SYLLABUS OF

SECOND YEAR (CIVIL)

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

(w.e.f. 2006-07)

NORTH MAHARASHTRA UNIVERSITY, JALGAON

STRUCTURE OF TEACHING AND EVALUATION

S.E. (Civil) w. e. f. 2006 - 07

FIRST TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Strength of Materials	4	1	-	3	100	25	-	-
2	Surveying – I	4	-	2	3	100	25	50	-
3	Building Construction & Materials	4	-	4	3	100	25	-	25
4	Concrete technology	4	-	2	3	100	25	-	25
5	Engineering Mathematics-III	4	1	-	3	100	25	-	-
6	Computer Graphics	-	-	2	-	-	25	-	-
	Total	20	02	10	-	500	150	50	50
	Grand Total	32			750				

SECOND TERM

Sr. No	Subject	Teaching Scheme Hours/Week			Examination Scheme				
		Lectures	Tutorial	Practical	Paper Duration Hours	Paper	TW	PR	OR
1	Theory of Structures – I	4	1	-	3	100	25	-	-
2	Surveying - II	4	-	2	3	100	25	50	-
3	Building Design & Drawing	4	-	4	4	100	50	-	25
4	Fluid Mechanics – I	4	1	2	3	100	25	-	25
5	Engineering Geology	4	-	2	3	100	25	-	-
	Total	20	02	10	-	500	150	50	50
	Grand Total	32			750				

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

SYLLABUS OF SECOND YEAR (CIVIL)

TERM-IST (w.e.f. 2006-07)

STRENGTH OF MATERIALS

Teaching Scheme:
Lectures: 4 Hours/Week
Tutorials: 1 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks

UNIT-I: **(11 Hrs., 20 marks)**

Normal stress & strain, Hooke's law. Axial force diagrams. Deformation in prismatic, stepped, linearly varying & composite members under concentrated load & self-weight. Stress & strain in indeterminate members. Temperature stresses.

UNIT-II: **(9 Hrs., 20 marks)**

[A] Shear stress & strain. Modulus of rigidity. Poison's ratio, relation between E & G. Generalized Hooke's law. Bulk modulus, stress strain diagram, working stress, factor of safety.

[B] Thin cylindrical & spherical shells.

[C] Stresses due to impact load using strain energy method.

UNIT-III: **(10 Hrs., 20 marks)**

[A] Shear force & bending moment. Relation between SF, BM & loading. SFD & BMD for determinate beams viz. cantilever, simply supported, overhanging and compound beams under various loads viz. concentrated, uniformly distributed & varying, couples etc. Determination of critical SF & BM and points of contra-flexure. Construction of loading diagrams from shear force & beading moment diagram.

[B] Bending stresses in beams. Theory of bending. Flexural formula. Section modulus. Moment of resistance.

UNIT-IV: **(10 Hrs., 20 marks)**

[A] Shear stresses in beams. Shear stress formula, shear stress determination in symmetrical section.

[B] Shear stresses in shafts due to torsion. Stress, strain & deformation in determinate & indeterminate shafts of hollow or solid cross-sections. Composite shafts.

[C] Axially loaded columns. Buckling effect. Euler's formula. Various end conditions & concept of equivalent length. Rankine's formula. Limitations of formulae.

UNIT-V: **(10 Hrs., 20 marks)**

[A] Direct & bending stresses in short columns & other structural components due to eccentric or lateral loads. Core of section.

[B] Principle stresses & strain. Stresses on inclined plane. Graphical method. Theories of Failure.

[C] Stresses due to combined bending and torque in shafts.

TERM WORK:-

It shall consist of at least two assignments for each unit of above syllabus.

REFERENCE BOOKS:-

1) E.P.Popov - Mechanics of Solids
2)Timoshenko - Strength of Materials
3) V.L.Shah - Strength of Materials
4) Ramamrutham - Strength of Materials

SURVEYING -I

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Practical: 50 Marks

UNIT-I **(10 Hrs., 20 marks)**

LEVELLING:

a. Instruments used in levelling, Dumpy level, Automatic Level, Types of levelling staves.
b. Principal axes of Dumpy level. Testing and adjustments of Axis of Bubble tube, a line of collimation of dumpy level.
c. Reciprocal levelling , curvature and refraction correction, Distance to the visible horizon .
d. Profile levelling : L - section and cross -sections.

ROUTE SURVEY:

Reconnaissance survey; Locating obligatory points, preliminary Survey, fixing gradients, paper and field location survey, Plotting L -section and cross -section, construction survey.

UNIT-II **(10 Hrs., 20 marks)**

THEODOLITE:

a. Principal axes and permanent adjustments of transit theodolite.
b. Uses of theodolite : measurement of horizontal angles , vertical Angles, magnetic bearings, prolonging a line, lining in, measuring deflection angles, setting out the angles.
c. Theodolite Traversing: Computation of consecutive and independent co-ordinates, Adjustments of closed traverse, Gales Traverse by co-ordinate method, omitted measurements.

UNIT-III **(10 Hrs., 20 marks)**

TACHEOMETRY:

a. Principle of stadia method, fixed hair method with vertical staff to determine horizontal distances and elevations of the points.
b. Use of Tacheometry in surveying, Tacheometric contour survey, use of tacheometric tables.

UNIT-IV **(10 Hrs., 20 marks)**

CURVES:

a. Horizontal and vertical curves and their purposes.
b. Simple circular curves - Elements and setting out by linear & angular methods.
c. Compound curves -Elements and setting out of compound curves.
d. Introduction to reverse curves (No numerical problem to be asked). Elements, Location and uses.
e. Transition curves -Types and uses, Length of transition curves, Elements of cubic parabola, Length of combined curve, setting out the combined curve by deflection angle method.

(No numerical problem to be asked).

UNIT-V **(10 Hrs., 20 marks)**

PLANE TABLE SURVEY:

a. Objective and equipment required for plane table survey.
b. Methods of plane tabling - Radiation, Intersection, Traversing and Resection .
c. Two point & Three point problems and their solutions by different methods, strength of fix.
d. Advantages, disadvantages, limitations and errors of plane Table surveying.

Minor Instruments:

Study and use of Abney Level, Box sextant, Indian pattern clinometer and pantagraph

TERM WORK:

Details of practical Exercises and projects:

1. Measurements of horizontal and vertical angles by transit Theodolite,
2. Measurements of horizontal angles of a triangle by repetition method.

Project-1

3 Theodolite Traverse survey project of a closed traverse with at least four sides.

4 Computation of horizontal distances and elevations by Tracheometry for horizontal and inclined sights.

Project-2

5 Tacheometric contouring project with at least two instrument stations at 60 m apart.

6 Radiation and intersection method in plane Table survey.

Project-3

7 Plane table survey project of a closed traverse of minimum four sides.

8 Solution of three - Point problem in plane tabling.

9 Use of box sextant and Abney level.

10 Study and use of Indian pattern clinometer and pantagraph.

Project-4

11 Road project for minimum length of 500m, including fixing of alignment, profile leveling, and cross sectioning.

Note: The Term Work will consist of:

(i) Field book containing record of all exercises and projects listed above.

(ii) File of full imperial size drawing sheets as mentioned below

1) Theodolite Traverse survey project. 1 sheet
2) Tacheometric contouring project……..1 sheet
3) Plane Table Traverse survey project…..1 sheet
4) Solution of three -point problem…… 1 sheet
5) Road project showing L- section, plan of road and Typical cross -section …….Min -1 sheet

REFERENCES BOOKS

1) Prof. T.P. Kanetkar and prof. S.V.Kulkarni. - Surveying and leveling Vol. I & II
2) Prof. B.C. Punmia - Surveying vol. I & II
3) Late David clark. - Plane and Geodetic Surveying for Engineers, Vol. I
4) Cliver and clendening - Principles of surveying
5) P.B. Shahani - Advance surveying , Vol.I & II

Handbook

S.P.Collins - A handbook of accurate surveying methods .

BUILDING CONSTRUCTION & MATERIALS

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 4 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Oral/Sketches: 25 Marks

UNIT I **(10 Hours, 20 marks)**

a) Types of building, load bearing , framed structure, steel structure, timber structure, composite structure. Various parts of building- sub structure & super structure. Plinth & plinth level, sill & sill level, lintel & lintel level, floor & floor level, roof & roof level, plinth height, plinth protection, cornice, coping etc. function of each.

b) Foundation- purposes & classification (detailed) , advantages & disadvantages of each & circumstances under which each is used. Factors considered for selection of foundation.
Design considerations for spread footing(load bearing structure) Design of wall footing.

c) Bearing capacity of soil, safe B.C. of soil, factor of safety, methods of improvement of B.C. of soil, types of soil & bearing capacity of each type of soil.

UNIT II **(10 Hours, 20 marks)**

a) Masonry:- Principles of masonry construction, types of masonry, types of walls i.e. load bearing, partition and retaining walls, various types of partition walls such as brick partition , timber partition, glass partition etc.

b) Stone masonry:- types of stone masonry & construction method, Dressing and bonding , precast stone masonry, through stone, proportions of mortars used for stone masonry.

c) Brick and Block Masonry:- various types of bonds in brick masonry, reinforced brick masonry, precautions to be taken in masonry constructions, composite masonry , solid & hollow blocks used for masonry , methods of preparation of blocks, cavity wall & cavity wall construction.

d) form and formwork: function of forms, form erection, oiling and stripping of form, requirement of form and form work, form work for various civil engineering structures, materials used for form work.

UNIT III **(10 Hours, 20 marks)**

Super Structure

a) Types of lintels and arches, stability consideration for arches, laying of arch, detailing of R.C.C. lintel and chajja.

b) Doors and windows: types of each and circumstance under which each is used, minimum area of windows openings for different climatic conditions, various materials used for doors and windows, fixtures and fastenings used. I.S. notations for doors & windows.

Special flooring: marble, Granite, kota, ceramic tiles, artificial granite, acid proof floors.

c) Circulation:- Horizontal & vertical , stair and staircase planning & design , types of staircases as per shape and material used. Design of staircase.

Details of ramps, ladders, lifts & escalators used for vertical circulation.

d) Floor and Roof:- ground floor, upper floors, mezzanine floor, design & construction requirements, various types of floor finishes used, advantages & disadvantages & circumstances under which each is used. Damp proof construction of floors, walls & finishes.

Types of roof & roof covering, flat roof & its drainage, water proofing, false ceiling & method of fixing.

Different types of shell structures, barrel arch, cone, hyperbolic, parabolic, folded plate, space frame, & their uses.

UNIT IV **(10 Hours, 20 marks)**

a) Steel trusses, various sections used for steel work method of connections i.e. riveted, bolted & welded, types of trusses & their uses, roofs, covering materials & method of fixing tubular structures.
b) Building finishes, objective & processes, pointing, plastering & painting, white wash & co lour wash, distempering etc, on old & new surfaces, repairs & maintenance.
c) Scaffolding, shoring, under pinning & strutting, types, purposes & precautions.
d) R.C.C. framed structure, column, beam, footing, slab & their connections, general requirement and details.

Industrialization of Building:-

Modular co-ordination: modular planning & recommendation, modular tolerances, prefabrication, advantages of prefabrication, prefabrication systems, principles of design of prefabrication, components of precast construction, Ferro cement & Ferro concrete construction.

UNIT- V **(10 Hours, 20 marks)**

a)Stone :- natural bed of stones, stone quarrying uses of stones, qualities of good building stone ,test on stone, preservation of stone.

b)Bricks:- composition of good brick earth, classification of burnt brick, manufacture of bricks, uses of bricks, qualities of good bricks, tests of bricks.

c)Timber:- properties and uses, testing, conversion and sawing, defects. in timbers,

d)Artificial timber, Veneers, Plywood and Block board.

Aluminum, Glass. Heat insulating materials, Sound absorbent materials.

TERMWORK:- shall consist of sketch book having 1/4 imperial size sheets showing following details.

1) Free hand sketching practice: different type of lines, squares, rectangle, circles, plans of buildings.
2) Lettering 6 mm, 4mm , 2mm with technical terms regarding construction.
3) Different types of lines, method of dimensioning as per I.S. code
4) Symbols & conventional sign of materials.
5) Orthographic, isometric, oblique & axonometric views.
   Sketches after actual measurements (6 to 9) on drawing sheets.
6) C.C.T.W. paneled door: plan, elevation, section.
7) Flush door: plan, elevation, section.
8) Arches in stone & brick.
9) Stone masonry: U.C.R, C.R., Ashlar.
10) Bonds in brick work with isometric view for one bond for one brick.
11) Different types of roofs.
12) Steel trusses, shells, folded plate, space frames etc. orthographic and three dimensional sketches.
13) Types of stairs.
14) Report regarding visits to the construction sites.(minimum two visits)
15) Materials & their rates.

REFERENCES BOOKS:

1. Rangwala - Building construction
2. Sushil kumar - Building construction
3. Bindra and arora - Building construction
4. Punmia - Building construction
5. Rangwala - Engineering Materials
6. Dr.S.V.Deodhar - Civil Engineering Materials

CONCRETE TECHNOLOGY

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks

UNIT-I **(10 Hours 20 marks)**

A) Cement: - Manufacture of cement, chemical composition, setting and hydration of cement. Types of cement, properties and testing of cement.

B) Aggregates – Classification, properties, grading and testing of aggregates, requirements of aggregate for mortar and concrete, impurities in aggregates and its effect on strength of concrete.

C) Water:- Characteristics of water, suitability to be used in concrete, tests on water, mixing of water, Seawater

UNIT-II **(10 Hours 20 marks)**

Concrete:

A) Fresh Concrete:- Definition and its ingredients, grades of concrete, concreting process, significance of water cement ratio. Properties of fresh concrete, form work for good concreting, Tests on fresh concrete.

B) Hardened Concrete:

Various properties of hardened concrete, factors affecting various properties, micro cracking, and stress - strain relation, testing of hardened concrete, creep and shrinkage of concrete.

C) Quality control during concreting.

UNIT-III **(10 Hours 20 marks)**

A) Admixtures, classification and their effects on various properties of concrete.

B) Types of Concrete: -

Light weight concrete, polymer concrete, fiber reinforced concrete, ready mixed concrete, self compacting and high performance concrete, Ferro cement.

C) Special concreting techniques:

Pipe Crete concrete, under water concreting, concreting in extreme weather conditions.

UNIT-IV **(10 Hours 20 marks)**

Concrete mix design

A) Introduction, object of mix design, factors to be considered, statistical quality control. introduction to different methods of mix design.

B) Concrete mix design by I.S. method and IRC method., High strength concrete mix design.

UNIT-V **(10 Hours 20 marks)**

A) Introduction to Non-destructive testing of concrete, rebound hammer, ultrasonic pulse velocity, pull out test, impact echo test.

B) Deterioration of concrete, Permeability, Durability, Chemical attack, Carbonation of concrete , corrosion of reinforcement.

C) Repair – Symptoms and diagnosis of distress, Evaluation of cracks, common types of repair, shotcrete.

D) Introduction to lime & lime concrete.

LIST OF EXPERIMENTS:-

1. Testing of Cement -
   a). Fineness of cement
   b) Setting time
   c) Compressive strength
   d) Soundness
2. Testing of aggregate -
   a) Fineness modulus and sieve analysis,
   b) Crushing value
   c) Impact value

d) moisture content
e) Abrasion test,
f) shape test,
g) specific gravity

3. Testing of concrete –

a) Workability of concrete (Slump cone and compaction factor)
b) Compressive strength (Cubes and cylinders),
c) Split test ie tensile test of cylinders
d) Modulus of rupture (flexural strength)
e) Concrete mix design by I.S. method

TEXT BOOKS:-

Concrete Technology by

1. M.S.Shetty (S Chand Publication)
2. M.L.Gambhir (T M H Publication)
3. S.V.Deodhar (Central Techno Publication)

REFERENCE BOOKS:-

1. A.N. Neville, J.J. Brooks - Concrete Technology - Addition Weslley
2. R.S. Varshney - Concrete Technology - Oxford & I B H.
3. P Kumar Mehta - Concrete - Gujrat Ambuja

ENGINEERING MATHEMATICS – III

Teaching Scheme:
Lectures: 4 Hours/Week
Tutorials: 1 Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks

UNIT-I **(10 Hours, 20 marks)**

Linear Differential Equations:

Linear Differential equation of order n, Solution of LDE with constant coefficient, method of variation of parameters, equations reducible to linear form with constant co-efficients, Cauchy's linear equation, Legendre's linear equation. Applications of linear differential equations to cantilever, loaded beams, whriling of shafts.

UNIT-II **(10 Hours, 20 marks)**

A. Simultaneous linear differential equations of the forms:
   (i) $f_1(D)\,x + \Phi_1(D)\,y = \psi_1(t)$
   $f_2(D)\,x + \Phi_2(D)\,y = \psi_2(t)$, where $D \equiv d/dt$
   (ii) $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ (Symmetrical form)
B. Differential equation of 1st order, and higher degree (Clauriats form)
C. Applications of Partial Differential equations to:
   (i) Vibration of strings or wave equations:
   $\frac{\partial^2 y}{\partial t^2} = a^2 \frac{\partial^2 y}{\partial x^2}$
   (ii) One dimensional heat flow equation
   $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$
   (iii) Laplace equation Two dimensional heat flow equation.
   $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial x^2} = 0$
   by separating variables only.
   Applications of partial Differential equations to problems of civil and allied engineering.

UNIT-III: **(10 Hours, 20 marks)**

Statistics: Mean, Mode, Median standard deviation, Variance, co-efficient of variation, Moments, Skewness and kurtosis, Bivariate distribution, Correlation and Regression, Rediability of Regression estimates.

UNIT-IV **(10 Hours, 20 marks)**

Probability:Theorems on Probability, Binominal Distribution, Poisson distribution , Normal distribution, Beta distribution, Gamma distribution, Chi-Square distribution.

UNIT-V **(10 Hours, 20 marks)**

Theory of Sampling: Sampling, Types of sampling, Sampling distribution, Testing Hypothesis, Null Hypothesis level of Significance, Test of significance, Test of Significance of large sample. Decision quality control.

TEXT BOOKS:

1. H.K. Dass - Advanced Engineering Mathematics 5th Revised Edition 2006 (S. Chand Publication) New Delhi.
2. Erwin Kreyszig - Advanced Engineering Mathematics (Wiley Eastern Ltd.)
3. B.S. Grewal - Higher Engineering Mathematics, Khanna Publication, Delhi

REFERENCE BOOKS:

1. Wylie C.R. & Barrett - Advanced Engineering Mathematics - Mc Graw Hill
2. B.V. Raman - Engineering Mathematics - Tata Mc- Graw – Hill.

3. P.N. Wartikar & J.N. Wartikar - Applied Mathematics (Volume I & II) - (Pune Viduarthi Griha Prakashan, Pune)
4. Thomas L. Harman James - Advance Engineering Mathematics with MATLAB 2e - (Thomson Learing)
5. Dr. Gokhale, Dr. Chaudhari & Dr. Singh - Engineering Mathematics – III

COMPUTER GRAPHICS

Teaching Scheme: **Examination Scheme:**
Practical : 2 Hours/Week Term Work: 25 Marks

Study of any computer drafting software. Using Various Drawing and editing menu commands. Inserting / editing text, arrows & dimensions.

TW shall consist of drawings on A4 size sheets of the following

1) One sheet each showing use of commands viz array, arc, rotate, mirror, offset, etc.
2) A plan of 2 BHK house.
3) Typical Reinforcement details of beam & column

N O R T H M A H A R A S H T R A U N I V E R S I T Y , J A L G A O N .

SYLLABUS OF SECOND YEAR (CIVIL)

TERM-IIND (w.e.f. 2006-07)

THEORY OF STRUCTURE - I

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(3 Hrs)
Tutorials: 1 Hour/Week	Term Work: 25 Marks

UNIT-I

a) Deflection of Beams.: - **(11 Hours, 20 marks)**

Relation between BM, slope and defection , determinate beams by double integration method. Concept of moment area method, Mohr's theorem. Use of moment area method to calculate deflections of beams such as simply supported, over hanging and of uniform cross sections and different cross sections. Conjugate beam method. Application of conjugate beam method to simply supported, overhanging and compound beams. Propped cantilevers.

b) Energy methods for deflection:-

Concept of strain energy, Maxwell's reciprocal theorem of deflection. Castiglino's theorm . Use of strain energy and unit load methods for finding out of deflections for beams & bends.

UNIT-II

a) Deflection of trusses:- **(10 Hours, 20 marks)**

Deflection of statically determinate plane trusses by Castigliano's first theorem

b) Analysis of redundant trusses by Castiglino's second theorem, lack of fit and temperature changes in members, sinking of supports (degree of indeterminacy maximum upto 2 only).

UNIT-III **(10 Hours, 20 marks)**

a) Fixed Beams:- Concept, advantages and disadvantages. Nature of B.M. Diagrams. Fixed end moment due to various types of loads such as point, uniformly distributed, Uniformly varying, couples for beams of uniform c/s and stepped cross sections. Effect of sinking of support. B.M.D & S.F.D.

b) Continuous Beams:- Concept , Nature of B.M. diagrams, Clapyeron's theorem of three moments for beams due to concentrated load, UDL, couples etc. Effect of sinking of supports, plotting of B.M.& S.F. diagrams.

UNIT-IV **(9 Hours, 20 marks)**

b) Three hinged arch:- Concept of three hinged arch as a haunched beam, support reactions. B.M., S.F. and axial thrust diagrams for circular and parabolic three hinged arches. Influence lines for B.M., S.F. and axial thrust. Maximum B.M., S.F. and axial thrust due to point load & UDL.

b) Two hinged arches :-

Horizontal thrust at supports. Shear, normal thrust and BM at a point, BM diagrams for concentrated load and udl, parabolic and semicircular arches.

UNIT-V **(10 Hours, 20 marks)**

a) Influence lines:- Basic concepts , influence line for reactions, B.M.& S.F. for simply supported, overhanging, & compound beams. Influence lines for members of statically determinate plane trusses.

Calculations for S.F & B.M for beam and for force in the truss member using influence lines.

b) Moving loads:- Introduction, conditions for maximum BM and maximum S.F. at a section due to moving point loads, UDL longer or shorter than span and train of moving loads. Absolute maximum B.M. & S.F., Construction of Max. B.M. diagram.

TERM WORK:-

Term work shall consist of ten assignments given on the syllabus given above.

REFERENCE BOOKS:-

1) Junnarkar and shah - Mechanics of structures Vol – II.
2) V.N.Vazirani & M.M.Ratwani - Analysis of structures (Volume - I & II)
3) S. Rammamrutham - Theory of structures
4) C.S.Reddy - Basic structural analysis.
5) C.K.Wang - Indererminate structures

SURVEYING- II

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Practical : 50 Marks

UNIT-I **(10 Hrs., 20 marks)**

Geodetic Surveying:

Objects ; methods in geodetic surveying , Triangulation figures; Strength of figure; Classification of trangulation systems; Selection of stations ; intervisibility and height of stations, towers, signals and their classification ;phase of signals ; measurement of angles; instruments used , methods of observation of angles ; satellite station and Reduction to centre ; Eccentricity of signals ; Base line measurement , Apparatus used, Base net; equipment used for base line measurement , field work and corrections ; Reduction to mean sea level; Exetension of a base.

UNIT-II **(10 Hrs., 20 marks)**

Triangulation Adjustments :kinds of errors; laws of weights, determination of the most probable values of quantities; The method of least squares; Indirect observations on independent quantities; normal equation; conditioned quantities ; The probable error and its determination ; distribution of error to the field measurements , method of correlates, station adjustment and figure adjustment; adjustment of a geodetic triangle , figure adjustment of a triangle ; calculation of spherical triangle ; adjustment of geodetic quadrilateral, Adjustment of a quadrilateral with a central station by method of least squares .

UNIT-III **(10 Hrs., 20 marks)**

Photogrammetry: Objects ; application to various fields, terrestrial photogrammetry (only general idea) and aerial photogrammetry ; Aerial camera; comparison of map and vertical photograph ; Vertical tilted and oblique Photographs ; Concept of principal point nadir point, isocentre, horizon point and principal plane, Scale of vertical photograph; computation of length and height from the photograph; relief displacement on vertical photograph; flight planning; ground control ; radial line method; Binocular vision and stereoscopic fusion , mirror and lens Stereoscopes, parallax equation ; measurement of parallax and determining deference of elevation, Stereometers; general idea of stereoscopic plotting instruments.

UNIT-IV **(10 Hrs., 20 marks)**

Remote Sensing :-

Basic principles, importance, scope, signatures in remote sensing, electromagnetic radiation, Atmospheric effects in radiation, interaction of electromagnetic radiation with matter, electromagnetic spectrum, atmospheric windows, sensors used in remote sensing, classification of sensors, remote sensing platforms, data products, multi concept in acquiring remote sensing data, imageries, interpretation techniques, image processing. Applications of remote sensing to Civil Engineering.

UNIT-V **(10 Hrs., 20 marks)**

Hydrographic Surveying :-

Objects; establishing controls; shore line survey, river surveys; soundings, tide gauges, Equipment for taking soundings; signals. The nautical sextant; measuring horizontal and vertical angles with the nautical sextant, sounding party, ranges making the soundings, methods of locating the soundings ;reduction of soundings , the three point problem and methods of solution.

Tunnel Surveying :- Instruments used; Laying of centre line on ground, Transfer of centre line, underground checks for deviation of tunnel driving from original centre.

Mine Surveying:- Special conditions confronted; Equipment for mine surveys; Correction for side telescope horizontal angles and top telescope vertical angle; The stations and station markers; measurement of distance and difference in elevation .

Use of Electronics in Surveys:- Electromagnetic waves and their properties, phase comparison, modulation, types of EDM Instruments, the geodemeter; the tellurometer; the distomat.

LIST OF EXPERIMENTS:-

1. One Second Theodolite :-
   i)Measurement of horizontal and vertical angles.
   ii)Measurement of horizontal angles by reiteration method.
2. Hydrographic survey (Any two exercises)
   i)Study and use of nautical sextant for measurement of angles.
   ii)Plotting the cross-section of the river by sounding method
   iii)Solution of three point problem.
3. Photogrammetry (Any two exercises):
   i)To find out the scale of the photograph .
   ii)Study and use of mirror stereoscope and finding out the air base distance.
   iii)Radial line method of plotting (photo triangulation).
   iv)Use of parallax bar for measuring parallax of two points and finding out the difference of elevation between them.
4. Adjustment of Geodetic quadrilateral by any one method .
5. Study and use of E.D.M. and its principle .

Note : The practical examination will be based on the above exercises.

TERM WORK

The term work shall consists of the record of the above exercises in a journal.

REFERENCE BOOKS –

1) T.P. Kanitkar, & S.V. Kulkarni - Surveying and leveling (vol-II)
2) B.C.Punmia - Surveying Vol. II and Vol .III.
3) P.Somand , B.N.Ghosh - Advance surveying
4) Norman Thomas - Surveying
5) Wolf - Photogrammetry
6) Clarks - Surveying
7) A.N. Patel, Surendra Singh - Principles of remote sensing

BUILDING DESIGN AND DRAWING

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hours/Week	Theory Paper: 100 Marks(4 Hrs)
Practical: 4Hour/Week	Term Work: 50 Marks
	Oral /Sketches:25 Marks

UNIT-I **(10 Hrs., 20 marks)**

a) Introduction :-Building definition and types of building as per occupancy, principles of planning of building, plan sanctioning, Tracing and ammonia print.

b) Building bylaws :- necessity of bye laws, plot size, width of road, open spaces, floor area ratio, marginal distances, building line and control line, height regulation, room sizes, types of area calculation- built-up area, floor area, carpet area, rules for ventilation, lighting, drainage, sanitation and parking of vehicles.

c) Ventilation and air conditioning of building :-
Ventilation: -necessity of ventilation, functional requirements, systems of ventilation and their choice movement of wind through building, wind effect, stack effect.
Air conditioning:- classification, comfort and comfort conditions, principles and system of comfort, object and necessity of air conditioning.

c) Fire protection :- Fire load, fire safety, grading of occupancy by fire load , considerations in fire protection, fire resistant construction of walls ,columns, roof, floor. wall openings, fire escape elements.

UNIT-II **(10 Hrs., 20 marks)**

a) Thermal insulation of buildings:-
Climate, thermal comfort, heat exchange of buildings, general principles and means of thermal insulation, structural control ,heat insulation of exposed walls, roof openings, use of sun breakers, chajja and insulating glass.

b) Noise and acoustics:-
Noise : effects of noise, types, noise control and noise insulation of structures, air borne and structural borne noise, transmission of noise, acceptable noise level.
Acoustics:- reverberation, Sabine's formula, acoustical defects, conditions of good acoustics, acoustics for various types of building.

c) Lighting: Natural and artificial, design of windows for clear daylight, sky daylight factor, necessity of artificial light, maximum light required at working table.

d) Building services: importance of building services, constructional requirements for different building services-electrical, tale communication and entertainment service, plumbing services –layout of water supply and drainage system, one pipe and two pipe system, storage disposal arrangement, septic tank, garbage disposal arrangements, solar water heater.

UNIT-III **(10 Hrs., 30 marks)**

a) Planning of residential building:-
Load bearing/ frame structure- bungalows, row houses, and apartments.

b) Working drawings :- importance of working drawings, use of working drawings.

UNIT-IV

a) Planning of public building (frame structure)- functional requirement of public buildings, following types of public buildings may be considered for planning :
Primary or secondary school building , hostel building, lodge building, hotel building, primary health center, factory building, bus stand, library building, commercial complex building, bank building ,post office building , marriage hall.
(13 Hrs., 20 marks)

b) Perspective drawings **(5 Hrs., 10 marks)**
One point and two point perspective drawings .

Note: 1) Theory questions shall be asked on Units I ,II.

2) Only drawing questions shall be asked to draw on drawing sheets from unit III and IV .

TERM WORK

A . Drawing file (full imperial sheets)

a) Planning of a small bungalows from given data load bearing or framed structure plan showing furniture arrangement, front elevation ,two sectional elevations, site plan, built up area calculation and schedules.
scale for all views (1:50) except site plan.
for site plan it is (1: 100) or suitable. (sheet no.1)

b) perspective of sheet no- 1 with suitable scale. (sheet no -2)

c) Tracing and ammonia print for (sheet no-1).

d) Drawings:-Plan and elevation using computer drafting software on A4 size sheet for (sheet no-1)

Project work

Project work shall consist of preparation of working drawings after planning and designing buildings mentioned in unit No.III-part (a) and unit No IV-part (a). Every student shall select different type mentioned.

Drawing for project work shall consist of following drawings at Scale 1:50 or suitable.

i) lay-out plan of project building showing different types of buildings, internal roads , compound walls, entrance gate ,garden ,electrical poles, free plantation etc. (project sheet no -1)

ii) Plan/typical floor plan . (Project sheet no- 2.)

iii) Car parking plan. /Terrace plan. (Project sheet no- 3.)

iv) Foundation plan. (Project sheet no-4)

v) Structural plan : (Project sheet no-5)

vi) Front elevation. : (Project sheet no-6)

vii) Sectional elevations.: (Project sheet no-7)

viii) Lay-out plan showing water supply and drainage arrangement.:(Project sheet no -8)

ix) Axonometric view . (project sheet no-9)

x) Drawings:- Layout plan and elevation using computer drafting software on A4 size sheet.

B. File work shall consist of

a) project work.
i) Data given for project work.
ii) Planning of different units of project building.
iii) Approximate cost of project building.(Cost per $m^{2.}$).

b) Report regarding visit to construction sites , preferably visit to the type of buildings given for the project. (Minimum two)

REFERENCE BOOKS:-

1) M.G. Shah, C.M. Kale, S.Y. Patki - Building Drawing.
2) Y.S.Sane - planning & Designing Building
3) Dr S.V.Deodhar - Civil Engineering Drawing .

FLUID MECHANICS - I

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks
Oral---------:25 Marks

UNIT-I **(13 Hrs., 20 marks)**

a) Introduction :- Scope and application of fluid mechanics, Newton's law of viscosity, classification of fluids: Newtonian and non-Newtonian fluids, ideal and real fluids. Physical properties of fluids – density, specific weight, specific volume, specific gravity, dynamic and kinematics viscosity, compressibility, surface tension, capillarity , vapour pressure.

b) Fluid statics – fluid pressure, pressure head, measurement of pressure, manometers, introduction to mechanical gauges. Civil engineering applications of pressure forces on plane and curved surfaces and buoyancy and flotation.

UNIT-II **(11 Hrs., 20 marks)**

a) Kinematics of fluid flow- types of fluid flow – steady and unsteady: uniform and non-uniform: laminar and turbulent: one, two, three dimensional flows: rotational and irrational flows, velocity & acceleration of fluid particles, stream lines and equipotential lines and flow net.
Equation of continuity for one-dimensional and three-dimensional flows. Electrical analogy method of drawing flow net related to civil engineering.

b) Dynamics of fluid flow – Forces acting on fluids in motion. Mention of various equations of motion, Euler's equation of motion, Bernoulli's theorem, simple applications of continuity and Bernoulli's equation such as Pitot tube, Venturimeter. orificemeter. Introduction to linear momentum principle.

UNIT-III **(9 Hrs., 20 marks)**

a) Dimensional analysis and Hydraulic similitude – Dimensions of physical quantities, dimensional homogeneity, Buckingham pi-theorem, important dimensionless parameters and their significance.
Model analysis: geometric, kinematics and dynamic similitude. Model laws: Reynold's and Froude's model laws. Application of dimensional and model analysis to fluid flow problems.

b) Laminar flow – Flow through pipes, flow between parallel plates, Stoke's law, various methods of measurement of viscosity, Darcy's law, Reynold's experiment. Transition from laminar to turbulent flow.

UNIT-IV **(9 Hrs., 20 marks)**

a) Flow through opening – Orifices: types, coefficients of velocity, contraction and discharge, small and large orifices, submerged orifices.
Mouthpieces: types, external cylindrical mouthpiece.

b) Flows over notches and weirs – Rectangular, triangular and trapezoidal notches and weirs, Cipolleti weir, empirical formulae for discharge over rectangular weirs, corrections for velocity of approach and end contractions, broad crested weirs.

UNIT-V **(8 Hrs., 20 marks)**

Open Channel flow – Classification of open channels, geometric elements, steady and unsteady flows, uniform and nonuniform flows, continuity and energy and momentum equations, kinetic energy and momentum correction factors.

Uniform flow: Chezy's and Manning's equations, roughness coefficients, concept of normal depth, calculation of normal depth for triangular & wide rectangular channels. Hydraulically efficient section.

Critical flow: Specific energy, specific energy diagrams, conditions for critical depth in rectangular and triangular channels.

LIST OF EXPERIMENTS:-

Experiments will be based on the critical portion as detailed below.

1. Measurement of viscosity.
2. Study of simple and differential manometers.
3. Buoyancy: metacentric height of ship model.
4. Study of Bernoulli's theorem.
5. Calibration of Venturimeter / Orificementre.
6. Electrical analogy method.
7. Study of laminar flow/ Heleshaw's apparatus.
8. Coefficients of Orifice / Mouthpiece / notches.
9. Study of Impact of jet.
10. Study of uniform flow formulae in open channel (Chezy's & Manning's formulae) / velocity distribution in open channel.
11. Specific energy and specific force.

TERM WORK: Termwork will consist of a journal giving details of experiments performed. Minimum eight experiments should be performed.

ORAL:- Oral shall be based on term work.

REFERECNE BOOKS

1) Dr. A.K.Jain - Fluid Mechanics
2) Dr. P.N.Modi , Dr. S.M. Seth - Hydraulic and Fluid Mechanics
3) R.K.Bansal - Hydraulic and Fluid Mechanics.
4) Dr. K. Subramanya. - Flow in Open channels
5) Dr. K. Subramanya - Theory and applications of Fluid Mechanics.
6) Ramamurthum - Hydraulic , Fluid Mechanics and Fluid Mechanics.
7) Dr.Garde and Mirajgaokar. - Fluid Mechanics
8) Som and Biswas - Fluid Mechanics
9) Streeter and Wylie - Fluid Mechanics

ENGINEERING GEOLOGY

Teaching Scheme:
Lectures: 4 Hours/Week
Practical: 2Hour/Week

Examination Scheme:
Theory Paper: 100 Marks(3 Hrs)
Term Work: 25 Marks

UNIT-I **(10 Hrs., 20 marks)**

Introduction :- Objects, scope, and subdivisions.

Rock and minerals :- Rock forming minerals, primary and secondary minerals.

Igneous Rocks:- Mineral composition, felsic and mafic minerals. Textures, reasons for textural variation, crystalline matter and glass; dependence of degree of crystallization and shape and size of crystals. conditions of cooling. Conditions of cooling of plutonic, hypabyssal and volcanic rocks, classification.

Study of common rock types prescribed in practical work.

Secondary Rocks:- Rock Weathering, decomposition and disintegration, favourable conditions, processes and products of decomposition and disintegration. transport and deposition.

Classification:- Residual, sedimentary, Chemical and organic deposits.

Sedimentary deposits:- Agents of transport. Textural characteristics of aqueous, aeolian and glacial deposits , clastic texture, stratification and lamination, current bedding, consolidation by welding and cementation, grain size classification, study of common rocks prescribed in practical work.

UNIT-II **(10 Hrs., 20 marks)**

Structural Geology :- Outcrop, Dip and strike, conformable series, unconformity and overlap, Different type of faults and folds in rocks, modes of occurrence of igneous rocks, joints.

Physical Geology :- Geological action of running water, river valley development, waterfalls, ox-bow lakes, flood plain deposits, deltas, rejuvenation and resulting features such as canyons, river terraces and incised meanders.

UNIT-III **(10 Hrs., 20 marks)**

Ground Water :- Meteoric, connate and juvenile water, watertable and depth zones, relation between surface relief and water table, perched water table,

Influence of textures and structures of rocks on ground water storage and movement, pervious and impervious rocks, Geological conditions favourable for natural springs and seepages, depression and contact springs, hot springs and geysers. wells and drillholes, fluctuations in water table levels, effects of dams and canals, effect of pumping, cone of depression, circle of influence, conservation of ground water, Artesian wells, geological conditions that produce artesian pressure, water bearing capacity of common rocks.

Earthquakes: geological considerations for choosing sites of buildings in seismic areas.

Indian Geology: General principals of stratigraphy, age of the earth and divisions of geological time, physiographic divisions of India and their characteristics, geological history of peninsula, study of formations in peninsula and the significance of their structural characters in major civil engineering activities, economic minerals and building stones.

UNIT-IV **(10 Hrs., 20 marks)**

Preliminary geological Investigation: use of geological maps, aerial photographs, remotely sensed imageries, verification of surface data by subsurface exploration, drill holes, test pits, trenches, exploratory tunnels, shafts, adits, drifts, etc.

Compilation and interpretation of information obtained from these. correlation of surface data with the results of subsurface exploration. Limitations of drilling, comparative reliability of data obtained by drilling and excavation.

Engineering significance of geological structures such as stratification, dip, folds, faults, joints, crush zones, fault zones, dykes etc.

Land Slides: Causes, use of remotely sensed Imageries for identification of land sides, role of water, stability of slopes in consolidated material, influence of dip and slope, safe and unsafe

slopes, prevention of landslides, keeping slopes free from water, retaining walls, vegetation, slope treatment. Precautions to be taken while aligning roads etc. across hills and making cuts in hillsides.

UNIT-V **(10 Hrs., 20 marks)**

Tunneling:- Influence of geological conditions on design and construction methods. Preliminary geological investigation for tunnels. Important geological considerations while choosing alignment. Difficulties during tunneling as related with lithology, nature and structures of material to be excavated. Role of groundwater, geological conditions likely to be trouble some. Suitability of common rock types for tunneling, unlined tunnels.

Geology of Dam Sites: - Depending of strength, stability and water tightness of foundation rocks on their physical characters and geological structures, Influence of geological conditions on the choice of type and design of dam , precautions to be taken to counteract unsuitable conditions, treatment of leaky rocks, faults dykes, crush zones, joints, unfavorable dips, etc. Earthquake in regions of dam.

Geology of Reservoir sites:- Dependence of water tightness on physical properties and structure of rocks ,geological conditions suitable and suitable for reservoir sites, precautions of amount of siltation in reservoir. Conditions likely to cause leakage through reservoir rim, importance of growing water studies and effects of raising of the water table.

TERM WORK:- It shall be based upon following :-

1) Study of the following minerals in hand specimen:
   Quartz and its varieties, common varieties of cryptocrystalline ,muscovite,biotite zeolites, calcite,iceland sper, gyspem satinsper ,fluorite, barytes,tourmaline, beryl asbestos ,talc ,kyanite, garnet , galena, magnetite, haematite, limonite, iron pyrites, cchromite, bauxite, azurite, malachite.
2) Study of the following rock types in hand specimens: Granites, syenites ,diorites, gabbros rhyolites trachytes, andesites Basalts, varieties of Deccan trap rocks ,volcanic breccias, pegmatites, dolerites, Graphic granites.Laterrites , Bauxites, Conglomrates, Breccias, Sand stones, Quartzites, Grits Arkose, Shales, Mudstone , chemical and organic lime stone .
   Marbles , quartzites , varieties of Goeisses ,slates,phyllites and varieties of schists.
3) Construction of geological sections from contoured geological maps, interpreting geological features without drawing section, solution of engineering geological problems such as alignment of dams, tunnels,roads,canals, etc. based on geological maps.

REFERENCE BOOKS:-

1. R.B. Gupte - A text book of Engineering geology.
2. D.V. Reddy - Engineering geology for civil Engineers.
3. David Tood - Groundwater Hydrology
4. Keller - Environmental Geology.
5. G.B. Deshpande - Geology of Maharashtra (GSI Publication).

S.E. (Civil)
Term Ist
Concrete Technology

LIST OF EXPERIMENTS:-

1. Testing of Cement -
   - a). Fineness of cement
   - b) Setting time
   - c) Compressive strength
   - e) Soundness
2. Testing of aggregate -
   - e) Fineness modulus and sieve analysis,
   - f) Crushing value
   - g) Impact value
   - h) moisture content
   - e) Abrasion test,
   - f) shape test,
   - g) specific gravity
3. Testing of concrete –

a) Workability of concrete (Slump cone and compaction factor)

b) Compressive strength (Cubes and cylinders),

c)Split test ie tensile test of cylinders

d) Modulus of rupture (flexural strength)

e) Concrete mix design by I.S. method

Lab In charge **H.O.D. (Civil)**