Shivaji University, Kolhapur
Second Year Engineering - Civil
SYLLABUS STRUCTURE

S. E. Civil – Part-I – Semester -III

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Engineering Mathematics-III	3	-	1	-	4	100	25	-	-	125
2	Surveying-I	3	4	-	-	7	100	25	50	-	175
3	Structural Mechanics-I	3	2	-	-	5	100	25	-	25	150
4	Building Construction*	3	-	-	2	5	100	50	-	-	150
5	Fluid Mechanics-I	3	2	-	-	5	100	25	25	-	150
6	Numerical Methods	2	2	-	-	4	-	50	-	-	50
	TOTAL	**18**	**10**	**-**	**2**	**30**	**500**	**200**	**75**	**25**	**800**

* Theory paper of 4 Hrs duration

S. E. Civil – Part-II – Semester - IV

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Structural Mechanics-II	3	-	1	-	4	100	25	-	-	125
2	Surveying-II	4	2	-	-	6	100	25	50	-	175
3	Engineering Geology	3	2	-	-	5	100	25	50	-	175
4	Building Design*	4	-	-	4	8	100	50	25	-	175
5	Fluid Mechanics-II	3	2	-	-	5	100	25	-	-	125
6	Computer Aided Drawing	-	2	-	-	2	-	25	-	-	25
	TOTAL	**17**	**8**	**1**	**4**	**30**	**500**	**175**	**125**	**-**	**800**

* Theory paper of 4 Hrs duration

Shivaji University, Kolhapur
Third Year Engineering - Civil
SYLLABUS STRUCTURE

T. E. Civil – Part-I – Semester -V

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Design of Steel Structures	4	2	-	-	6	100	25	-	-	125
2	Geotechnical Engineering-I	3	2	-	-	5	100	25	50	-	175
3	Water Resources Engineering-I	3	2	-	-	5	100	25	-	-	125
4	Concrete Technology	3	2	-	-	5	100	25	-	-	125
5	Environmental Engineering-I	3	2	-	-	5	100	25	50	-	175
6	Building Planning & Design*	-	-	-	4	4	-	50	-	25	75
	TOTAL	16	10	-	4	30	500	175	100	25	800

Theory paper of 4 Hrs duration

T. E. Civil – Part-II – Semester - VI

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Structural Mechanics-III	4	-	-	-	4	100	-	-	-	100
2	Geotechnical Engineering-II	3	2	-	-	5	100	25	-	-	125
3	Engineering Management	4	-	1	-	5	100	50	-	25	175
4	Water Resources Engineering-II	3	2	-	-	5	100	25		25	150
5	Environmental Engineering-II	3	2	-	-	5	100	25	-	-	125
6	Structural Design & Drawing-I	-	-	-	4	4	-	50	-	25	75
7	Seminar	-	2	-	-	2		50	-	-	50
	TOTAL	18	8	-	4	30	500	225	-	75	800

Vacation Field Training of at least 15 days should be completed during third year before the commencement of 7th Semester.

Shivaji University, Kolhapur
Final Year Engineering - Civil
SYLLABUS STRUCTURE

B. E. Civil – Part-I – Semester -VII

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Design of Concrete Structures-I	4	-	-	-	4	100	-	-	-	100
2	Quantity Surveying & Valuation	4	4	-	-	8	100	50	-	25	175
3	Earthquake Engineering	3	2	-	-	5	100	25	-	-	125
4	Transportation Engineering	4	2	-	-	6	100	25	-	25	150
5	Elective-I	3	2	-	-	5	100	25	-	25	150
6	(a) Project Work	-	2	-	-	2	-	75	-	-	75
	(b) Report on Field Training*	-	-	-	-	-	-	25	-	-	25
	TOTAL	18	12	-	-	30	500	225	-	75	800

* Assessment of report on field training to be done by the project guide

B. E. Civil – Part-II – Semester - VIII

S. No.	Subject	Teaching Scheme per Week					Examination Scheme (Marks)				
		L	P	T	D	Total	Theory Paper	TW	POE	OE	Total
1	Town Planning & Transportation Engineering	4	-	-	-	4	100	-	-	-	100
2	Construction Practices	4	-	-	-	4	100	-	-	-	100
3	Design of Concrete Structures-II	4	2	-	-	6	100	25	-	-	125
4	Elective-II	3	2	-	-	5	100	25		25	150
5	Elective-III	3	-	-	-	3	100	-	-	-	100
6	Structural Design & Drawing-II	-	-	-	4	4	-	50	-	25	75
7	Project Work	-	4	-	-	4		75	-	75	150
	TOTAL	18	8	-	4	30	500	175	-	125	800

S.E. (CIVIL ENGINEERING) – Part I
ENGINEERING MATHEMATICS – III

Teaching Scheme   Examination Scheme
Lectures   : 3 hours/week   Theory   :   100 marks
Tutorial   : 1 hours/week   Term Work: 25 marks

SECTION – I

Unit 1 Linear Differential Equations: Linear Differential Equations with constant coefficients, Homogenous Linear differential equations   [5 hours]

Unit 2 Applications of Linear Differential Equations: Applications of Linear Differential Equations with constant coefficients to civil engineering problems (Cantilever, Strut and beam).   [4 hours]

Unit 3 Partial differential equations: Four standard forms of partial differential equations of first order.   [5 hours]

Unit 4 Fourier series: Definition, Euler's formulae, Dirchilt's Conditions, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions, Half range series   [6 hours]

SECTION – II

Unit 1 Curve Fitting: Fitting of Curves by method of Least-squares, Coefficient of correlation, Spearman's rank correlation coefficient and lines of regression of bivariate data.   [4 hours]

Unit 2 Probability: Random variable, Probability mass function and probability density function, Binomial, Poisson and Normal distributions.   [5 hours]

Unit 3 Vector Differentiation: Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function. Irrotational and solenoidal vector field.   [5 hours]

Unit 4 Vector Integration: The line integral, Surface integral, volume integral, Gauss's Divergence theorem, Stoke's theorem, Green's theorem (Without proof).

Nature of Question paper:
1. There will be two sections carrying 50 marks each.
2. There will be four questions in each section and three question
   should be attempted from each section.

Reference Books:
1. A text book of Applied Mathematics: Vol. I, II and III by J. N. Wartikar & P. N. Wartikar , Vidyarthi Griha Prakashan, Pune.
2. Higher Engineering Mathematics by Dr. B. S. Grewal.
3. Advanced Engineering Mathematics by Erwin Kreyszig.
4. A textbook of Engineering Mathematics by N. P. Bali, Ashok Saxena and N. Ch. S. N. Iyengar- Laxmi Publication, Delhi.
5. Fundamental of Statistics by S. C. Gupta.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
SURVEYING-I

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
Practical: 4 hour per week   Term work: 25 marks
                                                     Practical-Oral: 50 Marks

Section – I

UNIT 1
                                                                      (7 Hrs)

a) Introduction-Construction and Permanent adjustments of Dumpy Level, Tilting
   & Auto Level.
b) Sensitivity of Bubble Tube; Correction for curvature and refraction.
c) Reciprocal leveling
e) Precise Leveling-Study of Precise level, classification based on precision limits,
   Field Procedure.

UNIT 2   **(7 Hrs)**

a) Contouring Methods and application of contour maps for alignments and capacity
 of reservoir.

b) Planimeter-Types, Theory, concept of zero circle, Study of Digital Planimeter.
c) Computation of Areas and Volumes.

UNIT 3 (6 Hrs)

a) Plane Table Survey: Equipment and Accessories, methods, Two point and Three point problems, and contouring with plane table. Use of Tangent Clinometer and Telescopic Alidade.

Section – II

UNIT 4 (8 Hrs)

a) Theodolite: Vernier, Micro optic and electronic.Vernier Theodolite- Construction, Adjustments and uses. Methods of horizontal and vertical angle measurement. Use of Electronic Theodolite.
b) Trigonometric Leveling – Single and Double Plane Method.

UNIT 5 (7 Hrs)

a) Theodolite Traversing – Objectives and types.
 Closed traverse- balancing, correction, Gale's Traverse table.
b) Omitted Measurements

UNIT 6 (5 Hrs)
a) Surveying-Hydrographic, Tunnel and mine survey.
b) Minor Instruments: Hand Level, Abney Level, Ghat Tracer, Box Sextant and Nautical Sextant.
c) Survey for Engineering Projects- Reconnaissance, Preliminary and detailed. Setting out of a building.

- ■ **TERMWORK**
  Experiments
1) Use of Dumpy Level, Auto Level and Tilting Level.

2) Reciprocal Leveling

3) Sensitivity of Bubble Tube using Dumpy Level

4) Illustration of Permanent adjustment of Dumpy Level.

5) Evaluation of constant of Planimeter.

6) Use of Digital Planimeter for measurement f areas.

7) Study of Theodolite

8) Measurement of horizontal angle by various methods

9) Measurement of Magnetic bearing and vertical angle by theodolite

10) Study and use of Minor Instruments

11) Methods of Plane Table Survey

12) Two Point and Three Point Problems

■ Projects

1) Block contouring project

2) Theodolite Traversing Project

Practical and Oral Examination will be based on above syllabus.

■ Recommended Books

1) *Surveying*- B.C.Punmia Vol.1 & 2 Laxmi Publications New Delhi

2) *Surveying and Levelling*- T.P.Kanetkar and S.V.Kulkarni Vol.1 & 2 – Vidhyarthi Griha Prakashan,Pune

3) *Surveying*- Agor – Khanna Publications,Delhi.

4) *Surveying*-Bannister, Raymond and Baker, Pearson Education

5) *Surveying*-K.R. Arora Vol.1 &2

6) *Surveying*- Jawaharlal Sharma -Publishers,Delhi

7) *Surveying and Levelling*- Basak-Tata Mcgraw Hill

8) *Surveying* – S.K.Duggal Vol1&2-Tata Mcgraw Hill Publications,New Delhi.

9) *Plane Surveying*- Alak De- S.Chand and Company.

10) *Plane and Geodetic Surveying* - David Clark.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
STRUCTURAL MECHANICS-I

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
Practical: 2 Hours per week   Term work: 25 marks
                                                              Oral: 25 marks

SECTION I

Unit-1   **(06 Hrs)**
Scope of the subject, Engineering properties of different materials, St. Venant's principle. Simple stress & strains, Hooks law, stress strain behavior for ductile & brittle material, working stress, Factor of safety, Composite sections under axial loading: compound bars, temperature stresses in Composite sections.

Unit-2   **(04 Hrs)**
Simple and complementary Shear stress, Poission's ratio, Normal Stresses & strains in three dimensions, elastic constants, relation between elastic constants.

Unit-3   **(07 Hrs)**
Analysis of statically determinate beams: S.F & B.M. diagrams for beams subjected to point load (inclined load also), uniformly distributed load, uniformly varying load and couples. Relation Between intensity of load, shear force & bending moment. Virtual work approach for computation of S.F & B.M.

Unit-4   **(03 Hrs)**
Thin walled cylinders and spheres, change in volume, wire wound thin cylinders.

SECTION-II

Unit-5   **(08 Hrs)**
Bending stresses in beams: simple bending theory, pure bending of beams, flexure formula, moment of resistance of different cross sections, built- up sections, Rectangular, circular and flanged sections, bending stresses in composite beams of two different materials, Equivalent sections

Unit-6   **(04 Hrs)**
Shear stresses in beams: Distribution of shear stresses in beams of various commonly used sections such as rectangular, T, circular and I sections.

Unit-7   **(04 Hrs)**
Strain energy due to axial force gradually applied and impact load, Resilience. Strain energy due to shear force, bending moment.

Unit-8   **(04 Hrs)**
Analysis of pin jointed trusses, assumptions, method of joints and method of sections.

Term Work

The term shall consist of -

A. Experiments (any five):
1. Tension test on Mild and TOR steel.
2. Compression test on different metals.
3. Compression test on Timber (parallel & across the grains).
4. Shear test on Mild steel.
5. Brinell and Rockwell Hardness test on different metals.
6. Impact test on different metals.

B. Experiments (any Two):
1. Bending test on Mild steel.
2. Flexure test on flooring tiles.
3. Water absorption & compression test on Burnt brick.

C. At least one numerical assignment on each unit.

Text Books
- *"Mechanics of Structure"* (Vol. I & II) By Junnarkar S.B. and Advi, Charotar publication
- *"Mechanics of Materials"* by R.C. Hibbler, Pearson Education
- *"Mechanics of Materials"* by Gere and Timoshenko, CBS publishers
- *" Mechanics of Materials"* Vol I & II by Punmia, Jain, Laxmi Publications
- *" Strength of Materials"* by S Ramamrutham, Dhanapat Rai Publications
- *" Strength of Materials"* by Bhavikatti S.S., New Age Publications

Reference Books
- *"Introduction to Mechanics of Solids"* by J.B. Popov, Prentice – Hall publication
- *"Strength of Material"* by F. L. Singer and Pytel, Harper and Row publication.
- *"Mechanics of Material"* by Beer and Johnston, Mc Graw Hill publication.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
BUILDING CONSTRUCTION

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
                                                    (4 Hrs Duration)
Drawing: 2 hour per week   Term work: 50 marks

SECTION – I

UNIT-NO.1

(8 Hrs)

Engineering properties of following materials.
. *Stones* – Requirements of good building stone, uses of building stones.
. *Bricks* – Manufacturing, Types and Engineering Properties.
. *Aggregates* - Fine Aggregates and coarse aggregates - Origin, types, particle size and shape, mechanical and physical properties, grading, sieve analysis.
. *Timber* – Natural & Artificial wood and their application in Civil Engineering.
. *Steel* – Standard sections, steel as reinforcement. High Yield Strength Steel and high tensile steel, uses of steel in Building Construction. Anti-corrosive treatments.
. *Cement*- Ordinary Portland, rapid hardening and low heat cements, main properties.
Tiles - Ceramic, Vitrified, Natural Stone/Mosaic, Paving Blocks etc.
Miscellaneous – Aluminum, Glass, Plastic etc.

UNIT –No.2

(6 Hrs)

. *Basic requirements of a building as a whole*: strength and stability, Dimensional stability, comfort and convenience, damp prevention, water-proofing techniques, heat insulation, day lighting & ventilation. Sound insulation and anti termite treatment.
Building components and their basic requirements : Foundations, plinth, walls and columns in superstructure, floors, doors & windows, sills, lintels and weather sheds, roofs, steps and stairs, utility fixtures.
Formwork for basic RCC elements: Ideal Requirements & types. Foundations: Stepped, isolated, combined, strip, raft, strap or cantilever, pile.

UNIT No. 3

(4 Hrs)

. *Plain cement concrete* – Properties, Grades and their uses.
Stone masonry – Random Rubble, Uncoursed Rubble, Coursed Rubble & Ashlar Masonry.
. *Brickwork & Brick Bonds* - English, Flemish, Principles Observed During Construction

SECTION – II

UNIT No. 4   (4 Hrs)

Composite masonry, various partition walls, brick, aluminium & timber.
Solid concrete blocks, hollow concrete blocks and light weight blocks (Siporex), soil stabilized blocks, Fly Ash Blocks.

UNIT No. 5   (7 Hrs)

Arches: Arches and their stability consideration, technical terms in arches,types of arches, methods of construction.
Lintel: Necessity, Materials: wood, stone, brick, steel, R.C.C. and reinforcedbrick lintels.
Doors – Classification, T.W. Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening.
Windows - Classification, T.W. Glazed Windows, Aluminum Glazed Windows, Steel Windows, fixtures and fastening.
Stairs: Technical terms, requirements of a good stair, uses, types, materials for construction. Design of stairs (Dog Legged and Open Well)

UNIT – No.6   (7 Hrs)

Roofs and Roof coverings: Terms used. Roof and their selection, pitched roofs and their types, Timber Trusses (King Post and Queen Post), Steel Trusses types and their suitability, roof coverings and their selection.
Ground and Upper floors and factors for selections of floorings: Various types of Tile flooring (Natural and Artificial Material), Concrete Flooring (Tremix Flooring) Construction of upper floors: R.C.C. slabs, R.C.C. beams and slab. Flat slab floor.

TERM WORK

1. Drawing to a scale, draw on half imperial drawing sheet.

A. *Foundations*: - Isolated, Combined Footing, Under Reamed Piles.
   (With reinforcement details)
B. *Stone Masonry*: UCR, Course Rubble
C. *Brick masonry*: English bond, Flemish bond
D. *Doors*: T.W. Paneled Door.
E. *Windows*: T.W. Glazed Window.
F. *Stairs*: Dog legged and Open well.
G. *Timber Trusses*: King Post and Queen Post.

2. Sketch Book :

A. Lettering, Symbols, Types of lines and dimensioning as per IS 962.

B. *Stone masonry*: Ashlar, Ashlar chamfered Polygonal and Dry masonry.
C. *Doors*: Flush doors, Revolving door, Collapsible door and rolling shutter.
D. *Windows*: Louvered window, Sliding Window, Bay window, Casement window, Dormer Window, Corner Window.
E. *Roofs*: Line Sketches of steel trusses for different spans.
F. *Stairs*: Quarter turn, bifurcated, Spiral, Geometrical.
G. *R.C.C. Literals & Chajja*

REFERENCE BOOKS

- *Building Construction* – B.C.Punmia (Laxmi Publications)
- *Basic Civil Engineering* – G. K. Hiraskar (Dhanpat Rai Publications)
- *A Text Book of Building Construction* – S.P. Arora, S.P. Bindra (Dhanpat Rai Publications)
- *Construction Technology* (Volume 1 to 4) – R. Chudley (ELBS)
- *A to Z of Practical Building Construction and Its Management*- Sandeep Mantri (Satya Prakashan, New Delhi)
- *SP 7*- National Building Code Group 1 to 5- B.I.S. New Delhi
- *I.S. 962 – 1989* Code for Practice for Architectural and Building Drawings
- *A Course in Civil Engineering Drawing* – V.B.Sikka (S.K.Kataria and Sons)
- *Civil Engineering Drawing* – M. Chakraborty.
- *Engineering Materials* – R.K.Rajput (S. Chand)
- *Handbook of Building Construction*- M. M. Goyal (Amrindra Consultancy (P) Ltd.)

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
FLUID MECHANICS-I

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
Practical: 2 Hours per week   Term work: 25 marks
                                                                   Practical/Oral: 25 marks

SECTION-I

Unit-1

Introduction: Scope and importance of Fluid Mechanics, Physical Properties of fluids (density, specific weight, specific volume, sp. gravity, Viscosity-Newtons law of viscosity, Newtonion and Non-Newtonion fluids. Compressibility, Surface tension and Capillarity$_h$ vapour pressure-Cavitation), Ideal fluid, Real Fluid

Unit-2

Dimensional analysis & Model studies :

Dimensions & Dimensional homogeneity, Importance & use of Dimension analysis, Buckingham's pie theorem- Statement & application, Non-dimensional numbers & their Significance.

Hydraulic similitude- Importance & use. Geometric, Kinematic & dynamic Similarities, Froude's & Reynold's model law, Scale ratios, applications   **(6)**

Unit-3

Fluid Statics :

Pressure, Pascal's   Law, Hydrostatic Law, pressure measurement devices –piezometer, manometers,Mechanical gauges. Forces on Plane and Curved Surfaces, Centre of pressure and pressure diagram, buoyancy, Metacentre, Stability of Submerged and floating bodies.

                                    (6)

Unit-4
Fluid Kinematics:
Concept of control volume, Velocity and acceleration of fluid Particle, Classification of fluid flow
–
(Steady- Unsteady, Uniform-Nonuniform, Rotational-irrotational , turbulent – laminar, l-D,2-D, 3-D
flow, Compressible-incompressible flow).
Streamlines, Equipotential lines, Stream Function and Velocity Potential, Flow Net- (Properties,
Drawing methods, engineering applications). Continuity equation – (differential & integral form)
(5)

SECTION- I I

Unit-5
Fluid Dynamics :
Forces acting on fluid in motion, Euler's equation along a streamline, Bernoulli's Theorem-
limitations, Applications -Pitot Tube, Venturimeter, Orificemeter, Orifices and Mouthpieces,
Concept of HGL & TEL.

(6)

Unit - 6
Flow in pipes:
A. Laminar flow
Reynold's Experiment, Coutte & Hazen Poisulle's Equation for viscous flow between parallel
plates and circular pipes.

B. Turbulant flow
Velocity distribution and Shear stresses in turbulent flow, Prandtl mixing length theory,
Nikuradse's Experiment, Introduction to Moody's Chart, Nomograms and Other pipe
diagrams. **(5)**

Unit – 7
Losses in pipes:
Darcy - Wiesbach Equation, factors affecting friction, Minor Losses in pipes, Concept of
equivalent length of pipe for different pipe fittings, Equivalent diameter of pipes, Hydraulic Power
transmission by pipe.

(4)

Unit – 8
Pipes in parallel,, Series, Syphon, two reservoir problems.
Water hammer in pipes- Rigid and Elastic Water Column Theory. Surge Tanks - (Function,
location and Uses **(5)**

TERM WORK

a) Measurement of discharge - Calibration of measuring tank, measurement of pressure (
Piezometer,

manometers, Pressure gauges) Use of hook or point gauge.

b) At least **SIX** experiments from the following.

   1) Verification of Bernoulli's Theorem

   2) Determination of metacentric heights

   3) Plotting of streamlines, flownets

   4) Calibration of an orifice / mouthpiece

   5) Calibration of venturimeter / orificemeter

   6) Study of factors affecting coefficient of friction for pipe flow (at least for two different materials and two

      different diameters)

   7) Determination of loss of head due to i) Sudden expansion, ii) contraction iii) elbow iv) bend
      v) globe
      Valve etc.

   8) Study of Laminar flow

c) Study of Moody's charts, nomograms for pipe design.

d) Simple computer programs.

RECOMMENDED BOOKS

   1) *Fluid Mechanics* – A.K. Jain – Khanna Pub., Delhi

   2) *Fluid Mechanics – Hydraulic & Hydraulic Mechanics* -Modi / seth – Standard Book House, Delhi

   3) *Fluid Mechanics* – S. Nagrathanam – Khanna Pub., Delhi

   4) *Fluid Mechanics* – Streeter-McGraw-Hill International Book Co., Auckland

   5) *Elementary Fluid Mechanics* – H. Rouse – Toppan C. Ltd. Tokyo

   6) *Fluid Mechanics* – Garde-Mirajgaonkar – Nemchand & Bros., Roorkee

   7) *Fluid Mechanics* – Shames - McGraw-Hill International Book Co., Auckland

   8) *Fluid Mechanics* – Arora

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
NUMERICAL METHODS

Teaching Scheme: Examination Scheme:
Lectures: 2 Hours per week   Theory paper: --
Practical: 2 hour per week   Term work: 50 marks

Unit – 1
Matrix operations on computer, multiplication and inversion, Gauss elimination method, Choiesky decomposition method, solution of simultaneous equations, Gauss elimination, Gauss Jordan and Gauss scidal methods.

Unit – 2
Roots of equation, Newton Remphson method, trial and error method, bisection, method.

Unit – 3
Solution of ordinary differential equation, Euler's method, modified Euler's method and Runga Kutta methods.

Unit – 4
Finite difference method, central forward and backward differences, application to deflection of determinate beams, buckling load of long columns of constant, non uniform, stepped variation of moment of inertia.

Unit – 5
Numerical differentiation and integration : Trapezoidal rule, Simpon's, $1/3^{rd}$ rule.

Unit – 6
Statistical analysis, mean and standard deviation , least square method, regression analysis – linear parabolic, curve fitting.

TERM WORK
Termwork shall consist of at least 12 programs with flowcharts, source listing, input and outputs based on above topic in 'C' programming language.

NOTE : All the units described above are to be taught with computer application, application based on Civil Engineering problems.

References

- *"Numerical methods",* by E. Balaguruswami, Tata Mc. Graw. hill.
- *"Numerical analysis* (Schaum's series)"*,* by Scheid F, Tata Mc. Graw hill.

- *"Numerical methods for engineers",* by Chapra. Sc. and R.P.Canale, Tata Mc. Graw hill.
- *"Computer based numerical analysis",* by Shantha Kumar M., Khanna publication.
- *"Numerical methods in engineering and science",* by Grewal B.S., Khanna publication.
- *"Computer oriented numerical methods"* by Salaria R.S., Khanna publication.
- *"Numerical methods in 'C'",* by J.G.Kori., Laxmi publication

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part I
STRUCTURAL MECHANICS-II

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
Tutorial: 1 Hour per week   Term work: 25 marks

SECTION-I

Unit 1.   **(06 Hrs)**
Principle stresses and strain for 2-D problems: Normal and shear stresses on inclined plane, Principal planes and Principle stresses, Principle strains, Mohr's circle method, principle stresses in beams and thin cylinders.

Unit 2.   **(06 Hrs)**
Combined direct and bending stresses, eccentric load on short columns, kern of a section, eccentricity of load about both axes of section. Chimney subjected to wind pressure, simple problems on dams and retaining walls.

Unit 3.   **(06 Hrs)**
Theory of torsion, assumptions, transmission of power, combined bending, torsion and thrust for solid and hollow shafts, Principle stresses, equivalent torque and equivalent moment for circular shafts.

Unit 4.   **(04 Hrs)**
Behavior of axially loaded long columns-Effective length, slenderness ratio, crippling load by Euler's and Rankine's formulae, limitations.

SECTION-II

Unit 5.   **(08 Hrs)**

Slope and deflection of beam: Computation by double integration, Macaulay's method, moment area method, conjugate beam method.

Unit:6   **(05 Hrs)**

Deflection of determinate beams, bents & trusses by strain energy method, Castigliano's theorem.

Unit:7   **(03 Hrs)**

Theories of elastic failure : Maximum principal stress. Maximum principal strain, Maximum shear stress theories, Total strain energy and distortion energy theory, causes of failure, fatigue and creep.

Unit:8   **(06 Hrs)**

Influence line diagrams, Muller-Breslau principle, application to statically determinate simple &compound beams to determine support reaction, S.F. & B.M at any section, ILD for force in members of determinate truss.

Text Books

- "Mechanics of Structure" (Vol. I & II) By Junnarkar S.B. and Advi, Charotar publication
- "Mechanics of Materials" by Gere and Timoshenko, CBS publishers
- " Mechanics of Materials" Vol I & II by Punmia, Jain, Laxmi Publications
- " Strength of Materials" by S Ramamrutham, Dhanapat Rai Publications
- " Strength of Materials" by Bhavikatti S.S., New Age Publications

Reference Books

- "Introduction to Mechanics of Solids" by J.B. Popov, Prentice – Hall publication
- "Strength of Material" by F. L. Singer and Pytel, Harper and Row publication.
- "Mechanics of Material" by Beer and Johnston, Mc Graw Hill publication.

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part II
SURVEYING-II

Teaching Scheme: Examination Scheme:
Lectures: 4 Hours per week   Theory paper: 100 marks
                                                                    (4 Hrs Duration)
Practical: 2 hour per week   Term work: 25 marks
                                                                    Practical/Oral: 50 Marks

Section – I

UNIT 1   (10 Hrs)

a) Tacheometry: Significance & Systems, Principle, constants. Basic Formulae and Field
Work Stadia method, Auto reduction Tachometer, Tangential system.
b) EDM: Importance, Principles of Electronic Distance measuring instruments,
Classification of EDM's based on carrier waves used. Study and use of Total Station.

UNIT 2   (11 Hrs)

a) Triangulation Principle & Classification, system , Selection of station , Base line
Measurement, correction and use of subtense bar, signals, satellite station, reduction to
center, spherical excess, angular observations, trilateration.
b) Triangulation Adjustments: Theory of errors, laws of weights, concept of most
probable value

UNIT 3   (5 Hrs)

Field astronomy: Terms, co-ordinate systems, determination of latitude and true
bearing by observation on the sun and pole star

Section – II
UNIT 4   (10 Hrs)
Curves -
a) Horizontal curves: Elements, Setting out of simple curves by linear and angular
methods. Simple, compound, reverse and transition curves.
Transition Curves- Types, Elements, Length, and concept of ideal transition curve.
b) Vertical curves: Types, Introduction to compound reverse and combined curves.
Methods of setting out.

UNIT 5- Photogrammetry   (9 Hrs)

a) Terms, Types, vertical photographs, scale, ground coordinates, relief displacement,
Flight planning Photomaps and Mosaics.
b) Stereoscopy and photo interpretation.

UNIT 6- Remote sensing: **(7 Hrs)**

a) Introduction, Classification and principles, electromagnetic energy and its interaction with matter, Idealized systems, sensors, platforms, and application in civil engineering.
b) G.P.S & G.IS. as surveying techniques – Overview, uses and applications

■ **Term Work**

Field book Practicals
1. Tacheometry
    a) Determination of tachometric constants.
    b) Determination of grade of a line.
    c) Determination of area of a polygon.
2. Use of subtense bar for distance measurement.
3. Setting out of curves
    a) Simple circular curves
    b) Transition curves
4. Study of topo sheets
5. Observation of aerial photographs under stereoscope
6. Traversing by Total Station.

■ **Projects**

    1) Road project   2) Radial Contouring.

■ **Recommended Books**

1) *Surveying*- B.C.Punmia and Jain Vol.1 , 2 & 3 Laxmi Publications New Delhi

2) *Surveying and Leveling*- T.P.Kanetkar and S.V.Kulkarni Vol.1 & 2 – Vidhyarthi Griha
        Prakashan,Pune

3) *Advanced Surveying*- Agor – Khanna Publications,Delhi.

4) *Surveying*-Bannister, Raymond and Baker, Pearson Education

5) *Surveying*-K.L. Arora Vol.1 &2

6) *Surveying*- Jawaharlal Sharma -Publishers,Delhi

7) *Surveying and Levelling*- Basak

8) *Surveying* – S.K.Duggal Vol 1&2-Tata Mcgraw Hill Publications,New Delhi.

9) *Advanced Surveying*- S.Gopi,R.Satikumar and N.Madhu, Pearson Education

10) *Higher Surveying*- A.M.Chandra-New Age International Publication.

S.E.(Civil Engineering)Part-II
ENGINEERING GEOLOGY

Teaching Schemes:	Examination Schemes:
Lectures : 3 hours/week	Theory Paper:100 marks
Practical : 2 hours/week	Term work : 25 marks
	POE : 50 marks

SECTION I

Unit 1
Introduction: Definition, Scope and subdivisions, applications of Geology in Civil Engineering.
(01)

Unit 2
(06)
Physical Geology: Major relief features of the Earth, Denudation, Interior of the Earth.
Geological work of river: Normal cycle of erosion, Processes and features of erosion and deposition, Transportation, Civil Engineering Significance.
Geological work of wind: Processes and features of erosion and deposition, Transportation, Civil Engineering Significance.
Volcano: Central and Fissure types, Products of volcano.
Mountain: Types, examples.

Unit 3
(09)
Mineralogy and Petrology:
Mineralogy : Definition, Physical properties of mineral, Classification of minerals.
Petrology: Definition, rock cycle.
Igneous rocks: Origin, Textures and Structures, Classification, Concordant and Disconcordant intrusions,Civil Engineering significance.
Secondary rocks: Formation, Classification.
Residual deposits: Soil, Laterite and Bauxite and their importance.
Sedimentary deposits: Formation, Textures, Classification and Structures, Civil Engineering significance.
Chemical and organic deposits.
Metamorphic rocks: Agents and Types of Metamorphism, Stress and antistress minerals, Structures, Products of metamorphism.

Unit 4
(05)
Structural Geology: Outcrop, Strike and Dip, Unconformity-Types, Outliers and Inliers, Overlap.
Fold and Fault: Parameters, Classification, Causes, Civil Engineering significance.
Joint: Types, Civil Engineering considerations.

SECTION II

Unit 5
(02)
Building Stones: Engineering properties of rocks, Requirement of good building stone, Building stones of India.

Unit 6
(02)
Grounwater: Sources of groundwater, water table, Zones of groundwater, Porosity and permeability, Types of Aquifer.

Unit 7
(05)
Earthquake : Introduction, Causes, Seismic waves, Isoseismal lines, Recording of earthquake, Scale, Effects, Reservoir Induced Seismicity.
Landslides : Types, Causes, Stability of hill slopes, Prevention of Landslides.

Unit 8
(03)
Preliminary Geological Investigations : Steps in geological investigations for project site, Engineering consideration of structural features.
Exploratory drilling: Observations, Preservation of cores, Core logging, Core recovery, R.Q.D., Graphical representation of core log, Limitation of exploratory drilling method.

Unit 9
(05)
Geology of Dams and Reservoirs : Preliminary geological survey, Influence of geological conditions on Location, Alignment, Design and Type of a dam, Suitable and Unsuitable geological conditions for locating a dam site, Site improvement techniques, Dams on carbonate rocks, sedimentary rocks, folded strata and deccan traps, Suitable and unsuitable geological conditions for reservoir site.

Unit 10
(04)
Geology of Tunnel and Bridge : Definition, Civil Engineering terms, difficulties during tunneling, Influence of geological conditions on tunneling, Lining after tunneling, Geological consideration while choosing tunnel alignment, Tunnel in folded strata, sedimentary rocks and deccan traps.Dependence of types of bridges on geological conditions.

PRACTICAL WORK
1. Megascopic study of Rock forming minerals.
2. Megascopic study of Ore forming minerals.
3. Megascopic study of Igneous rocks.
4. Megascopic study of Secondary rocks.
5. Megascopic study of Metamorphic rocks.
6. Study of geological maps.
7. Study of Structural Geological models.
8. Study tour to the places of Engineering Geological importance.

TERM WORK

A Journal containing full record of above practical work shall be examined as Term work. Practical examination based on above practical course.

REFERENCE BOOKS

1. Engineering and General Geology – By Prabin Singh, S. K. Katariya and sons, Delhi.
2. Principles of Petrology – By G. W. Tyrrell, B.I.Publication Pvt.Ltd.,New Delhi.
3. Principles of Physical Geology – By A. Holmes, ELBS Chapman & Hall,London.
4. Structural Geology – By M. P. Billings, Prentice Hall of India Private Ltd.,New Delhi.
5. A Text Book of Geology – By P. K. Mukerjee ,The World Press Pvt.Ltd., Calcutta.
6. Geology Hand book in Civil Engineering- By R. F. Legget – McGrawHill, New York.
7. Principles of Engineering Geology and Geotechnics- By D. P. Krynine& W. R. Judd, CBS Publishers & Distributors,New Delhi.
8. Engineering Properties of Rocks – By L. W. Farmer, Champman & Hall, London.
9. Experiments in Engineering Geology – By K. V. G. K. Gokhale & D. M. Rao,TMN, New-Delhi.
10. A Text Book of Engineering Geology – By R. B. Gupte, Pune Vidyarthi Griha Prakashan, Pune.
11. Engineering Geology for Civil Engineering – By Dr. D. V. Reddy,Oxfard & IBH Publishing Co. PVt. Ltd.,New Delhi.
12. Engineering Geology - By B. S. SathyaNarayanswami,Dhanpat Rai& Co.(P) Ltd, Delhi.
13. Groundwater Hydrology- By Tood D. K., John Wiley & Son, New York.
14. Engineering Geology Laboratory Manual.
15. Rultey's Elements of Mineralogy – By H. H. Read, CBS Publishers & Distributors, Delhi.

Teaching Scheme: Examination Scheme:
Lectures: 4 Hours per week   Theory paper: 100 marks
                                                                    (4 Hrs Duration)
Drawing: 4 hour per week   Term work: 50 marks
                                                                    Practical Oral: 25 marks

SECTION – I
Planning of Residential Buildings

UNIT-NO.1:-   (5 Hrs)
Site Selection criteria.
Principles of Building planning. Significance Sun diagram. Wind Diagram.
Orientation, Factors affecting, criteria under Indian condition.

UNIT-NO. 2   (10 Hrs)

Building Planning Byelaws & regulations as per SP-7, 1983 National Building code of India group 1 to 5.
Planning of Residential Building (Bungalows, Row Bungalows, Apartments and Twin Bungalows) Procedure of Building Permission, significance of commencement, plinth completion or occupancy certificate.

UNIT-NO.3   (5 Hrs)

Low cost Housing-Materials & Methods (conceptual introduction only)
Maintenance, Repairs, Rehabilitation of Structures. (conceptual introduction only)

SECTION – II
Building Services

UNIT-No.4:-   (8 Hrs)

Plumbing system, Various Materials for system like PVC, GI, AC, CI, HDPE, and Stoneware. Various types of traps, Fittings, Chambers, Need of Septic Tank, Concept of Plumbing & Drainage plan, introduction to rainwater harvesting. Concept of rain water Gutters. Rainwater outlet & Down Tank Systems.
Electrification: - Concealed & Open Wiring, Requirements & Location of various points, Concept of Earthing.
Fire resistance in building: Fire protection precautions, confining of fire, fire hazards, Characteristics of fire resisting materials, building materials and their resistance to fire.

UNIT-No.5   (8 Hrs)

Ventilation: - Definition and necessity of Ventilation, functional requirement, various system & section criteria.

Air conditioning: - Purpose, Classification, Principles, Systems & Various Components of the same.
Thermal Insulation: - General concept, Principles, Materials, Methods, Computation of Heat loss & heat gain in Buildings.
Introduction to Acoustics: Absorption of sound, various materials, Sabine's formula, optimum reverabaration time, conditions for good acoustics.
Sound Insulation: Acceptable noise levels, Noise prevention at its source,Transmission of noise. Noise control-general considerations.

UNIT-No.6:-   *Building Finishes*   (8 Hrs)

Paints: Different types and application methods.
Varnishes & application methods.
Plastering, Pointing & various techniques.
Tile cladding, skirting, dado work with various materials.
Miscellaneous finishes such as POP, sand blasting techniques, wall paper.

TERM WORK:

1. Imperial size sheet based on actual measurement of existing residential building consisting of plan, elevation, section passing through staircase. Site plan. Area statement & brief specifications.

2. Planning & design of residential building (G+1).

3. Full set of drawings for the building planned in 2- (a) Municipal Submission drawing. (b) Working Drawings:
   - Foundation / Center Line Drawing.
   - Furniture layout plan.
   - Electrification plan
   - Water supply & drainage plan.

4. Project report giving details of following systems
   - Stair Case
   - Drainage System
   - Water Supply System
   - Water Tank
   - Spectic Tank
   - Design of terrace Drainage System

REFERENCE BOOKS:

- *Building Drawing* – Shah, Kale, Patki (Tata McGraw- Hill)
- *Building Design and Drawing* – Y. S. Sane (Allied Book Stall, Pune)
- *SP 7- National Building Code* Group 1 to 5- B.I.S. New Delhi
- *I.S. 962 – 1989* Code for Practice for Architectural and Building Drawings

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part Ii
FLUID MECHANICS-Ii

Teaching Scheme: Examination Scheme:
Lectures: 3 Hours per week   Theory paper: 100 marks
Practical: 2 Hours per week   Term work: 25 marks

SECTION- I

Unit-1
a) Uniform flow in open channel :
Introduction, Difference between pipe flow and open channel flow. Types of open channels, Types of flows in open channel, Geometric elements, Velocity distribution, Measurement of velocity- (Pitot lube, current meter)
b) Steady *&* Uniform Flow :
Chezy's & Manning's formula, Roughosity coefficient, Uniform Flow computations, Hydraulically efficient section (Rectangular, Triangular, Trapezoidal)
c) Depth energy relationship in open channel flow :
Specific energy (definition & diagram, Critical, Sub-critical, Super-critical flow), Specific force, Specific discharge- (definition & diagram)   **(6)**

Unit -2
Gradually varied flow (G.V.F.) :
Definition, Classification of channel Slopes, Dynamic equation of G.V.F.(Assumption and derivation), Classification of G.V.F. profiles-examples, Direct step method of Computation of G.V.F. profiles   **(5)**

Unit -3
Rapidly varied flow (R.V.F.) :
Definition, examples, Hydraulic jump- Phenomenon, relation of conjugate depths, Parameters, Uses, Types
of Hydraulic jump. Hydraulic jump as an energy dissipater   **(4)**

Unit -4

Notches & Weirs : Types, derivation of discharge equation, Velocity due to approach, Francis formula**,** Calibration of notch, errors in measurement.
Weir & Spillway :   Sharp, broad & round crested weirs, calibration of weir, time of emptying tank with weir, Profile of Ogee spillway, Flow below gates.   **(5)**

SECTION-Il

Unit-5
Impact of jet :   .
Impulse momentum principle, Impact of jet on Vanes-flat, curved (stationary and, moving), Inlet & outlet velocity triangles, Series of flat, curved vanes mounted on wheel.   **(5)**

Unit-6
Hydraulic turbines :
Importance of hydro-power, Classification of turbines, description, Typical dimensions and working principle of Pelton, Francis & Kaplan turbine (Detailed design need not to be dealt with), Unit quantities, Specific speed, Performance Characteristics, Selection of type of turbine, description & function of Draft tube, Thoma's cavitation number. **(5)**

Unit-7
Centrifugal pump :
Classification, Component parts, Working of centrifugal pump, Performance Characteristics, Selection of pump, Common pump troubles & remedies, Introduction to different types of pumps such as reciprocating, multi-stage, Jet, Air lift, Submersible pump. **(4)**

Unit-8
Boundary layer theory :
Concept, Boundary layer along thin plate- Characteristics, Laminar, Turbulent Boundary Layer, laminar sub layer, Various Thicknesses- Nominal, displacement, Momentum, Energy. Hydraulically smooth and Rough boundaries, Separation of Boundary layer, control of Separation, Introduction to Drag and Lift on submerged bodies (like Flat plates, Sphere, Cylinder, aerofoil), stokes law,
Drag and Lift coefficients**.** **(6)**

TERM WORK

A) Any four of the following :
  1) Study of specific energy diagram for different discharges.
  2) Calibration of V notch / Rectangular notch.
  3) Calibration of sharp crested suppressed weir and plotting of upper / lower nappe
  4) Calibration of Ogee Weir.
  5) Study of hydraulic jump
        a) Verification of sequent depths,
        b) Determination of loss in jump.
         c) Plotting the following parameters with respect to Froud number i) Y2/Y1 ii) Length iii) Energy loss
  6) Study of flow over broad crested weir.
  7) Study of flow below gates – Discharge v/s head relation, Equation of flow, Determination of contraction in fluid in downstream of gate.
  8)   Velocity distribution in open channel in transverse direction of flow

B)   i) Impact of jet
     ii) Study of Turbines (Demonstration)
     iii) Test on centrifugal pump
     iv) Study of charts for selection of pumps

RECOMMENDED BOOKS

1) *Fluid Mechanics* – A.K. Jain – Khanna Pub., Delhi

2) *Fluid Mechanics* – K. L. Kumar – Eurasia Publication House, Delhi

3) *Fluid Mechanics* – Streeter-McGraw-Hill International Book Co., Auckland

4) *Open Channel flow* – Rangaraju – Tata McGraw-Hill Pub. Co., Delhi

5) *Fluid Mechanics* – K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi

6) *Fluid Mechanics* – Hydraulic & Hydraulic Mechanics -Modi / seth – Standard Book House, Delhi

7) *Flow in open channel* – V. T. Chaw - McGraw-Hill International Book Co., Auckland

8) *Flow in open channel* - K. Subramanyam – Tata McGraw-Hill Pub. Co., Delhi

SHIVAJI UNIVERSITY, KOLHAPUR
S.E. (Civil) -Part II
COMPUTER AIDED DRAWING

Teaching Scheme: Examination Scheme:
Lectures: --   Theory paper: --
Practical: 2 hours per week   Term work: 25 marks

Assignment No. 1
.   Sudy of Auto CAD Commands
Assignment No. 2
            Preparation of 2D AutoCAD drawing of Project prepared in the term work of
            subject Building Design.
Assignment No. 3
            Preparation of ANY one of the working drawings of Project prepared in the
            termwork of subject Building Design.

REFERENCE BOOKS:

* *AutoCAD* – David Frey (BPB Sybex Publications)
* *AutoCAD* – George Omura

EQUIVALENCE OF SUBJECTS FOR SE-CIVIL (Pre-revised)

SE-CIVIL – I

S. No.	Subject in the Pre-revised Curriculum of SE-Civil-I	Equivalent Subject in the Revised Curriculum	Class in Revised Curriculum
1	Engineering Maths-III	Engineering Mathematics-III	SE-(Civil)-I
2	Structural Mechanics-I	Structural Mechanics-I	SE-(Civil)-I
3	Surveying-I	Surveying-I	SE-(Civil)-I
4	Building Construction & Drawing	Building Construction	SE-(Civil)-I
5	Fluid Mechanics-I	Fluid Mechanics-I	SE-(Civil)-I
6	Computer Programming	Numerical Methods (only Term work)	SE-(Civil)-I

SE-CIVIL – II

S. No.	Subject in the Pre-revised Curriculum	Equivalent Subject in the Revised Curriculum	Class in Revised Curriculum
1	Structural Mechanics-II	Structural Mechanics-II	SE-(Civil)-II
2	Surveying-II	Surveying-II	SE-(Civil)-II
3	Building Construction & Design	Building Design	SE-(Civil)-II
4	Engineering Geology	Engineering Geology	SE-(Civil)-II
5	Fluid Mechanics-II	Fluid Mechanics-II	SE-(Civil)-II
6	Water Resources Engineering-I	Water Resources Engineering-I	TE-(Civil)-I

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