elevation, Dumpy levels, Tilting & Automatic level, Temporary & Permanent adjustments of Dumpy level, Levelling methods, leveling staves, Booking & reduction of field notes. Running a level line, L- Section, Cross - section. Difficulties in levelling work, corrections & Precautions to be taken in levelling work, Errors in levelling.

**Contouring:** Definition, Characteristics & uses, methods of contouring, Interpolation techniques  
**(10 hrs)**

#### **Unit II: Plane Table Survey**

Plane table & accessories, Advantages & limitations of P.T. surveying, orientation & methods, methods of plotting - Radiation, intersection, traversing, Two point problems & its solution by graphical method. Three point problems & its solution by Bessels graphical method. Errors in P.T. surveying.

**(04 hrs)**

#### **Unit III: Computation of Area & Earth Work**

Planimeter - Types of planimeter, areas of zero circle, uses of planimeter.

Types of cross sections, derivation of equations for areas of cross sections for level, two level, three level, side hill two level & multilevel sections, Prismoidal & Trapezoidal formula, mass diagram for economic grade line.

**(6hrs)**

#### **Unit IV: Theodolite**

Theodolite & types, Fundamental axis & parts of transit theodolite, uses of theodolite, temporary & permanent adjustments of transit theodolite, measurement of Horizontal angle - Method of repetitions & method of reiterations. Measurement of vertical angles, prolonging a straight line by theodolite, measurement of deflection angles & bearing of a line.

Theodolite traversing - objectives & uses. Closed traverse - balancing, correction, Gale's traverse table, Omitted measurements.  
**(08 hrs)**

#### **Unit V: Trigonometrical Levelling**

Determination of elevation of objects, when the base of object is accessible & inaccessible by single plane & double plane method. Distance & difference in elevation between two inaccessible objects by

double plane method. Salient features of Total station, Advantages of Total station over conventional instruments. Application of Total station **(6hrs)**

### **Unit VI: Survey for Engineering projects**

Reconnaissance, Preliminary & detailed setting out a building, route surveys for highways, railways & waterways. Tunnels - correlation of underground & surface surveys, shafts & Adits, study of minor instruments. Construction & uses of minor instruments such as Abney level, Box sextant, Ghat tracer & Tangent clinometer. **(6hrs)**

#### **Text/Reference books:**

1. Surveying and Levelling by Vol. I and Vol. II – T.P.Kanetkar and S.V.Kulkarni
2. Surveying and Levelling by Subramanian, Oxford University Press.
3. Surveying, Vol. I & II by Dr.B.C.Punmia, Ashok K. Jain, Arun K.Jain
4. Surveying and Levelling by N. N. Basak
5. Surveying Vol. I & II by Dr.K. R. Arora
6. Surveying, Vol. I & II by S. K. Duggal
7. Surveying: Theory and Practice by James M. Anderson, Edward M. Mikhail
8. Surveying theory and practices by Devis R. E., Foot F. S.
9. Plane and Geodetic surveying for Engineers. Vol. I by David Clark
10. Principles of Surveying. Vol. I by J.G.Olliver, J.Clendinning

#### **Pattern of Question Paper:**

Question paper shall be set having two sections A and B. Section A questions shall be set on first three units (1,2,3) and Section B questions on remaining three units (4,5,6) . Question paper should cover the entire syllabus.

For 80 marks Paper:

1. Minimum ten questions
2. Five questions in each section
3. Question no 1 and 6 be made compulsory.
4. Two questions from remaining questions from each section be asked.

## **SURVEYING LABORATORY**

### **Practicals - Any 07 from the following :**

**Note: Use instruments mention in book / total station.**

- 1) Measurement of bearing of sides of a closed traverse & adjustment of closing error by Bowditch method.
- 2) To locate points using radiation & intersection method of plane tabling.
- 3) Two point problem by graphical method / three point problem by Bessels graphical solution.
- 4) To determine difference in elevation between two points using reciprocal leveling & determine collimation error.
- 5) Measurement of area of a irregular figure by a planimeter/ digital planimeter.
- 6) Study & use of minor instruments.
- 7) Measurement of horizontal angle by repetition and reiteration method using theodolite.
- 8) Measurement of vertical angle using theodolite.
- 9) Study of Total Station, traversing using a total station.

### **Project work : (Any two)**

- 1) Block contouring.
- 3) Highway Project.
- 4) Theodolite traverse survey.

### **Practical examination:**

It consist of practical based oral exam based on above field exercises & project work drawings.

## PART-I

### CE 205- Building Construction

#### Objectives :-

To enable the students to identify various components of building (foundation, Lintel, stairs case, roofs & floors), their functions and methods of construction so as to achieve good knowledge about building construction.

To study the materials such as paints and distemper used for treatment of the surfaces so as to achieve good knowledge about the building material. & students will be learn various building components & their construction method.

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#### Unit - I :-

**Sub Structure** :- Site investigation & sub soil exploration, methods of siteexploration, bearing capacity of soil & rock & SBC values based I.S. Code,Field methods of improving SBC.

**Foundation** :- function, types - shallow & deep foundation i.e. spread footing,combined, strap, grillage, raft foundation & pile foundation :- Pre-cast,cast-in-situ, under reamed pile, friction pile, end bearing pile, compaction pile etc.

Foundation in black cotton soil & its preventive measures

Causes of failure of foundation & its remedial measures

Timbering of trenches & its methods.

Foundation dewatering & its methods i.e. ditches & sumps, well point system, deep well system etc.

#### Unit II - Superstructure

**Types of structure** :- Load bearing, framed & composite structure its advantage & disadvantages.

**Doors & windows** :- Purpose, Material used for doors & windows, Types of doors & windows, criteria for location of doors & windows.

Fixtures & fastening for doors & windows.

**Ventilators** :- Types & their suitability

**Lintel & arches** :- Types of lintel i.e. R.C.C. lintel with or without weather shed & R.C.C. boot lintel, Various technical terms used in arch, types of arches i.e. Concrete arch, Flat arch, Segmental arch & relieving arch etc.

#### Unit III

**Stairs** :- Technical terms, requirements, thumb rule, classification of stairs, types of steps, design of stair case, suitability of lifts, ramps & escalators

**Roofs** :- Technical terms, types of roof i.e. pitched, curved & flat roofs, types of pitched roofs : i.e. lean to roof, king post & queen post roof, steel trusses.

**Roof covering** material used for pitched roofs

**Flat roofs** :- Types, advantages & disadvantages

**Flooring** :- Selection of flooring material, types of flooring :- i.e. I.P.S., Terrazzo, Mosaic, Ceramic Tiles & its Construction, Manufacture of Cement Tiles.

#### Unit IV

##### Building Finishes :-

**Plastering** :- Objective, requirement, mortar & tools used for plastering, methods of plastering, plaster on lath, stucco plastering, defects in plastering & its remedies.

**Pointing :-**Objectives, mortar used for pointing, working method of pointing, types of pointing.

**Painting & colouring :-** objects of painting, characteristic of an ideal paint, types of paints & their uses, white washing & colour washing, distempering, defects in painting

#### **Unit V**

**Shoring :-**Types of shoring:- i.e. raking shores, flying shores, vertical shores.

**Under pinning :-**Methods of under pinning i.e. pit method & pile method

**Scaffolding :-**component parts, types of scaffoldings

#### **Unit VI**

**Damp proofing :-** Causes of dampness, illeffects of dampness, material used for damp proofing, requirement of an ideal damp proofing material, methods of damp proofing, DPC treatment in buildings.

**Termite Proofing :-** Types of termites, anti-termite treatment methods i.e. pre-construction treatment, post- construction treatment.

**Water proofing :-**water leakage, reasons & preventive measures for water leakage, water proofing of flat roofs & its methods, material used for water proofing.

#### **Reference book :-**

- 1] Building construction - B.C. Punmia
- 2] Building construction - Arora & Bindra
- 3] Building construction - S.C. Rangawala
- 4] Building construction - N.K.R. Morty

### **Building Construction Laboratory**

#### **Term Work :-**

- 1] Sketches on quarter size sheet - each unit minimum 4 sketches.
- 2] One sheet :- Measured drawing of R.B.
- 3] Practical on markout of R.B.
- 4] Field visit to building under construction & its report writing including materials used for construction, construction process, human resources required, construction details etc.

**PART-II**  
**CE 206- FLUID MECHANICS –II**

- **Course Objectives :-** To introduce the students to various hydraulic engineering problems like open channel flows, model analysis, impact of jet on vanes and hydraulic machines. At the completion of the course, student should be able to relate the theory and practice of problems in hydraulic engineering.

**Unit :-I**

**Uniform flow in open channels** – Classification of channels, classification of flow in open channels- steady and un-steady flows, uniform and non-uniform flows, laminar and turbulent flows, sub-critical, critical and super critical flows. Geometric properties of rectangular, triangular and trapezoidal channels. Discharge through open channel by Chezy's and Manning's formulae. Best hydraulic sections for uniform flow for rectangular, triangular and trapezoidal sections. Numericals. Velocity distribution in open channels. -----(07 Hrs)

**Unit :- II**

**Non-Uniform flow in open channels** – Types Non-Uniform flow in open channels, specific energy, specific energy diagram, alternate depths, specific force, conjugate depths, critical depth, critical velocity, minimum specific energy in terms of critical depth. Gradually varied flow – basic dynamic equations, types of channel beds, and water surface profiles. Rapidly Varied flow- application of momentum equation, hydraulic jump in rectangular channels, hydraulic jump types and applications. Simple problems. Measurement of flow in open channels- venturiflume , standing wave flume and Parshall's flume. ---07hrs.

**Unit :-III**

**Dimensional Analysis and model studies :-**

Introduction, systems of units , fundamental and derived quantities. Dimensionals of physical quantities, dimensional homogeneity, dimensional analysis using Rayleigh's method and Buckingham's  $\pi$  theorem method- problems.

Model studies- model and proto, advantages of model analysis, similitude- types, various dimensionless numbers, model laws- types, significance, scale factors. Numericals on Reynold's and Froude's model laws. Classification of models- undistorted and distorted models. Fields of model studies. -----08Hrs

**Unit :-IV**

**Impact of jet on vanes –**

Introduction, Impulse –momentum equation. Impact of jet on a stationary flat plate, oblique stationary flat plate, hinged plate. Impact of jet on a moving plate, work done, efficiency of jet. Plate may be flat, curved, jet striking at center, one of its tip, plate Is symmetrical,



unsymmetrical etc. Impact of jet on series of vanes (flat, curved and radially curved) mounted on a wheel. Condition for maximum efficiency simple numericals. Jet propulsion.-----07 Hrs.

#### **Unit:- V**

Turbines –

Introduction to turbines, general lay-out of hydro electric power plant, heads and efficiencies of a turbine, classification of turbines, impulse and reaction turbines. Pelton wheel turbine-components, velocity triangles and work done. Working proportion and design of pelton wheel-problems. Francis turbine and Kaplan turbine – components, velocity triangles, working proportion and its design, draft tube and its types, governing of turbines, specific speed and its significance. Selection criteria for turbines, various efficiencies and characteristics of turbines, cavitation, runaway speed, surge tank. Simple numerical.-----07Hrs.

#### **Unit :- VI**

- a. **Centrifugal Pumps** – components, types, construction, principle of working, heads and efficiencies, work done, velocity triangles, minimum starting speed, characteristics curves, specific speed, priming of pump, self priming pumps, multi stage centrifugal pumps, NPSH and its significance, cavitation in pumps. Simple numericals.
- b. **Reciprocating pumps** – components, types, working principle, negative slip, air vessels and its significance. Simple numericals.
- c. Monoblock pumps, gear pumps, air lift pumps, jet pumps, and submersible pumps. Factors considered while selecting a particular type of pump.-----08 Hrs.

#### **• Course Outcomes :-**

1. Students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels.
2. They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady conditions.
3. Problems pertain to design, construction as well as efficient working of various types of hydraulics structures and machines is considerably simplified by using dimensional analysis and model studies.
4. Impact Of Jet on vanes which is a base for analysis and design of turbo machines.
5. They will have knowledge in hydraulic machines( pumps and turbines)

#### **Recommended Books :-**

##### **a. Text books :-**

1. Hydraulics and Fluid mechanics – Dr. P.N. Modi and Dr. S.M. Seth. Standard book house New Delhi
2. A text book of Fluid mechanics and Hydraulic machines – R.K. Bansal, Laxmi publications New Delhi.
3. A text book of Fluid mechanics and Hydraulic machines – R.K. Rajput and S.Chand and co. New Delhi.

4. Flow through open channels –Dr. Subramanya.K Tata MC. Graw, Hill. New Delhi.

**b. Reference Books :-**

1. Fluid mechanics – V.L. Streeter and F.B. Wylie Tata MC. Graw, Hill. New Delhi.
2. Fluid mechanics and Hydraulic machines – S.Ramamrutham, Dhanapatrai Publications.
3. Fluid mechanics and Hydraulic machines – R.Rajendra Prasad, Nikita Publications, Latur.
4. Ven-Te Chow – open channel hydraulics, MC Graw Hill, New York 2009
5. Jain A.K. – “Fluid mechanics”, Khanna Publishers Delhi.

**Fluid Mechanics – II Laboratory.**

**Term Work :-** It consist of experiments given below (any eight)

1. Determination of Chezy's and Manning's Constant.
2. Determination of Coefficient of discharge for venturiflume / standing wave flume
3. Study of hydraulic jump
4. Trial on Pelton wheel turbine
5. Trial on Francis Turbine
6. Trial on Kaplan Turbine
7. Trial on Centrifugal Pump.
8. Trial on reciprocating pump
9. Study of specific energy diagram for different discharge
10. Study of cavitation

**Note :- The practical Based oral examination shall be conducted on the term work performed**

**Pattern of Question Paper**

No Separate sections as practiced earlier and question paper should cover entire syllabus in one section.

For 80 marks paper :-

1. There will be seven questions
2. Q.1 is compulsory having weightage of 24 marks and should have atleast 8 bits of short notes of 04 marks each which any six to be answered.
3. From remaining six questions (one question from each unit) any four questions are to be answered, each having weightage of 14 marks

## PART-II

### CE 207- ADVANCED SURVEYING

#### **Objective**

This is an advanced course based on SURVEYING. It introduces various basic concepts in Surveying through theory and series of practical's based on theory.

#### **Unit I: [8 hrs]**

##### **A) Geodetic Surveying**

Objects, Methods in Geodetic surveying, Triangulation, Classification of triangulation systems, Triangulation figures, Strength of figure & derivation for well conditioned triangle, Selection of stations, intervisibility & height of stations, Towers signals & their classifications, Phase of signals & their corrections. Satellite stations, Reduction to center. Base line measurement, Reduction to mean sea level and extension of base.

##### **B) Trigonometrical Leveling**

Terrestrial refraction, Angular corrections for curvature and refraction, Axis signal correction, Determination of Difference in elevation by single observation and reciprocal observations.

#### **Unit II: [7 hrs]**

##### **Triangulation Adjustment**

Kinds of errors, Laws of weights, Determination of Most probable values [MPV] of conditioned and independent quantities, Method of least squares, probable error and its determination, Distribution of error to the field measurement. Normal equation, Method of correlates, station adjustment and figure adjustment of Geodetic triangle [without central station] and Geodetic Quadrilateral [without central station], Spherical triangle, calculations of spherical excess and sides of spherical triangle.

#### **Unit III: [04 hrs]**

##### **Hydrographic surveying:**

Introduction, soundings, methods of locating soundings, horizontal & vertical control. The sextant ranges, plotting of soundings. Three point problem - mechanical, graphical and analytical solutions.

#### **Unit IV: [4 hrs]**

##### **Remote Sensing**

Basic principles, Electromagnetic spectrum, Interaction mechanism and image formation, Classification of remote sensing systems, platforms for sensing different types of data products, Applications to Civil Engineering, concept of global positioning systems [GPS] and Global information system [GIS] and different GPS and GIS.

#### **Unit V: [11 hrs]**

##### **Curves:**

classification, degree of curve, elements of circular & compound curves, theory & methods of setting out simple curves. Instrumental method of setting out compound curves. Revers curve between two parallel straights (equal & un-equal radius). Vertical curves, their types, & setting out method of vertical curves.

**06 hrs.**

Transition curves : Ideal transition curves. characteristics methods of determination of length. Elements of different types & methods of setting out.

**05 hrs.**

#### **Unit VI: [6 hrs]**

##### **Tacheometric Surveying:**

Basic principle, Types of Tacheometric Surveying, Tacheometric equation for horizontal & Inclined line of sight in fixed hair method. Anallatic lens in external focussing telescopes, Reducing Tacheometric constants in internal telescope, Moving hair & tangential method, substance bar Beaman stadia arc.

##### **Text Books**

- Surveying and Leveling Vol. II , T.P.Kanetkar & S.V.Kulkarni,
- Surveying Vol. II & III, Dr. B.C.Punmia.
- Surveying & Levelling, N.M. Basak.

##### **Reference Books**

- Surveying for Engineer, J. Uren and W.F.Price, McMillan Publication.
- Introduction to Surveying, By Anderson, McGraw Hill Publication.
- Elements of Photogrammetry, Paul R Wolf, McGraw Hill Publication.
- Remote Sensing in Civil Engineering, J.M.Kennie and M.C.Matthews.

## **PART-II**

### **ADVANCED SURVEYING - LABORATORY**

The term work shall consist of a record of field exercise as under

- 1) Determination of tacheometric constants for the theodolite.
- 2) Determination of horizontal distance & RL of points by tachometric observations with horizontal & inclined line of sight & vertical staff.
- 3) To set out simple curves using linear methods - Perpendicular offsets from long chord.
- 4) To set out simple curves using linear methods - Perpendicular offsets from long chords produced.
- 5) To set out simple curves by using Rankine's deflection angles method.
- 6) Satellite station and reduction to centre

#### **Project work (compulsory)**

1) Project work shall be conducted in the field outside the institute premises and shall be based on the Adjustment of a **Geodetic Quadrilateral / Geodetic Triangle** without central station.

2) Tacheometric contouring.

A Laboratory Journal based on the practical work would be submitted for the term-work. Practical Examination would be based on the term work. Course Teacher for the Laboratory would decide the breakup of marks for the Oral Examination. An Objective Multiple Choice Test based on the theory as well as laboratory experiments will be conducted as a part of the practical examination. It consist of practical based oral exam based on above field exercises & project work drawings.

## **PART-II**

### **CE 208- CONCRETE TECHNOLOGY**

**Objectives:** To study different ingredients of concrete. To study properties of different ingredients. To study various admixtures . To study properties of fresh and harden concrete. To study concrete mix design.

#### **UNIT – I**

##### **1. Introduction**

Classification, properties, grades, advantages and disadvantages of concrete of concept of quality of control. (01hrs)

##### **2. Cement**

Basic properties of cement compound, manufacturing process, hydration of cement, physical property of Portland cement, chemical properties of cement, types of cement.

(05 hrs)

#### **UNIT – II**

##### **Aggregates**

Classification of aggregate, properties of aggregate, strength, toughness, hardness, partical shape and texture, specific gravity, bulk density, voids porosity and absorption, bulking of sand, deleterious substances, alkali, aggregate reaction, fineness modulus, maximum size of aggregate grading and surfaces area, gap graded aggregate and grading limit.

(08 hrs)

#### **UNIT – III**

##### **1. Water**

Quality of mixing water, impurities in water and its effect. (02 hrs)

##### **2. Admixtures.**

Retarders acceleator, plasticisers, super plasticizers, air entering agent, water proofing agent.

(03 hrs)

#### **UNIT – IV**

##### **Fresh Concrete**

Manufacturing Process of Concrete, Workability ,measurement, factors affecting workability, effect of time and temperature on workability.

Requirements of workability, segregation and bleeding, ready mixed concrete, pumped concrete.

(10 Hrs)

#### **UNIT – V**

##### **Properties of Hardened Concrete**

Strength of concrete, Types, factors influencing strength, Stress –Strain characteristics of concrete. Shrinkage and temperature effects. Creep Permeability and Durability of concrete. Nondestructive testing of concrete. Rebound hammer test, ultrasonic pulse velocity test.

(06 Hrs)

#### **UNIT – VI**

##### **1. Special Concretes**

Light weight concrete, high density concrete, Ferro cement, fiber reinforced concrete, Polymer concrete.

##### **2. Concrete Mix Design**

Concept of mix design, variables in proportion statistical quality control of concrete Common terms. Different methods Trial and error, ACI method and IS code method.

(08 Hrs.)

**Outcomes:** After completion of this subject student will be familiar with different ingredients of concrete. He will be familiar with properties of different ingredients of concrete. Student will be familiar with different admixtures. Student will familiar with properties of fresh and harden concrete. Student will be able to prepare concrete mix design. He will be familiar with special concretes.

Text Books: 1) Concrete Technology by M.S.Shetty  
2) Concrete Technology by M.L.Gambhir

## **PART-II**

### **CONCRETE TECHNOLOGY LABORATORY**

#### **TERM WORK**

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

**1)Test on Cement:**

Fineness, Standard Consistency, Setting time, Compressive strength and Soundness test. (Minimum four)

**2) Test on Aggregates:**

Bulk density specific gravity, finesses modulus, Aggregate impact value, flakiness index, elongation index of aggregates, Abrasion value, crushing value, silt content, bulking of sand. (Min:four)

**3) Test on Fresh Concrete :**

Slump, Vee – Bee, Compaction factor and flow test for fresh concrete .  
(Min: Three)

**4) Tests on Hardened Concrete:**

Split tensile strength, modulus of rupture, young's modulus, compressive strength, Non destructive Testing, Rebound hammer and Ultrasonic pulse velocity test.  
(Min: four)

**Practical oral**

Practical based oral examination.

**PART-II**  
**CE 209- THEORY OF STRUCTURES - I**

**Objectives:** To understand analysis of statically determinate and indeterminate structures. To study moving load and influence lines for statically determinate structure. To study analysis of Columns. To study analysis of three hinged arches and three hinged suspension bridges.

**UNIT – I : Fixed Beams**

Analysis of fixed beams for shear force and bending moment, Effect of sinking of supports  
(4 hrs)

**UNIT – II : Continuous Beams**

Clayperon's theorem of three moments , Analysis of continuous beam for shear force and bending moment, Effect of sinking of supports.  
(6 hrs.)

**UNIT – III:**

**1. Moving Load**

Maximum Bending moment and shear force diagram for simply supported spans, Transverse by single point load, two concentrated loads and uniformly distributed loads, Enveloping parabola, Equivalent uniformly distributed load.  
(4 hrs.)

**2. Influence Lines**

Influence line for reaction, shear force and bending moment in simply supported beam , Influence lines for force in member of statically determinate trusses.  
(6 hrs.)

**UNIT – IV :**

**1. Strain Energy**

Resilience of beams in bending, Deflection of beams from strain energy. Castiglianos theorem and its application to beams and pin jointed trusses.  
(6 hrs.)

**2. Columns**

Long columns subject to eccentric and lateral loads ,Column with initial curvature.  
(03 hrs)

**UNIT – V : 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. Influencer lines temperature effects.  
(06 hrs)

**UNIT – VI : 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 diagrams for Bending moment and shear force.  
(06 hrs )



**Outcomes:** After completion of this subject student will be able to analyse Fixed and continuous beams. Student will be able to analyze moving loads and will be able to draw influence line diagrams for simply supported beams. Student will also be able to analyze columns. Student will also be able to analyze three hinge arches and three hinge suspension bridges.

Text Books : Theory of Structures By S.Ramamrutham  
Analysis of Structures By C.S.Reddy.

## PART-II

### CE 210- Building Planning and Drawing

#### Objective

To understand the concept, aspects, principles of planning & designing of building structures, building services, various bye laws etc.

To prepare various types of drawing for the R.B. & P.B. structures planned & designed satisfying the functional & market requirement.

#### Unit I

##### Planning of Building

Role of various agencies involved in construction industry such as owner, Architect, Structural engineer, Civil engineer & contractor

Principle of planning of Buildings, Principles of Architectural design – form, function, utility, aesthetics. Integrated approach in Built Environment,

Brief sequence of activities in planning & execution of building project.

##### ❖ Building Bye laws

Building Rules and Byelaws: Necessity of laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.)/FSI, marginal distances, building line control line, height regulation, room sizes,

Types of area calculations – built up area, floor area, carpet area, Rules for ventilation, lighting, drainage, sanitation and parking of vehicles, number of stories, building line, open space requirement, height of building marginal distance, provision for means of access, plinth height of building, light & ventilation, set back distance

##### ❖ Principles of planning :

Aspect, prospect, roominess, grouping, privacy, circulation, sanitation, orientation, elegance, economy & flexibility.

Planning of residential building i.e. living area, sleeping area, service area :- K/R, D/R & Bath – WC area, other areas :- i.e study room, children room, guest room, store room, office room etc. Concept of Bubble diagram

#### Unit-II

##### ❖ Submission of working drawing

Line plans, working drawing, submission plans to sanctioning authorities, legal documents, check list for planning a building projects, site plan, budget restriction, building services, landscape Architecture, location plan, layout plan, selection of site.

Foundation plan, furniture plan, drainage plan, electrification plan for load bearing and framed structure

### **Unit -III**

#### **❖ Functional Planning of Building :**

**Planning residential building :-** preparation of plan, elevation, sectional elevation, site plan along with area statement, schedule of opening and construction notes of load bearing and frame structure.

Planning of residential buildings – Load bearing / Framed Structure – (a) Bungalows (b) Row houses, .

**Planning of public building :** Building for education –school /college

Building for Health – Primary Health centre, Building for Entertainment- theater, Other structure- Office , Hostel, Bank , post office , Rest office

### **Unit -IV**

**Introduction to Auto Cad :-** Application of auto cad, Drafting Commands, benefit of computer aided drawing.

Introduction to Low Cost Housing

### **Unit -V**

#### **❖ Building Services No.1**

**Fire protection :-** Introduction, causes of fire, fire hazards, fire load, characteristics of fire resisting materials, fire-resisting properties of common building materials.

**Ventilation & Air-conditioning :-** Definition, necessity, functional requirement of ventilation system, systems of ventilation., purposes of Air-conditioning, classification of A/C, essentials of comfort A/C, System of A/C.

**Acoustics' & sound Insulation :-** Behavior of sound in enclosures, reflection of sound, defects due to reflected sound i.e. Echoes, reverberation, sabine's expression for reverberation time, absorption of sound, requirement of good acoustical material, acoustical defects, general principles & factors in acoustical design of hall.

Sound insulation, noise classification

## Unit -VI

### ❖ Building Services No. 2

**Electrification :-** concealed & open wiring, requirement & locations of various points, concept of earthing & its methods.

**Thermal Insulation :-** Introduction, advantages of thermal insulation, materials, methods.

**Plumbing system :-** Introduction, various material required for system like copper, brass, GI, lead, PVC pipes etc.

**House drainage :-** Aim of house drainage, pipes & traps, characteristics of trap, classification of pipes & traps, sanitary fittings, systems of plumbing, requirement a water closet, house drainage plan, septic tank construction.

### Green building

- Introduction-Benefits, National priorities, rating system, check list.
- Site selection and planning , Materials Used
- Water efficiency , Energy efficiency

### Outcomes:

After completion of this studio students will able to understand basic principles of building design and planning. They will explore building drawing as a way of discovering and developing ideas for designing residential, commercial and public buildings. The student develops basic drawing skills; create multilayer architectural and working drawing drawings.

### Reference book :

- i) Building planning & drawing- Shah, Kale / Patki
- ii) Building planning & drawing- Y.S.Sane
- iii) Building construction – B.C. Punmia
- iv) Building planning & drawing- Dr. N.Kumarswamy & A.Kameshwar rao
- v) Green Home, BDS Publisher
- vi) National Building Code of India, 2005 IS 456, IS 1893 & IS 54326 and relevant IS codes
- vii) Griha Manuals, Vol 1 to 5, The Energy and Resource Institute, Delhi, 2011
- viii) National Building Code of India
- ix) AutoCAD: The Complete Reference: Cohn, David S.

## **Building planning & Drawing laboratory**

### **Term work :**

- a) Graph paper drawings (line plans) for
  1. Two plans of R.B. (one for Bungalows and one for Row house)
  2. Four plans of P.B.
- b) Two A1 size drawing sheet of residential building with area statement, schedule of opening & brief specification
  - a. Bungalows
  - b. Row houses

Submission and Working drawing: Scale 1: 100

(by hand as well as by Auto CAD)

- a. Developed plan
  - b. Plan/typical floor plan Elevation
  - c. Foundation plan
  - d. Simple section and section passing through Staircase
  - e. Water supply and drainage layout
- c) Two A1 size drawing public building ( set of two sheets ) i.e. All size drawing public building i.e. with plan, elevation, section and site plan with area statement, schedule of opening , construction notes etc. (by hand as well as by Auto CAD)
  - d) Project work on planning & Design of residential building –full set of drawing with by hand as well as by Auto CAD
    - i) Municipal submission drawing Working drawing
    - ii) Foundation / center line drawing
    - iii) Electrification plan
    - iv) Water supply & drainage plan
    - v) Furniture plan
- (f) A field visit report with drawings to one construction site.

## PART II

### CE 211- PROFESSIONAL COMMUNICATION SKILLS

#### Course Objectives:

1. To understand the concept, process and importance of Professional Communication
2. To enable students to acquire English Speaking and Writing Skills
3. To enable students to develop Presentation Skills

#### Unit I: Fundamentals of Professional Communication

(05 Hrs)

- Definition of Communication Elements of Communication (Sender, Receiver & Media)
- Communication Process/ Cycle
- Types of Communication (Verbal- Oral & Written, Non-verbal- Body Language, Sign Language & Paralanguage)
- Patterns of Communication in Organization (Internal, External, Upward, Downward, Horizontal, Diagonal, Grapevine)
- Barriers of Communication (Physical, Mechanical, Language, Psychological, Linguistic, Cultural )
- 7 C's of effective Communication

#### Unit II: Speaking Skills

(04 Hrs)

##### Presentation Skills

- Public Speaking
- Group Discussion
- Interview Skills

#### Unit III: Writing Skills

(05Hrs)

##### Business Correspondence

- Elements/ Parts of Business Letters
- Formats: Full Block, Semi Block
- Job Application, Demand Letter, Letter of Complaint, & Letter of Claim
- Resume Preparation
- Comprehension
- E-mail: Nature, Purpose, Advantages, Characteristics of Successful E-mail messages & E-mail format
- Reports: Meaning, Significance, Essential Features of a good Report & Types of Report

**Unit IV: Phonetics**

(05 Hrs)

- Study of Speech Organs
- List of Phonetic Alphabets
- Manner of Articulation of 44 Sounds
- Word Transcription

**Unit V: Introduction to behavioural Skills**

(04Hrs)

- Developing Positive Attitude
- Time Management
- Stress Management

**Unit VI: Vocabulary**

(02 Hrs)

- Synonyms
- Antonyms
- One word substitution

**Outcomes:**

1. Students would understand the concept, process and importance of Professional Communication
2. Students would acquire English Speaking and Writing Skills
3. Students would develop Presentation Skills

**Text Books:**

1. Business Communication by Sangeeta Magan, Biztantra, New Delhi. ISBN: 8177228285
2. Soft Skills for Managers by Dr. T. Kalyana Chakravarthi & Dr. T. Latha Chakravarthi, Biztantra, New Delhi. ISBN 10: [8177225685](#)
3. English Grammar and Composition by Rajendra Pal and Prem Lata Suri, Sultan Chanda and Sons Publisher. ISBN: 978-81-8054-868-0

**Reference Books:**

1. Behavioural Science by Dr. Abha Singh, Wiley India Pvt. Ltd. ISBN: 9788126538027
2. Soft Skills for Everyone by Jeff Butterfield, Cengage. ISBN: 9788131514672
3. Essentials of Business Communication - Rajendra Pal and J. S. Korlhalli Sultan Chand & Sons, New Delhi. ISBN: 8180547299
4. Essential Communication Skills by Shalini Aggarwal, Ane Books Pvt. Ltd, New Delhi. ISBN: 978-8180522802

5. Spoken English: A Manual of Speech and Phonetics by R.K. Bansal & J.B. Harrison, Orient Blackswan Pvt. Ltd, Hyderabad. ISBN: 978- 8125050858
6. Ace of Soft Skills by Gopalswami Ramesh, Mahadevan Ramesh, Pearson Publication, Delhi. ISBN: 9788131732854
7. Effective Technical Communication by M. Ashraf Rizvi, McGraw Hill Education Pvt. Ltd. Delhi. ISBN: 978-00-7059-952-9

### **PROFESSIONAL COMMUNICATION SKILLS LABORATORY**

- Communication Cycle/Process
- Self Introduction
- Extempore
- Role Play
- Listening Phonetic Sounds' Manner of Articulation in Language Laboratory
- Group Discussion
- Mock Interview
- Application Writing
- Email Writing
- Resume Writing
- Vocabulary Based Activity
- PPT Presentation on Non-Technical Issue

Note:

- Use of Language Laboratory is mandatory
- Conduct any eight practical out of twelve
- Practical Examination is obligatory