

Bhavnagar University
B.E. Semester VI (Civil)
C-601: Elements of Structural Design

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	--	04	100	04	25	25	150

1. Loads:

Indian Standard Specification for dead loads and wind loads on buildings. Wind loads on typical roof trusses.

2. Reinforcement:

Different types of reinforcement and their properties.

3. Design methods:

Plastic Design, working stress method, limit state method, characteristic strength, characteristic loads, critical load combination and arrangements, partial safety factors.

4. Reinforced Concrete:

Limit state of collapse for flexure for R.C. members like rectangular beam with tension and or compression reinforcement, simply supported slabs, cantilever slabs, simply supported two way reinforced slabs, one way reinforced continuous slabs, T – beams and L-beams, limit state of collapse for shear and torsion, development length, limit state of serviceability's, limit state of collapse for axial compression; short axially loaded columns and long columns, links and helical reinforcement, simple isolated spread footings,; square and rectangular shapes, simple staircases, deflection of beams

5. Steel Structures:

Tension members, compression members, single and built-up section, choice of sections, connections, Riveted, Bolted and Welded, Splices. Simple roof trusses, Spacing, form, rise and camber, end conditions Simple beams and purlins, rolled section, deflection. Simple connections of beam to beam, beam to column, column to base, connections to transfer direct reaction with or without moment. Stiffened and unstiffened connections. Axially loaded columns, single and built-up sections. Choice of section. Lacing and battening. Foundation: gusseted, grillage and slab base plates.

Term work:

Shall be based on the course under Elements of structural Design and consist of following:

1. Test on simple R.C.C. beams and steel column / strut members.
2. 20 problems based on the topics of the course under “Elements of Structures Design”.

Practical:

Practical shall consist of oral and sketching based on the topics given under term-work

Books:

1. Reinforced concrete Vol-I H.J.Shah
2. Reinforced concrete design. - S.N.Sinha
3. Limit state theory in design of reinforced concrete. -Dr. S.R.Karve & Dr V.L. Shah.
4. Design of Reinforced concrete- S.Ramamurtham

Steel:

- 1 Design of steel structures. - A.S. Arya & J.L.Ajmani
2. Design of steel structures.- Duggal
3. Design of steel structures. - Dr Ramchandra
3. Design of steel structures.- L.S.Negi.
4. Design of steel structures.- Kazmi - Jindal

Bhavnagar University
B.E. Semester VI (Civil)
C-602: Concrete Technology

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. Cement:

Various types, chemical composition, physical properties and test, hydration, admixtures, air entraining agents, pozolonas and their tests.

2. Aggregate:

Classification, grading, physical and chemical test, durability, effect on strength of concrete, light weight aggregate.

3. Concrete Mix:

Basic principles of concrete mix design, various methods of designing a mix of given strength, I.S. Code method of concrete mix design. Durability, workability and its measurement, vibration, curing and placing, various methods, analysis of freshly mixed and hardened concrete, pro – cooling in mass concrete work, heat dissipation. Air entrainment,

4. Properties:

Detailed consideration of various destructive & non destructive tests on concrete cubes, cylinders & beams. Effects of creep and shrinkage. Modulus of elasticity, fatigue strength, quality control. Use of statistics in quality control, acceptance criteria for concrete, fire resistance, abrasion, permeability.

5. Special Techniques:

Under water concreting, Guniting, pressure grouting, repairs by epoxy resins.

6. Special Concretes:

Light weight concrete and various special concretes for structural use. Method of design properties & use.

Term Work:

Term work shall consist of test on cements & aggregates, preparing concrete mixes of various strengths, test on cubes, cylinders & flexural test on beams and obtaining stress strain relationship the assessment of term – work shall include a practical / oral test also.

Text books:

1. Concrete Technology - M.L.Gambhir.
2. Concrete Technology Vol –I, II, - D.F.Orchard.’
3. Concrete Technology- M.S.Shetty.
4. Properties of concrete - A.M.Neville.
5. Properties of concrete - A.M.Neville & Brooks
6. Design of concrete mixes- N.Krishnaraju

Bhavnagar University
B.E. Semester VI (Civil)
C-603: Railway and Bridges

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

(A) Railway Engineering:

1. Introduction:

Transportation models; History and LK development of railways; types of railways.

2. Permanent way:

Railway track; Track gauges; Tractive resistance; Track stresses.

3. Permanent way Materials;

Functions, types and requirements of rails, sleepers, ballast, formation, fixtures and fastenings; Rail joints, welding of rails, creep wear of rails, sleeper density; Ballast section; subgradetreatment and improvement.

4. Permanent way Geometrics:

Cross – section elements; Alignment; Gradients; Grade compensation; Horizontal curves, super elevation, equilibrium cant, cant deficiency, speed on curves, widening of gauge; Transition curves; Vertical curves; standard dimensions.

5. Point and crossing:

Diversion problems; simple turnout, its component parts typical track junctions and combinations.

6. Stations and yards:

Site selection, types and layout of stations and yards; various equipment used in stations and yards; Isolation of running line.

7. Signaling and interlocking: (Elementary treatment only)

Objects, principles and systems of signals and signaling; Necessity, junction, principles and methods of inter locking; purpose and methods of train working; centralized traffic control.

8. Track construction and Maintenance:

Plate laying methods and operation; Relaying of track; Material and labor requirements; Necessity and essentials of track maintenance; Railway accidents; Modernization aspects of Track and traction.

Term Work:

Shall be in form of Tutorials, Assignments, Field visits based on the above course

Text Book:

Railway Engineering By:

1. S.P. Arora & S.C. Saxena
2. B.L.Gupta
3. Rangwala
4. IRB Standard Publications.

(B)Bridge Engineering:

1. Introduction:

History and development of bridges and bridge engineering; classification and components of bridges; Requirements and identification of bridges.

2. Bridge site:

Ideal bridge site and least objectionable bridge site; consideration in site selection; Bridge alignments; site investigation and collection of data.

3. Bridge Hydrology:

Determination of high flood discharge and design discharge; waterway calculation; criteria for fixing length and span; concepts of economic span, scour depth, depth of foundation, afflux, clearance, free board; Bridge geometrics.

4. Bridge Loading standards;

Types of loading standards; Types of loads and stresses; standards of loading for road, railway and pedestrian bridges; Traffic needs in design of bridges.

5. Low cost Bridges:

Meaning, types and suitability of low cost bridges; Minor, temporary, emergency, movable bridges.

6. Bridge superstructure:

Types and choice of permanent major bridges and culverts; Bridge floorings – types and merits; Bridge details – bearings. Joints, railings, furniture, articulation.

7. Bridge substructure:

Types, components and general design considerations of piers, abutments and wing walls, Bridge foundations; Bridge approaches; Training works.

8. Bridge construction and Maintenance:

Outline of methods of construction/ erection of different types of bridges; Inspection, testing, assessment and strengthening of bridges; Maintenance aspects of bridges; Bridge architecture.

Term Work:

Term Work Shall be in form of Tutorials, Assignments, Field visits based on the above course

Text Book:

Sir No	Title	Authors	Publishers
1	Text book of Railway Engg.	B.L. Gupta	Standard Pub. New Delhi
2	Railway Bridge & Tunnel	V.N. Varirani, S.P. Chandola	Khannal Pub, Delhi
3	A Text book of Railway Engg.	P.K. Bhattacharjee, A.K.Basu	Orent bugman, Bombay
4	Principles of railway Engg.	Rangwala S.C.	Chorotar Pub Ananad
5	Rail Road Engineering	William W Hay	John Willey & Sons Newyork.
6	Bridge Engineering	S.P.Bindra(Hampat Rai & Sons)	--
7	Esentials of Bridge Engg.	D.Johnson Victor	Oxford IBH Pub. Co.
8	Bridge Engg.	Ponnuswamy	Tata Mic-Raw Hill Pub

Bhavnagar University
B.E. Semester VI (Civil)
C-604: Environmental Engineering -II

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	03	25	25	150

A. Sanitary Engineering:

1. Introduction:

Scope and necessity of waste water treatment and disposal.

2. Quality and Quantity of waste water:

Domestic wastewater characteristics. Biological methods of analysis, parameter affecting BOD: BOD equations; Method of estimating BOD, Limitations or BOD test, COD, Industrial was tweeter characteristic, production of was tweeter per unit of production. Basic characteristics of Industrial Effluent standards W/W.

3. Sewerage System:

Wastewater collection, sewerage and its appurtenances, Design of sewerage, lying testing & commissioning of sewerage system.

4. Primary, secondary testing:

Primary, secondary testing and advance treatments, sludge digester, incinerator and such other ancillary units design, operation and maintenance of disposal and reuse, sludge blogs and other treatment units & system.

5. W/W management:

Urban and rural W/W disposal schemes, Investigation, Planning, execution and management, distribution problems and remedial measures, Low cost sanitation.

(B) Water supply Engineering:

6. Introduction:

Necessity, scope of water supply and community health and sanitation, safe water and personal hygiene.

7. Quality and Quantity of Water:

Water and its requirements; sources of water and its corresponding qualities. Quantities, for domestic industrial and agricultural and other specific use, BIS, WHO.CMR.and other standards, demand of water.

8. Water Treatment Trends:

Introduction, primary, tertiary, advanced treatments, design, operation and maintenance of treatment units and system. Theory of settling, coagulation, flocculation; flow through porous media, softening, disinfection; decantation disinfection, sludge dewatering and disposal.

9. Water Conveyance and Distribution:

Water transport and distribution system for urban and rural supply. Design of systems from ESR to consumer point and system appurtenances, laying, testing and commissioning of water supply system.

10. Water Supply Management Urban and Rural W/S Scheme:

Investigation, planning, execution and management – limitation, problems and remedial measures.

Text Book			
No	Title	Author/s	Publisher
1	Water supply and sanitary Engineering	S.K.Hussain	Oxford and IBH Pub.co.New Delhi
2	Municipal sanitary Engineering	Victor M Ehlers & Ernest W.Steel	Tata Megraw Hill
3	Principles of water treatment	T.H.V.Tebbntt	--
4	Water supply and sewerage	Steel and Mcghee	--
5	Standard Hand Book of Environment Engineering	Corbitt	--
6	Water supply and sanitary Engineering	Birdy	--
7	Water supply and sanitary Engineering	Hussein	--
List of IS Standard			
1	1. IS-10500 Drinking water standards. 2. IS-1622-1964 Samples for bacteriological Examination(MPN) 3. IS 5187-1969 Environmental sanitation Part – I to X BIS, WHO, IRMR and other standards..		

Bhavnagar University
B.E. Semester VI (Civil)
C-605: Highway and Traffic Engineering

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	03	25	25	150

(A) Highway Engineering:

1. Highway Development and planning:

Road transport and its Perspective; Developments in road construction Highway development in India; Elements of highway planning classification of roads, Road highway development Organizations India; Elements of highway economics and Finance.

2. Highway Location and surveys:

Highway alignment and controlling factors; Engineering surveys & route location; Highway project and its features.

3. Highway Geometric and Design:

Geometric design controls and criteria Cross-section elements, camber, sight distance requirements; Horizontal alignment and curvature; Vertical alignment, gradients and vertical curves; IRC recommendations.

4. Highway Pavements and Design:

Types of Pavement and pavement structures; Factors in Pavement Types of Pavement and p design; outline of various flexible pavement design methods; design of rigid pavements design of joints in cement concrete pavement.

5. Highway Materials, and Testing:

Basic highway materials, their functions and desirable characteristics; Road aggregates and their testing; bituminous materials and their testing; Filler and scalar; Principles and Methods of bituminous mix design.

6. Highway construction:

Types of Roads – Earth & gravel, soil stabilized water bound maradm, Bituminous, cement connected roads, construction techniques; Explanatory description, materials, requirement, need of tools, plant and equipment, construction procedure, quality control.

7. Highway Maintenance:

Pavement failures in flexible and rigid pavements; Maintenance measures and operation; Evaluation and strengthening of existing pavements.

8. Miscellaneous:

Highway drainage – significance, surface and subsurface drainage methods, erosion control; Hill roads; alignment principles, Obligatory points, geometric standards, special design and construction features, drainage and maintenance; Road side aesthetics and amenities, road side furniture and equipment, road side arboriculture; Advertisement control system approach to highway & pavement design.

(B) Traffic Engineering:

1. Traffic Characteristics:

Traffic components; Road user, vehicular, road surface, characteristics; Traffic composition; equivalent traffic.

2. Traffic surveys:

Physical inventory; Traffic volume, speed, speed and delay surveys; origin and destination survey; pedestrian survey.

3. Traffic flow characteristics:

Traffic flow Permanente's and their relationships; Fundamental Traffic flow diagram; Traffic flow models; Traffic capacity; Passenger car units; Fluctuations in traffic flow; Traffic flow surveys.

4. Parking of Traffic:

Parking surveys; parking supply and demand; parking patterns; methods of parking; parking controls and restrictions.

5. Traffic safety:

Traffic accidents – statistics and studies, causes; accident investigations and analysis; accident diagrams and records; Measures to reduce accidents.

6. Traffic Management:

Problems of traffic circulation and safety; Traffic regulation; traffic control devices; various regulation and control measures – speed restrictions, turning movement restrictions, One-way streets, closing side streets, tidal flow operations, channelization, segregation; area traffic control; land term v/s short term solutions.

7. Intersection and junctions:

Types of road junctions and traffic conflicts; at-grade intersection; design of rotary intersection; design of traffic signals; Grad- separated intersections; Interchanges.

8. Highway Lighting:

Terminology; Basic concepts and consideration; types of discernment; factors in highway lighting; design layout and practice of highway lighting systems.

Term Work:

Term work shall be in form of tutorials, assignments, and laboratory experiments, Mine project, based on the above course.

Text Book			
No	Title	Author/s	Publisher
1	Highway Engineering	C.E.G. Justo & S.K.Kanna	Standard Bublication
2	Traffic Engineering and transport planning	L.R. Kadiyali	