

Solapur University, Solapur
Structure of B.E. (Civil Engineering) Part I & II
w.e.f. Academic Year 2010-11.
B.E. (Civil Engineering) Part -I

Sr. No.	Subject	Teaching/Week					Examination scheme				
		L	Pr.	Tu.	Dr.	Total	Theory Paper	TW	POE	OE	Total
1.	Design of Concrete Structures-I	3	-	1	-	4	100	-	-	-	100
2.	Quantity Surveying and Valuation	3	4	-	-	7	100	50	25	-	175
3.	Earthquake Engg.	3	2	-	-	5	100	25	-	-	125
4.	Water Resources Engg.II	3	2	-	-	5	100	25	-	25	150
5.	Elective I	3	2	-	-	5	100	25	-	25	150
6.	Seminar	-	2	-	-	2	-	50	-	-	50
7.	a) Project work	-	2	-	-	2	-	25	-	-	25
	b) Assessment of report on field training-II	-	-	-	-	-	-	25	-	-	25
Total		15	14	01	-	30	500	225	25	50	800

B.E. (Civil Engineering) Part -II

Sr. No.	Subject	Teaching/Week					Examination scheme				
		L	Pr.	Tu.	Dr.	Total	Theory Paper	TW	POE	OE	Total
1.	Design of Concrete Structures-II	4	2	-	-	6	100	25	-	-	125
2.	Construction Practices and Town Planning	4	-	-	-	4	100	-	-	-	100
3.	Elective II	3	2	-	-	5	100	25	-	25	150
4.	Elective III	3	2	-	-	5	100	25	-	-	125
5.	R.C.C. Structural Design and Drawing	-	-	-	4	4	-	50	-	50	100
6.	Project work	-	6	-	-	6	-	100	-	100	200
Total		14	12	-	04	30	400	225	-	175	800

B.E. (Civil Engineering) -List of Electives

To be implemented from 2010-11

B.E.Civil – Part-I	B.E.Civil – Part-II	
5 Elective I	3 Elective II	4 Elective III
5.1. Open Channel & River Hydraulics	3.1. Advanced Engg. Geology	4.1. Advanced Design of Concrete Structures
5.2. Air Pollution & control	3.2. Ground Improvement Techniques	4.2. Industrial Waste Treatment
5.3. Design of Foundations	3.3. Traffic Engg. & Control	4.3. Water Power Engg.
5.4. Advanced Design of Steel Structures	3.4. Infrastructural Engineering	4.4. Entrepreneurship
5.5. Managerial Techniques	3.5. Project Appraisal	4.5. Reliability Engg.
5.6. Computer Applications in Civil Engg	3.6. Solid and Hazardous & Waste Management	4.6. Finite Element Method
5.7. Advanced structures	3.7. Dynamics of Structures	4.7. Experimental Stress Analysis
5.8. Advanced Concrete Technology	3.8. Environmental Management	4.8. Optimization Techniques.
5.9. Remote Sensing and GIS Applications	3.9. Design of Bridges	4.9. Disaster Management

B.E. CIVIL –PART I

1. Design of Concrete Structures –I

Teaching Scheme:

Lecture: 3 Hrs. / Week

Tutorials: 1 Hr. / Week

Examination Scheme:

Theory Paper: 100 Marks

Course objectives:

These courses should result in,

- Study of various design philosophies for RCC structures.
- Design of various RCC structural elements using IS codes.

SECTION I

Unit 1: Introduction:

Philosophies of Design, and their relative advantages and disadvantages. Types and classification of limit states, characteristics strength and characteristics load, load factor, Partial safety factors. Limit State of Serviceability – Significance of deflection, I.S. Recommendations. (05)

Unit 2: Limit state of Collapse (Flexure):

Analysis and Design of singly and doubly reinforced rectangular sections. (05)

Unit 3: Analysis and Design of Flanged Sections:

Analysis and Design of Singly Reinforced T & L Beams for flexure. (05)

Unit 4: Limit states of Collapse (Shear and Bond):

Shear failure, types of shear reinforcement, Design of shear reinforcement. Bond – Types of bond, factors affecting bond, resistance, check for development length. (05)

SECTION II

Unit 5 Uni-axial bending of columns

Analysis and Design of axially and eccentrically (uni-axial) loaded Circular and Rectangular Columns. Interaction diagrams, Circular columns with helical reinforcement. (07)

Unit 6: Footings

Design of Isolated rectangular column footing, Combined rectangular footing. (06)

Unit 7: Limit State of Collapse (Torsion) -

Behavior of R.C. rectangular sections subjected to torsion, Design of sections subjected to combined bending and torsion, combined shear and torsion, Design of beams for torsion. (07)

- Note: -**
1. Problems based on above syllabus shall be covered in tutorials.
 2. Only IS: 456-2000 shall be allowed in University Exam.
 3. Unless otherwise mentioned separately, all the design should be by Limit State method.

Reference Books:

1. IS: 456-2000
2. Limit State Theory & design –Karve & Shah Structures Pub., Pune
3. Reinforced Concrete Design (Limit State) - A.K. Jain
4. Fundamentals of Reinforced Concrete- Sinha & Roy
5. Limit State Design of Reinforced Concrete - P.C. Varghese, Prentice Hall of India, New Delhi.
6. Reinforced Cement Concrete - B.C. Punmia
7. Handbook of Reinforced Concrete SP- 16

B. E. (CIVIL) PART – I

2 QUANTITY SURVEYING & VALUATION

Teaching Scheme:

Lecture: 3 Hrs / Week
Practical: 4 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 50 Marks
POE: 25 Marks
Paper duration: 4 hr.

Objective: To learn the ethics of civil engineering profession and implement them.

SECTION – I

Unit 1:**(06)**

- a) General introduction to Quantity surveying – purpose of estimates. Types of estimates, various items to be included in estimates. Principles in selecting units of measurement for items, various units and modes of measurement for different trades, administrative approval and technical sanction to estimates. I.S. 1200, Introduction to D.S.R.
- b) Specifications – purpose and basic principles of general and detailed specifications; detailed specifications for various items of work.

Unit 2:**(08)**

- a) Prime cost, provisional sums and provisional quantities, taking out quantity – P.W.D.method. Measurement and abstract sheets and recording. Centre line method.
- b) Analysis of rates, factors affecting the cost of materials, labour. Task work, schedule as basis of labour costs. Plants and equipment -hour costs based on total costs and outputs. Transports, octroi. Overhead charges, rates for various items of construction of civil engineering works. Standard schedule of rate, price escalation.

Unit 3:**(07)**

- a) Detailed estimate of buildings, R.C.C works, culverts, earthwork for canals. Roads including hill roads and other civil engineering works. Preparing bar bending schedule.
- b) Approximate estimates- purpose, various methods used for buildings and other civil engineering works such as bridge, water supply, drainage, road- railway projects, school buildings, industrial sheds.
- c) Different methods of executing works. Essentials of legally valid contract.Contract between Engineer and Employers, Contract between Employer and Contractor, Appointment and authority of Engineer for executing civil construction works.
- d) Organizational set up of P.W.D. and general idea about its working and delegation of powers. Classification of works, method of carrying out work in P.W.D. Mode of payment, Bill forms.

SECTION – II

Unit 4:

(06)

- a) Competitive bidding- Local competitive bidding, global bidding, item rate contract, percentage rate contract and Lumpsum contract. Preparing tender papers- Invitation of tenders, tender notice, tender documents, (various terms and conditions to contracts). submission. Scrutiny and acceptance. Two envelope method. Award of jobs. Rights and responsibilities of parties to contracts.
- b) Negotiated contracts. Cost plus percentage. Cost plus fixed fees. Cost plus sliding scale of fees. Target cost as based on sharing risk and profits. Turnkey contracts. More than two party contracts.
- c) Introduction to BOT., BOOT, BOLT.etc.

Unit 5:

(05)

- a) Principles of valuation, definition of value, price and cost. Attributes of value, Different types of values- Book value, salvage value, scrap value, replacement value, reproduction value, earning value, Market value, Potential value, Distress value, Speculation value, Sentimental value. Accommodation value. Essential characteristics of market value.
- b) Valuer and his duties, purpose of valuation and its function. Factors affecting the valuation of properties-tangible and intangible properties, Landed properties- free hold and leasehold properties, different types of lease.

Unit 6:

(04)

- a) Rental method of valuation. Form of rent, different types of rent, standard rent.
- b) Value of land, belting method of valuation, Valuation based on land and building- item wise, carpet area basis, unit basis, cubic content basis.
- c) Development method of valuation for building estate.
- d) Valuation on profit basis for lodges, cinema theatres, hotels, motels etc. valuation for compulsory acquisition of land, structure by the Government. Valuation for rating purpose. Methods for assessing ratable value of property. Rental method, Comparison method, fundamental principles of rating valuation e.g. Communibus Annis, Ritussic, stantibus etc.

Unit 7:

(05)

- a) Valuation from yield and from life, gross yield and net yield, outgoing, capitalized value, Year's purchases-Single rate and dual rate, reversion value of land, annuity-perpetual, whole life, deferred. Sinking fund.
- b) Depreciation and different methods of calculating depreciation (straight line method, declining balance method, sinking fund method, quantity survey method). Depreciated cost, Obsolescence.
- c) Introduction to Arbitration.

TERM WORK

- 1) Reading the Drawings (Plan and section) Minimum 3- drawings need to be given for (reading only) such as
 - a) Watchman cabin
 - b) Compound wall.
 - c) Septic tank / water tank.
 - d) Building drainage system.
 - e) Kitchen platform.
 - f) Cement godown.
 - g) Staircase block.
 - h) A small culvert

- 2) Detailed specification for minimum five civil engineering items. (One each from Roads, Irrigation works, Water Supply & Sanitation & three from buildings)

- 3) Detailed estimate for a two storied building
 - i) Selecting the items from drawing.
 - ii) Preparing abstract as per DSR or standard building items (without qty)
 - iii) Take of quantities related to buildings (all items need to be taken)
 - iv) Preparing the bill of quantity(BOQ).

Note: Estimates shall include compound wall with gate, sanitary schedule and electrification schedule.
- 4) Rate Analysis: (civil engineering items.)
One each from (Road, Irrigation work, Water supply and sanitation) and five from buildings.

- 5) Schedule of reinforcement any two of the following
 - a) Column and column footing.
 - b) Beam and Slab
 - c) Staircase.

- 6) Valuation reports for any two of the following:
 - a) A building for residential purpose or commercial purpose.
 - b) A hotel.
 - c) A theater
 - d) Any one construction machine.

The report shall include valuation certificate also.

Ref. Books

- i) Quantity Surveying – P. L. Bhasin
- ii) Elements of Estimating and Costing – S. C. Rangwala
- ii) Civil Engineering Contracts and Estimates – B. S. Patil
- iii) Professional Practice(Estimating and Valuation) – Roshan Nanavati (1984 Edition)
- iv) Estimating and Costing – Dutta
- v) Estimating and Costing – Birdi
- vi) Standard specifications Volumes I & II (P. W. D. Maharashtra)
- vii) Estimating, Costing and Specification in civil engineering – Chakroborty M.
- viii) Valuation of real Properties – S. C. Rangwala
- ix) C.P.W.D.specifications
- x) C.P.W.D. schedule of rates.

B.E. CIVIL – PART I

3. EARTHQUAKE ENGINEERING

Teaching Scheme:

Lectures: 3 Hrs / Week

Practicals: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25Marks

- Course objectives:**
1. Student should understand behavior of structure during earthquake
 2. Devise a method to make the structure integrated and ductile
 3. Able to apply the above on field.

SECTION – I

Unit: 1 Elements of Seismology –

General effects of an earthquake, terminology, structure of earth, causes of an earthquake, plate tectonic theory, seismic waves, magnitude and intensity, methods of measurement, energy released, seismograph, strong motion earthquakes, accelerogram, soil liquefaction, prominent earthquakes of India.

(05)

Unit: 2 Free vibrations of single degree-of-freedom systems –

Dynamic loads and dynamic analysis, degrees of freedom, Undamped free vibrations, multiple elastic forces, viscously damped vibrations, equations of motion and solution, logarithmic decrement.

(08)

Unit: 3 Forced vibrations of single degree-of-freedom systems –

Forced vibrations (harmonic loading) of single degree of freedom systems. Undamped and viscously damped vibrations, equations of motion and solution, Force transmitted to foundation, transmissibility, response to harmonic support excitations.

(08)

Unit: 4 Response spectrum theory:

Response to general dynamic loading, Duhamel's integral, rectangular and triangular loading, Earthquake response spectrum, tripartite spectrum, construction of design response spectrum, effect of foundation and structural damping on design spectrum.

(05)

SECTION – II

Unit: 5 Principles of earthquake resistant design –

Planning aspects, symmetry, simplicity, regularity. Resistance of structural elements and structures for dynamic load, design criteria, strength and deflection.

(03)

Unit: 6 Evaluations of Seismic Forces –

Philosophy of earthquake resistant design, Provisions of IS 1893, Soft storey, Design spectrum of IS 1893, evaluation of lateral loads due to earthquake on multistorey buildings. (03)

Unit: 7 Ductile detailing of RCC members-

Concept of ductility, different ways of measuring ductility, factors affecting ductility, energy absorption, provisions of IS 13920. (04)

Unit: 8 Earthquake resistant construction -

Failure mechanism of different types of masonry construction, Construction aspects of Masonry and Timber structures, Retrofitting and strengthening techniques of low cost and low rise buildings. Provisions of I.S. 4326 and IS 13935. (04)

Term Work:-

The term work shall consist of at least one assignment on each unit.

Reference Books:

1. Dynamics of Structures –A.K. Chopra
2. Structural Dynamics - Mario Paz CBS Publication
3. Earthquake Resistant Structures –D.J. Dowrick John Wiley Publication
4. Dynamics of Structures – R. M. Clough and Penzian ,McGraw Hill co.New Delhi
5. Mechanical Vibrations – G. R. Grover Roorkee University, Roorkee
6. Analysis and Design of Foundations for Vibrations – P. J. Moove. Oxford and I. B. H. Publication, Delhi
7. Foundation Design Manual – N. V. Nayak, Dhanpatrai and sons, Delhi
8. Manual of Earthquake Resistant Non engineering Construction, University of Roorkee
9. Elements of Earthquake Engineering – Jai Krishna, South Asian Pub.New Delhi
10. Earthquake Resistant, Design of Masonry and Timber Structures – A.S. Arya
11. Elements Seismology – Rochter
12. Earthquake Resistant Design of R. C. C. Structures – S. K. Ghosh
13. IS 1893-2002 –Part I, IS 13920, IS: 4326 and IS 13935.
14. Earthquake Tips published by NICEE, IIT Roorkee.
15. Government of Maharashtra Earthquake resistant Design of house guiding lines and assessment of damages.

B.E. Civil – Part I

4.WATER RESOURCES ENGINEERING – II

Teaching Scheme:

Lecture : 3 Hrs / Week

Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25 Marks

Oral Exam: 25 Marks

Course Objectives:

After studying this subject the students will be able to plan and design the reservoirs depending upon the water resources potential. They will be able to analyze and design the Gravity dams and Earth dams (Simple Designs). They shall understand the design principles of Arch dams. They will be able to analyze the weirs, barrages, canals and canal structures. They will be made conversant with water power engineering and river training.

SECTION – I

Unit 1: (05)

- a) Planning of Reservoirs: Storage calculations, Control levels, silting of reservoirs, reservoir sedimentation surveys, reservoir losses,
- b) Dams – Necessity, types of dams, selection of site for dams, selection of type of dam, Introduction to dam instrumentation

Unit 2: (06)

- a) Gravity Dams - Forces acting on dam, design criteria, theoretical and practical profile, high and low dam, stability calculations, materials and methods of Construction, Galleries, joints.
- b) Arch Dams – Types, Layout of Constant angle and Constant radius arch dam, Forces acting on arch dams. (03)

Unit 3: (05)

Earth Dams: Components and their functions, Design Criteria; seepage through and below earth dam, Application of Slip circle method, Inverted Filters, Downstream Drainage, relief wells, Construction of earth dam.

Unit 4: (04)

- a) Spillways: Necessity and different types , factors affecting choice and type of spillway, elementary hydraulic design, jump height and tail water rating curve, energy dissipation below spillway, gates for spillway
- b) Outlets in Dams: types and energy dissipation in outlets transition

SECTION – II

Unit 5: (04)

- a) Weirs on Permeable Foundations: Theories of seepage, Bligh's creep theory, Khosla's theory - exit gradient, Piping and undercutting, Concept of flow net etc. Kolhapur type weirs- working principles, suitability and construction.

Unit 6: (06)

- a) Canals: Types, Alignment, Design – Kennedy's and Lacey's Silt theories, Canal losses, Typical canal sections, canal lining – Necessity and types, Economics of canal lining.
- b) Canal Structures (Introduction): Cross drainage works and canal regulatory works – Aqueduct, Culvert, Super passage, Level Crossing, Cross and Head regulator, Canal Siphon, Canal Escape, canal fall, canal outlet

Unit 7: (03)

- a) River and River Training Works: Types of rivers, Meandering phenomenon, Types of river training works, river navigation.
- b) Water Logging and Drainage: Causes, effects, preventive and curative measures, alkaline soils, soil efflorescence, drainage arrangements.

Unit 8: (04)

Elements of Hydropower Engineering: Power crisis and competing uses of water, need of harnessing solar energy. Types of water power plants, small hydropower plants, layout and components of each type, Intakes, Conveyance system, Surge tanks, Power house types, components and layout, tail race. Comparison of competing uses of water

TERMWORK

A) Minimum seven assignments from the following:

- 1) Determination of height of dam: Reservoir capacity calculations based on demand and supply, fixing control levels of dam.
- 2) Design of gravity dam: Elementary and practical profile with stability calculations
- 3) Earth dam

- a) Design- Determination of section – slip circle calculations.
- b) Filters and Drainage arrangements.
- 4) Spillway: Geometrical section, Design of spillway; Energy dissipation arrangements and gates.
- 5) Arch dam layout of constant angle and constant radius
- 6) Drawing sheet: Outlets through earth dam. Masonry dam, layout.
- 7) Drawing sheet: Typical plan and section of Kolhapur type barrage.
- 8) A typical layout of Hydropower plant and its functioning. Calculating reservoir capacity for hydropower plant
- 9) Design of any one Canal Structure / Cross Drainage Works

B) Report based on Field visits to Irrigation and Water Power Engineering Projects

ORAL EXAMINATION

Oral Examination will be based on above mentioned TERM WORK

Text Books:

1. Irrigation Engineering – S. K. Garg , Khanna Pub. Delhi
2. Irrigation and Water Power Engineering - Priyani , Charoter pub. House, Anand
3. Irrigation and Water Power Engineering – Punmia, B. C.
4. Irrigation – Bharat Singh ,NEW CHAND & bros. Roorkee
5. Irrigation Engineering Vol. I – Varshhey and Gupta
6. Engineering Hydrology - K. Subramanya
7. Design of Canals – Circular of Government of Maharashtra, !8 February 1995

Reference Books:

1. Design of Small Dam – U. S. B. R., OXFORD & IBH pub.co.
2. Engineering for Dam Vol. I, II, III – Justinn, Creager and Hinds
3. Design of Hydraulic Structures Vol. I & II – Leliavsky
4. River Behaviour, Management and Training - C B I & P Publication

B.E. (CIVIL) PART – I
5. ELECTIVE I

5.1 OPEN CHANNEL AND RIVER HYDRAULICS

Teaching Scheme:
Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives:

By studying this subject, the students will understand the basic principles of the open channel flow. They will be able to analyze the various types of flows viz. uniform flow, gradually varied flows, rapidly varied flow etc. They will be able to apply this knowledge for river engineering also. The students will become familiar with model analysis.

SECTION – I

Unit 1: **(04)**

Basic fluid flow concepts, Classification of open channel flow, Velocity and pressure distribution. Energy and Momentum Equation applied to open channel flow, Energy and momentum coefficients, Channel Geometry and geometrical elements.

Unit 2: **(04)**

Uniform and critical flow computations: Energy depth relationships, Resistance formulae, Concepts of First and Second hydraulic exponent, Determination of critical and normal depth, hydraulically most efficient channel sections, Channel transitions.

Unit 3: **(05)**

Gradually varied flow: Different equation governing GVF, Classification analysis and control sections of profiles, Computation of GVF profiles by different methods.

Unit 4: **(05)**

Rapid varied flow: Type, Analysis and characteristics of Hydraulic jump in rectangular channels, Location of jump, Introduction to jump in non-rectangular channel and on sloping floor, Use of jump as Energy dissipater. Flow Measurement – Weir, spillways, critical depth flumes.

SECTION – II

Unit 5: **(04)**

River gauging: Dominant discharge, Methods of gauging, current meter rating curve, automatic water level recorder, stage discharge relationship of a river.

Unit 6: (06)
Fluvial Hydraulics- Sediment transport, Mode of sediment motion and formation, Threshold movement, Total sediment load, Suspended and bed load Theories, Reservoir Sedimentation.

Unit 7: (04)
River Management and Training:
Type of river, river morphology, meandering and braiding of River River training work-Classification Types-Guidebanks, Groynes, Deflectors, Embankments, Cut-offs, Bank Protection Stable channel nature river training works, river morphology.

Unit 8: (04)
Similitude and model analysis: Basic principles, fixed bed and models, distorted models.

Term Work:-
Assignment / problems based on above syllabus.

Reference Books:

1. Open Channel Hydraulics- Ven Te chow, McGraw hill book co.Newyark.
2. Open Channel Flow-F.M.Henderson.
3. Mechanics of Sediment transport and alluvial river problems: R.J.Garde.New Age Publications, New Delhi.
4. River Mechanics: Vol.I&II, Hsieh Wen Shen.
5. River Gauging-Chitale and Hiranandani.
6. Flow through Open Channel – Ranga Raju.
7. Flow in Open Channel – K.Subramanya (Tata McGraw Hill).

B.E.Civil (Part-I)
5 ELECTIVE – I

5.2 Air Pollution and Control

Teaching Scheme
Lectures: 3Hrs/ Week
Practical: 2Hrs/Week

Examination Scheme
Theory papers: 100 Marks
Term Work: 25 Marks
Practical/Oral: 25 Marks

Course Objectives: This course should result in

1. Thorough understanding of Sources, Causes & effects of Air Pollution.
2. Basic knowledge of Air Pollution controlling equipments.
3. Basic knowledge of Air pollution Prevention.

SECTION I

Unit 1 **(03)**

The Structure of the atmosphere, Definition and scope of Air Pollution, Scales of air pollution.

Unit 2 **(05)**

Sources of Air Pollution : natural and artificial, Classification of pollutant, quantity and composition of particulate & gaseous pollutant, units of measurement.

Unit 3 **(06)**

Effect of different air pollutants on man, animals, vegetation, property, aesthetic value and visibility, air pollution episodes. Global effects of air pollution- global warming, ozone depletion, acid rain and heat island effect.

Unit 4 **(06)**

The meteorology and air pollution: Different meteorological factors and their effect, lapse rate and stability of atmosphere, inversion phenomenon, Precipitation and its relation to scavenging pollutant in the air, wind pattern, direction, velocity and fluctuations, models of diffusions and dispersion, plume behavior, stack height design, Maximum Mixing Depth.

SECTION II

Unit 5 **(05)**

Air pollution monitoring and regularity control, Ambient Air quality standards, emission limits, ambient air and stack sampling, equipment for ambient air and stack sampling, methods of sampling, pollution monitoring of existing sources and new installation.

Unit 6 **(04)**

Chemistry of air pollution, Chain reactions of hydrocarbons, nitrogen oxide, Sulphuric oxides and intermediates, photochemical smog formation, air pollution indices -aerosols, fog, smog index.

Unit 7**(06)**

Control of pollutant emission at source, alternative fuels, process change, removal methods of particulate, principals of particulate removals, various types of particulate control equipments, settling chamber, cyclone separators, scrubbers, fabric filters and electrostatic precipitators.

Unit 8**(05)**

- a) Principles of removal of gaseous pollutants, design of incineration, absorption adsorption systems. Vehicular pollution, composition, quantity and control.
- b) Status of air pollution in India, Air pollution control act and strategy for effective control of air pollution.

Term Work:-

1. Assignments / problems on Air pollution.
2. Sampling and analysis of Ambient Air
3. Sampling and analysis of Automobile exhaust
4. Demonstration of stack gas monitoring

Reference books:-

- i) Air pollution – Wark and Warner
- ii) Air pollution – Martin Crawford
- iii) Air Pollution and Control Technologies- Y.Anjaneyulu, Allied Publishers
- iv) Air pollution and Industry – R.D. Ross
- v) Air Pollution – Rao and Rao
- vi) Environmental Engineering – by Peavy and Powe.
- vii) Air Pollution – Stern
- viii) Fundamentals of Air Pollution- Raju BSN, IBH Publisher
- ix) Air Pollution and Control- Murali Krishna, Jain Brothers
- x) An Introduction to Air Pollution- R.K.Trivedi and Goyal, BS Publications.

B.E. (CIVIL) - I
5. ELECTIVE – I

5.3 DESIGN OF FOUNDATIONS

Teaching Scheme:
Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course objectives: the course should result in

1. Study of analysis and design of shallow foundation and deep foundation
2. Constructional aspect of various types of foundations.

SECTION – I

Unit 1: **(04)**

- a) Bearing Capacity of Foundations: Theories of failure of soil - Terzaghi, Meyerhof; I. S. Code Method of determination of bearing capacity, Field tests for bearing capacity evaluation - Plate Load test, Standard Penetration test, Pressuremeter test - Test procedure and Limitations
- b) Foundation Settlement - Immediate, Consolidation, Secondary consolidation, Total and differential settlement

Unit 2: **(06)**

Shallow foundations- Types, Depth of foundation, Analysis and Design – Isolated footing, combined footing, proportioning of footing, eccentrically loaded footing, Floating foundation

Unit 3: **(03)**

Raft foundations: Types of rafts, Bearing capacity and settlements of raft, Design consideration and I.S. Code method of analysis and Design

Unit 4: **(04)**

Foundations on Weak Soil - Swelling potential, Effect of swelling on foundations; Application of geosynthetics - geotextiles / geogrids / geonets / geocomposites
Foundation Design on Weak Soil – Isolation of foundation from swelling zone by using Cohesive Non Swelling (CNS) soil, measures to control settlement

SECTION – II

Unit 5: **(07)**

Pile Foundations: Classification, Load carrying capacity - Static and dynamic methods ,
Solapur University, Solapur *B.E. (Civil Engineering) Syllabus* 18

Negative skin friction, Batter piles, Pile Caps, Pile Load tests, Rock Socketing, Pull out resistance , Laterally Loaded piles, Special piling systems – Granular Piles / Stone Columns, Bored Precast Piles, Element piles, Bored Compaction Piles, Micro piles, Lime Piles.

Pile Groups: Design of pile groups - Group Efficiency, Pile spacing, Pile cap (2 piles, 3 piles);

Under-reamed piles- Single and Multi-Bulb URP's, Equipment, construction and precautions, Design

Unit 6: (02)

Pier Foundations: Types and use of piers, Allowable pressure and Settlement, Design and construction of piers.

Unit 7: (04)

Well Foundations: Types of well foundations, open well ,box and Pneumatic caisson foundations , Design of well foundations, analysis of Lateral Stability , Construction of open and Pneumatic wells.

Unit 8: (07)

Machine Foundations- Dynamic response of soil, Types of machine foundations, Study of stress v/s strain under applied static and oscillatory stresses, Permissible amplitude, Criteria for satisfactory machine foundations, Introduction to analysis and design of simple machine foundations using I.S. Code, Vibration isolation

Term work: Term work consists of Minimum 8 sets of exercise based on each of the theory part of syllabus.

References:

1. "Foundation Engineering Hand Book" by Winterkorn H.F. and Fang H.Y , Van Nostand Reinhold Company, 1975
2. "Foundation Engineering" by B.J. Kasmalkar, Pune Vidyarthi Griha Prakashan
3. "Foundation Design Manual" by N.V .Naik, Dhanpat Rai and sons
4. "Foundation Analysis and Design" by J.E. Bowles, Tata McGraw Hill Book Company.
5. "Pile Foundation Analysis and Design", by Poulos, H.G. and Davis, E.H., John Wiley and Sons, New York.
6. Mohan, Dinesh (1990). "Pile Foundations", Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
7. Swami Saran, "Soil Dynamics and machine foundation", Galgotia Publications Pvt. Ltd., New Delhi
8. W. C. Teng, "Foundation Design", Prentice Hall of India Pvt. Ltd., New Delhi
9. P. Shrinivasu "Hand Book of Machine Design" Tata McGraw Hill Book Company"
10. Ronald F. Scott "Foundation Analysis", Prentice Hall Inc.,
11. "Soil Mechanics and Foundation Engineering"- B.C. Punmia,Laxmi Publications Pvt. Ltd.New Delhi

B. E. (CIVIL) PART – I
5. ELECTIVE – I

5.4 Advanced Design of Steel structures

Teaching scheme:

Lectures: 3 Hours per week
Practicals: 2 Hour per week

Examination scheme:

Theory paper: 100 marks
Term work: 25 marks
Oral exam: 25 marks.

Objectives: Students should learn analysis and design of steel and composite structures.

SECTION – I

1. Design of Trussed girder bridges and bearings. Deck type through type bridges, bracing systems, end bearings, mechanical and elastomeric bearings. (07)
2. Multistory steel buildings, load transfer mechanism, lateral resisting systems, Design of moment resistant frames. (06)
3. Cold-formed light gauge steel sections, special design considerations for compression elements, design of compression elements, design of light gauge beams, behavior under repetitive loads and temperature effects. (07)

SECTION – II

4. Plastic analysis, plastic bending of beams, plastic hinge, upper and lower bound theorems, uniqueness theorem, yield criteria, analysis and design of fixed and continuous beams. (07)
5. Plastic analysis and design of portal frames, collapse mechanisms, multistory-multibay frames, plastic moment distribution method, minimum weight design, variable repetitive loads, introduction to limit states in steel Design. (07)
6. Concrete-steel composite sections, elastic behavior of composite beams, Design of composite beams, Design of encased steel columns. (06)

Practical work: Problems based on above topics of syllabus.

References:

1. Design of steel structures- Vol. II by Ramachandran, Standard Book House, Delhi.
2. Design of steel structures- A.S.Arya, J.L.Ajamani, Nemchand and brothers.
3. Structural analysis and design of tall buildings by B.S.Taranath.McGrawhill.

4. Steel skeletal Vol II. Plastic behavior and design by J.f.Bekar, M.R.Horne, J.Heyman. ELBS.
5. Plastic methods of structural analysis by Neal B.G.Chapter and Hall.
6. SP – 6(BIS)
7. Teaching Resource for structural steel Design – Vol.III by IIT Madras, Anna University Chennai, SERC, Madras and Institute for Steel Development and Growth (INSSDAG), Kolkatta.

B. E. (CIVIL) PART – II
5. ELECTIVE – I

5.5 MANAGERIAL TECHNIQUES

Teaching Scheme:
Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives: The students will understand modern managerial techniques and its applications for Civil Engineering applications.

SECTION – I

Unit 1: (05)

Introduction: Productivity, work study and its applications to civil engineering.
Method study: Recording techniques, critical examination methods, development
Activity charts, diagrams process charts.

Unit 2: (07)

Time study, time allowance standard time, predetermined motion time standards,
Analytical estimation, work specification, production studies. Job evaluation and
wages, role of trade unions and human behaviour in Context to Work study.
Applications of work study to civil engineering works like brick laying, brick work,
Prefabricated building units, concreting etc.

Unit 3: (06)

Total Quality management: Philosophy and concept by Dr J.M. Juran, Deming,
Febingham, Elements of TQM, Implementation Strategies
Introduction to 5S Techniques, Kaizen

Unit 4:

TQM, implementation startiges of TQM, steps in TQM, 5 s techniques, contribution
by Juran. (02)

SECTION – II

Unit 5: (07)

Work sampling techniques, Purpose principles.
Statistical basis, normal, binormal one Poisson distribution accuracy, confidence.
Random numbers and application.

Unit 6: (07)

Reliability analysis – evaluation of reliability analysis and distribution or changes of
Failure of products standard deviation, failure probability, reliability, curves, reliability
assurance of sampling reliability design single, double limit operations, Redundancy,
application of civil engineering.

Unit 7:

(07)

Value analysis and value engineering – value analysis as a cost reduction technique information, search analysis creative thinking and judgement types of value, value Analysis procedure and application in value engineering value control.

TERM WORK:

Exercise: Any two from first four besides 5 and 6.

Work study procedures in building unit manufacture element. Preparation of flow Process charts.

Motion study of: Concreting.

Erection of roof trusses.

Factory sheds.

Brick laying.

Flooring etc. preparation of flow processes charts.

Actual working stoppages utilization. Avoidable stoppages time sampling, frequency And control charts calculations (from civil engineering works).

Work sampling in increasing the productivity, finding idle timings and efficiency of Items of works in a small civil engineering works.

One problem on Reliability Analysis.

One problem on Value Analysis and Value Engineering.

Reference Books:-

Work Study Applied to Building – Geary

Work Study – R. M. Currie, the English language book co.

Motion and time Study – Marvind Mandel, Prentice hall of India ltd.

Quality Control and Reliability – N. L. Enrick

Work Sampling – M. V. V. Raman

Value Engineering – Miles

Work Study – I. L. G., Universal pub. corporation

Value Engineering – A practical approach for owners – Designers and Constructors –

Larry Zimmerman and GlentHart, CBJ pub.& Distributors

B. E. (CIVIL) PART – I
5. ELECTIVE –I

5.6 COMPUTER APPLICATION IN CIVIL ENGINEERING

Teaching Scheme:
Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives:

By studying this subject, the students will be able to write computer programmes for analysis and design of variety of structural elements. They will be proficient in computer aided design and drafting using suitable application software tools.

SECTION-I

Unit 1: (09)
Computer aided design of steel structures: Development of software for basic structural Elements such as beam, column base, gantry girder, using I.S. 800 specification.

Unit 2: (09)
Computer aided design of R.C.C. Structures: Development of software for basic Structural elements such as rectangular beam, T beam, one – way and two – way slabs, Columns and isolated column footings using I.S. 456.

SECTION – II

Unit 3: (09)
Structural Drafting : Structural drafting and detailed drawings of components design using AutoCAD, AUTOLISP and WINDOWS, application of simple structural steel and R.C.C. elements, drawings of plan elevation of structures

Unit 4: (09)
Use of software for analysis of structures, preparation of input data, output and interpretation of results, application of software for plane trusses, portal frames.

Term work shall consist of at least two applications on each of the units based on theory of syllabus

Books:-

Matrix Operations on Computer – L. L. Bhirud, Oxford and IBM Pub. Co.
Matrix, Finite Element, Computer and Structural Analysis – Madhuji Mukhapadhyaya, Oxford and IBM Pub. Co.
Numerical Algorithm – E. V. Krishnamurthy & S. K. Sen, Affiliated Best West Press Pvt. Ltd.
Numerical Concrete, Fundamental approach – Edward G. Nawy- Prentice Hall New Jersey.

B. E. (CIVIL) PART – I
5. ELECTIVE –I

5.7 ADVANCED STRUCTURES

Teaching Scheme:

Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam. : 25 Marks

Course objectives: Student should Learn advanced analysis of structures

SECTION – I

Unit 1:

Influence lines: Muller Breslau principle, I.L.D. for propped cantilever, fixed beam, continuous beam (06)

Unit 2:

Beams curved in plan. (05)

Unit 3:

Fixed arches elastic center method. (04)

Unit 4:

Approximate methods for analysis of portal frames subjected to lateral loads -Portal and Cantilever method (05)

SECTION – II

Unit 5:

Analysis of Secondary Stresses in Plane Frames (05)

Unit 6:

Analysis of space trusses by tension coefficient method. (05)

Unit 7:

Beams on elastic foundations. (05)

Unit 8:

(05)

Unsymmetrical Bending & Shear center

TERM WORK:-Assignments Based on above Syllabus**Books:**

- i) Advanced Structural Analysis – Vazarani and Ratwani
- ii) Design of Steel Structures – Ramchandra Vol. II Standard book house Delhi
- iii) Strength of Materials – Vol. II Timoshenko, East-West Press ltd. Delhi
- iv) Mechanics of Structures – S. B. Junnarkar Vol. III, Chartor pub. House Anand

B.E. (CIVIL) - I
5. ELECTIVE – I

5.8 Advanced Concrete Technology

Teaching Scheme:

Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course objectives: Students should learn recent advances in concrete technology.

SECTION – I

Unit 1: Review of cements including blended cement, chemical and physical process of hydration. Aggregates – Coarse aggregate, Natural sand, Crushed sand. (3)

Unit 2: Addition to Concrete:- Review of types covering pulverized fuel ash, ground granulated blast furnaces slag and silica fume, Rice husk Ash, manufacture, physical characteristics, effects on properties of concretes. Admixtures: - Plasticizers, Super plasticizers, retarder, accelerators, Curing compounds and their effects on properties of concrete. (5)

Unit 3: Properties of Fresh Concrete: Workability setting, bleeding and segregation. Theory and application principles governing in concrete placing and compaction of concrete. Durability & impermeability, microstructure and carbonation of concrete, fire resistance. (4)

Unit 4: Special Concretes: - High performance concrete, High Strength concrete, fiber reinforced concrete, Light weight concrete, High density and radiation shielding concrete, High volume fly ash concrete, Self compacting concrete, Recycled concrete. (7)

SECTION-II

Unit 5: Special Processes & technology for particular types of structures: Mass concrete, Sprayed concrete, Ferro-cement concrete, pumped concrete, Roller compacted concrete, Sustainability of concrete industry. (4)

Unit 6: Ready mixed Concrete: Types of plants, Concrete specification, Process adopted for central RMC plant, Distribution & transport, Code recommendations, quality control. (3)

Unit 7: Mix design: Review of methods & philosophies, mix design for special purpose (High grade concrete), variability of results. (6)

Unit 8: Quality concepts- Definitions, principles & standards, quality control in concrete Construction, tools for quality management. (2)

Unit 9: Repair & rehabilitation: Visual inspection of concrete structure, distress in concrete, Non- destructive test, crack repair techniques, damage assessment procedure, deterioration- causes & prevention, strengthening techniques. (5)

Term work: Experiments

- 1) Tests on fresh & hardened concrete: Workability tests, Strength test- compression, flexure
- 2) Mix design for high performance concrete: Experimental
- 3) Non destructive testing of concrete- Rebound hammer, Ultra sonic pulse velocity test
- 4) Effects of additives and admixtures in concrete: Effects on workability and strength of concrete.

References:

- 1) Concrete Technology by M.S. Shetty
- 2) High performance concrete by P.C. Aitcin
- 3) Concrete Technology by A.R. Santhakumar, IIT Madras
- 4) Concrete Technology by Neviell.

B.E. (CIVIL) - I
5. ELECTIVE – I

5.9 REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM
APPLICATIONS

Teaching Scheme:

Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objective:

The students study the Remote sensing techniques and Geographic Information system. The students also understand applications of these techniques for Civil Engineering applications.

Unit No. 1

Introduction to Remote Sensing system: data acquisition and processing, Applications, Multi concept in remote sensing. (3)

Unit No. 2

Physical Basis of Remote Sensing: EMR nature, definition, nomenclature and radiation laws; Interaction in atmosphere-nature, its effects in various Wave-length regions, atmospheric windows; Interaction at ground surface soils Geometric basis of interaction. (7)

Unit No. 3

Platform and Sensors: Terrestrial, aerial and space platforms, Orbital characteristics of space platforms, sun- and geo-synchronous; Sensor systems-radiometers, opto-mechanical and push broom sensor; resolution : spectral, spatial, radiometric and temporal; IFOV, FOV, GRE; geometric characteristics of scanners, V/H and S/N ratio; Data products from various air and spaceborne sensors-aerial photographs, LiDAR, Landsat, SPOT, IRS, ERS, IKONOS etc.,

Unit No.4 (7)

Image Interpretation: elements of interpretation; digital image processing and interpretation; Field verification; (3)

Unit No.5

Geographical Information systems: components of GIS-data acquisition, spatial and attribute data, pre-processing, storage and management; data structures raster and vector data; GIS analysis functions; Errors and corrections; data presentation and generation of thematic maps; (8)

Unit No.6

Civil engineering application of remote sensing techniques and GIS. (8)

Term work: Based on above syllabus with minimum one case study with GIS Software.

Reference books:

1. A. M. Chandra and S. K. Ghosh, *Remote Sensing and GIS*, Narosa Pub, 2007.
2. T .M. Lillisand, R.W. Kaifer and J. W. Chipman, *Remote Sensing and Image Interpretation* ; John Wiley and sons Inc,6th Edition Nov 2007.

Books:

1. I. Heywood, S. Cornelius and S. Carver, *An Introduction to GIS*; Pearson Education-2nd Ed, 2002.

B.E. (Civil) Part-I

6. SEMINAR

Teaching Scheme:

Practical : 2 hours / week / batch

Examination Scheme:

Term Work – 50

The topic for the Seminar may be related to Civil Engineering area and interdisciplinary area related to Civil Engineering such as –

- 1) Structural Engineering
- 2) Environmental Engineering
- 3) Geotechnical Engineering
- 4) Transportation Engineering
- 5) Infrastructural Engineering
- 6) Water Resources Engineering
- 7) Town & Country Planning
- 8) Construction Engineering
- 9) Surveying & Remote Sensing Techniques
- 10) Project Management
- 11) Legal Aspects in Civil Engineering
- 12) Earthquake Engineering
- 13) Disaster Management

B.E. (Civil) Part-I

7. a) PROEJCT WORK

Teaching Scheme:

Practical: 2 hours / week

Examination Scheme:

Term Work: 25 marks

The topic for the Project Work may be from any Civil Engineering and interdisciplinary area related to Civil Engineering as mentioned in content at B.E. (Civil) Part-I. Practical work at B.E. (Civil) part-I will comprise of literature survey / problem formulation / preparation of experimental setup as the case may be of the identified problem.

7. b) ASSESSMENT ON REPORT OF FIELD TRAINING

Examination Scheme:

Term Work – 25 Marks

The students are required to undergo training in any area related to Civil Engineering as mentioned in the Seminar for 30 working days beyond the academic schedule between the completion of T.E. (Civil) Part-I and B.E.(Civil) Part-I term end. Students shall submit the report of the field training taken and necessary certificate from the organization where such training is undertaken

Assessment will be done by project guide.

B.E. Civil –Part II

1. Design of Concrete Structures –II

Teaching Scheme:

Lecture: 4 Hrs. / Week
Practicals: 2 Hr. / Week

Examination Scheme:

Theory Paper: 100 Marks
Term work: 25 Marks

Course objectives:

- These courses should result in,
- Design of RCC water tanks.
 - Study of prestressed concrete structures.

SECTION I

Unit 1: Design of Slabs (Limit state method)

One Way, Two Way slabs with different end conditions as per IS Code, cantilever slab. (05)

Unit 2 : Staircases (Limit state method)

Design of Staircases, types of staircases, design of simply supported and Dog-legged staircases. , Open well staircase with solid waste slab. (05)

Unit 3: Design of continuous beams by Limit State method. (05)

Unit 4: Analysis and design of cantilever and counterfort retaining walls (10)

SECTION II: PRESTRESSED CONCRETE

Unit 5 : Introduction to prestressed concrete, concepts, systems and methods of prestressing. (04)

Unit 6: Analysis of rectangular and Symmetrical I sections, thrust line, cable profiles. (06)

Unit 7: Losses in prestress. - Pre & Post tensioned members. (04)

Unit 8: Design of rectangular and Symmetrical I sections. (06)

Unit 9: Analysis and design of end blocks by I.S.code method, stress concentration. (05)

Note: Only IS: 456-2000 shall be allowed in University Exam.

TERM WORK:

Ten Design Assignments on above syllabus.

Reference Books:

1. IS: 456-2000 and IS 1343
2. Reinforced Cement Concrete -B.C. Punmia
3. Reinforced Cement concrete- Jain Vol.I & II
4. Prestressed Concrete – T.Y.Lin John Willey & sons, Newyork.
5. Prestressed Concrete – Sinha & Roy, S.Chand & Co., New Delhi
6. Prestressed Concrete – N.Krishnaraju.
7. Prestressed Concrete –P. Dayaratnam.
8. Prestressed Concrete – Leon Hardt.

B.E. Civil –Part II

2. CONSTRUCTION PRACTICES AND TOWN PLANNING

Teaching Scheme:

Lecture: 4 Hrs / Week

Examination Scheme:

Theory Paper : 100 Marks

Course objectives: To impart basic knowledge of Town Planning and Construction Practice to engineering students.

SECTION – I

TOWN PLANNING (2 clock hours per week)

Unit 1: Necessity- Contribution- layouts (08)

Necessity and scope of Town Planning, Brief history. Greek and Roman towns, planning in ancient India - Indus Valley civilization. Vedic period. Buddhist period. Medieval period.

Contribution of town planners in modern era such as Sir Patrick Geddes. Sir Ebenezer Howard. Clarence stein sir Patrick Abercrombie, Le corbusier Present status of town planning in India.

Layout of residential units, neighbourhood unit planning, Radburn plan, grid iron pattern.

Cul de sacs shoe string development. Growth pattern of towns, concentric satellite, ribbon, scattered.

Unit 2: Elements of Town-surveys-Town aesthetics (06)

Elements of town, various zones, Types of zoning.

Urban roads- Objective and classification of roads, various road networks.

Surveys- physical, social, economic civic etc., Analysis of data, Town aesthetics, Treatment of traffic islands, open spaces, walks ways, public sit-outs. Sky walk, Continuous park system. Green ways.

Unit 3: M.R.T.P. –Land acquisition – rural development. (05)

Different town planning works with reference to M.R.T.P. Act. (Brief idea about various provisions):

Land acquisition act – necessity and procedure of acquisition.

Village planning- Planning process, Multilevel planning, Decentralization concepts.

Rural developments- planning methodology, Growth centre approach, Area Development approach, Integrated rural development approach

SECTION – II

Construction Practices(2 clock hours per week)

Unit 1: Earthwork Equipments (10)

Introduction -Conceptual planning of new project, site access and services, Mechanical v/s Manual construction.

Excavation in Earth: Earth moving equipments - Tractors, Bulldozers, Scrappers, Power shovel, Hoes, simple numerical problems based on cycle time and production rates, Drag line, Clamshell, Trenchers, Compactors- types and performance, operating efficiencies.

Unit 2 : Prefabricated Units and Hoisting/ Erraction Equipments (05)

Prefabricated construction – relative economy, elements and simple connections, cranes. Floating and dredging equipments. Asphalt mixing and batching plant (hot mix plant) ,sensor paver for rigid roads.

Unit 3: Safety and disaster management. (04)

- a) Diaphragm Walls – Purpose and Construction Methods
- b) Safety measures in construction, prevention of accidents
- C) Introduction to Disaster management

Reference books:

Town Planning:

- Town and country Planning- N.K. Gandhi
- Town and country Planning-G.K. Hiraskar
- Town Planning- S.C.Rangawala, Charotar Publications, Pune
- MRTTP Act 1966
- Land Acquisition Act - 1894
- Urban Pattern by Gallion, Eisner
- Rural development Planning – Design and method : Misra S.N., Satvahan Publications , New Delhi
- Economic development in Third world: Todaro Michael, Orient Longman Publication, New-delhi

Construction Practices:

- i. Construction, Planning, Equipment and methods - R. L . Peurifoy McGraw hill book co New Delhi
- ii. Erection of Steel Structures – Thomas Baron
- iii. Reinforced Concrete Bridges – Taylors
- iv. Planning and Construction of Docks and Harbors – Quin

- v. Construction Equipment Guide – Day
- vi. Construction Equipment – Mahesh Varma ,Metropolitan book co ,New york
- vii. Hand Book of Heavy Construction – Stubbs
- viii. Concrete Construction Hand Book – Wadel
- ix. Heavy Construction – Planning, Equipment and methods – Jagman Singh, Oxford and IBH publishers, New Delhi
- x. Construction of Diaphragm Walls, I Hajnal, I Marton, F. Regele
Wiley Interscience Publication, John Wiley & Sons.
- xi. Structural & cut off Diaphragm walls, R.G.H. Boyes, Applied Science Publishers Ltd., London. Construction Technology, Prof. S. S. Ataev, Mir Publishers, Mascow.

B.E. (CIVIL) PART-II
3. ELECTIVE II

3.1. ADVANCED ENGINEERING GEOLOGY

Teaching Scheme:
Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives: To impart knowledge of recent advances in engineering geology to students.

SECTION – I

I) STRATIGRAPHY AND INDIAN GEOLOGY (5)

Definition and scope, Geological Time scale, Physiographic division of India and their geologic, geomorphologic and tectonic characteristics, General study of important geological formations of India namely Dharwar Vindhyan, Cuddapah Gondwana and Deccan traps Testeary with respect to

1. Introduction and general information.
2. Distribution.
3. Litho logy.
4. Tectonics.
5. Economic importance etc. Significance of these studies in Civil Engineering.

II) SEISMIC ACTIVITY OF DECCAN TRAP REGINS (6)

Continental Drift and plate Tectonics in brief, Seismic zones of India, world, Seismic activity of Deccan trap region. Various theories on the origin of the seismic activity of Deccan Trap region, Reservoir induced seismicity. Nature and characteristics of seismic activity of Deccan Trap region. Tectonics of Deccan Trap region. Tectonic Nature of seismic activity of Deccan Trap region. Prediction of earthquake. Earthquake proof constructions. Numerical problems based on seismic data.

III) SUBSURFACE EXPLORATION (4)

Various steps in the geological studies of project site, Engineering consideration of Structural features like dip, strike, joints, fractures, faults, folds, dykes etc. Exploratory drilling, observations during drilling, preservation of cores, core Logging, Graphical representation of core log, Limitations of exploratory drilling method, Numerical problems on core drilling.

IV) SUBSURFACE WATER (5)

Runoff, Fly off and percolation of surface water, Ground water, Juvenile, connate and meteoric water, water table, zones of subsurface water, perched water table, types of aquifer. Requirements of good aquifer, Porosity and permeability of rocks, Darcy's law, hydraulic gradient, regional problems in ground water, water bearing capacity of common

rocks, springs, hot springs and geysers, Artesian wells, cone of depression and its significance in civil Engineering, Natural and artificial recharge of aquifers, Saline water intrusions - control and prevention, Numerical problems related to Groundwater. Photogrametry, Remotesensing and GIS /GPS, Water management.

SECTION II

V) ENGINEERING GEOLOGY OF DECCAN TRAPS (6)

Types of basalts and associated volcanic rocks, Engineering characteristics of these rock types, Engineering significance of variation in size, number and infillings of gas Cavities, Compact and amygdaloidal basalt as construction material, Effect of Jointing, hydrothermal alteration and weathering on engineering behavior of Various varieties of Deccan traps. Tail channel erosion problem in Deccan Trap region, suitability of basalts from tunneling point of view. Problems due to columnar basalt, dykes, red bole, tachylitic basalt, volcanic breccia and fractures, Laterites-Origin, occurrence and engineering aspects. Ground water bearing capacity of the rocks of Deccan Trap region, Percolation tanks, Geological conditions suitable and unsuitable for construction of Percolation tanks

VI) GEOLOGY OF SOIL FORMATIONS (2)

Soil genesis, Geological classification of soils, Residual and transported soils, soil Components, characteristics of soils derived from different types of rocks. Nature of alluvium and sand of the rivers of Deccan Trap region, Scarcity of sand in Deccan Trap area.

VII) GEOPHYSICS (5)

Various geophysical methods, Basic principles of seismic, magnetic gravitational and electrical resistivity methods, electrical resistivity. Use of electrical resistivity method using Wenner schlermesger, Inverse slope Configuration in Civil Engineering problems such as

- i) Finding out the thickness of over burden and depth of hard rock.
- ii) Locating the spot for ground water well.
- iii) Seepage of water finding.
- iv) Water harvesting techniques

VIII) ROCK MECHANICS (4)

General principles of rock mechanics, various engineering properties of rocks and their dependence upon geological characters, In-built stresses in rocks, measurements of these stresses by various Methods.

IX) RESOURCE ENGINEERING (3)

Types of resources, Earth renewable and non renewable resources, Coal and Petroleum as energy resources, Genesis, occurrence and reservoir in India of coal and Petroleum in brief, geothermal energy. Mining methods, Mining laws, Mineral dressing techniques.

TERM WORK

The term work shall consist of the laboratory work based upon following Syllabus.

- 1) Study of geological map of Maharashtra state and India.
- 2) Study of Civil Engineering aspects of important rock types.

- 3) Study and identification of important rocks and minerals in Magascopic and thin section under Microscope.
- 4) Three point problems.
- 5) Core logging of exploring drill hole.
- 6) Study and constructions of subsurface sections based upon data of the series of drill holes.
- 7) Completion of outcrop on contoured geological map and drawing a section of it.
- 8) Photogrammetry, Remotesensing and GIS
- 9) Use of electrical resistivity method for determining depth of bedrock, or ground water, Problems on confined and unconfined aquifers.
- 10) Education tour to the projects to study engineering geological aspects.

ORAL EXAMINATION

The oral exam will be based upon the above syllabus of the term work

RECOMMENDED BOOKS

- i) Geology of India and Burma – D.N Wadia, M. S. Krishnan, Higginbotham Pvt Ltd;
- ii) Groundwater Hydrology by Tood D. K.-John Wiley& Son. New York
- iii) Groundwater- C.F. Tolman. McGraw Hill Co.
- iv) A Text Book of Engineering Geology-By R. B. Gupte-Pune Vidyarthi Griha Prakashan, Pune.
- v) India's Mineral Resources - S. Krishnaswamy. Oxford & I.B.H. Co.
- vi) Koyana Earthquake Journal (1968) Indian Geophysics Uni.
- vii) Engineering Geology for Civil Engineers by Dr. D. V. Reddy.
- viii) Introduction to Rock Mechanics by Verma B. P., Khanna Publisher Delhi.
- ix) Engineering Geology –By B. S. Sathya, Narayanswami.
- x) Introduction to Engineering and General Geology – by Dr. P.T.Sawant, New India Publishing Agency- NIPA, New Delhi.

**B.E. (CIVIL) PART –I I
3 ELECTIVE - II**

3.2 GROUND IMPROVEMENT TECHNIQUES

Teaching Scheme:
Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course objective:- Students should learn to identify problematic soil and their associated problems and to propose suitable remedial techniques and design

SECTION -I

UNIT- I **(5)**

Ground improvement: - Objectives of soil improvement, classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique

Mechanical modification: - Type of mechanical modification, Aim of modification, Principle of modification for various type of soils

UNIT- II **(4)**

Dewatering:- Principle, technique, Ground water lowering by well points, deep wells, vacuum and electro osmotic methods. Stabilization by thermal and freezing techniques

UNIT –III **(6)**

Vibrofloatation and sand drains:-

Vibrofloatation- technique, equipment, basic application, Design philosophy

Sand piles- concept, design, factors influencing compaction

Blasting and dynamic consolidation- Preloading with sand drain, fabric drains, wick drains etc- Theories of sand drains- design and relative merits

UNIT- IV **(5)**

Stone column:-

Stone column- Functions- method of installation- Equipments, procedure, design, estimation of load carrying capacity and settlement.

SECTION -II

UNIT- V **(5)**

Earth reinforcement:

Principles and basic mechanism of reinforced earth, simple design, synthetic and natural fibre based Geotextiles and their applications. Filtration, drainage, separation, erosion control- case studies

UNIT- VI**(4)**

Compaction and slope stabilization:-

Compaction - Insitu compaction of granular and cohesive soil, Shallow and deep compaction methods,

Slope stabilization - Concept, various methods- Growing vegetation, drainage, anchoring, micro piling bolting Soil nailing etc

UNIT VII**(5)**

Chemical modification:

Definition, methods, admixtures, cement stabilization- Hydration, effect of cement stabilization on permeability, swelling shrinkage etc, criteria for cement stabilization, Stabilization using fly ash, lime stabilization, Bitumen, tar or asphalt stabilization

UNIT VIII**(6)**

Grouting:

Types of grout- suspension and solution grouts, basic requirements of grout. Grouting equipment- injection methods, jet grouting, grout monitoring.

Term work: - At least One assignment shall be given on each unit based on concept, theory and design of ground improvement technique

Minimum 8 assignments shall be given

Books:-

1. Ground Improvement Techniques- Purushothama Raj P. (1999) Laxmi Publications, New Delhi.
2. Construction and Geotechnical Method in Foundation Engineering- Koerner R.M. (1985) - Mc Graw Hill Pub. Co., New York.
3. Das, B.M., Principles of Foundation Engineering, Fourth Edition, PWS Publishing, 1999.
4. Boweven R., Text Book on Grouting in Engineering Practice, Applied Science Publishers Ltd
5. Donald .H. Gray & Robbin B. Sotir, Text Book On Bio Technical & Soil Engineering Slope Stabilization, John Wiley
6. Rao G.V. & Rao G.V.S., Text Book On Engineering With Geotextiles, Tata McGraw Hill
7. Soil stabilization, principles and practice—Ingles C.G. and Metcalf J. B. (1972), Butter worths, London.
8. Shroff A. V. “Grouting Technology in Tunelling and Dam, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi-1999
9. Moseley M. D. Ground Treatment, Blackie Academic and Professional, 1998
10. Van Impe W. E., Text Book on Soil Improvement Technique and Their Evolution, Balkena Publishers.

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.3 TRAFFIC ENGINEERING AND CONTROL

Teaching Scheme:

Lecture: 3 Hrs/Week

Practical: 2 Hrs/Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25 Marks

Oral Exam: 25 Marks

Course objective:- Students should learn basics of traffic engineering and control.

SECTION – I

Unit 1: (8)

- a) Introduction to traffic engineering, Nature of highway, traffic problems, scope of traffic engineering.
- b) Traffic characteristics –
 - ii) Road user characteristics, General human characteristics, physical characteristics.
 - iii) Vision eye – movement peripheral vision, Visual attention, and visual sensitivity to light and color, glare vision and recovery perception of space.
 - iv) Hearing
 - v) Stability sensation
 - vi) Time factor in response, Theory of PIEV modifying factors, conditional responses.
- c) Vehicle types dimensions, resistance, power requirement for different resistance (No example to be set in examination), change in direction – minimum turning radius off tracking slip angle, vision driver's vision, forward to rear visibility from driver's position lighting

Unit2: (6)

- a) Speed – trends classification of speed values, spot speed study and interruption, different factors influencing spot speed.
- b) Traffic volume – volume counting, magnitude, distribution, composition, variation, distribution of annual traffic volume by daily and hourly magnitude.
- c) Origin and destination – method of collecting O –D data, Analysis of O – D data. O – D characteristics.
- d) Intersection, Elements of intersection operation, Time space relationship for diverging, merging crossing man oeuvres, intersection operation number types and frequency of conflicts time lost at intersection.

Unit 3: (6)

- a) Parking – parking studies, space consideration, parking demand, parking load and duration, space demand relation.
- b) Accidents – accident record, system and analysis, accident characteristics, magnitude, trends, assurance, distribution, interpretation and use of accident facts.

SECTION – II

Unit 4 (6)

Traffic control –

- a) Driver – driver licensing.
- b) Vehicle registration requirements and accessories, vehicle inspection, inspection coverage, general control for motorist pedestrian.
- c) Speed control – methods of control devices speed zoning.
- d) One way street – necessity, requirements, advantages and disadvantages.
- e) Curb parking – problems created by curb parking, types, space control, time control.

Unit 5: (6)

- a) Traffic control devices and aids.
- b) Traffic signs – basic requirements such as attention, meaning response time respect.
- c) Traffic marking attention, meaning response time, reflecterization and illumination.
- d) Traffic signals – basic requirements, time apportionment delay.
- e) Road lighting basic factors, Pavement brightness, Luminary design and placement, Glaze, types of light sources.

Unit 6: (8)

- a) Instruments used in traffic studies – volume measurement – detectors and counters speed – optical and instruments radar, Headway instruments, vehicle performance fue meter, decelerotometer, environment characteristics, street lighting and road surface, photometer, bump integrator, portable skid, resistance tester, sideways force test vehicle miscellaneous equipment.
- b) Traffic design (No question set on this topic) – Objective of traffic design, general idea regarding benefit cost analysis, traffic design criteria and data, capacity of road.

TERM WORK:- Based on above syllabus

Books:-

- i. Traffic engineering – Natson Smith and Hurd, McGraw Hill Publication
- ii. Principle Practice and Design of Highway Engineering – S. K. Sharma, Pub. S.Chand and Company Ltd.
- iii. Highway Engineering – S. K. Khanna, C.E.G. Justo, Publication Nemchand and Borthers Ltd., Roorkee
- iv. Highway Traffic Analysis and Design – R. J. Salter, Publisher – The Macmillan Press Ltd.
- v. Traffic Engineering - R. J. Salter, Publisher – The Macmillan Press Ltd.
- vi. Traffic Engineering Practice – Editor E. Davis, Pub. E. and F. F. N. Spon Ltd
- vii. Indian Road Congress Specifications
- viii. Traffic Engineering and Transport Planning – Kadiali L. R. Khanna Pubs.

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.4 INFRASTRUCTURAL ENGINEERING

Teaching Scheme:

Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objective: Students will learn modern trends in Infrastructural planning and Implementation

Unit 1

An Overview of Basic Concepts Related to Infrastructure.

Introduction to Infrastructure,
Overview of the Power Sector, Water Supply and Sanitation Sector, Road, Rail, Air, and Port Transportation Sectors, Telecommunications Sector Urban Infrastructure, Rural Infrastructure in India
An introduction to Special Economic Zones, Organizations and Players in the field of Infrastructure, The Stages of an Infrastructure Project Lifecycle, Infrastructure Project Finance (7)

Unit 2

Public private partnership in Infrastructure

A Historical Overview of Infrastructure Privatization the benefits of Infrastructure privatization Problems with Infrastructure privatization
Challenges in privatization of Water Supply: - privatization of Power: Privatization of Infrastructure in India:Water Supply project- Privatization of Road Transportation Infrastructure in India (7)

Unit 3

Challenges to Successful Infrastructure Planning and Implementation

Mapping and facing the Landscape of Risks in Infrastructure Projects, Economic and Demand Risks, Political Risks, Socio-Environmental Risks, Cultural Risks in International infrastructure projects, Legal and Contractual Issues in Infrastructure
Challenges in Construction and Maintenance of Infrastructure (6)

Unit 4

Strategies for Successful Infrastructure Project Implementation

Risk Management framework for Infrastructure Projects, Shaping the planning phase of infrastructure projects to mitigate risks, Designing Sustainable Contracts, Introduction to Fair Process and Negotiation, Negotiating with multiple Stakeholders on infrastructure projects, Sustainable Development of Infrastructure (8)

Unit 5

Advanced Infrastructure:

Information Technology and Systems for successful infrastructure Management, Innovative design and Maintenance of Infrastructure facilities, Performance Modelling and Life Cycle Analysis techniques Capacity Building and Improving the Government's role in infrastructure implementation ,An integrated framework for successful Infrastructure Planning, and Management – Infrastructure Management Systems and Future Directions (8)

Term work: Based on above syllabus with minimum five field visit reports.

References:

Indian Road Congress Journal
Indian Railways Journal
Indian Water Works Association Journal
Bhagirath

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.5 PROJECT APPRAISAL

Teaching Scheme:

Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives: To enable students to learn technical, economical and Social feasibility appraisal of Civil Engineering Projects.

SECTION – I

Unit 1: (06)

Project Requirement Identification

Identification of needs, present availability, additional requirements, alternatives and their comparative study, project identification

Unit 2: (06)

Technical Analysis

Technical analysis market and demand analysis, project location resource requirement and their fulfillment technology, know how requirements technical study of alternatives and their suitability.

Unit 3: (06)

Technical Analysis

Financial analysis interest, compounding and discounting, investment and capital outlay cash flow of the project and its significance profit, Probability and break even analysis, internal rate of return, of shadow pricing benefit cost ratio, influence of inflation on profitability influence of inflation and escalation on the projects.

SECTION – II

Unit 4: (05)

Social Aspects

Social cost benefit analysis, objectives, direct – indirect costs and benefits – tangibles, intangibles and their conversion, levy subsidy concepts

Unit 5: (08)

Appraisal: criteria and selection from alternatives, discounting non-discounting criteria selection under capital restriction, social restriction and other restriction risk analysis, sensitivity analysis, application of decision tree analysis and game theory.

Unit 6: (05)

Project administration organization and control during execution period maintenance. And care taker operational set up, project management after completion. Preparation of project report and norms and its presentation.

Definition of entrepreneurship and entrepreneur qualities.

(03)

TERM WORK:

Term work consists of Preparation and Submission of a detailed project report of anyone of the civil engineering projects like lift irrigation, irrigation, bridge, water supply, housing complex, road etc.

Books:

- i) Water resources Project Economics – Kuiper
- ii) Project Preparation, Appraisal, Budgeting and implementation–p prasanna Chandra
- iii) Cost Benefit Analysis – E. J. Mishan
- v) The Practice of Entrepreneurship – Geoffery G. Meredith R. E. Nelson

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.6 Solid and Hazardous Waste Management

Teaching Scheme:

Lecture: 3 Hrs/Week
Practical: 2 Hrs/Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks
Oral Exam: 25 Marks

Course Objectives: This course should result in

1. Thorough understanding of Types, Sources, Generation Solid Waste & Hazardous waste.
2. Imparting Basic knowledge of Collection, Transportation, and Treatment & Disposal of Solid Waste Management.
3. Basic knowledge of Handling & Storage of Solid Waste.

SECTION I

Solid Waste Management

Unit 1

(05)

Solid Waste management: Functional outlines of refuse, storage, transportation of refuse, analysis , composition and quantity of refuse, storage , transportation of refuse. Economic aspects of refuse collection & transport.

Solid waste in industries, common types of solid waste, classification, collection and transportation. Concept of biomedical & Hazardous waste management.

Unit 2

(05)

Solid waste handling & Processing methods, Segregation and salvage recovery of by-products, use of solid waste as raw material in industries. Recycling of solid waste.

Unit 3

(05)

Composting Theory of composting, types of composting, factors governing composting, processing before composting, mechanical composting plant, and recovery of Bio –gas energy from organic solid waste.

Unit 4

(05)

Incineration, theory and types of incinerators, location planning, aspect, effect of feed, composition, rate and temperature, Air supply, design of incineration plant, pyrolysis and its by-products, Energy recovery

Solid waste management rules, Status of solid waste management in India. Cost economics of solid waste management.

SECTION –II

Hazardous Waste Management

Unit 5: (05)
Definition of Hazardous waste, Characteristics and nature of hazards, natural and manmade hazards, classification of hazards.

Unit 6 : (05)
Qualitative estimation of damages, risk assessment and management.

Unit 7: (05)
Types of Hazardous waste, Characteristics, site Assessment waste minimization resource recovery.
Strategy for minimization of damage due to natural and manmade hazards.

Unit 8: (05)
Storage and handling of hazardous waste, Site Selection, Transportation of hazardous wastes. Case Studies of hazards, episodes. Sanitary landfill site selection, Types of land filling, Technique, maintenance and precaution, leachate and its control, control of contamination of ground water.

Term Work:-

1. Analysis of solid waste
2. Project on Design of Refuse collection & Disposal System for medium size town / part of city.
3. Report on the study of at least two cases of Hazards and Episodes.
4. Assignments (One Assignment on each unit)

Reference Books:-

- i) Solid Waste Management – Dr. A.D. Bhide
- ii) Solid Waste Management – George Tchobanoglous
- iii) Solid Waste Management Hand Book – Pavoni
- iv) Composting – Gottas
- v) Handbook and solid Waste Disposal – Tchobanoglous
- vi) Manual on Municipal Solid Waste management by ministry of Urban Development of Govt. of India.
- vii) Management of Municipal Solid Waste- T.V.Ramchandra, Capital Publishing company, New Delhi
- viii) Text Book of Solid Waste Management- I.H.Khan, and Naved Ahsan, CBS Publishers and Distributors, New Delhi.
- ix) Hazardous Waste Management – C.A. Wentz McGraw Hill International Edition

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.7 DYNAMICS OF STRUCTURES

Teaching Scheme:

Lecture : 3 Hrs / Week

Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25 Marks,

Oral Exam: 25 Marks.

Course objectives: The students should learn further part of the subject particularly the multi degree-of-freedom systems.

SECTION – I

Unit 1: SDOF Systems Subjected to General Dynamic Loading

Duhamel's integral, Application to simple loading cases, numerical evaluation of response integral, Piece wise exact method, Newmark's-Beta method. (08)

Unit 2: Free Vibration Analysis of MDOF systems - I

MDOF systems , selection of DOFs , formulation of equations of motion , Stiffness matrices, Static condensation, Free Vibration as Eigen Value problem, Frequencies and Mode Shapes, Determination of natural frequencies and mode shapes by Stodola- Vianello method, Orthogonality conditions. (08)

Unit 3: Free Vibration Analysis of MDOF systems – II

Modal analysis method for free vibration analysis, modal combination rules, systems with and without damping, proportional damping. (04)

SECTION - II

Unit 4: Forced Vibration Analysis of MDOF systems

Governing equations, modal analysis, numerical evaluation of modal equations by Newmark's-Beta method, mode combinations. (08)

Unit 5: Distributed- Parameter Systems

Partial differential equations of motion, Free and forced Vibration, Application to beams in flexure (05)

Unit 6: Energy Methods

Rayleigh method for Discrete and continuous systems, Fundamental mode analysis. (06)

TERM-WORK: Problems / Tutorials based on above topics

References:

1. Dynamics of Structures –A.K. Chopra Dhanapat Rai & sons, New Delhi
2. Structural Dynamics - Mario Paz CBS Publication
3. Dynamics of Structures – R. M. Clough and Ponian ,McGraw Hill Co., New Delhi
4. Mechanical Vibrations – G. R. Grover Roorkee University, Roorkee.

B.E. (CIVIL) PART –I I
3. ELECTIVE II

3.8 Environmental Management

Teaching Scheme:

Lecture : 3 Hrs / Week

Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25 Marks

Oral Exam: 25 Marks

Course Objectives: This course should result in

1. Thorough understanding of Environmental Management System.
2. Imparting Basic knowledge of different Environmental pollution control acts.
3. Basic knowledge of Environmental Impact Assessment.

Unit I

Fundamentals of environmental management system (EMS) and ISO 14000 series: History Background and development of ISO 14000, TC-207, ISO 14000 series. Environmental management Plans, principles and elements. The ISO 14001-Environmental management systems standard, Definitions, Eco labeling, Auditing (6)

Unit II

Environmental management acts related to environmental protection: Air , Water , Soil and Hazardous Waste. Detailed study of following acts - Water act 1974 (Prevention and control of pollution), Air act 1981 (Air pollution prevention and control of pollution), Hazardous waste management handling rules -1989. Municipal solid waste rules- 2000, Noise pollution regulation and control rules 2000 (7)

Unit III

Electronic waste management: Objectives, Classification of E-waste, guidelines for environmentally sound management of E-waste, environmentally sound treatment technology for E-waste, guidelines for environmentally sound integrated E-waste recycling and treatment policy International scenario, hazardous substances that can occur in E-waste. (4)

Unit IV

Biomedical waste management: Introduction, Classification, Types, segregation, packaging and transportation and storage, possible hazards, Effects, Detailed study of Biomedical waste management and handling rules 1998: (3)

SECTION –II

Unit V

Air pollution control:, Air quality standards, Air pollution control technologies for oxides of sulphur: Reducing SO_x levels through dilution by increasing stack height,

use of alternative fuels. Extraction of sulphur from fuels. Reduction of sulphur in combustion process, fuel gas desulfurization.

Air pollution control technologies for oxides of Nitrogen: Emission of nitrogen oxides. Control technologies for oxides of nitrogen emissions.

Air pollution control technologies for volatile organics, Hydrocarbons and hydrogen sulphide. (4)

Unit VI

Advanced waste water treatment: Carbon adsorption, Ion exchange, sodium and hydrogen cycle. Membrane process. Electro dialysis process, pressure membrane process and membrane performance characterization. Nutrients removal such as nitrogen and phosphorus removal. Land treatment systems: Irrigation, rapid infiltration and overland flow systems. Wetland flow Systems. (4)

Unit VII

Environmental Impact Management (EIA)

- I) Definition, Objectives of EIA .EIA procedure in detail, Role of different actors in EIA, Components of EIA, Areas of human concern(Impact categories), Contents of EIA, Categories of projects under EIA, Introduction to Impact assessment methods such as Leopold matrix Legal provision for public participation in India, Role of general public in Environmental clearance.Limitations of EIA
- II) The environmental rules 1999 (sitting for industrial process, methodology for preparing environmental impact assessment, role of regulatory agencies and control boards in obtaining Environmental clearance for project.
- III) **Case studies:-** Positive and negative environmental impacts of Dams, Express highways, Major industries, Power plants (7)

Unit- VIII

Miscellaneous Topics

- I) **Removal of Chromium:** General, control methods, reduction precipitation, Ion Exchange, RO, Lime coagulation and adsorption
- II) **Removal of Mercury:** General, measurement of mercury, mercury losses in Chlor-Alkali industries, removal of mercury from gaseous streams, removal of Mercury through liquid streams.
- III) **Treatment of phenolic effluents:** Introduction, sources of phenols, Treatment and removal (5)

Term Work:

Term work shall consist of **assignments** on all above units and following chapters and **one industrial visit report.**

Oral shall be based on above termwork

Reference Books:

1. Environmental engineering and management- Dhameja, Katson publications, Delhi
2. Indian standards BIS
 - IS/ISO 14001
 - IS/ISO 14004
 - IS/ISO 14011
 - IS/ISO 14010

- IS/ISO 14012

3. Air Pollution and control, K.V.S.G. Murli Krishna, Jain Brothers., Delhi
4. Water Management, K.V.S.G. Murli Krishna, Environmental Protection Soc., Kakinada
5. Wastewater treatment and reuse- Metcalf and Eddy, TMG, Delhi
6. Pollution control in process industries- S P Mahajan, TMG, Delhi
7. Environmental science and engineering- Henry and Henke, PHI, New Delhi
8. For all environmental acts and updates - <http://www.envfor.nic.in>

B.E. (CIVIL) PART –I I

3. ELECTIVE II

3.9 DESIGN OF BRIDGES

Teaching Scheme:

Lecture : 3 Hrs / Week

Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25 Marks

Oral Exam: 25 Marks

Course objectives: Student should learn various elements of bridge, loading on bridges, Design of various elements of bridges using IRC Codes.

SECTION – I

Unit 1: Components of bridges, Classification, importance of bridges, Investigation for Bridges. (4)

Unit 2: Standard specification for Road Bridges. I.R.C. bridge code, width of carriage way, clearances, loads to be considered i.e. D.L., L.L., Impact load, wind load, Earthquake load, Longitudinal force, Centrifugal force, buoyance, Earth pressure, water current force, thermal force etc. (5)

Unit 3: General design considerations for R.C.C. & P.S.C. Bridges. Traffic aspects for highway bridges. Aesthetics of bridge design, Relative costs of bridge components. Design of reinforced concrete deck slab, Pigeaud's theory, beam and slab and T-beam, Courbon's theory. (9)

SECTION – II

Unit 4: Construction Techniques – Construction of sub structure footing, piles, cussions, construction of reinforced earth retaining wall and reinforced earth abutments, super structure – erection method for bridge deck construction by cantilever method, Inspection maintenance and repair of bridges. (7)

Unit 5: Design of sub structure – abutments, Piers, approach slab. (8)

Unit 6: Bearing and expansion joints – forces on bearings – Types of bearings, design of reinforced elastometric bearings, expansion joints. (5)

Term work: A set of tutorials based on above topics of syllabus.

References:

1. Concrete Bridge Practice by Dr.V.K.Raina, Tata McGraw Hill
2. Essentials of Bridge Engg. by D. Johnsons Victor, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
3. Design of RCC Bridges- Jagdish Jayaram
4. Reinforced Concrete Structures – Vol. II by Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications.
5. Bridge Engg. by S. Ponnuswamy, Tata McGraw Hill

B. E. (CIVIL) PART – II

4. ELECTIVE – III

4.1 ADVANCED DESIGN OF CONCRETE STRUCTURES

Teaching Scheme:

Lecture – 3 Hrs / Week

Practical - 2 Hrs / Week

Examination Scheme:

Theory Paper – 100 Marks

Term Work – 25 Marks

Course objectives: Student should learn analysis and design of several R.C.C.

SECTION – I

Unit 1 Analysis and Design of Flat Slab, Grid Slab and Circular Slab. (07)

Unit 2: Analysis and Design of Combined Footing and Raft Foundation. (06)

Unit 3: Analysis and Design of pile foundation with pile cap. (07)

SECTION – II

Unit 4 : Water Tanks : Design criteria, permissible stresses, Design of circular water tanks resting on ground with flexible and rigid base design by approximate method and I.S.code method. (07)

Unit 5: Design of rectangular tanks, resting on ground by approximate method and I.S.code method. (07)

Unit 6: Design of underground circular water tanks. (06)

Note: Use of IS 3370 part IV and IS 456-2000 is allowed in the examination.

Term work: Problems based on above topics.

References:

1. Reinforced Concrete, Limit State Design by Ashok K.Jain, New Chand and Bros.Roorkee.
2. Advanced Reinforced Concrete Design by P.C. Varghese- Prentice Hall of India.
3. Advanced Reinforced Concrete Design by N.Krishnaraju- CBS Publishers & Distributors.
4. Reinforced Concrete Structures Vol. I & Vol.II by Jain and Jaikrishna
5. Reinforced Concrete Structures Vol. I & Vol.II by B.C. Punmia, A.K.Jain, Arun K.Jain

B.E.Civil (Part-II)
4 ELECTIVE – III

4.2 Industrial Waste Treatment

Teaching Scheme:

Lecture – 3 Hrs / Week
Practical - 2 Hrs / Week

Examination Scheme:

Theory Paper – 100 Marks
Term Work – 25 Marks

Course Objectives: This course should result in

1. Thorough understanding of Generation of Waste water in different industries.
2. Imparting Basic knowledge of waste water treatment options for different industries.
3. Basic knowledge of legislation of pollution control.

SECTION I

Unit 1

(05)

Use of water in industry, Sources of wastewater, quality, and quantity variation in waste discharge, water budgeting, characterization and monitoring of wastewater flow, stream standards and effluent standards.

Unit 2

(07)

Waste volume and strength reduction, In –Plant measure, good housekeeping, Process change, leakage prevention, segregation, recycling, neutralization, equalization and proportioning of waste.

Unit 3

(05)

Water quality monitoring of streams, Self-purification of stream, B.O.D. reaction rate, D.O. Sag curve and D.O. deficit calculations. Classification of streams.

Unit 4

(03)

Miscellaneous methods of dissolved solids removal, sludge disposal methods.

SECTION II

Unit 5

(03)

Different types of waste treatment and their selections, Development of treatment flow diagram based on characteristics of waste.

Unit 6

(09)

Manufacturing processes in major industries, water requirements, wastewater sources, composition of wastes, Viz, Sugar, Distillery, Dairy, Pulps, Paper mill, Fertilizer, Tannery, Chemical, Steel Industry, power Plants, Textile Treatment flow sheets, alternative methods of treatment, factors affecting efficiency of treatment plant.

Unit 7

(03)

Acclimatization of bacteria to toxic wastes, Process Sensitivity, operation and maintenance requirements.

Unit 8

(05)

Water pollution control act, Organizational set up of central and state boards for water pollution control, classification of river on water use, minimal national standards, and socio-economic aspects of water pollution control.

Term Work should consist of:

- 1) Characterization & Treatment plant and design of any one of the above mentioned industry.
- 2) Assignments / Solution of problems on B.O.D. reaction rate, Self – purification of streams.

Reference Books:-

1. Waste Water Engineering – Metcalf Eddy - Mc Graw Hill Publications.
2. Industrial Waste Treatment - Nelson Nemerow, Addison - Wesley
3. Industrial Waste Treatment – Rao & Datta, Oxford and IBH Publishing Co.Pvt.Ltd., New Delhi
4. Industrial Waste Water Treatment- Dr.A.D.Patwardhan, Prentice Hall of India
5. Water and Waste Water Engg.- Fair G.M., Gayer J.C. and Okun D.A. , John Wiley Publication
6. Water and Waste Water Technology, M.J.Hammer and M.J.Hammer(Jr.)

B.E.Civil (Part-II)
4 ELECTIVE – III

4.3 WATER POWER ENGINEERING

Teaching Scheme:

Lecture – 3 Hrs / Week
Practical - 2 Hrs / Week

Examination Scheme:

Theory Paper – 100 Marks
Term Work – 25 Marks

Course Objectives:

On completion of this course the students will be conversant with the hydrology of water power projects, power generation and distribution methodology and types of water power stations. They shall know the constraints and opportunities in hydro power generation. They shall be conversant with all the components of power station, operation and maintenance of power station. They shall be able to broadly analyze and design such components. They shall also gain knowledge of tidal power and small hydropower generation stations

SECTION – I

Unit 1:

Introduction: Sources of energy, types of power station, choice of type of generation, component of water power project, types of hydro power schemes, general layouts of various hydropower schemes (4)

Unit 2:

Estimation of hydro power potential, basic water power equation, gross head, net head nature of supply, storage and pondage. Method of computing hydrographs, mass curves, flow duration curves.

Nature of demand: Load curve, load duration curves, load factor, plant factor, plant use factor, firm power secondary power (05)

Unit 3:

Intake structures - Types, level of intake, hydraulics of intake structures, trash rack, transition, conduit intake gates (03)

Unit 4:

Conduits: Types, economic section, power canals, pen-stock types hydraulic design and economic diameter pipe supports, anchor blocks, tunnels – classification, location and hydraulic design, tunnel linings (05)

Unit 5:

Surge Tank: Functions and behaviour of the surge tanks, location, types of surge tanks, basic

design criteria of simple surge tank, forebay (03)

SECTION – II

Unit 6:

Power station: General arrangements of a power station, power house, sub-structure and super structure, under ground power station – necessity principal, types, development and economics. (04)

Unit 7:

Turbines: Classification of turbines, characteristics of different types, choice of type of turbine, turbine setting and cavitation (04)

Unit 8:

Tail race: Functions, types, channel and tunnel draft tubes, function and principal types (03)

Unit 9:

Pumped storage plants, purpose and general layout of pumped storage schemes, main types, typical arrangements of the upper reservoirs, economics of pumped storage plants (03)

Unit 10:

Tidal power stations: Classification according to the principle of operation and general description of different types, depression power plants (04)

Term work:

Term Work shall consist of exercises based on theory.

Visit to Water Power Station. Visit report with the salient features and details of station

Text books:

- i) Hydro Power Structures – R. S. Varshney (ISBN 8185240787)
- ii) Water Power Engineering – M. M. Dandekar, Vikas Pub. House Pvt. Ltd.
- iii) Water Power Engineering – P. K. Bhattacharya, Khanna Pub., Delhi
- iv) Water Power Engineering – M. M. Deshmukh, Dhanpat Rai and Sons
- v) Textbook Of Water Power Engineering- Shirma R. K. , Sharma T. K
Publisher: S Chand & Company Ltd.

Reference Books:-

- i) Water Power Development – E. Mosonvi, Vol. I & II
- ii) Hydro-electric Engineering Practice – G. Brown, Vol. I, II & III
- iii) Hydro – Electric Hand Book – Creager and Justin

B.E. Civil (Part-II)
4 ELECTIVE – III

4.4 ENTREPRENEURSHIP

Teaching Scheme:

Lecture – 3 Hrs / Week
Practical - 2 Hrs / Week

Examination Scheme:

Theory Paper – 100 Marks
Term Work – 25 Marks

Course Objective: To enable students to learn various skills needed to run own business or to work as Entrepreneur.

SECTION – I

Unit1: Introduction (07)

Entrepreneurship : Definition entrepreneur and enterprise, need and scope of entrepreneurship, traits of an entrepreneur, present scenario of Indian industry and the place of SSI with respect to entrepreneurship, SWOT analysis for selection of business opportunities, Barriers for self growth.

Unit2: History of Entrepreneurship (06)

Small scale industries policy resolutions since independence major features only small medium and large scale industry. Tiny industries procedures and formalities to be done to start a SSI, Infrastructure of SSI, special scheme for technical entrepreneurs, whom to approach for what? Introduction to industries developing agencies, financial, technical, marketing such as DST, DIC, SFC, SIDBE, SSICD, SISI, ICICI export promotion councils, banks, technical consultancy organizations etc. and their role.

Unit3: (07)

Selection of product : Criteria for selection of product for SSI, market survey techniques, marketing viability of the product, typical areas of civil engineering.

SECTION – II

Unit4: (07)

Finance and accountancy: working capital and fixed capital assessment incentives from financial institutions and government, financial ratios, their significance, break even analysis cash flow charts financial statements.

Unit5: (07)

Project report: Preliminary and final project report preparation, financial technical commercial and economic viability project implementation process project profiles.

Unit6:

(06)

Introduction to marketing management sale and sales promotion. Industrial and commercial tax laws (major features only). Motivation risk and its analysis goal setting decision making. Communications skills effective communication and barriers. Subject may be taught with respect to suitable case studies and industrial visits. Audio video films shall be used on the above topics.

TERM WORK:

- i) Preparation of preliminary and final project report of anyone small scale industry from civil engineering field.
- ii) Report based on two industrial visits.

Books:-

- i) Planning and Industrial Unit

--by Jay Narayan Vyas Published by GranthVitrana, 101, Shree -yas, Opp. Jain Temple Near Navrangpura Bus Stop, Navrangpura, Ahmedabad 380 009

- ii) The Practice of Entrepreneurship

– Geoffery G. Meredith R.E. Nelson and P. A. Neck, Published by International Labour Office, CH 1211, Geneva 22, Switzerland

- iii) Small Scale Industry Handbook

– Jay Narayan Vyas, Published by Granthvitarana Ahmedabad

- iv) Financing an industrial Unit

– Jay Narayan Vyas & Dilip Patel, Published by Granthvitarana Ahmedabad

- v) Entrepreneurship Development Vol. I, II & III

– Vasant Desai Published by Himalaya publishing house, Ramdoot Dr. Bhalerao Marg, Girgaon, Mumbai – 400 004

- vi) Entrepreneurship for the Nineties

– Gordon B. Baty published by Prentice Hall Inc. College Technical Reference by Granthvitarana

B.E.Civil (Part-II)
4 ELECTIVE – III

4.5 RELIABILITY ENGINEERING

Teaching Scheme:

Lecture – 3 Hrs / Week
Practical - 2 Hrs / Week

Examination Scheme:

Theory Paper – 100 Marks
Term Work – 25 Marks

Course Objective: The objective of this course is to help students appreciate the fundamental issue related to structural reliability and reliability based design specifications through innovative and interesting design projects.

Unit 1:	(4)
Review of basic probability and statistics	
Unit 2:	(4)
Reliability of structures and safety in civil Engg.	
Unit 3:	(4)
Random variables, Function of Random variables, Distribution models	
Unit 4:	(4)
Structural analysis and design, load and resistance models	
Unit 5:	(4)
Reliability analysis method (FORM)	
Unit 6:	(4)
Simulation Techniques, Monte Carlo simulations	
Unit 7:	(8)
Design specification, Load and resistance factors in design codes, Load combination, Steel design specifications based on ASD & LRFD, Design of tension members, Design of beam elements	
Unit 8:	(4)
System reliability concepts, System and component reliabilities series and parallel models, Connection problems and reliability	
Unit 9:	(4)
Load estimation based on ASCE-7 project presentation	

Term work: Assignment based on above syllabus.

REFERENCE BOOKS

1. Structural Reliability Analysis and Prediction by R.E. Melchers, John Wiley & Sons 1999
2. Reliability of Structures by A.S. Nowak & K.R. Collins, McGraw-Hill, 2000

B. E. (CIVIL) PART – II
4. ELECTIVE –III

4.6 FINITE ELEMENT METHOD

Teaching Scheme:

Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25 Marks

- Course objectives:**
1. To introduce students to more advanced numerical method viz. FEM
 2. To enable students to analyse more complicated structures for which Closed form solutions are not readily available.
 3. To orient students to know and implement various research methods.

SECTION – I

Unit1: (6)

Analysis of skeletal structures : Formulation of stiffness matrices for elements of plane truss; Beam and plane portal frame by direct method; Transformation of matrix from local to global system; Numbering of nodes; minimization of band width; force displacement relations; Solution for displacement unknowns; Applications of method to plane truss; Continuous beams and plane portal frames.

Unit2: (8)

Elementary theory of Elasticity: Stress strain relation; Strain displacement relations; plane stress and plane strain problems; Compatibility conditions; differential equations of equilibrium; equations for two dimensional and three dimensional problems.

Unit3: (6)

Principle of minimum potential energy; variational method; continuum problems; Two dimensional Elements; use of displacement functions; Pascal's triangle; triangular and rectangular elements; formulation of element stiffness matrix.

SECTION – II

Unit4: (6)

Convergence requirements – Selection of the order of polynomial, conforming and non conforming elements, Effect of element aspect ratio, finite representation of infinite bodies.

Unit5:

(8)

Shape function in Cartesian and natural co-ordinate system, Lagrange's interpolation formulae, concept of iso-parametric element, relation between Cartesian and natural coordinate system, Jacobian matrix, one and two dimensional iso-parametric elements.

Unit6:

(6)

Introduction to three-dimensional problem, various three-dimensional elements, Axisymmetric problems, formulation of stiffness matrix of three dimensional and axisymmetric elements.

Term Work: - based on above syllabus

Books:-

- i) Introduction to Finite Element Method – Chandrakant C. Desai & F. Abel
(Van Nortrand Reinhold Co.)
- ii) Finite Element Method – Houbner
- iii) Finite Element Method – Martin
- iv) Concepts of Finite Element Method – R.D.Cook.
- v) Finite Element Method in Engg. – Zienkiewicz O.C.
- vi) Finite Element Method - Zienkiewicz O.C. & Taylor
- vii) Finite Element Method -Krishnamurthy
- viii) Finite Element Method - Brebbia & Connor
- ix) Finite Element Method – S.S. Rao.
- x) Finite element method- J. N. Reddy

B.E. Civil – Part II
4. ELECTIVE – III

4.7 EXPERIMENTAL STRESS ANALYSIS

Teaching Scheme:

Lecture: 3 Hrs / Week
Practicals: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks
Term Work: 25Marks

Course objectives: The course aims at the following:
1. The student should learn to understand response of the structure.
2. The student must validate the theoretical developments using Experimental investigations.

SECTION – I

Unit 1: History of experimental stress analysis, method for generating, applying and measuring forces, fundamental concepts of strain measurement, load cell, proving ring, Huggenburger, Berry, Johanson ,Demec optical extenso-meters. (08)

Unit 2:Electrical resistance strain gauges, properties of grid, backing and cement, different types of wire and foil types strain rosettes, Balancing- Series, parallel. (08)

Unit: 3: Dimensional analysis theorem, Model analysis- Simulations, Problems. (04)

SECTION – II

Unit: 4: Brittle coating method, general principles, advantages and disadvantages, state of stress and laws of failure calibration technique, applications, methods of crack detection. (07)

Unit: 5: Photo – elasticity – polariscope and auxiliary instruments, stress optic law, Fringe pattern, isoclinics and stress trajectories materials properties and their values, calibration techniques, application of model results to prototype two dimensional models, compensation techniques, separation of principal stresses. (14)

Term Work:-

The term work shall consist of a record of set of experiments and exercises based on the theoretical course of the syllabus.

Reference Books:

1. Photo elasticity Vol. I – Frocht
2. Applied Stress Analysis - Direlli
3. Experimental Stress Analysis- Dally & Riley, McGraw Hill
4. Experimental Stress Analysis- Srinath, T.McGraw Hill
5. Mechanical measurements- Beckwith & Buck
6. Strain Gauge Primer- Perry Lisner
7. Experimental Stress Analysis & Motion measurements- Dove & Adams

B.E. (Civil) Part-II
4. ELECTIVE– III

4.8 OPTIMIZATION TECHNIQUES

Teaching Scheme:
Lecture: 3 Hrs / Week
Practical: 2 Hrs / Week

Examination Scheme:
Theory Paper: 100 Marks
Term Work: 25 Marks

Course Objective:

To enable students to learn and use optimization techniques for various decision making problems in Civil Engineering

SECTION – I

Unit 1: (4)
Introduction: Classical optimization techniques, Standard format of optimization problems, Types of optimization problems, formulation of optimization problems

Unit 2: (04)
Linear Programming, Graphical solution, simple method quality, sensitivity analysis.

Unit 3: (06)
Transportation problems, shortest route problem, maximum flow problem, Linear Programming representation of network.

Unit 4: (8)
Decision theory and Games, decision tree, decision under risk, Game theory.

Unit 5: (8)
Inventory models – deterministic models probabilistic model. Queuing theory, simulation applications

Unit 6: (8)
Introduction to non classical optimization Techniques, Queuing theory, simulation applications, Introduction to non-linear programming. Dynamic programming and integer programming

Term work: - consists of at least one exercise on each of the above unit – minimum six

Recommended Books

- i. Optimisation – S. S. Rao, Wiley Eastern Ltd.
- ii. Operation Research - H. A. Taha, Mac-Millan
- iii. Graph Theory – Narsingh Rao, Prentice Hall
- iv. Operation Research – Wagner, Wiley Eastern Ltd.
- v. Project Management – Lick D., Gower Publication England
- vi. Project Management for Engineering and construction by Oberlender G D – McGraw Hill.

B.E. Civil – Part II
4. ELECTIVE – III

4.9 DISASTER MANAGEMENT

Teaching Scheme:

Lecture: 3 Hrs / Week

Practicals: 2 Hrs / Week

Examination Scheme:

Theory Paper: 100 Marks

Term Work: 25Marks

Course Objective: To study the emerging approaches in Disaster Reduction & Management. The emphasis will be on programmes of National & International organizations for Disaster preparedness, Mitigation and awareness to prevent or reduce losses that occur due to hazards, disaster and emergencies.

Expected Learning Outcome:

The students who shall take this course can prepare hazard zonation maps through education on Disasters and Community Involvement. Teaching will include field trip & interaction with programmes of disaster research & mitigation by national organizations

Unit-I

(8)

Environmental Hazards & Disasters.

Meaning of Environmental hazards, Environmental Disasters and Environmental stress.-
Concept of Environmental Hazards, Environmental stress & Environmental Disasters.-
Different approaches & relation with human Ecology -- Landscape Approach-- Ecosystem Approach- Perception approach- Human ecology & its application in geographical researches.

Unit –II

(8)

Types of Environmental hazards & Disasters

Natural hazards and Disasters

Planetary Hazards- Endogenous Hazards- Landslides-Causes and distribution of Volcanoes

Volcanic Hazards/ Disasters- Hazardous effects of volcanic eruptions- Environmental impacts of volcanic eruptions

Earthquake Hazards/ disasters- Causes of Earthquakes- Distribution of earthquakes- Hazardous effects of earthquakes- Earthquake Hazards in India- Human adjustment, perception & mitigation of earthquake.

Exogenous hazards/ disasters- Infrequent events- Cumulative atmospheric hazards/ disasters

Infrequent events- Cyclones- Lightning- Hailstorms

Cyclones- Tropical cyclones & Local storms-- Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation)

Cumulative atmospheric hazards/ disasters -- Floods- Droughts- Cold waves- Heat waves

Floods- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation)

Droughts- Impacts of droughts- Drought hazards in India- Drought control measures

Extra Palnetary Hazards/ Disasters

Man induced Hazards /Disasters-Physical hazards/ Disasters-Soil Erosion

Soil Erosion-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion

- Conservation measures of Soil Erosion

Chemical hazards/ disasters

- Release of toxic chemicals, nuclear explosion- Sedimentation processes

Sedimentation processes-- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation

Biological hazards/ disasters- Population Explosion

Unit -3

(6)

Emerging approaches in Disaster Management- Three Satges

Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting&warning- Preparing disaster preparedness plan- Land use zoning- Preparedness through (IEC) Information, education &Communication Pre-disaster stage (mitigation)

- Disaster resistant house construction- Population reduction in vulnerable areas- Awareness

Emergency Stage - Rescue training for search & operation at national & regional level- Immediate relief- Assessment surveys

Post Disaster stage-Rehabilitation- Political Administrative Aspect- Social Aspect- Economic Aspect- Environmental Aspect

Unit -4

(4)

Natural Disaster Reduction & Management -Provision of Immediate relief measures to disaster affected people-Prediction of Hazards & Disasters-Measures of adjustment to natural hazards

Unit-5

(6)

Mitigation- Institutions- the work of- Meteorological observatory - Seismological observatory - Volcano logy institution - Hydrology Laboratory - Industrial Safety inspectorate - Institution of urban & regional planners -. Chambers of Architects.Engineering Council-. National Standards Committee

Integrated Planning- Contigenncy management Preparedness -Education on disasters -Community involvement-The adjustment of Human Population to Natural hazards & disasters

Role of MediaMonitoring Management- programme of disaster research &mitigation of disaster of following organizations.

International Council for Scientific Unions (ICSU)- Scientific committeeon problems of the Environment (SCOPE), International Geosphere-Biosphere programme (IGBP) - World federation of Engineering Organizations(WFED)-National Academy of Sciences-World

Meteorological organizations(WMO)-Geographical Information System(GIS)- International Association of Seismology & Physics of Earth's Interior(IASPEI)-Various U.N agencies like UNCRD, IDNDR, WHO, UNESCO, UNICEF,UNEP.

Unit –6

(4)

Preventive Measures

A regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster& Disaster in Hills with particular reference to India -Ecological planning for sustainability & sustainable development in India-Sustainable rural development:A Remedy to Disasters-Role of Panchayats in Disaster mitigations- Environmental policies &programmes in India-Institutions & National-Centres for Natural Disaster reduction, Environmental Legislations in India,-Awareness, Conservation Movement, Education & training

Practice

1. Practical exercise will be set on each unit
2. Each student will be required to prepare a project work of Coastal EcoSystem, Desert Eco System and Mountain Eco System & submit it at the end of year & this will be evaluated by an internal as well as external examination

Reference

- Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994
Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003
A.S. Arya Action Plan For Earthquake,Disaster, Mitigation in V.K. Sharma (Ed) Disaster Management IIPA Publication New Delhi, 1994
R.K. Bhandani An overview on Natural &Man made Disaster & their Reduction ,CSIR, New Delhi
M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management,IIPA, New Delhi, 2001
P. C. Sinha, Disaster Mitigation, Preparedness, Recovery and Response SBS Publishers & Distributors Pvt. Ltd.
D. P. Coppola, Introduction to International Disaster Management,Butterworth-Heinemann.

B.E. Civil – Part II

5 R.C.C. STRUCTURAL DESIGN AND DRAWING

Teaching Scheme:

Drawing: 4 Hrs / Week

Examination Scheme:

Term Work: 50 Marks

Oral : 50 Marks

Course objectives: To train students imagine and predict response of structure and accordingly by making necessary provision of cross section & a proper detailing bring it to reality.

Term work shall consist of detailed design & drawing of the following R.C. structures by Limit State method unless specified.

- 1) Residential two storied building.
- 2) Any one from the following.
 - a) Combined trapezoidal footing/ raft foundation.
 - b) Pile foundation for structure with pile cap.
 - c) Water tank (GSR/USR) by working stress method using IS 3370.

Note:

1. Computer analysis of any one frame for project No.1 shall be performed for Dead Load, Live Load & Earthquake Loads using relevant application software.
2. Drawings prepared shall indicate ductility details as per the provisions in IS: 13920.

B.E. (Civil) Part-II

6. PROJECT WORK

Teaching Scheme:

Practical - 6 hours per week per batch

Examination Scheme:

Term Work – 100 Marks

Oral Exam. – 100 Marks

Project work at B.E. (Civil) Part-II is continuation of Project Work of B.E. (Civil) Part-I on any topic from Civil Engineering area or interdisciplinary area related to Civil Engineering. The project work should be completed at B.E. (Civil) Part-II level.