Dr. Babasaheb Ambedkar Marathwada University, Aurangabad

Syllabus Structure for TE (Civil) Part I / II

Subject Code	Subject	Teaching Scheme Hrs / Week			Exam Scheme .				Total
		Theory Lecture	Pract.	Total	Theory		Term Work	Pr/ Oral	
300 I (C)	Theory of Structure II	04	--	04	100		--	- -	100
3002 (C)	Design of structure I. (Steel)	04	--	04	100		50	50	200
3003 (C)	Engg Geology & Rock Mechanics	04	02	06	100		25	25	150
3004 (C)	Build. Planning & Design	04	04	08	100		50	50	200
3005 (C)	Transportation Engg - I	04	02	06	100		00	--	100
	Total	20	10	30	500		125	125	750
P ART II									
3007 (C)	Environmental Engg -I	04	- -.	04	100		---	---	100
3008 (C)	Design of structure II (RCC)	04	---	04	100	---	---	---	100
3009 (C)	Geotechnical Engg.	04	02	06	100		25	25	150
3010(C)	WRE -I	04	---	04	100		--	.-	100
3011 (C)	Professional Practice	04	04	08	100		50	25	175
30012(C)	SDD - II (Practical) .	- -	04	04	---	---	50	25	75
	Case Study	00	02	02	00		25	25	50
	Total	20	12	32	500		150	100	750

Total of Part - I 750

Total of Part - II 750

Grand Total I & II = 1500

3001 [C]:THEORY OF STRUCTURES - II

Theory Lect. = 04 Hrs / Week

Theory = 100
Duration = 3 Hrs

1 Analysis or redundant pin jointed trusses with degree or redundance up to two, Second theorem of castigliano, Lack of fit, Trussed Beam. 5 Hrs.

2 Analysis of indeterminate structures by Moment distribution method. application to continuous beams and partial frames, Non-sway and sway frames. 5 Hrs.

3 Analysis of indeterminate structures by slop def1ection method, application to continuous beam and portal frames. 5 Hrs.

4 Analysis of continuous beams and portal frames by Kani's method. The rotation contribution, rotation factor, displacement contribution, displacement factor, storey shear. 5 Hrs.

5 Analysis of two hinged arches, influence line of B.M. and S.F. Rib shortening, temperature effect on two hinged arches. 6 Hrs.

6 Plastic theory, collapse load, load factor, plastic hinge, plastic moment of resistance, shape factor, continuous beams, portal frames. 5 Hrs.

7 Elastic center analysis of fixed symmetrical arches. 4 Hrs.

8 Experimental stress analysis, Introduction to photo-elasticity material, plane and circular polariscopes. strain gauges types. electrical resistance strain gauges. 5 Hrs.

REFERENCE BOOK :

1. Theory Of Structures - S. Ramamrutham & R. Narayan
2. Theory Of Structures - Timoshenko & Goodier
3. Basic Structural Analysis - C.S Reddy
4. Advanced Theory Of Structures - Dr. N.C Sinha &Dr. P.K Gayen
5. Mechanics Of Structures - Vazirani & Ratwani
6. Experimental Stress Analysis - Dally & Riley
7. Structural Analysis -L.S Negi & R.S. Jangid

3002 [C]: DESIGN OF STRUCTURE – I (STEEL)

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 4 Hrs / week	T/W = 50
Duration =3Hrs	PR/Oral = 50

1. Varieties of steel used in general construction work and their properties , working stresses various Indian Standard Section. 4 Hrs.

2. Loading on structures : Dead Load , Live load , wind load , Seismic load, Erection load etc., loading on high way and railway bridges, Recommendations of Indian standards, Indian road congress standards , Indian Railway standards. 4 Hrs.

3. Design of riveted and welded joints, structural connection , framed connection , Design of joints subjected to tension and bending. 4 Hrs

4. Roof trusses : Types of trusses, loading of trusses and end bearing, Design of tabular structures and connections. 5 Hrs

5. Design of simple and compound beams and end connections. 5 Hrs

6. Design of plate girder , gantry girder. 8 Hrs

7. Design of axially and eccentrically loaded simple columns and compound columns. 4 Hrs

8. Column bases : Design of slab base and gusseted base and moment bases. 6 Hrs

(Use Indian standard No. 800 and 808 shall be allowed in the examination)

REFERENCES :

Indian standard Institute Publications.

IS : 875 – Loading standard
IS : 808 – Properties of section
IS : 800 – Code of practice for use of steel
IS : 226 – Structural steel
IS : 816 – Welding
IS : 808 – Use of steel tube
Handbook for structural Engineers ,Vol. I , II , III
National Building code.
Indian Road Congress specifications for Highway bridges
Indian Railway standards for Railway bridges .

REFERENCES BOOKS :

1. Design of Steel Structures : A.S. Arey and J.L.Ajmani
2. Design of Steel Structures : B.S. Krishnamachar
3. Design of Steel Structures : Vazrani & Ratwani
4. Design of Steel Structures : Dayaratnam

Term Work :

The term work shall consist of a detailed design report and set of drawing(drawn on at least two imperial size sheets) of at least two steel structures given below.

Part A : Design of a factory shed consisting of

1. Roof truss
2. Columns and column base

Part B: 1. Gantry girder

2. Plate girder

Part C: Computer design of any two of the following using software-

1. Tension & Compression member
2. Design of column & connection
3. Design of slab base & gusseted base

Practical Examination:

The practical Examination shall be based on record submitted by the candidate and viva voce based on syllabus.

3003 : ENGINEERING GEOLOGY & ROCK MECHANICS

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 2 Hrs / week	T/W = 25
	PR/Oral = 25
	Duration = 3 Hrs

Geological Consideration : Introduction of Geology , Importance of lithology , Necessity of Geology, Scope of Geology in civil Engineering.

Physical Geology: Geological action of running water, river , valley development , normal cycle of regional erosion, water fall, river capture, meanders and Ox-Bow lakes escarpment and related features, transportation and depositions by river flood plane deposits deltas, rejuvenation and related features such as canyons, incised, meander and river terrace. Earth movement , earthquake , the crust, and interior of earth volcanism types of mountains.

Mineralogy : Composition on earth crust, rocks and minerals, silicates and non silicates minerals, rock forming minerals, physical properties of minerals, Moh's Scale of hardness.

Petrology : Igneous rock , its sub division- volcanic hypabyssal and plutonic rocks. Hatch scheme of classification study of common rock types, bathylights and intrusive igneous types such as sill, laccolath, lopolith, phacylith, dyke, vein and apophses.

Secondary rocks, rock weathering, decomposition and disintegration of rocks. Classification of secondary rocks, residual, sedimentary, organic and chemical deposits influence of nature of transportation agent and glacial deposits. Clastic texture, stratification and lamination, consolidation by welding and cementation. Characteristics of shallow water deposits. Study of common rock types lost.

Metamorphic rocks : Metamorphism, agents and kinds of metamorphism , metamorphic minerals and structures stress and anti stress minerals, contact and thermal cataclistic, dynomothermal, cataclistes, dynamothermal and plutonic metamorphism, study of common rock types.

Structural Geology : Structural elements of rocks-dip and strikes. Unconformity and overlap, Folds and faults in rocks, their types and effect on outcrops, inliers and outliers.

Stratigraphy and Indian Geology: General principles of stratigraphy, age of earth and division of geological time. Physiographic division of India and their characteristics. Geological history of peninsula, study of formation in peninsula and significance for their structural characters in Engineering.

Engineering Geology : Preliminary geological investigation, use of geological maps and section, bore holes, drill holes, limitation of drilling.

Engineering significance of geological structures such as stratification dips, faults, joints crush Zones, fault zones, dykes etc. Core recovery R, Q,D.

Influence of geological condition on the choice of type and design of Dams. Favourable and undesirable conditions for locating dam and precautions to be taken to counteract unsuitable condition , treatment of leacky rocks and also engineering significance of fault zones, crush zones, dyke , joint, unfavourable dips etc.

Tunneling: Importance geological consideration while chossing alignment difficulties during tunneling as related with lithology nature and structure of material to be excavated geological condition likely to be troublesome.

Ground Water : Meteoric, connate and juvenile water, water table and depth zones of saturation, relation between surface relief and water table. Various types of springs. Pearched water table. Fluctuations in water table levels, effect of dams and canals, effects of pumping cone of depression, Artesian wells, geological conditions, that produce artesian pressures:

Water Harvesting: Importance, artificial recharge and natural recharge of wells and tube wells.

Geology Of Dam Sites: Influence of geological condition on the choice of type and design of dams. Preliminary geological work at dam sites, favorable and unsuitable condition for location and dam. Precautions to be taken to counteract unsuitable conditions for location a dam. Treatment of leaky rock, fault zones, crush zone, dykes, joints. unfavorable dips etc.

Geology Of Reservoir Sites: Dependence of water tightness of physical properties and structures of rock. Geological condition suitable and unsuitable for reservoirsite. Condition likely to cause leakage through the reservoir rim. Importance of ground water studies and effects of raising of the ground water table.

Land Slides: Causes , influence of dip and slope , safe and unsafe slope, terminal creep. prevention of land slides, precaution to be taken while making cut in hill sides.
Building Stone: Requirements of good building stone. Suitability of common rocks as building stone.

Engineering Geology Of Deccan Trap: Engineering significance of variations in size, number and in filling of gas cavities, joining. Hydrothermal alteration and weathering. Factory-affecting strength and water tightness of ballasts Characteristics leading to erosion of tail channels of dams, Suitability of basalts for tunneling, factory that create difficulties in tunneling. Suitability of different types of basalts as construction materials, problems of dykes redboles, volcanic brecias and river alluvium. Precautions to be taken during subsurface exploration in basalts.

Term Work Examination:
The assessment of the term work shall be done on the following criterias :
Continuous assessment
Performing the experiments in the laboratory.

Oral examination conducted internally on the syllabus and term work mentioned.
The term work shall be consists of laboratory work based on the syllabus prescribed below:
Identification of following minerals and rocks megascopioally,.

Minerals and ores: Quartz and its varieties , common varieties of amorphous silica, orthoclase, plagioclase, zeolite, biotite, and hornblendes, asbestos, actinolite, chlorite, olivine, sepantine ,tourmaline, kaoline, corundum, kyanite, magnetite, limonite chromite, pyrolusite, bauxite, calcite, mulch, azurite, gypsum, barytes , iron pyrites, galena, flouroar, rock graphite, native copper.

Rocks : Granite , syentes, diorites, gabbro, rhylites, trachyte, phyllites and endesite, basalt, obsidian, pumice, pegmatite, graphic granite, dolerite, volcanic braccis. Mudstone, shale, sandstone, grits, arkoss, quartzite, conglomerate, breccias, organic and chemical lime stone, laterites, schist, gneisses, augen, marble and hematite, quartzite.

Map and problems:

Geological map reading the construction of section , simple contoured geological maps, completion of out crops , logging of drill core.

Practical Examination

The practical examination shall consist of an oral test based on the above term work.

REFERENCE BOOKS –

1. Geology of Engineers : Joseph M. Trefethen
2. Geology and Engineering : Robert F. Legget
3. Engineering Geology and Geotechnics : Krynine and Judd
4. Principles of physical Geology : Arthus Holmes
5. Geology in Engineering : John R. Schuitz and Arthus B. Cleves
6. Engineering Geology : F.G.H Blyth
7. Engineering Geology : Rish and Waston
8. Elements of Engineering Geology: Richey
9. P.W.D Hand Book Chapter No. 6: (1980) on Engg. Geology
10. Geology of India : Wadia D.N
11. Principles of Engineering Geology: R.B Gupte

3004 : BUILDING PLANNING & DESIGN

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 4Hrs / week	T/W = 50
	PR/Oral = 25
	Duration = 3Hrs

1. Classical and contemporary Indian Architecture – Terms used in Architecture, Important classical order , contemporary Indian Architecture.

2. Architectural Composition : Principles of Architectural composition, Unity proportion, mass composition , scale, Functional treatment. Modern architecture climate and design considerations. Recommendations of central building research Institute , Roorkee. Principles of building planning.

3. Functional Design: of buildings based on the various requirements for residential and public buildings such as educational , Industrial, Offices, Hospitals, Libraries , Hotels, Markets, Power Houses, Air terminals etc.

4. Design Aspects for orientation for natural ventilation and lighting , acoustical needs , sun breakers, fireproofing etc.

5. Considerations in Planning : Site development , water supply sanitary plumbing and air conditioning for public buildings, parking requirements , vertical and horizontal access.

6. Perspective Drawing : General principles of perspective drawing . One point perspective and two point perspective mainly for buildings.

7. Standards for planning : Standards for planning for Apartment buildings, Hospital buildings , shopping building & Office building.

8. Landscaping : Necessity, Landscaping of residential and institutional building . Interior Decoration : Necessity , Different materials used , Different colour and colour schemes used, Internal space used, lighting.

9. Interior Decoration: Necessary, Different Materials used,Different color and color schemes usd internal space used, Lighting.

Practical Examination :
The Practical Oral Examination shall consist of Sketching submitted by the candidate and viva- voce based on the syllabus.

The Term works will consists of;

1. Two sheets of working drawing for the one public building, layout component building, plumbing etc.
2. One sheets of perspective of a buildings.
3. Introduction to AUTOCAD incorporating 2-D commands. Preparing Line Sketches (2 Nos.) for 4 to 5 Rooms Plan.
4. One print out of Interior Decoration of above mention ed residential building and landscaping of institutional building using related software

Software Requirement: Latest version of AutoCAD, Build Master, Interior Designer, 3D-Max studio

REFERENCE BOOKS:

1. Planning and Designing of buildings : Y.S. Sane.
2. Principles of perspective drawing : M.G.Shah & C.M.Kale
3. Architectural Design : Earnest picketing
4. Architecture (Buddhist and Hindu Periods) : Percy Brown / D.B.Taraporwala Sons. And Co. Ltd.
5. An Introduction to Indian Architecture : Dr. Charles Febri Asia Plublishing
6. The art and Architecture of India (Buddhist and Hindu and Jain) : Benjamin Rowland Published by Penguin Books.
7. Time Sever Standards : Rowland.

3005 TRANSPORTATION ENGINEERING- I

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
	Duration = 3Hrs

1. History of Bridges and development, classification , alignment finalization, investigation, selection of bridge site, flood discharge , water way , calculations afflux, scour, river training works , types of foundation- shallow , piles, cofferdams, cassions.
2. Approaches of Bridges, types of construction, slab culvert, box pipe, cause ways, and submersible bridges , IRC loading, piers, abutments, wing wall and its stability.
3. Layout, Signaling and Interlocking and their principles, objects, construction of tracks and its maintenance, modern trainds in railway.
4. Permanent way, gauges, sleepers, ballast, function of rails, failures of rails, Rail joints, rail fixtures and fastenings, types of gradient, grade compensation, types of curves.
5. Points and crossings, junctions, stations and yards, requirements of railway.
6. Elements of Docks and Harbours Engineering, classification, requirements, selection of site. Qury and Bulkhead.
7. Classification and geological considerations of tunnels, types, tunnel survey setting and modern techniques, tunnel lining and its safety.
8. Introduction to Airport, Layout, Site selections, Runway, Terminals

REFERENCE BOOKS

1. Railway Track : K.F.Antia
2. Principles of Railway Engineering : S.C.Rangawala
3. Railway Engineering : Saxena
4. Bridge Engineering : S.P.Bindra
5. Elements of Bridge Engineering : J.S.Alagia
6. Elements of bridge Engineering : D. Johnos Victer

3007(C): ENVIRONMENTAL ENGINEERING-I

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100 Duration = 3Hrs

Section I

Ecology:
Basic concept of ecology, ecological systems (lake, forest, cropland), biochemical cycle, energy flow, food chain, food web, ecological indices and ecological succession.

Air pollution:
Definition, statements of problem, Source of air pollution, type and classification of air pollutants, primary and secondary air pollutants.
General physicochemical properties of atmosphere, various layer of atmosphere and their importance, atmospheric stability, mixing heights, turbulence, flume types, and diffusion. Atmospheric diffusion theories, plume rise evaluation of diffusion coefficient, design of stack height, Gaussian dispersion model, estimation of ground level concentration. Effects of air pollution on health, man, animal, vegetation materials etc. photochemical smog, green house effect, ozone depletion, acid rain. Control of air pollution, various methods and instruments used for control for SPM vehicular emission control.

Noise pollution:
Physical properties of sound waves, anatomy of sound, theory of noise measurement and units, weighing networks, sound pressure, loudness, sound intensity, cumulative decibel, control of noise.

Smoke and its control:
Sources of smoke, measurement of smoke, smoke and public health, smoke preventation and control.

Odour pollution:
Theory of odour, sources of odour, measurement of odour, odour control method

Section II

Water supply
Introduction to water supply schemes

Quantity: Population forecasting, Rate of water consumption for various purposes, factor affecting, fire demand.

Quality: Characteristics, standards and significance.

Treatment : principles of water treatment processes. Introduction of different water treatment sheets. Aeration, screening,Theory of chemical coagulation and flocculation, design of mechanical flocculation, mean velocity gradient "G" and power consumption, common coagulants, coagulants aids.

Principle of sedimentation, efficiency of ideal settling basin, reduction inefficiency by current and other factors, short circuiting, settling velocity, types of sedimentation tanks, inlet and outlet arrangements. Design of clarriflocculator.

Filtration:
Theory of filtration, Mechanism of filtration, design of filters, filter material, type of filters and their classification, rapid gravity and slow sand filter, components, materials, under drainage system, operational troubles, design of filters.Theory of disinfections, factor affecting disinfections, type of disinfectants, type and method of chlorination, break point chlorination, bleaching powder estimation. Design of various components part of water supply scheme including treatment Plant.

Softening of water: methods, lime soda and ion exchange method

Demineralization: Reverse osmosis, Eletrodialysis

Distribution systems classification, capacity of distribution or service reservoirs, Plumbing in high rise buildings.

REFERENCE BOOKS:

1. Stern, Air pollution volume I -IV, Mc Graw Hill
2. Rao H. V.N. & M.N., Air pollution, T.M.H.Publication
3. Duggal K.N., Elements of Environmental Engineering, S.Chand & Company
4. Peavey & Rawe, Environmental Engineering, Mc Graw Hill
5. Water supply and treatment manual - Govt. of India publication
6. Garg S.K., Water Supply Engineering, khanna Publishers, New Delhi

DESIGN OF STRUCTURE- II (R.C.C)

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
	Duration = 3Hrs

1. Introduction to limit state design: Types and classification of limit states . characteristic strength and characteristics load , factor of safety for characteristic strength and loads. Redistribution of moments and its I.S. Code provisions

2. R.C. beam designs: Singly , Doubly reinforced sections, properties of sections according to I.S. code , Design parameters maximum values , analysis and design for flexure.

3. Flanged Sections : i) Effective width of flange
    1. ii) Design of flanged section by I.S. code method .
4. Limit state collapse (Shear) : Shear behavior up to failures, types of failure , factors affecting shear failure , strength of R.C. beams in shear , design of shear reinforcement as per I.S. recommendations.

5. Limit state collapse- Bond : Bond ,types of bond , factors affecting bond resistance , check for development length .

6. Limit state : a)Serviceability : Significance of deflection , types of deflection , types of deflections and I.S. requirements.
   b) Limit state of cracking: Cracking , causes mechanism & effects , classification and types of cracks, bar detailing rules.

7. Limit state of collapse: Axial compression and bending : Analysis of axially loaded short columns and design. Analysis under uniaxial bending and axial compression. Stress block parameters, Interaction diagrams. Analysis and design of sections. (I.S. 456 SP-16 Column design charts of sections)

8. Column footings : Isolated square footing, rectangular footing

9. Design of staircases: Dog-legged staircase, Open well staircase

10. Design of slabs : One way, two way , simply supported , cantilever and continuous.

11. Introduction to earthquake Engg

12. Design of water tank: Introduction to working stress method and design of rectangular water tank resting on ground.

Note : Design and detailing of above structures by limit state theory. References :
I.S. 875 for loading standards & I.S. 456 for R.C.C. design.

References :- I.S. 875 for loading standards & IS. 456 for R.C.C. design.

IS 1893 for earthquake Engg. Analysis.

REFERENCE BOOKS

1. Limit State Theory & Design : Shah & Karvey
2. Limit State Design :A.K.Jain
3.. Limit State Design : Sinha
4. Limit State Design :Vazrani
5. Masonary and Timber structures Including earthquake resistant Design by : Anand S. Arya
6. Earthquake resistant structure and designof building : Code of practice

Earthquake Tips : www.nicee.org, www.bmtpc.org

Refer IS – 4326 – 1993

3009 [C] GEOTECHNICAL ENGINEERING

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 2 Hrs / week	T/W = 25
	PR/Oral = 25
	Duration = 3Hrs

Introduction

Origin of soil, scope of "Geotechnical Engineering", types of weathering, soil formation, major soil deposits of India, components of soils, soil minerals, water in clay.

Properties of Soil :

Mechanical composition of soil, volume and weight relationship, specific gravity, density, density, relative density, void ratio, porosity, degree of saturation , functional relationship , moisture content, grain size analysis, mechanical and sedimentation analysis, consistency limits soil texture and structure, elementary ideal about swelling, sensitivity and thixotrophy.

Classification of soil :

Particle size classification, Highway research board classification, ISI classification, unified classification .

Soil moisture and permiability

soil moisture, effect of moisture content on soil structural water, absorbed water, capillary water , effective and neutral pressure, critical hydraulic gradient, seepage of water through soil , permeability, Darcy's law, Discharge velocity and seepage velocity, factors affecting the permeability. Laboratory methods of permeability concept of flow net and its characteristics, Graphical methods of flow net construction and its application to isotropic soil only.

Stress Distribution in soil:

Boussinesq's equation for point load , vertical pressure under loaded circular area and uniformly loaded rectangular area. Newmark's method for uniformly distributed loads preparation and use of Newmark's chart.

Compaction :

Proctor density and optimum moisture content, factor affecting compaction, field methods of compaction control and mechanical stabilization of soils.

Consolidation :

Measurement of compressibility, relation pressure and void ratio laboratory, consolidation test. Terzaghi's one dimensional consolidation , percentage

consolidation and square root of time fitting , method and logarithm of time fitting method, coefficient of consolidation.

Shear Strength:

Concept of shear strength , principles stresses, Mohr's envelops for cohesive , non cohesive and non cohesive and composite soils, General principles of drained, consolidated un-drained and drain tests. Direct unconfined tri-axial and vane shear tests. Determination of shear strength by direct, unconfined, tri-axial and vane shear tests. Comparison of these methods.

Earth Pressure:

Earth pressure at rest active and passive condition elementary idea about Rankine's and Coulomb's earth pressure.

Stability of Slope:

Factors contributing to slope failures. Classification of slope failures, Infinite and finite slope. The Swedish Method and its application to dry cohesive soils and composite soils, friction circle method, Taylor's stability number and stability curve.

ORAL BASED ON PRACTICAL CONDUCTED AND TOT AI.. SYLLABUS

The oral/practical examination shall consist of viva-voice based on the practical work done during the course, the record of experiments submitted by the candidate and the syllabus of the subject. The assessment will be based on perfom1ing an experiment and record of experiments submitted by the candidate. Viva-voice/oral will be based on the syllabus.

The term work shall consist of a record of laboratory experiments a mentioned below.

1. Determination of specific gravity
2. Field density test
3. Determination of particle size distribution of soil by :Sieve analysis or Wet analysis
4. Determination of Atterberg's limit
5. Permeability test variable and constant head method.
6. Standard proctor compaction test.
7. Direct shear test
8. Unconfined compression test
9. Tri-axial compression test
10. Consolidation test

11. Static cone penetration test
12. Standard penetration test

Note: Minimum 10 experiments should be carried Out, Out of 8, 9, 10, 11 and 12 three demonstration experiments will be permitted.

REFERENCE BOOKS

1. Alam Singh" Soil Engineering in Theory and Practice, Geotechnical Testing and Instrumentation" Asia Publishing House (p) Ltd. New Delhi.
2. Punimia B.C. "Soil Mechanics and Foundation Engineering" Laxmi Publications Pvt. Ltd., New Delhi. .
3. P. Purushottam Raj "Geotechnical Engineering" Tata McGraw Hill Publishing Company Limited, New Delhi. . I
4. Kasmalkar B.J. "Geotechnical Engineering", Pune Vidyarthi Griha Prakashan, Sadashiv Peth, Pune-30.

3010 [C] WATER RESOURCES ENGINEERING - I

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 2 Hrs / week	Test = 20
	T/W = 25
	PR/Oral = 25
	Duration = 3Hrs

Hydrology : Definitions , Hydrological cycle, Hydrologic budget, Hydrologic data, Hydrologic terms and their units.

Precipitation : Forms of precipitation , weather systems for precipitation , characteristics of precipitation in India, Measurements of precipitation, Rain gauge network preparation of precipitation data, presentation of rainfall data, mean precipitation , Depth – area Distribution curves , Frequency of rainfall.

Infiltration : Infiltration process, Factors affecting infiltration, measurement , Indices.

Evaporation and Evapo-transpiration : Evaporation process , evaporimeter , evaporation estimation, evaporation reduction, measurement of evapo-transpiration penman's equation.

Runoff : Different routs of runoff, rainfall runoff correction, Strange's Tables , Watershed simulation, factor affecting runoff, flow distribution curve , Flow mass curve, and uses. Hydrographs, Factors affecting flood hydrograph, components of flood hydrograph , base flow separation, effective rainfall, Unit hydrograph, Application of unit hydrograph, Use and limitations of unit hydrograph, Derivation of unit hydrograph, unit hydrograph from complex storm, S curve.

Flood studies : Design flood and methods of its estimation, Empirical formulae, Frequency analysis , Dumbel's and Log Pearson Type III distribution , Muskingum methods.

Watershed Management : Conservation of land and water , Necessity of watershed development, small structures and steps involved in watershed management, Ridge line treatment, Upper treatment, drainage line treatment , Erosion and sediment yield , factors affecting sediment yield, erosion control.

Ground Water Hydrology : Occurrence and distribution of ground water , aquifer parameters, movement of ground water, specific yield of well steady flow wells in confined and unconfined aquifers, effect of partial penetration , interference of wells and boundary, Recharge of ground water.

Water application to crops and Water-logging : Functions of water , consumptive and non consumptive use of water , factors affecting crop water requirement, irrigation water standards, wilting point , Delta, Duty , factors affecting crop duty , important crop in India , their seasons crop rotation , depth and frequency of irrigation . Various methods of applying water to crops and their comparison , causes and effects of water logging , it's remedial measures, drainage of irrigated areas, consumptive use of water.

Stream Flow and River Training Works : Site selection for stream gauging , measurements of stage and discharge , flow mass curve and flow duration , river training for flood control, various methods.

G.I.S. application to water resource engineering, Introduction to geographical introduction system and advantages , application

REFERENCE BOOKS :

1. Engineering Hydrology : K. Subramanya , Tata McGraw Hill Publication, New Delhi. Elementary Hydrology : Vijay P. Singh
2. Hydrology and Water Resources Engineering : S.K. Garg
3. Irrigation Water Resources & Water Power Engg.: Dr. P. N.Modi
4. P.W.D. Hand Book - Chapter 1, 9

3011 [C] PROFESSIONAL PRACTICE

Teaching Scheme	Examination Scheme
Lectures : 4 Hrs / week	Theory = 100
Practical : 4 Hrs / week	Test = 20
	T/W = 50
	PR/Oral = 25
	Duration = 3Hrs

Introduction of I.S. 1200: for modes of measurements, Taking out quantities : Methods of taking out quantities P.W.D. method , English method , Estimates for buildings, slab , culverts, septic tanks , wells, roads, railway track and canals, plumbing works R.C.C. slabs and framed structures abstracting.

Analysis of rates : Analysis of rates for various items of constructions. Introduction of District schedule rates.

Approximate Estimate : Methods of preparing approximate estimates for buildings, roads, bridge, water supply scheme. Sewage scheme. Irrigation scheme.

Specifications : Detailed Specification (Reference to be made to P.W.D. Hand books and I.S. 1200) for typical items of Civil Engineering works , Brief specifications, principles of writing specifications.

Contracts : Various agencies involved in construction industry, essentials of valid contract. Contract documents conditions of contracts, Role of Engineering in Government works on contract . Role of architect and Civil Engineering in Semi Government and private organizations. Performance of contract Breach of contract. Termination of contract.

Types of Contracts : Items rate , percentage rate, lump sum , cost plus percentage, cost plus fixed fee, target, piece work rate list and labour contract, Negotiated contracts, Contract for supply of materials and transport of materials.
Tender : Definition , Tender notice, Earnest money, Security Deposit, preparation and submission of tenders security and acceptance of tenders.

Government Procedure for Execution of works : Classification of works administrative approval , technical sanction, bills management book, nominal Muster Roll, Accounts of works and stores , tools and plants , materials of site account , daily diary.

Valuation : Definition , Nature of values, factors affecting value of land and buildings, salvage value, scrap value , book value , market value , prospective value , sinking fund Depreciation , methods of working out sinking fund and depreciation , methods of

valuation for buildings.

Properties : Definition , Mortgage , Amortization , Arbitration ,sale of real and immovable properties , Registration of sale deed , formation co-operative housing societies and related procedure for execution and construction , Department Act.

The term work shall consist of a record of laboratory experiments a mentioned below.

1. Estimate of a two stories building.
2. Estimates a culvert or road of railway of canal.
3. Estimate of simple R.C.C. framed structure / Industrial steel structures.
4. Analysis of rate for ten items of construction
5. Specifications for six items of construction.
6. Valuation report for a building.
7. Preparation of a tender notice

Practical Examination :
The practical examination shall consists of an oral based on term work and syllabus

REFERENCE BOOKS :

1. Civil Engineering Contracts & Estimates: B. S. Patil
2. Estimating and Costing in Civil Engg. : B.N. Datta
3. Elements of Estimating & Costing : S.C. Rangwalas
4. estimating costing and Specification : M. Chakraborti

CASE STUDY

Marks: TW: 25
ORAL: 25

The case study schedule for part – II of T.E. civil class

Candidates to identify the field/ topic, submit the objectives of case study, collection of literature in the selected topic , prepared questionnaire for selected topic.

Visit to reputed institute/ R &D centers in the vicinity of the institute or dwelling of the candidates during the vacation (i.e. after part-I examination)

The candidate shall be anchorage to select live case studies ,like

A) Construction

Building construction at adhering byelaws
Old building in the city / town – a structure stability , renovation requirements
Existing roads / pavement status and routine maintenance
Existing monuments –study and remedial measures
Public buildings

B) Study regarding Environmental
Existing water supply system of city / town/ rural area
Metering of water supply system
Existing sanitary system
Strom water management of the city
Quality analysis of surface water
Quality analysis of ground water
RWH- Domestic Buildings / public building / industrial building

C) Municipal corporation
Study of byelaws
Town planning / city planning
Solid waste management

Case Study report shall consist of problem definition, result, discussions, conclusion drawn

Reference shall be of

1. Minimum five national journals
2. Minimum two international journals
3. Student should refer similar case studies with reference to India
4. Visit to local bodies / Government organization / public and private sector interaction with heads of the organizations and also study the previous reports etc.