

Bhavnagar University
B.E. Semester IV (Civil)
C-401: Structural Analysis -I

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
04	--	02	100	04	25	25	150

1. Indeterminate Structures:
Static and kinematic indeterminacy Principle of superposition, Maxwell's reciprocal theorem, stable/unstable structures.
2. Slope deflection method applicable to continuous beams & plane frames, Moment distribution methods applied to portal frames including sway.
3. Energy Principle:
Castigliano's theorems, computation of displacements of statically determinate trusses, beams and frames by unit load method, two hinged arch, beams curved in plan.
4. Influence lines:
Influence lines for statically determinate beams, Influence lines for support reactions, shear force and bending moment. Rolling loads. Equivalent uniformly distributed loads, BM and SF envelopes, Focal length criteria for maximum effects. Influence lines for forces in the members of determinate trusses. Applications of method of virtual displacements.
5. Matrix Methods:
Basic stiffness and flexibility methods, system approach for analysis of beams and planar trusses.
6. Space Frames:
Simple space frames by method of tension coefficients.
7. Domes:
Spherical and conical domes, ring beams with symmetrical loadings.
8. Suspension bridges:
Unstiffened three hinged parabolic and catenary types, Internal force, length and anchorage.
9. Application of computer for simple problems of structural analysis.

Term work:

This will consist of at least 25 problems based on the syllabus of Structural Analysis – I

List of Experiment:

1. Deflection of suspension bridges...
2. Deflection of curved beams & two hinged arches.

Reference Book:

1. Matrix Analysis of Framed Structures.- by Gere & Weaver.
2. Mechanics of Structures Vol –II –by S.B. Junarkar.
3. Analysis of structures Vol-II- by V.N. Vazirani and M.M.Ratwani.
4. Basic structural analysis- by C.S.Reddy

Bhavnagar University
B.E. Semester IV (Civil)
C-402: Soil Mechanics

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
03	--	02	100	03	25	25	150

1. Introduction:

Definition of soil, Necessity of study of soil mechanics, Physical properties of soils – void ratio, porosity, degree of saturation, moisture content, unit weight, specific gravity, relative density etc., Size and shape of grains, Absorbed and adsorbed water.

2. Classification of Soils:

Bases of different classification systems, I.S. classification system, and plasticity chart.

3. Permeability and Seepage:

Effect of moisture content on soil, form of water in soil, hygroscopic moisture, film moisture and capillary moisture in soil, Darcy's Law and its validity. Factors affecting permeability, laboratory determination of permeability, permeability of stratified soil masses. Seepage pressure, quick condition, Laplace equation, flow net and its characteristics.

4. Consolidation of Soils:

Compressibility of soils, Definition and mechanism of consolidation, Spring analogy. Compression index, coefficient of compressibility, coefficient of volume change. Derivation of Terzaghi's one dimensional consolidation equation. Time factor and consolidation ratio. Calculation of Consolidation settlement for uniform pressure increment in a clay layer. One dimensional consolidation test. Laboratory and theoretical time curves.

5. Shear Strength of Soils:

Mohr's strength theory shear strength of soils, shearing characteristics of sands, Direct shear tests, Cylindrical failures, Critical void ratio, Liquefaction during shear tests, Shear strength of cohesive soils, Triaxial tests, study of stress strain curves, Coulomb's law, Field determination of shearing strength of soils-in situ.

6. Earth Pressure:

Lateral earth pressure, different yield condition, active and passive pressures, Rankine's theory, Coulombs Theory, Coulomb-Rebhann's construction, Pressure distribution on sheeting of trenches, Cohesive back fills, Stability and design of retaining walls.

7. Soil Compaction:

Effectiveness of compaction, optimum moisture content, different methods of compaction, Compaction of cohesive and non-cohesive soils, placement water content, and Field compaction control.

Term Work:

Term work, Practical/Oral shall be based on the course under "Soil Mechanics"

List of Experiments:

1. Field Density of soil, core cutter / sand replacement method.
2. Specific gravity of soil.
3. Mechanical analysis of soil.
4. Hydrometer analysis / pipette method, test of fine grained soils.
5. Waterberg limits (Any Two): Liquid limit, Plastic limit, shrinkage limit.
6. Shear test (Any Two): Box shear test, vane shear test, unconfined compression test.
7. Compaction test.
8. Consolidation test.

At least four problems from each topic subject to minimum of 25 problems.

Text Books:

1. Introduction to Soil Mechanics and Foundations – B.C.Punmia.
2. Soil Mechanics and Foundations Vol-I- V.N.S.Murthy.
3. Soil Mechanics- M.J.Smith.

Reference Books:

1. Basic Soil Mechanics- By R.Whitlaw.
2. Problems in Geotechnical Engineering- By B.C. Chattopadyay.
3. Geotechnical Engineering- By Bpwles.
4. Problems in Engineering Soil- By Capper – Cassie.
5. Introduction to Soil Mechanics- By Branja M.Das.

Bhavnagar University
B.E. Semester IV (Civil)
C-403: Applied Geology

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
03	--	02	100	03	25	25	150

1. Geological Exploration:

Objects, Methods of surface and subsurface explorations; Methods of geophysical exploration; Study of tope sheets and geological maps. Geological mapping. Applications of remote sensing techniques to civil engineering practices.

2. Engineering Sites:

I) Dams and reservoirs:

Introduction, types, geological characters for investigation, suitability of different rocks, geological problems after dam and reservoir construction, typical examples.

II) Tunnels and road cuttings:

Types and geological investigation for tunnels, Roads – geological considerations, stability of hill slopes and cuttings, Bridges geological considerations, nature of foundation rocks.

III). Improvement of sites:

Objects and methods of site improvement for different engineering projects – grouting, backfilling rock bolting, soil stabilization.

3. Engineering Properties of Rocks:

I) Rocks as materials for construction: Properties of rocks required for their selection as building stones and road materials – important building and road stones.

II) Rocks as sites for construction: Laboratory testing of rocks for strength - Uniaxial, tensile, shear, modulus of elasticity, triaxial tests, in – site test for rocks.

4. Geohydrology:

Sources, Hydrological cycle, zonal distribution, water bearing properties of rocks, artesian Qatar. Different rocks as aquifers, groundwater exploration, wells, springs, engineering considerations.

5. Soils:

Constitution, physical and engineering properties, formation, profile, geological classification, erosion and its control, Indian groups.

6. Earthquakes:

Terminology, classification, Causes, effects distribution and prediction of earthquakes, Intensity scale and measuring equipment; Seismogram and Seismograph; seismic zones of India earthquake problems in India, engineering considerations.

7. Mass Movements (Landslides):

Definition, classification, causes and preventives measures; settlement and subsidence; stability of hill slopes.

Term Work:

Term Work, Practical/Oral shall be in the of assignments, tutorials, laboratory experiments, files visits to areas of geological interest and civil engineering project sites, group discussion and reporting based on the above course. Sections of 8 geological maps and structural / geometrical problems.

Text Book:

1. Engineering and general geology – Parbin singh- Katson Publishing House, Ludhiana

Reference Book:

1. A text book of geology –P.K.Mukerjee- The worlds press Pvt. Ltd, Calcutta.
2. Principles of Engineering Geology and geotechnics – D.P.Krynine & W.R.Judd- Mc Graw Hill book Co.Inc.
3. A text Book of geology- K.M.Bangar- Standard Pub. Distributors, Delhi.
4. Experiments in engineering geology- K.V.O.K. Gokhale & D.M.Rao- Mc graw Hill book co. Inc.
5. Bis and other standards & Publication.

Bhavnagar University
B.E. Semester IV (Civil)
C-404: Fluid Mechanics-I

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
03	--	02	100	03	25	25	150

1. Fluid Fundamentals:
Fluids – definition, classification, properties, dimensions and units, Development of fluid mechanic.
2. Measurement of Pressure:

Absolute, atmospheric, gauge and vacuum pressures, Pascal's law, Principles of manometer and mechanical gauging, Types of manometers and gauges, Pyrometers.
3. Hydrostatics:
Fluid pressure at a point, Pressure-density-head relationship, Total pressure, resultant pressure, intensity of pressure and centre of pressure on submerged plane and curved surfaces, Pressure diagrams, Practical applications.
4. Buoyancy:
Buoyancy and floatation, Principle of buoyancy, centre of buoyancy, Met centre and met centric height, stability of submerged and floating bodies.
5. Hydrokinetics:
Fundamentals of fluid flow, Types of flows, Ideal and real fluids, Description off fluid motion.
6. Hydrodynamics:
Forces acting on fluid under motion, Euler's equation of motion, Bernoulli's equation, Equation of continuity,
7. Fluid Flow Measurement:
Fluid Flow parameters and properties, Flow measurement devices venturimeter, orifices, mouthpieces, notches, weirs, Flow under constant and variable heads, pitot tubes and current meters.
8. Flow Through Pipes:
Laminar and turbulent flows, Reynolds's experiments, Darcy Weisbach equation, Laws of fluid friction, Major and minor head losses, Hydraulic gradient and total energy line, pipe combinations in series and parallel, Flow through siphon, Flow through nozzles.
9. Flow Through Channels:
Open channel, Types of flow, Channel roughness, Flow parameters, Equations for uniform flow – chezy's Bazin's Kutter's , Manning's formula, Most economical channel section, Velocity distribution in open channels.

Text Book:

1	A text book of “ Fluid Mechanics and Hydraulic Machines	by DR. R.K. Bansal,	Laxmi Publications, New Delhi.
2	Fluid Mechanics	By Mody and Seth	Standard book house, Delhi

Reference Books			
1	Fluid Mechanics, Hydraulic and Hydraulic Machines	By K.R. Arora,	Standard book house, Delhi
2	Hydraulics, fluid mechanics and fluid machines	By S.Ramamurtham	Dhanpat Rai & sons publishers 1682, Nai Sark, Delhi-6
3	Fluid Mechanics	By Streeter Victor L.,	Mc-Grow Hill International book co. London.
4	Open Channel Hydraulic	By Van Tee Chow	“
5	IS and other standards & Publications.		
6	Flow in open channel	By K.Subramniam	TaTa Mc-Graw Hill publishing Co.Ltd
7	Hyd. In civil Engg.	A.Chadwick	M/S Allen & Unwin New Delhi.
8	F.M. & its application	Gupta & Gupta	M/S Wiely Eastern New Delhi

Bhavnagar University
B.E. Semester IV (Civil)
C-405: Advanced Construction

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
03	--	02	100	03	--	--	100

1. Pile Foundation:

Piles and their functions, Behavior, carrying capacity, Negative skin friction, Piles resisting uplift and inclined loads, Under rimmed piles, Methods of installation, Pile driving and equipment. Types of piles, their design features and choice.

2. Cofferdams:

Definition, functions, behaviors, Types of cofferdams and their suitability, Design features, Economic height, Control of seepage.

3. Caissons:

Definition, functions, behaviors, Types of cofferdams and their suitability, Design features, Economic height, Well curbs and cutting edges, Method of constructions and sinking, Caisson disease, Sinking problems, Tilting of caissons.

4. Tunneling:

Purpose and advantages of tunnels, Tunneling investigations, size, shape and alignment of tunnels, Methods of tunneling in soft ground and hard rock, tunneling problems.

5. Temporary Works:

False work, formwork, centering, scaffolding, tresses, cribs, clusters, Design features of temporary works, centering for domes and arches, slip formwork.

6. Miscellaneous:

Shoring and underpinning, strengthening of foundation, Excavation in deep trenches, Erection of steel structures, Construction in busy and restricted locality.

7. Mechanical and Power Appliances:

Excavating, transporting, conveying, hoisting, lifting, Pumping, drilling, erection, compacting equipments, Earthmoving machinery, Air compressors, Rollers, Vibrators, Drills, pipe line conveyance.

8. Construction Plants:

Aggregate production plant, Concrete batching and mixing plant, bituminous plant, pavers, drilling plant.

Text Book:

1	Building Construction (Vol. I & II)	S.C.Rangawala	Charotar Publication
2	Building Construction	B.C. Punamia	Asaurabh & Co

3	Building Construction	N.L.Arora,B.R. Gupta	Satya Prakashan Pub.Co
Reference Books			
1	Building Construction	By Bunrifoy	--
2	Havy Construction	By Stubb	--
3	Construction (Principles, Materials & Methods)	Institute of Financial Education Crirago.	--
4	Safety Management in Const.	D.Gold Smith	M/S Mc Graw Hill Book co .New Delhi
5	Construction Plants & Equipment.	--	“
6	Building Design & Const .H.B.Mettitt	--	“

Bhavnagar University
B.E. Semester IV (Civil)
C-406: Building Planning and Architect

Teaching Scheme			Examination Scheme				Total Marks
Hours per week			Theory		Pract/ Oral /Marks	T.W. Marks	
Theory Lectures Hours	Tut Hours	Practical	Marks	Hrs.			
03	--	04	100	04	25	25	150

1. Drawing Concepts:

Drawing elements, sizes and principles; Drawing instruments; Drawing conventions, abbreviations and graphical symbols; Composition of drawings; Types of drawing; Line plan, working drawing and detailed drawing; submission drawings of approval and sanction Legal strength of drawings; Reading and interpretation of details from building drawing; General guidelines for preparation of drawings.

2. Building Drawings:

Planning concepts and principles of buildings; Rules for design of building and building components; Concept of modular coordination; Orientation; Site plan; Drawing the plan, elevation and sections of residential, public and industrial building; Detailed drawings of building components; Structural detailing; Detailing of building services; Legends and tabular details on drawings; Approving and controlling authorities; Professional working drawings suitable for fabrication and construction.

3. Perspective Drawings;

Terms, elements, principles and types of perspective; Methods of preparing perspective drawings; one point and two point perspectives; Bird's eye view.

4. Project Drawing :

Types and nature of project drawings-key plan, index plan, site plan, longitudinal section, cross sections, land plan and schedule, foundation plan, earthwork plans, mass-haul diagram, network plans, topographical plans, contour plans, revenue maps, city plans, survey drawings etc., plans and drawings for administrative approval, technical sanction and legal permissions.

5. Principles of Architecture .

Introduction, unity, contrast, proportion, scale, balance, rhythm, characters, purpose.

Term Work:

1. A-1 Size sheet on "Measured Drawing"
2. A-1 Size Sheet on Residential Building.
3. A-1 Size sheet on public Building
4. A-1 Size sheet on "Perspective Drawing" & field visit, reports, sketch book.

Text Book:

Civil Engineering Drawing By:

1. Y.S. Sane
2. Gurucharan Singh.
3. Rangwala
4. Shah Kale
5. Varma

Reference Books:

Civil Engineering Drawing By:

1. Mackey – 4 volume.
2. Bis & other standareds & publications.
3. Civil Engineering Drawing and Design By Y.S. Sane.
4. Civil Engineering Drawing and Design by M.G.Seth/Kale.
5. National building codes.