University of Pune

Structure of B.E. (Civil Engineering) 2008 Course (To be commenced w.e.f. July, 2011)

Semester I

Sub code No.	Subject Title	Teaching Scheme Hours per week			Examination Scheme				Total Marks
		Lect.	Tut.	Pract/ Drg	Paper	TW	Pract	Oral	
401001	Environmental Engineering-II	4	--	2	100	25	--	50	175
401002	Dams and Hydraulic Structures	4	--	2	100	25	--	50	175
401003	Structural Design-III	4	--	2	100 **	25	--	50	175
401004	Elective -I	4	--	2	100	25	--	--	125
401005	Elective -II	4	--	--	100	--	--	--	100
401006	Project Work	--	--	2	--	*	--	--	--
	Total	20	--	10	500	100		150	750

*** It is mandatory to present a seminar and submit report based on work of first semester.** **** Theory paper of 4 hrs. duration**

Semester II

Sub code No.	Subject Title	Teaching Scheme Hours per week			Examination Scheme				Total Marks
		Lect.	Tut.	Pract/ Drg	Paper	TW	Pract	Oral	
401007	Elective -III	4	--	2	100	25	--	--	125
401008	Elective-IV	4	--	--	100	--	--	--	100
401009	Quantity Surveying ,Contracts and Tenders	4	--	4	100 **	50	--	50	200
4010010	Transportation Engineering-II	4	--	2	100	25	--	50	175
401006	Project Work	--	--	6	--	100	--	50	150
	Total	16	--	14	400	200		150	750

**** Theory paper of 4 hrs. duration**

Semester I

Elective-I	Elective-II
1.Structural Design of Bridges 2. Systems Approach in Civil Engineering 3.Air Pollution and Control 4. Architecture and Town Planning 5. Advanced Geotechnical Engineering	1. Matrix Methods of Structural Analysis 2. Hydroinformatics 3. TQM & MIS in Civil Engineering 4. Earthquake Engineering 5. Advanced Concrete Technology

Semester II

Elective-III	Elective-IV
1. Advanced Structural Design 2.Advanced Foundation Engineering 3. Advanced Engineering Geology with Rock Mechanics 4. Advanced Environmental Management 5. Construction Management	1. Integrated Water Resources and Planning 2. Advanced Transportation Engineering 3. Statistical Analysis And Computational Methods in Civil Engg. **4.Open Elective** Finite Element Method in civil engg. Geoinformatics Hydropower Engineering Industrial Waste Water Management

Open Elective: The concept of opting for open elective has following objectives i)To strengthen the industry Institute Interactions.
ii) To promote interdisciplinary exchange of knowledge.
Methodology to opt: Keeping above objectives in mind, the civil engg. department of any college will establish tie up with industry and taking advantage of experts from industry and academics, the draft of syllabi will be prepared. Such draft shall be forwarded to B.O.S. The B.O.S. shall approve this draft and send to faculty of engg.and academic council for their approval. The department can start such open elective only after approvals from B.O.S, faculty of engg.and academic council. Considering the time involved in entire process, departments are advised to initiate this process well in advance. However, no department can start any open elective without prior permission and approval of BOS before commencement of term.
The syllabus of following open electives is approved so far. Any department can opt for following subjects under open elective or suggest another, under binding of above methodology.

List of open electives approved:
Elective IV (401 008) iv) Open Elective

- **Finite Element Method**
- **Geoinformatics**
- **Hydropower Engineering**
- **Industrial Waste Water Management**

401001 ENVIRONMENTAL ENGINEERING – II

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs / week	Paper : 100 Marks
Practical: 2 Hrs/week	Oral : 50 Marks
	TW : 25 Marks
	Duration : 3 Hrs.

Unit I

Sewage quantity: Collection and conveyance of sewage, sources of sewage, variations in sewage flow, Design of circular sanitary sewers. Sewer materials, choice of materials, testing of sewer pipes, sewer appurtenances. Pumping of sewage and types of pumps. Introduction and relationship between TOC, COD and BOD. Effect of change of life on sewage quality. (5 Hrs)

Characteristics of sewage: Physical, chemical and biological characteristics, interpretation and practical significance of test results. Sampling, analysis of sewage for pH, Suspended Solid, Total Solids, COD, BOD, Chlorides and sulphates. Process flow diagram for sewage treatment. (4 Hrs)

Unit II

Stream sanitation: Self purification of natural streams, river classification as per MoEF, Govt. of India & effluent discharge standards as per BIS 2490, Oxygen Sag Curve, Streeter - Phelps equation and terminology (without derivation and numerical).

Sewage treatment: Process flow diagram for sewage treatment, Theory and design of screen chamber, Grit Chamber and Primary sedimentation tank as per the Manual of CPHEEO. (8 Hrs)

Unit III

Theory & design of secondary treatment units: Introduction to unit process and unit operations for secondary treatment. Biological principle, important microorganisms in waste water & their importance in waste water treatment systems, bacterial growth, general growth pattern, growth in terms of bacterial numbers and bacterial mass. Kinetics

of biological growth, cell growth, substrate limited growth, cell growth and substrate utilization, effect of endogenous metabolism.

Activated sludge process: Design of ASP, sludge volume index, sludge bulking & control. Types of ASP.

Trickling filter: Biological principle, different T.F media & their characteristics, design of standard rate and high rate filters using NRC formula, single stage & two stage filters, recirculation, ventilation, operational problems, control measures, theory of rotating biological contractors. (9 Hrs)

Unit IV

Low cost treatment methods:

Oxidation pond: Bacteria – algae symbiosis, design of oxidation pond as per the manual of CPHEEO, advantages & disadvantages of oxidation ponds.

Aerated lagoons: Principle, aeration method, advantages & disadvantages of aerated lagoons.

Introduction and theory of Phytoremediation technology for wastewater treatment.
Introduction and theory of root zone cleaning system (6 Hrs)

Unit V

Theory & design of anaerobic treatment units: Septic tanks, suitable conditions & situations, biological principle, method of treatment & disposal of septic tank effluent. Design of septic tank along with up flow filters and soak pit.

Anaerobic digester: Principal of anaerobic digestion, stages of digestion, bio – gas production its characteristics & application, factors governing anaerobic digestion, design of anaerobic digesters. Such as gravity thickener, sludge drying bed, decanters.

Methods of sludge treatment and disposal, advantages & disadvantages. Up-flow Anaerobic Sludge Blanket (UASB) Reactor– Principle, advantages & disadvantages. (8 Hrs)

Unit VI

Industrial waste water treatment: Methods of sampling. Equalization and neutralization. Application of preliminary, primary and secondary treatment for industrial wastewater as per the pollution control norms.

Sources of waste water from manufacturing process, characteristics of effluent, different methods of treatment & disposal of effluent for the following industries:

Sugar, dairy, distillery, paper & pulp and textile. Flowchart and automobile industry. Discharge standards as per pollution control norms. (8 Hrs)

Term Work

The term work shall consist of a journal giving details of at least 8 out of 12 of the following experiments of which Sr.No.12 is compulsory.

Solids -Total solids, suspended solids, volatile solids, settleable solids & non settleable solids.

Sludge Volume Index.

Dissolved oxygen.

Bio-Chemical Oxygen Demand.

Chemical Oxygen Demand.

Electrical Conductivity.

Determination of Phosphates by spectrophotometer.

Determination of Nitrates by spectrophotometer.

Determination of heavy metals like Cr^{6+} or Zn or Ni or Cd.

Determination of total nitrogen by kjeldal method

Visit to domestic / Industrial wastewater treatment plant & its detailed reports.

Computer aided design of Sewage Treatment Plant (STP) and Effluent Treatment Plant (ETP) using suitable software such as;

ETPSOFT/02 by Prachi services,e-

mail:prachiservises@rediffmail.com and www.worldenviro.com

C programming or any other suitable software.

Note: - Term Work should include a detailed analysis of practical interpretation, significance and application of test results.

Reference Books

Environmental studies by Rajgopalan- Oxford University Press.

Waste Water Treatment & Disposal – Metcalf & Eddy - TMH publication.

Environmental Engg. - Peavy, Rowe - McGraw Hill Publication.

Waste Water Treatment – Rao & Dutta.

Waste Water Engg. – B.C. Punmia & Ashok Jain - Arihant Publications.

Water Supply & Waste Water Engg.- B.S.N. Raju – TMH publication.

Sewage Disposal & Air Pollution Engg. – S. K. Garg – Khanna Publication.

Environmental Engg. – Davis - McGraw Hill Publication

Manual on sewerage and sewage treatment – Public Health Dept., Govt. of India.

I.S. Codes

I.S. 3025 (all parts)

e - Resources

http://nptel.iitm.ac.in/courses-contents/IIT Kanpur and IIT Madras.

http://cpcb.nic .in

http://moef.nic .in

401002 DAMS AND HYDRAULIC STRUCTURES

Teaching scheme:
Lecture: 4 Hrs/week
Practical: 2 Hrs /week

Examination Scheme:
Paper : 100 Marks
Oral : 50 Marks
TW : 25 Marks
Duration : 3 Hrs.

Unit I

Dams: Introduction - Types and classification of dams like gravity dams earth dams-arch dams- buttress dam- roller compacted concrete dams- selection of site for dams – choice of dams – preliminary and final investigations for dams.

Dam safety : I.S.guildelines and recommendations – restoration and retrofitting – strengthening of dams – maintenance of dams – field monitoring – dam instrumentation-piezometers – settlement systems and cells – inclinometers – tiltmeters – pendulums-extensometers – different gauges and cells- cracks and joint meters.

Arch dam (Introduction level): Introduction –concept-conditions favouring-layout-classification- forces acting-design of arch dam- basic assumptions- different design method.

Unit II

Gravity dams: Introduction-different components-conditions favouring- forces acting-combination of loading- seismic analysis-different seismic terms-determination of seismic forces-stress analysis-principal & shear stress at toe & heel- middle third rule-requirement of stability- modes of failure –elementary profile- different design methods(introduction only)- gravity method-construction of dam-preparation of foundation-concreting in gravity dam-colgrout masonry & roller compacted concrete dam(introduction)- temperature control-crack formation-construction joints- keys-water seals.

Unit III

Earth dams : Introduction- conditions favoring – limitations- classification –

investigation for earth dam-seepage analysis-plotting of seepage line-properties of

seepage line- structural stability analysis- forces acting- swedish circle method-stability

analysis for foundation-failure of earth dam -– seepage control-causes and control measures-filters and drains-types and design criteria of filter- seepage control in foundation-upstream blanket-cut off-drains-relief well-construction steps-important construction equipments (introduction).

Unit IV

Spillways: Introduction – data collection-principles of spillway-key lavels- site selection-components – classification- principles of hydraulic design of ogee and open channel (chute) spillway- energy dissipation devices-different types of basins and buckets-correlations between jump height and tail water depth.

Gates – Types of spillway gates like vertical gates- radial gates – automatic gates etc. - operation of gates -inspection and maintenance of gate – safety of gates.

Diversion head works: Selection of site- layout of work -types of weirs and barrages-design for subsurface flow-safety against piping and uplift. Uplift theories such as Bligh, Lane and Khosla's theories- design of weirs on permeable foundations.

Unit V

Canal: Introduction-types –components - selection of canal alignment-procedure for fixing alignment- data required for design-hydraulics of sediment transport-regimes of flow-sediment transport in canal-different sediment loads- sediment transport theory-semi theoretical approach- empirical approach- critical active force- shield's theory-design of stable canal in alluvial beds –Keneddy's theory-lacey's theory- design of irrigation canal based on crop water requirement- losses in canals- canal lining-advantages-limitations-requirements-types-cost economics of lining- maintenance of canals.

C.D.works: Types- Selection of appropriate type - necessity – design principles.

Canal falls: Introduction –necessity - site selection- classification- types – selection of type – components- design (introduction) - construction of fall (introduction).

Canal regulators: Cross and head regulators- functions and design – escapes- definition – necessity- types-outlets- classification- types of outlets- types of modular, non modular and semi modular outlets.

Unit VI

River training & bank protection: Objectives of river training- methods of river training- principles of design and construction of river training works- various measures of protection works.

Hydro-power: Types of hydropower plants such as runoff type- storage type- pumped storage type- tidal- mini & micro- general layout of different types- assessment of power potential- main components of hydro- power schemes- underground power house-different terms of hydropower like load factor - utilization factor, capacity factor-different heads and efficiencies.

Term Work

Minimum seven assignments as per the list given below.

Group I: All assignments compulsory.

Marking catchment area on a topo sheet and working out average annual rain fall and determining yield by various methods.

Stability analysis of gravity dam.

Stability analysis of earth dam.

Design of spillway and stilling basin.

Design of canals.

Design and analysis of a weir on permeable foundation.

Design of any one type cross drainage works.

Design of any one type of canal fall and standing wave flume. Group –III Any one of the following:

To develop a unit hydrograph and to draw a flood hydro graph for given two or three successive rainfall in basin of a water resources project.

Benefit cost analysis of a water resources project.

Design of any one type of river training work.

A typical layout of a high head hydropower plant, functions of all the components

and details of cost constructions.

5. A report based on visits to any irrigation projects during the second semester.

Oral: Based on above syllabus and term work.

Reference Books

1. Design of Small Dams- United States Department of the Interior, Bureau of Reclamation revised reprint 1974, Oxford and IBH Publishing Co.

Irrigation and Water Resources Engineering- Asawa G.L- New Age International (P) Ltd. Publishers, first ed, 2005.

Engineering for Dams- CreagerW.P, Justin J.D, Hinds J -Wiley Eastern Pvt. Ltd., New Delhi, 1968

Irrigation Engineering and Hydraulic Structures- Garg S.K- Khanna Publishers N.D. 13th ed, 1998.

Hydraulic Structures, Vol. 1. & Vol. 2- Grishin M.M- Mir Publishers, Moscow, 1982.

Design Textbook in Civil Engineering: Volume Six: Dams- Leliavsky, Serge – Oxford and IBH Publishing Co. Pvt. Ltd., 1981.

Roller Compacted Concrete Dams- MehrotraV.K- Standard Publishers Distributors, Delhi, 1st ed, 2004.

Irrigation, Water Resources and Water Power Engineering- Modi, P.N. - Standard Book House, New Delhi, 2nd ed, 1990.

Earth and Earth Rock Dams- Sherard J.L, Woodward R.J. - John Wiley and Sons, inc. 1963.

I.S. Codes

I.S. 8605 – 1977 (Reaffirmed 1998), Code of practice for construction of masonry in dams, third reprint, July 1999, B.I.S. New Delhi.

I.S. 6512-1984 (Reaffirmed 1998), Criteria for design of solid gravity dams, first revision, first reprint, September, 1998, B.I.S. New Delhi.

I.S. 457 – 1957 (Reaffirmed, 2005), Code of practice for general construction of plain and reinforced concrete for dam and other massive structures, sixth reprint, January 1987, B.I.S. New Delhi.

I.S. 10135 – 1985, Code of practice for drainage system for gravity dams, their

foundations and abutments, first revision, B.I.S. New Delhi.

I.S. 14591 – 1999, Temperature control mass concrete for dams – guidelines, B.I.S. New Delhi.

I.S. 11223 – 1985 (Reaffirmed 2004), Guidelines for fixing spillway capacity, edition 1.2 (1991-09), B.I.S. New Delhi.

I.S. 6934 – 1998 (Reaffirmed 2003), Hydraulic design of high ogee overflow spillways – recommendations, first revision, B.I.S. New Delhi.

I.S. 11155- 1994, Construction of spillways and similar overflow structures – Code of practice, B.I.S. New Delhi.

I.S. 5186 – 1994, Design of chute and side channel spillway – criteria, first revision, B.I.S. New Delhi.

I.S. 10137- 1982 (Reaffirmed 2004), Guidelines for selection of spillways and energy dissipaters, B.I.S. New Delhi.

I.S. 4997 – 1968 (Reaffirmed 1995) Criteria for design of hydraulic jump type stilling basins with horizontal and sloping apron, sixth reprint, January, 1998, B.I.S. New Delhi.

I.S. 7365-1985, Criteria for hydraulic design of bucket type energy dissipaters, first revision, B.I.S. New Delhi.

401003 STRUCTURAL DESIGN III

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / week	**Paper : 100 Marks**
Practical: 2 Hrs/week	**Oral : 50 Marks**
	TW : 25 Marks
	Duration : 4 Hrs.

____ Unit I

Prestressed concrete structures- Introduction- Basic concepts,-materials- various Pretensioning and post tensioning systems,-concept of Losses.

Stress calculations, concept of cable profile.

Unit-II

Design of Prestressed concrete simply supported rectangular and flange sections for flexure and shear including end block.

Design of one way and two way post tensioned slabs (Single panel only)

Unit-III

Earthquake loads by seismic coefficient method- Estimation of combined effect of lateral and vertical loading in multi storeyed frames.

Design of an intermediate continuous beam within the above structure.

Unit IV

Design of Water tanks- circular and rectangular with flexible and rigid base- resting on ground by approximate and IS code method.

Design of rectangular combined footing- with and without strap beam.

Design of Cantilever retaining wall- Tee and Ell shapes.

Note: Design based on above unit shall conform to latest versions of I.S. 456, I.S. 875, I.S. 1343,

I.S. 3370, I.S. 1893, I.S. 13920.

Term Work

Term work shall be based on the above syllabus. It consists of

Assignment on part 'a' of unit I and unit III each

Minimum three full imperial sheets based on two projects of RCC and one project of pre-stressed concrete.

Report on analysis of assignment on unit III by software or computer program

Two site visit reports one each of R.C.C. and another

P.S.C. Oral Examination: Oral based on above term work

Limit state theory and design of reinforced - Dr. V. L. Shah and Dr S. R. Karve Concrete, Structures Publications

Fundamentals of Reinforced Concrete- N.C. Sinha, S.K. Roy – S. Chand & Co. Ltd

Advanced design of structures- Krishnaraju - Mc Graw Hill

Design of Prestressed concrete structures- T. Y. Lin.

Prestressed Concrete- N. Krishna Raju – Tata Mc Graw Hill Publication Co.

Comprehensive RCC Design - Punmia, Jain & Jain - Laxmi Publications.

Design of design of reinforced Concrete structures- M. L. Gambhir -PHI

Reinforced Concrete, Vol I- Dr.H J. Shah Charotar Publishing House

Prestressed Concrete – A Fundamental Approach- Edward Nawy – PHI.

I.S. Codes

IS: 456: Indian Standard code of practice for plain and reinforced concrete, BIS, New Delhi.

IS: 1343: Indian Standard code of practice for Prestressed concrete, BIS, New Delhi.

IS: 1893: Indian Standard cCode of practice for criteria for Earthquake resistant design of structures, BIS, New Delhi.

IS: 3370-Indian Standard code of practice for concrete structures for storage of liquids, BIS, New Delhi.

401004 ELECTIVE I STRUCTURAL DESIGN OF BRIDGES

Teaching Scheme:	Examination Scheme:
Lectures : 4 Hrs/week.	Paper : 100 Marks
Practicals : 2Hrs/week	TW : 25 Marks
	Duration : 3Hrs.

Unit I

Types of highway bridges, RC & prestressed bridges, structural arrangement for slab, T-beam, box grader, balanced cantilever, continuous girders, rigid frame, arch, bow string, cable stayed bridges, curved and skew bridges.

Standard specifications of road bridges, width of carriage way , clearances, IRC classification for live loads, dead load, impact, longitudinal and centrifugal forces, horizontal forces due to water current, buoyancy effect, earth pressure and seismic forces.

Unit II

T-Beam type bridge: Components, number and spacing of main girders, RC design of deck slab using load distribution by Pigeoud's curves, IRC class AA tracked and wheeled vehicle. Design of cantilever slab.

Unit III

Prestressed concrete design of intermediate and end longitudinal girders. Design based on analysis by Courbon's method, design of end block. Design of elastomeric pad bearings.

Unit IV

Types of railway steel bridges, deck and through type truss bridges and plate girder bridges, arch bridges.

Classification of railway tracks, standard axle and train loads for different tracks, equivalent UDL, dynamic effect, Impact factor, longitudinal forces, racking forces, wind and seismic forces.

Unit V

Truss bridges: Structural arrangements for deck and through type railway

Bridges, width and clearances, analysis and design of members of steel truss bridge, typical connection details at joints.

Unit VI

Bracing systems in deck and through type truss bridges, analysis and design of horizontal truss bracings at chord levels. Various arrangements of portal bracings, mechanical bearings, design of rocker and roller bearings.

Term Work

Term work shall consist of at least two assignments from unit one to three and at least two assignments from unit four to six out of which one shall be based on use of standard computer software. In addition to this, a visit report be enclosed for any one type of bridge.

Reference Books

Essentials of Bridge Engineering – D. Johnson Victor, Oxford and IBH Publishing Co. Pvt. Ltd.

Concrete Bridge Practice – Analysis, Design and Economics, V.K.Raina, Tata Mc Graw Hills Publications.

Design of Bridge Structures – T.R.Jagdish and M.A.Jayram, Prentice Hall of India.

Design of Steel Structures Vol II – Ramchandra, Standard Book House, Delhi.

Codes

Indian Road Congress – Standard Specifications and Code of Practices for Road Bridges.

IRC 18 – 1985, Design Criteria for Prestressed concrete road bridges (Post Tensioned Concrete)

7) IS:1915-1961, Code of Practice for Steel Bridges.

401004 ELECTIVE I SYSTEMS APPROACH IN CIVIL ENGINEERING

Teaching Scheme:	Examination Scheme:
Lecture: 4 Hrs/week	Paper : 100 Marks
Practical: 2 Hrs /week	TW : 25 Marks
	Duration : 3 Hrs.

Unit 1

Use of systems approach in Civil Engineering and managerial decision making process. Introduction to Optimization Techniques and their application in Engineering Planning, design and Construction, Various models, Objective function and constraints, convex and concave functions, regions and sets.

Linear programming: Formulation of Linear optimization models for Civil engineering applications. The simplex method, special cases in simplex method, Method of Big M, Two phase method, duality, sensitivity analysis.

(9 Hrs)

Unit II

Linear programming -

The Transportation Model and its variants, Assignment Model, and its variants

(8 Hrs)

Unit III

Dynamic programming:

Multi stage decision processes, Principle of optimality, recursive equation, Applications, various models of D.P. (8 Hrs)

Unit IV

Non-Linear programming:

Single variable unconstrained optimization –Local & Global optima, unimodal function, Sequential Search Techniques-Dichotomous, Fibonacci, Golden section. Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton's Method. Multivariable optimization with equality constraints-Lagrange Multiplier Technique. (9 Hrs)

Unit V

Queuing Theory, Simulation, sequencing model – n jobs through 2, 3 and M machines. (8 Hrs)

Unit VI

Games theory, Replacement models (8 Hrs)

Term Work

One exercise on each unit. Out of these any two problems to be solved using computer

One exercise on formulation of a problem applicable to any field of Civil Engineering, requiring use of LP/NLP/DP. Formulation of objective function and constraints (No solution)

Reference Books

Operations Research by Hamdy A. Taha

Engineering Optimization by S.S.Rao

Quantitative Techniques in Management by N.D. Vohra (Mc Graw Hill)

Topics in Management Science by Robert E. Markland(Wiley Publication)

An Approach to Teaching Civil Engineering System by Paul J. Ossenbruggen

A System Approach to Civil Engineering Planning & Design by Thomas K. Jewell (Harper Row Publishers)

e - Resources

Mathematical Model for Optimization (MMO Software)

nptel.iitm.ac.in/courses/webcourse-contents/IISc-Bang/OPTIMISATION METHODS/New-index1.html

401004 ELECTIVE I AIR POLLUTION AND CONTROL

Teaching Scheme:
Lectures: 4 Hrs / week
Practical: 2 Hrs / week

Examination Scheme:
Paper : 100 Marks
TW : 25 Marks
Duration : 3 Hrs.

Unit I

Meteorological aspects: Zones of atmosphere, Scales of meteorology, Meteorological parameters, Temperature lapse rate, Plume behavior. Gaussion diffusion model for finding ground level concentration. Plume rise. Formulae for stack height and determination of minimum stack height.

Unit II

Air sampling and analysis: Air pollution survey, basis and statistical considerations of sampling sites, devices and methods used for sampling gases and particulars. Stack emission monitoring, isokinetic sampling. Analysis of air samples chemical and instrumental methods. Ambient air quality monitoring.

Unit III

Indoor air pollution: Causes of air pollution, sources and effects of indoor air pollutants, changes in indoor air quality, control of indoor air pollutants and air cleaning systems. Odour pollution: Theory, sources, measurement and methods of control of odour pollution.

Unit IV

Control of air pollution: By process modification, change of raw materials, fuels, process equipment and process operation. By use of air pollution control equipment for particulate and gaseous pollutants. Design of control equipment as Settling chamber, Cyclone, Fabric filter, Electro static precipitator and Wet scrubber. Control of air pollution from automobiles.

Unit V

Land use planning: As a method of control.

Economics of air pollution control: Cost/benefit ratio and optimization.

Legislation and regulation: Air (Prevention and Control) Pollution Act, 1981. The Environment (Protection) Act 1986. Emission standards for stationary and mobile sources. National Ambient Air Quality Standards.

Unit VI

Environmental impact assessment and management:

Methodology for preparing environmental impact assessment. Role of regulatory agencies and control boards in obtaining environmental clearance for project. Role of general public in environmental clearance. Public hearing. Environmental impacts of thermal power plants and water resources projects. Environmental management plan. The environmental rules 1999 (sitting of industries).

Term Work

Term work shall consist of assignments on all above units, detailed report on any two of the above chapters and one industrial visit report.

Reference Books

Air Pollution – H. V. N. Rao and M. N. Rao, TMH, Pub.

Air pollution – KVSG Murali krishna.

Air Pollution – Perkins.

Environmental Engineering – Davis, McGraw Hill- Pub.

Environmental Engineering – Peavy and Rowe, McGraw Hill- Pub.

Air Pollution – Stern.

Air Pollution Control – Martin Crawford.

I.S. Codes

1) I.S. 5182 (all parts), I.S. 15442 (2004)

e - Resources

http://nptel.iitm.ac.in/courses-contents/IIT Kanpur and IIT Madras.
http://cpcb.nic .in
http://moef.nic .in

4001004 ELECTIVE I ARCHITECTURE AND TOWN PLANNING

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs/week	Theory : 100 Marks
Practicals: 2 Hrs / week	TW : 25 Marks
	Duration : 3 Hrs.

Section I: Architecture

Unit-I

Architecture: role of "urban planner and architect" in planning and designing.

Necessity of integrated approach.

Principles of architecture

Qualities of architecture: user friendly, ecofriendly, utility of spaces, future growth, spanning, environmental filter (town-building)

Architectural composition and elements of design.

B: Landscaping: Environmental art and design for urban landscape.

Objectives, principles, elements, material, soft landscaping, hard landscaping, and garden styles: modern and historical, water body conservation and creation.

Unit-II

Built environment in urban areas-need, concept and importance – byelaws, enriching the spaces as per fuctional needs

Urban design and renewal for quality of life and livebility

Unit-III

Sustainable development

Advantages and usage of sustainable materials and sustainable technologies.

Green building concept, rating systems. case study of rated buildings.

Section II: Town Planning

Unit-IV

Objective of town planning, principles, stages in town development, growth of towns and theories of developments (ribbon, sector zone, concentric, multiple zone etc)

Study of new towns and planned towns like new mumbai, gandhinagar,pcntda.(infrastructure, disaster management etc)

Neighborhood- planning and role in urban development, town planning schemes, garden city & three magnet theory, green belts.

Unit-V

A) Levels In planning- regional/city/neighbourhood.

City development plan

Scope & purpose

Surveys- demographic, housing, land use, ws & sanitation, etc.

Traffic; transport- urban road objectives, classification, traffic management.

Legislative mechanism for dp: mrtp, planning agencies for various levels of planning. their organisation and purpose (cidco-mhada-midc).

Unit-VI

Acts-: land acquisition, udpfi (for land use, infrastructure etc),sez,spl townships

Application of gis, gps remote sensing in planning.

Term Work

Study of post independence modern building in India by a renowned architect. (individual work- any two buildings)

Study and analysis of city maps of either of an existing town / town area with respect to services, infrastructure, street furniture, housing etc. (individual / group work)

Study of housing complexes or townships, role of estate manager – report to be prepared –

(group work)

Neighbourhood plan. (group work)

Softwares related to planning. (group work)

Study of salient features of jnnurm

Reference Books

Principles of architechture by Methushoba – Mohan - Oxford University Press

Town planning by G.K .Hiraskar

Town planning by S. Rangwala

MRTP act 1966

Landaquisition act 1894

UDPFI guidelines, ministry of urban affairs and employment, Govt. & India.

Manual of tropical housing and building by koenigsbeger

Planning legislation by Koperdekar and Diwan.

Sustainable building design manual

Building Drawing- 5 th edition – Shah, Kale, Patki

Green Buildings (Mc Graw hill): by Gevorkian

Emerald Architecture: case studies in green buildings: - ISBN 978-0-07-154411-5

The engineering guide to LEED- new construction-sustainable constuction for engineers haselbach

401004 ELECTIVE I ADVANCED GEOTECHNICAL ENGINEERING

Teaching Scheme:	Examination Scheme:
Lecture: 4 Hrs/week	Paper : 100 Marks
Practicals: 2 Hrs /week	TW : 25 Marks
	Duration :3Hrs

Unit I

(a) Soil classification

Identification and classification, criteria for classifying soil - classification on the basis of grain size, plasticity, symbolic & graphic presentation. Classified soils and engineering properties.

(b) Soil structure & clay minerals

Clay minerals, clay water relations, clay particle interaction, soil structure & fabric, granular soil fabric.

Unit lI

(a) Earth pressure theory

Earth pressure theories for calculation of active and passive pressure, Rankines and coulombs earth pressure theories, analytical and graphical methods.

(b) Design of earth retaining structures

Design of gravity and cantilever retaining walls, design - cantilever sheet pile walls, anchored sheet pile walls, timbering and bracing for open cuts.

Unit llI

(a) Geosynthetics

Geosynthetics- types, functions, properties and functional requirements. Application of geosynthetics in geoenviroment.

(b) Reinforced soil

Mechanism, reinforcement soil – interaction. Applications – reinforcement soil structures with vertical faces, reinforced soil embankments. Reinforcement soil beneath unpaved roads, reinforcement of soil beneath foundations. Open excavation and slope stabilization using soil nails.

Unit IV

Soil behavior under dynamic loads

Soil behavior under static and dynamic loads. Acceptable levels of strain under static and dynamic loading. Soil properties relevant for dynamic loading and its determination.

(b) Machine foundations:

Types of machine foundations, design criteria, methods of analysis – elastic half space method, linear elastic weightless spring method. Evaluation of soil parameters. Design procedure for a block foundation for cyclic loading and impact loading.

Unit V

Ground Improvement

In-situ ground improvement by compaction piles, dynamic loads, sand drains, grouting, deep mixing, inserting reinforcement elements, freezing soil, and vibroflotation.

Unit VI

Rheology

Rheological elements, basic and composite rheological models. Examples of compound models used to explain different soil phenomena; such as secondary consolidation, creep etc.

Term Work

Experiments to be conducted (Any Three)

- **Plummet balance / Hydrometer Analysis.**
- **Consolidation test.**
- **Swelling Pressure Test.**
- **Triaxial test with measurement of pore pressure.**

Assignments (Any Four)

- **Soil Classification.**
- **Computation of Earth pressure behind Retaining Wall by Analytical method.**
- **Computation of Earth pressure behind Retaining Wall by Graphical method.**
- **Typical slope design with reinforced soil / Geosynthetics.**
- **Design of machine foundation.**

Computer programme / Software package for solution of two topic covered in theory.

*** Oral Examination will be based on the above term work.**

Reference Books

Physical and Geotechnical properties of soils- Joseph E. Bowels, Tata Mac-Grawhill

Advance Soil Mechanics – Braja Mohan Das- Tata Mc- Grawhill

Geotechnical Engineering by Shashi K. Gulati & Manoj Datta – Tata Mc-Grawhill

Basic and Applied Soil Mechanics- Gopal Ranjan & A.S. Rao- New Age Publication

I.S .Codes

IS: 1892-1979 – "Code of Practice for Subsurface Investigation for Foundation".

IS: 2131-1981 (Reaffiemed 1997), "Method for Standard penetration Test for Soils".

Handbooks

Bolt, Bruce A.(1999),"Earthquakes", W.H.Freeman.

Baghi, A.,(1994)" Design, Construction and Monitoring of Landfills."John Wiley Sons.

Day.R.W.(2002),"Geotechnical Earthquake Engineering Handbook",McGraw Hill.

e Resources

Website www.nptel.iitm.ac.in

401005 ELECTIVE II MATRIX METHODS OF STRUCTURAL ANALYSIS

Teaching Scheme:
Lectures: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration : 03 Hrs.

Unit I

Review of Matrix Algebra, Numerical methods for inversion of matrix such as Gauss Elimination, Solution of simultaneous equations, Gauss Jordon & Gauss Seidel iteration methods

Computer Algorithm & Programming aspects

Unit II

Flexibility Method, Selection of Redundant, Flexibility Matrix, Analysis of pin jointed indeterminate trusses, Continuous beams & Simple Portal Frames involving not more than three unknowns.

Unit III

Stiffness method, member stiffness matrix, effective node numbering, assembly, banded matrix, Analysis of determinate / indeterminate structures such as pin jointed trusses & beams, Member and Structure approach.

Unit IV

Stiffness matrix for portal frame member, Transformation matrix, Member and Structure approach, Problems involving not more than three unknowns

Unit V

Stiffness method for analysis of orthogonal grid structure, member stiffness matrix, transformation matrix, member & structure approach

Unit VI

Stiffness method for analysis of Space truss. Problems involving not more than three unknowns, Space frame, Formulation of member stiffness matrix for space frame member, Substructure Technique.

Software applications for analysis of skeletol structures, input data, Generation of geometry of structure, software solution & Presentation of output.

Reference Books

Numerical Methods for Engineering – S.C. Chapra & R.P. Canale Tata Mc Graw Hill Publication

Matrix & Finite Element analysis of structures – Madhujit Mukhopadhyay - Ane Books Pvt. Ltd.

Problems in structural Analysis by Matrix Methods – P Bhatt, Wheeler Publication

Advanced Structural Analysis – Devdas Menon – Narosa Publishing House

Matrix Analysis of Structures – Aslam Kassimalli Books / Cole Publishing company.

Structural Analysis – A Matrix Approach - Pandit & Gupta - Tata Mc Graw Hill Publication

Matrix Analysis of Framed Structures – Gere & Weaver- CBS Publications, Delhi

Matrix Methods of Structural Analysis – Meghare & Deshmukh- Charotar Publishing House, Anand.

401005 ELECTIVE II HYDROINFORMATICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs/week	**Paper : 100 Marks**
	Duration : 3Hrs.

Unit I

Introduction: Concept of hydro informatics scope of internet and web based modeling in water resources engineering.

Unit II

Introduction to multi criterion decision support system - Components for modeling software.

Unit III

Introduction to simulation: Different simulation techniques - Applications of simulation techniques in hydraulics.

Unit IV

Introduction to artificial neural networks:

Networks and its training - Back propogation algorithm, conjugate gradient algorithm, cascade correlation algorithm, applications of ANN in WRE.

Unit V

Genetic algorithm (G. A.): Concept, basic principle of GA, working principle of GA. Coding, fitness function, GA. Operations, reproduction, cross over mutation, applications of GA, in WRE.

Reference Books

Neural Network Fundamentals with Graphs, Algorithms, Applications-Bose N.K. & Liang

P.McGraw Hill N.Y.

Neural Network: A Comprehensive foundation - S. Ragkin, Prentice Hall, N.T.

Practical Handbook of GA Applications, Vol-I-L. Chambers, C.R.C. Press-

Boca Raton, Florida.

Machine Learning Neural Networks, Genetic Algorithm & Fuzzy system - Adeli H. & Hung

S.L. John Wiely & Sons inc. N.Y.

401005 ELECTIVE II TQM AND MIS IN CIVIL ENGINEERING

Teaching Scheme:
Lecture: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Section I – TQM

Unit I

Quality – various definitions and interpretation. Importance of quality in construction. Factors affecting good quality of construction. Importance of quality on a project in the context of global challenges.

Unit II

Difference between, quality control, quality assurance, total quality control and total quality management (TQM)

Process based approach for achieving TQM. Study of ISO 9001 principles,

Quality manual – Importance, contents, documentation. Importance of check-lists in achieving quality. Typical checklist for concreting activity, formwork activity, steel reinforcement activity.

Unit III

TQM – Necessity, advantages. Six sigma as a tool in TQM. Supply chain management as a tool in TQM. Benchmarking in TQM. Kaizen in TQM. Defects in construction and measures to prevent rectify defects.

Section II - MIS

Unit IV

Introduction to Management Information systems (MIS)

Overview, Definition. MIS and decision support systems, Information resources, management subsystems of MIS.

Unit V

Management information system structure based on management activity whether for operational control, management control or strategic planning.

Unit VI

Survey of information systems technology w.r.t hardware, software, communications technology, data processing, Information processing.

Concepts of information, planning and control, Information based support systems. Development of an MIS for a construction organization associated with building works.

Reference Books

Management –Principal, process and practices by Bhat – Oxford University Press.

Financial management by Shrivastava- Oxford University Press

Quality Control and Total Quality Management by P.L.Jain- Tata McGraw Hill Publ.Company Ltd.

Management Information Systems – Gordon B. Davis, Margrethe H. Olson – Tata McGraw Hill Publ. Co.

Total Engineering Quality Management – Sunil Sharma – Macmillan India Ltd.

Total Project Management – The Indian Context - P.K.Joy Macmillan India Ltd.

401005 ELECTIVE II EARTHQUAKE ENGINEERING

Teaching Scheme:
Lectures: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration: 3 Hrs.

Unit I

Introduction to earthquakes:

Geology of earth, configuration of tectonic plates in a globe, influence of Geology on earthquake, behavior of plates, their motion and effects, causes of earthquake and their characteristics, Earthquake parameters, magnitudes, intensity, scales, seismic zoning of India, seismic coefficients for different zones, Natural disasters, mitigation and social aspects.

Lessons from past earthquake: - Study of damages caused due to past, earthquakes in/ outside India and remedial measures.

Unit II

Theory of vibrations:

Vibrations - definition, causes, classifications. Single Degree of Freedom systems (SDOF) - free, forced, damped, un-damped vibrations. Introduction to Multi-degrees of Freedom systems (MDOF) - derivations of related equations and solutions to two degree and three degree of freedom systems.

Unit III

Seismic design of RC structure:

Effect of earthquake on RC structure, IS provision, Seismic coefficient method. Basic requirement, estimation of story shear, effect of unsymmetrical geometry and masses, mass center and stiffness center, estimation of story shear and tensional moments for unsymmetrical buildings. IS code provision to response spectrum, Modal analysis for RCC frame, Design of multistoried building, concept of ductile detailing, IS 13920 provisions for RC frame.

Unit IV

Seismic foundation design:

Type of forces generated due to earthquake, effects on different types of foundation, design of RCC isolated footing for earthquake loading, liquefaction, causes and its remedial measure.

Unit V

Introduction of different control systems:

Passive control: base isolation and active control: bracing system, TMD etc and some latest invention.

Unit VI

Restoration and retrofitting:

Evaluation of existing buildings, aging, weathering, development of cracks, improper load Path, asymmetry, materials and equipments for restoring and retrofitting, methodology of retrofitting for walls, slabs roofs columns, foundations etc. for buildings in stones, bricks, RCC.

Notes: Every design should confirm to latest versions of IS 1893, 4326, 13920, 13827, 13828, 13935

Reference Books

Earthquake resistance design of structure by Duggal- Oxford University Press.

Dynamics of structure by Clough R.W. and Penzin J. McGraw Hill Civil Engineering Series

Dynamics of structure by Anil Chopra, Prentice Hall India Publication

Dynamics of structure by Mario Paz, CBSPD Publication

5 .Earthquake Resistant Design by David J. Downik, John Wiley and Sons Publication

Earthquake Tips NICEE, IIT, Kanpur

Elements of Earthquake Engineering by Jaikrishna and Chandarsekaran.

Geo-technical Earthquake Engineering by Kramer S. L. Prentice Hall India Publication

Introduction to Structural Dynamics by John M. Biggs

Mechanical Vibrations by V. P. Singh

Relevant Latest Revisions of IS codes.

401005 ELECTIVE II ADVANCED CONCRETE TECHNOLOGY

Teaching scheme:
Lecture: 4 Hrs/week.

Examination scheme:
Paper : 100 Marks
Duration : 3Hrs.

Unit I

Cement and its types: general, hydration of cement, water requirement for hydration, alkali aggregate reaction.

Aggregate: grading curves of aggregates.

Concrete: properties of concrete, w/c ratio, w/b ratio, gel space ratio, maturity concept, aggregate cement bond strength.

Unit II

Light weight concrete, ultra light weight concrete, vacuum concrete, mass concrete, waste material based concrete, shotcreting, guniting, sulphur concrete and sulphur infiltrated concrete, jet cement concrete (ultra rapid hardening), gap graded concrete, no fines concrete, high strength concrete, high performance concrete and under water concreting.

Unit III

Design of high strength concrete mixes, design of light weight aggregate concrete mixes, design of flyash cement concrete mixes, design of high density concrete mixes

Advanced non-destructive testing methods: ground penetration radar, probe penetration, pull out test, break off maturity method, stress wave propogation method, electrical/ magnetic methods, nuclear methods and infrared thermography, core test.

Unit IV

Historical development of fibre reinforced concrete, properties of metallic fibre, polymeric fibres, carbon fibres, glass fibres and naturally occurring fibres. Interactio n between fibres and matrix (uncracked and cracked matrix), basic concepts and mechanical properties: tension and bending.

Unit V

Properties of hardened frc, behavious under compression, tension and flexure of steel fibres and polymeric fibres.

GFRC, SFRC, SIFCON-development, constituent materials, casting, quality control tests and physical properties.

Unit VI

Ferrocement, analysis and design of prefabricated concrete structural elements, manufacturing process of indusrrial concrete elements, precast construction, errection and assembly techniques.

Reference Books

Concrete technology by Santhakumar- Oxford University Press.

Concrete technology-A.M.Neville and Brooks

Properties of Concrete- Murdock.

Properties of Concrete-P.K.Mehta.

Concrete Technology- M.S.Shetty.

Fiber Reinforced Cement Composite- P.N.Balguru & P.N.Shah.

401007 ELECTIVE III ADVANCED STRUCTURAL DESIGN

Teaching Scheme:	**Examination Scheme:**
Lectures : 4 Hrs /week	**Paper : 100 Marks**
Practicals :2Hrs/week	**TW : 25 Marks**
	Duration : 3Hrs

Unit I

Design of cold formed light gauge steel sections subjected to compression- axial tension and flexure- composite roof deck system using light gauge section

Unit II

Design of perforated web beams such as castellated

beams Unit III

Limit state analysis and design of solid web gable portal frames- moment resisting bases and design of anchor bolts- concept of Pre engineering buildings.

Unit IV

Limit state design of flat slab and grid slab

Unit V

Limit state design of flat grid slab

Unit VI

Analysis and design of elevated water tank with multiple columns - analysis and design of staging subjected to earthquake forces, seismic coefficient method.

Term Work

Any one design project from section-I and one from section –II

One full imperial size drawing sheet showing structural design details for each project. Computer assisted drafting for only one drawing of the project.

Two site visits, one for steel structure and other for RCC structure based on the contents of section I and section II respectively.

Note: unless otherwise stated, design should be based on latest I.S. codes 800, 801, 811, 875, 3370, 1893

Reference Books

Varghese, P. C. Advanced Reinforced Concrete Design, PHI

Krishna Raju- Advanced Reinforced Concrete Design. CBSRD.

Shiyekar ,M R.-Limit state design in structural steel – Prentice Hall of India Learning Pvt. Ltd. Delhi.

Ramakrishna, V. Arthur P. D., Ultimate strength Design for Structural Concrete, Pitman, London.

Karve, S. R. and Shah, V. L. , Limit State Theory and Design of Reinforced Concrete PVG Prakashan, Pune.

Punmia, Reinforced Concrete Structures Vol. 1 and 2, Standard Book House New-Delhi.

Sinha and Roy., RCC Analysis and Design . S. Chand and Co. New-Delhi

Ramachandra, Design of Steel Structures Vol.-II Standard Publications New-Delhi.

Punmia,B. C. and Jain and Jain, Comprehensive Design of Steel Structures, Standard Book House

Handbooks

Guide for Structural use of steel work in Buildings- INSDAG Calcutta.

ISI Hand book for structural engineers SP 6 (5): 1980

ISI Handbook for structural Engineers SP6 (2) : 1962 Steel Beams and plate girders.

ISI Hand book for structural engineers SP 6 (6) 1972. Application of plastic theory in design of steel structures

401007 ELECTIVE III ADVANCED FOUNDATION ENGINEERING

Teaching scheme:	**Examination scheme:**
Lecture: 4 Hrs/week.	**Paper : 100 Marks**
Practicals:2Hrs/week	**Term work : 25 Marks**
	Duration : 3Hrs.

_ Unit I

IS code provision in respect of subsoil exploration for dams, canals, tunnels, off shower structure, air ports bridges. IRC, provisions for exploration in respect of roads. Case studies of failures of foundation,

Unit II

Design of shallow foundations subjected to inclined loads. Design of Raft foundation on different types of soil. Design of combined and isolated footing based on field test including calculation of settlement. Introduction to softwares available for geotechnical design.

Unit III

Design of pile based on cyclic load test. Study of provision made in different IS codes related to deep foundation, various types of pile. Design of Racer piles & piles subjected to lateral load. Testing and Design of piles subjected to tensile loads.

Unit IV

Design of under reamed pile foundation subjected to tensile loads. Design of sand drains and stone columns.

Unit V

Study of various provisions made as per IRC and as per IS in respect of design of well foundation. Case studies of failure of well foundation.

Unit VI

Design and enabling structures like cofferdam, sheet piles, cellular cofferdam Rockfioll cofferdam.

Term Work

Term work will consist of

A) Any Five of following assignments

Comparative study of provisions made for the extent of exploration in IS, IRC codes adapted by Indian railways, and PWD

Detailed study of any two Geophysical methods of exploration

Computations of Bearing capacity and Settlement of a Shallow Foundation involving inclined loads.

Design of Pile foundations subjected to inclined load and Tensile load.

Design of Sand Drains.

Comparative study of provisions for well Foundation as per IS, IRC and code adapted by Indian railways.

Design of Cantilever Sheet Pile using free end or fixed end method.

Stability analysis of Cellular Cofferdam.

B) Computer Modelling

Design of any one type of Deep foundation using computer software C) Site visit and Case study

1)One site visit to any important deep foundation and submission of report on the same giving details of design and construction.

Any one case study of failure of foundation from the published literature

Reference Books

Foundation Analysis and Design- Joseph E. Bowels, TATA Mc-Grawhill

Design Aids in Soil Mechanics and Foundation Engineerimg-Shenbage R Kaniraj, TATA Mc-Grawhill

Design of Foundation Systems- Nainan P Kurian, Narosa publication house

Foundation Design & Construction- M.J.Tamlinson, ELBS publication

G. A. Leonards, Foundation Engineering, McGraw-Hill, 1962.

J.E. Bowles, Foundations Analysis and Design, 3rd Ed., McGraw-Hill, 1968.

R.B. Peck, W.E. Hanson and T.H. Thornburn, Foundation Engineering, 2nd

Edition, John Wiley and Sons, 1974.

B) I.S .Codes

IS: 1892-1979 – "Code of Practice for Subsurface Investigation for Foundation".

IS: 2131-1981 (Reaffiemed 1997), "Method for Standard penetration Test for Soils".

IS: 6403-1981 – "Code of Practice for Determination of B.C. of Shallow Foundation".

IS: 8009 (Part-1) 1976, "Code of Practice for Calculation of settlements of foundations".

IS: 1904-1986, "Code of Practice for Design and Construction of Foundations in Soils, general Requirements".

IS: 2911-1979, "Code of Practice for Design and Construction of Pile Foundation,".

Handbooks

Fang , H.Y.,(1991)," Foundation Engineering Handbook", Chapman & Hall,NY.

Teng .W.C.(1962), Foundation Design , Prentice Hall International.

e Resources

Website www.nptel.iitm.ac.in

401007 Elective III ADVANCED ENGINEERING GEOLOGY WITH ROCK MECHANICS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs / week	**Paper : 100 Marks**
Practical: 2 Hrs / week	**TW : 25 Marks**
	Duration : 3 Hrs.

Unit I

Introduction

Importance of geological studies in engineering investigations Precaution necessary to avoid misleading conclusions likely to be drawn while interpreting drilling data. Dependence of design on geological features of project site.

Geology applied to civil engg. practices

Case studies illustrating economics made possible by proper geological studies. Indian stratigraphy

Engg. geology of major rock formations of India including Deccan Trap Basalts w.r.t. Introduction, Distribution and Engineering characteristics of Deccan trap

(8 Hrs)

Unit II

Subsurface explorations for water conservation Structures

Strength & watertightness of Deccan trap rocks from foundation point of view. Physical properties such as compressive strength, water absorption. Effect of weathering & hydrothermal alteration on the engg. properties of rocks. Illustrative case studies.

Remedial measures to treat geological defects:

Foundation investigations during construction for determining the foundation treatment for adverse geological features and Correction of it. Various methods and measures to treat geological defects. Typical case studies.

Erosion of tail channels:

Erosion of tail channel as factor in selecting site for spillway and geological conditions leading to tail channel erosion. Case studies. (8 Hrs)

Unit III

Geohydrological aspects of different rock formations

Groundwater Condition in Maharashtra with reference to Deccan trap area. Water bearing characters of different type of basalts. Various methods of water conservation techniques, Geological aspects of multi aquifer system, deep seated water. Geological aspects of leading to success of water conservation measures & artificial recharge. Watershed development & necessity of geological studies for such schemes. Case studies.

Geology of soil formation:

Residual & transported soils. Rock weathering conditions favorable for decomposition & disintegration. Influence of climate on residual & transported soils. Scarcity of sand in the rivers in the Deccan trap area. (8 Hrs)

Unit IV

Rock mechanics:

General principles of rock mechanics index properties of rock masses. Various laboratory testing methods. Mechanical properties of Rock Masses. Various systems of rock mass characterization such as R.M.R. and Q. system. (7 Hrs)

Geophysical techniques:

Basic principles of various methods, use of electrical resistivity method and application of it in civil engineering. (1 Hrs)

Unit V

Tunneling:

Variations in methodology of investigation for different types of tunnels, location, spacing, angles & depths of drill holes suitable for different types of tunnels. Difficulties introduced by various types of rock masses & unfavorable field characters. Measurement of discontinuities rock mass characterization using different methods as applicable for tunnels, bridges and slopes.

Bridges:

Investigation for bridge foundation, difference in objectives of investigation of dam foundation. Foundation settlements. Case studies.

Slopes:

Investigations of slopes, stability assessment based on Rock Mechanics Characterization (8 Hrs)

Unit VI

Resource engineering

Deccan Trap basalts as construction material. Use of Deccan Trap rocks for different purposes. Recent developments in construction industry w.r.t. engineering geology. Study of case studies.

Role of geology in planning and development

Influence of geological factors upon urban development & planning ,locating non-renewable resources and geothermal energy.

Earthquakes and tectonics:

Zoning of earthquakes with special reference to Seismicity in Maharashtra. R.I.S. (8 Hrs)

Practical Work / Term Work

I) Study of Geological map of Maharashtra state and India (2 Practicals)

II) Interpretation of drill hole data

Logging of drill cover, preparation of Litho logs & interpretation of drill data. Preparing geological cross sections from drillhole data & using them for designing of civil engineering structures representing following case studies.

1. **Dipping sedimentary formation**
2. **Faulted region**
3. **Folded region**
4. **Locating spillway on Igneous rocks**
5. **Tunnels in Tectonic areas**
6. **Tunnels and open cuts in non-tectonic areas**

(6 Practicals)

III) Use of electrical resistivity method for determining depth of bedrock.

(1 Practical)

IV) A compulsory guided tour to study geological aspects of an engineering projects & writing a report based on studies carried out during visits to civil engineering projects. The practical journal will be examined as term work

Reference Books

Jaeger – Rock Mechanics in Engineering, Cambridge Univ Press London , 1990

Goodmann – Principles of Rock Mechanics.

Bieniawski Z. T. - Engineering Classification of jointed Rock Masses

4.Dr. Dobbrin - Introduction to Geophysics

5.Goodmann – Engg. Geology

6.Megaw T. M.& Tunnels: Planning, Design, Construction

J. V. Bartlett - Int. ED, Ellis Horwood ltd. John Willey & Sons .

Skinner B. J: The Dynamic Earth, An Introduction to Phy

& Porter S. C Geology John Willey & Sons .NY 1989

Introduction to Rock Mechanics by B. P. Verma-Khanna Pub New Delhi

.Environmental Geology by Waldiya

.Environmental Geology – Keller, Prentice – Hall Publication.

Handbooks

1 Gupte R. B. (1980) – P. W. D. Handbook Chapter –6, Part-II 'Engineering Geology'Government of Maharashtra.

2 Tunneling India '94, "Central Board of Irrigation and Power", New Delhi

3 Manual on Rock Mechanics, Central Board of Irrigation and Power, New Delhi, 1988.

4 Handbook of Geological terms, geology and Physical Geology, David page, University of Michigan. USA

5 Handbook of Geology in Civil engineering, Robert Fergussion , Legget, Mc-Graw hill,

Geotechnical Engineering handbook, Robert day, Mc- Graw hill, ISBN 0-07-137782-4

I. S. Codes

IRC code of practice for Road Tunnels. IRC-78-2000; IS-12070; IS-1336 Part I and II.

I. S. 4453-1967 Code of practice for Exploration, pits, trenches, drifts & shaft.

I. S. 6926-1973 Code of practice for diamond drilling for site investigation river valley project.

I. S. 4078-1967 Code of practice for Logging and Storage of Drilling Core.

I. S. 5313-1969 Guide for core drilling observation.

e- Resources

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www.library.iisc.ernet.in
www.iitb.ac.in
www.nptel.iitm.ac.in

401007 ELECTIVE III **ADVANCED ENVIRONMENTAL MANAGEMENT**

Teaching Scheme: Lecture: 4 Hrs/week Practicals: 2 Hrs /week

Examination Scheme:
Paper : 100 Marks
TW : 25 Marks
Duration : 3 Hrs.

Unit I

Fundamentals of environmental management and ISO 14000 series: Background and development of ISO 14000 series. Environmental management systems (EMS) principles and elements and The ISO 14001- Environmental management systems standard. Environmental law in India: Environmental policy and laws. Constitutational and statutory laws in India

Unit II

Environmental Management Acts related to environmental protection:- Air , Water , Soil and hazardous waste 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.

Unit III

Air pollution management

Unit IV

Waste Water Management

Unit V

Solid Waste Management:- Municipal, Hazardous and

Biomedical Unit VI

EIA (Environmental Impact Assessment) and Auditing

Term Work

Term work shall consist of detailed report on any two of the chapters from the following

Industrial water pollution control technologies

Anaerobic treatment of industrial process wastewaters

Industrial water pollution control - Applications

Industrial waste water treatment – Principles

Pollution control legislations and their implementation

Distillery spent wash treatment technologies for the next decade

Pollution control systems for fertilizer industry

Particulate emission control technology

Global trend in industrial pollution control

Pollution control and waste management in sulphuric acid and super phosphate plant

EIA for any one (Thermal power station, water resources project or express highways)

Application of GIS/ remote sensing in environmental planning and management.

Air quality management for industries

Hazards wastes- Definition Classification and Treatment

Note: Oral will be based on the report produced by each student on the above articles.

Reference Books

Declaration of : The Stockholm Conference, Rio, Rio+5 and Rio+10

Anti pollution Acts (3) and commentaries published therorem.

Constitution of India [Referred articles from part-III part-IV and part-IV A]

Pares Distn. Environmental Lows in India (Deep. Deep, Lated edn.)

P. Leelakrishanan, Environmental and the last (Bullorthworths, Latold edn.)

Basic environmental technology: Jerry; A. Nathanson.

Handbook of environmental management and technology: Gwendolyn Holmes, Ben Ramnarine Singh, Louis Theodore.

The ISO 14000 Handbook: Joseph Cascio.

ISO 14004- Environmental management systems: General guidelines on principles, systems and supporting techniques (ISO 14004:1996 (E).

ISO 14001: environmental management systems:Specification with guidance for use (ISO 14001:1996b(E)) (International organization for standardization- Switzerland) [Note: - Declarations, comments, cases and research articles published from time to time will be recommended by the concerned teachers]

401007 ELECTIVE III CONSTRUCTION MANAGEMENT

Teaching Scheme:	Examination Scheme:
Lectures: 4 Hrs / week	Paper : 100 Marks
Practical: 2 Hrs / week	TW : 25 Marks
	Duration : 3 Hrs.

Unit - I

Overview of construction sector

Role of construction industry in infrastructure development, components of infrastructure sector, construction industry nature, characteristics, size, structure, role in economic development, construction management – necessity, applications, project management consultants – role, types, selection and appointment process, project overruns and means to combat them, project monitoring and reporting systems, managerial correspondence and communications, generation and identification of project investment opportunities.

(* At least 2 lectures of 2 hours duration by experts from field are to be conducted on above topics) (8 Hrs.)

Unit - II

Construction scheduling, work study and work measurement (8 Hrs.)

Construction scheduling

Construction project scheduling – purpose, factors affecting scheduling, time as a control tool, work breakdown structure, project work breakdown levels, line of balance technique, repetitive project management (3 Hrs.)

Work study and work measurement

Definition, objectives, basic procedure of work study, symbols, activity charts, string diagrams, time and motion studies. (5 Hrs.)

Unit - III

Labour laws and financial aspects of construction projects (9 Hrs.) Labour laws

Need and importance of labour laws, study of some important labour laws

associated with construction sector- workmans compensation act 1923, Building and other construction workers act 1996, child labour act, interstate migrant workers act (3 Hrs.)

Financial aspects of construction projects

Capital investments: importance and difficulties, means of finance, working capital requirements, project cash flow projections and statements, project balance sheet, profit loss account statements (6 Hrs.)

Unit - IV

Elements of risk management and value engineering (8 Hrs.)

Risk management

Introduction, principles, types, origin, risk control, use of mathematical models: sensitivity analysis, break even analysis, simulation analysis, decision tree analysis, risk identification, analysis and mitigation of project risks, role of insurance in risk management. (5 Hrs.)

Value engineering (3 Hrs.)

Meaning of value, value analysis, value engineering and value management, energy resources, consumption patterns, energy cost escalation and its impact.

Unit - V

Materials management and human resource management (8 Hrs.)

Materials management

Materials flow system, role of materials management in construction management and its linkage with other functional areas, vendor networking, buyer-seller relationships, eoq model and its variations, material codification and classification, concept of logistics and supply chain management, role of ERP in materials management – material resource information systems, (5 Hrs.)

Human resource management

Human Resource in Construction Sector, Staffing policy and patterns, Human Resource Management Process, Human Resource Development Process, Performance Appraisal and Job Evaluation, Training and Career planning, Role of ERP in Human Resource Management – Human Resource Information System (HRIS) (3 Hrs.)

Unit - VI

Introduction to artificial intelligence technique

Basic terminologies and applications in civil engineering

(a) Artificial neural network (b) Fuzzi logic (c) Genetic algorithm (8 Hrs.)

Term Work

Site Visit to a Construction project to study following documents and preparing a report –

- **Project Cash Flow Analysis.**
- **Project Balance Sheet.**
- **Work Break Down Structure.**
- **Materials Flow System in the Project.**

Scheduling of a Construction Project using Line of Balance Technique.

Assignment on Work Study on any two Construction Trades.

Assignment on EOQ Model and its variation.

Assignment on application of AI techniques in Civil Engineering

Seminar on any one topic from above syllabus.

Reference Books

Projects – Planning, Analysis, Selection, Implementation and Review, Prasanna Chandra, Tata McGraw Hill Publications.

Construction Management and Planning – B. Sengupta and H. Guha, Tata McGraw Hill Publications

Civil Engineering Project Management – C. Alan Twort and J. Gordon Rees, Elsevier Publications

Total Project Management – The Indian Context – P. K. Joy, MacMillian Publications

Materials Management–Gopalkrishnan & Sunderasan,Prentice Hall Publications.

Human Resource Management – Biswajeet Pattanayak, Prentice Hall Publishers

Labour and Industrial Laws – S. N. Mishra, Central Law Publications.

Artificial Neural Network – Veganarayanan – Prentice Hall

10. **Genetic Algorithm – David & Goldberg**

Fuzzi Logic & Engg Applications – Ross

Principles of Construction Management by Roy Pilcher (McGraw Hill)

e-Resourses

ERP Software-Builders Management Software

Project mates Construction Software

401008 Elective IV INTEGRATED WATER RESOURCES PLANNING & MANAGEMENT

Teaching scheme:
Lectures: 4 Hrs /week

Examination scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Introduction: World water resources, water resources in India, water as finite resource, variability of water in time & space, history of water resources development, water infrastructure-problems and perspectives, present institutional framework for water management. (3Hrs) Water laws: Constitutional provisions, National Water Policy, riparian rights / ground water owner ship, prior appropriation, permit systems, acquisition and use of rights,
scope for privatization. (3Hrs) Economics of water: Water as economic good, intrinsic value, principles of water pricing & water allocation, capital cost, opportunity cost, internal rate of return, benefit cost analysis, principles of planning and financing of water resources project. (4Hrs)

Unit II

Probabilistic and statistical methods: statistical parameters, mean, mode, median, standard deviation, curtosis, probability, random events, random variable, functions of random variables, moments and expectations, common probabilistic distributions (normal, lognormal, poission, extrem value, log-pearson etc.) estimation of parameters, goodness of fit tests, regression and correlation analysis. (4 Hrs) Systems engineering: Systems Engg. concepts, optimizing techniques, conventional (LP, NLP, DP…) and evolutionary (ANN, fuzzy logic, genetic algorithm), simulation, applications of soft computing techniques for water resources planning and management

(6 Hrs)

Unit III

Flood management: causes of floods, structural and non-structural measures, mitigation plan, flood damage assessment, use of geoinformatics,

Drought management: types of droughts, severity index, drought forecasting, damage assessment, mitigation plan, use of geoinformatics. (6 Hrs)

Unit IV

Basin scale hydrology: Estimation of surface water, estimation of ground water draft/recharge import/export of water (interbasin water transfer), recycling and reuse, storages. (5 Hrs)

Demand and supply based management: Consumptive & non consumptive demands, irrigation demand estimation, water utilization, irrigation efficiency, water management in irrigation sector, demand estimation in hydro/thermal/nuclear power sector, estimation & forecasting of water demands of domestic & industrial sector, navigation and recreational water demands (5 Hrs)

Unit V

Environmental management: protection of vital ecosystem, water requirements for environmental management, aquaculture, minimum flows, water quality management for various uses. (5 Hrs)

Social impact of water resources development: direct/ indirect benefits, employment generation, industrial growth, agro-industry, enhanced living standards, education & health, co-operative movement, management of rehabilitation & resettlement, control of water logging, salinity, & siltation of storages. (5 Hrs) Unit VI

Basin planning & management: Perspective plan for basin development & management, Decision support system for Integrated Water Resources Management (IWRM), use of Geoinformatics, Artificial Neural Networks in water resources planning, development & management (6 Hrs)

Reference Books

Water Resources Systems Engg, D. P. Loucks, Prentice Hall

S I Gass: 'Linear Programming', McGraw Hill, Kogakusha, 1975

S S Rao : 'Optimisation : Theory and Applications', Wiley Eastern, 1980.

L Mangasarian : 'Non-linear Programming' – TMH 1969.

A. K. Biswas; Systems Approach to Water Management, McGraw Hill Book Co, New York.

Chaturvedi, M.C. " Water Resources Systems Planning and Management" Tata McGraw Hill

James L.D and Lee R.R " Economics of Water Resources Planning", McGraw Hill

Water resources hand book; Larry W. Mays, McGraw International Edition

H.S. Ang and W.H. Tang, Probability Concepts in Engineering Planning & Design John Wiley, 1975.

J.R. Benjamin and C.A. Cornell; Probability statistics decisions for Civil Engineering, McHill 1975.

Arthur Mass et al, Design of Water Resources Systems, MacMillan 1962.

L. D. James & R.R.Leo, Economics of Water Recourses Planning, McGraw Hills, NY 1971.

W. A. Hill & J. A. Dracup, Water Resources Systems Engineering.

Water shed Management – B.M. Tideman

Watershed Shed Management V.V. Dhrava Narayana, G Sastry, U.S. Patnaik.

Water Resources Design Planning Engg and Economic; Edward Kuiper, Butterworth & Co.

T.M. Lillesand and R.W. Kiefer, Remote Sensing and Image Interpretation, John Wiley & Sons, New York, 1994.

ANN in Hydrology; Govinda Raju & Ramachandra Rao; PHI

"Handbook of Applied Hydrology" by Van Tee Chow- McGRAW Hill

401008 ELECTIV IV ADVANCED TRANSPORTATION ENGINEERING

Teaching Scheme:
Lectures: 4 Hrs / week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Transport System Planning:

Transport policy, process, and types of surveys. 0D matrix. Travel demand forecasting trip generation, modal spilt analysis, trip distribution, route assignment analysis, Transport Networks, network flow analysis.

Unit II

Urban Transport Technology:

Classification, mass and rapid transit system, Introduction to Intelligent Transportation System (ITS), Public Transport policy, intermediate. Introduction to BRT, Mono rail, sky bus, metro projects, grade separated interchanges such as flyovers, underpasses, overpasses, concept of Integrated Inter Model transit system.

Unit III

A. Transport Economics & Financing:

Vehicle operations cost, running cost, pollution cost, value of travel time, road damage cost, congestion cost, accident cost economic evaluation, various economic studies. Transportation plans – Benefit cost method, Net present value method, First year rate of return method, Internal rate of return method & comparison of various methods. Pavement management systems.

B. Highway Financing: Pay as you go method, credit financing, private financing, BOT, BOOT, dedicated road funds, road pricing, tolls, private provisions, advantages& limitations.

Unit IV

Traffic Systems:

Traffic impacts, traffic studies, level of service, traffic analysis process, basic traffic theory, intersection studies, turning movements, flow, delays, and queuing, signal design, grade separated intersection, parking studies, Traffic generation and parking, parking

demand surveys and requirements, parking facilities, instrumentation of traffic monitoring,

Unit V

Study of flexible pavement:

Highway pavements and airport pavements, Flexible pavements studies, performance studies, surface, surface characteristics of pavements, profile measurements, pavement unevenness, skid resistance, its measurements, IRC, AASHTO guide to design of pavement, pavements failure, maintenance strategy Freezing of soil, B.C. soil, desert soil etc. Strengthening of pavement – Benkelmen beam method. Distresses in Pavements.

Unit VI

a) Study of rigid pavement:

Concept of rigid pavement, comparison of rigid pavement over flexible pavement , Stress distribution in layered media, one and two layered system, joints in rigid pavement, longitudinal construction joints, design as per IRC guidelines, design of joints, dowel bars, temperature reinforcement, pavement failure, maintenance strategy strengthening of rigid pavement, types of overlays, flexible over rigid, rigid over rigid, mechanization in pavement construction.

b) Overlay types and their design as per IRC.

Reference Books

Highway Engineering - Laurence I Hewes & Clarkson H Oglesby

Traffic Engineering and Transport Planning - L R Kadiyali.

The Design and Performance of Road Pavements - David Croney, Paul Croney.

Understanding Traffic System -Michel A Taylor, William Young, PeterW Bonsall.

Principles of Urban Transport Systems Planning - B. G.Hutchinson.

Introduction to transport planning - M. J. Bruton.

Transport Networks - Potts Oliver (Academic Press).

Modem Construction Equipments's and methods- Frank Harries.

Principles of Pavement Design - E.F. Yoder (John Wiley & Sons, lnc USA).

Fundamentals of Transportation Engineering - C. S. Papacostas.

Pavement analysis and Design – Huang Y H, Prentice Hall, Englewood Cliff, New Jersey.

Introduction to Transportation Engg. and Planning – Morlok E K,

McGraw-Hill company.

13. Fundamentals of Traffic flow Theory – Drew, McGraw-Hill book co

14 A course in Traffic Planning and design-Saxena Subhash,Dhanpat Rai & sons,Delhi

15 Traffic analysis (New technologies new solutions)-Taylor M P ,Hargreen Pub.Co. New Delhi

HandBook

Handbook of Road Technology _Lay M. G.Gorden Breach Science Pub.Newyork.

e-Resources

www.nptel.iitm.ac.in/courses/iitkanpur

www.cdeep.iitb.ac.in/nptel

401 008 ELECTIVE IV (OPEN ELECTIVE)

FINITE ELEMENT METHOD IN CIVIL ENGINERRING.

Teaching Scheme:
Lectures: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Formulation of stiffness matrix, member approach for truss and beam element, node numbering, assembly of element equations, formation of overall banded matrix equation, boundary conditions and solution for primary unknowns, applications to truss and beam not involving unknowns more than three.

Unit II

Formulation for stiffness matrix using member approach for portal frame and grid elements, transformation matrix, applications to frame and grid not involving unknowns more than three.

Unit III

Theory of elasticity: Strain-displacement relations, compatibility conditions in terms of strain, plane stress and plane strain problems, differential equations of equilibrium, compatibility condition in terms of stresses, stress-strain relations in 2D and 3D problems

Unit IV

Principle of minimum potential energy, formulation of stiffness matrix for truss element using principle of minimum potential energy, concept of finite element for continuum problems, discretisation of continuum, use of polynomial displacement function, Pascal's triangle, element stiffness matrix for 1D axially loaded bar element and beam element, evaluation of stiffness matrix using variational principle

Unit V

Displacement function for 2D triangular (CST and LST) and rectangular elements, evaluation of stiffness matrix using variational principle, 3D element such as tetrahedron and hexahedron.

Unit VI

Use of shape functions, Area co-ordinates for CST element, Iso-parametric elements in 1D, 2D and 3D analysis, Jacobian matrix, Formulation of stiffness matrix for 1D and 2D Iso-parametric elements in plane elasticity problem.

Reference Books

Nonlinear finite element analysis by Reddy- Oxford University Press.

Introduction to the Finite Element Method – Desai & Abel, CBS Publishers & Distributors – Delhi

Introduction to Finite Elements in Engineering – T.R. Chandrupatla & A.D. Belegundu - Prentice Hall of India Pvt. Ltd.

Matrix, Finite Element, Computer & Structural Analysis – M. Mukhopadhyay, Oxford & IBH Publishing Co. Pvt. Ltd.

Finite Element Analysis – Theory & Programming – C.S. Krishnmoorthy, TATA Mc Graw Hill Publshing Co. Ltd.

An Introduction to the Finite Element Method – J.N. Reddy, TATA Mc Graw Hill Publshing Co. Ltd.

Theory & Problems – Finite Element Analysis – Gorge R. Buchanan, Schaum's Outline Series. TATA Mc Graw Hill Publshing Co. Ltd.

The Finite Element Method – O.C. Zien kiewicz, TATA Mc Graw Hill Publshing Co. Ltd.

Finite Element Analysis – S.S. Bhavikatti, New Age International (P) Ltd

401008 ELECTIVE IV (OPEN ELECTIVE) GEOINFORMATICS

Teaching Scheme:
Lecture: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Concept of remote sensing : Electromagnetic energy, Interaction of EMR with Atmosphere and earth material, atmospheric windows, EMR spectrum, platform, sensor types, MSS.

Aerial Remote Sensing:- Flight planning, types of Aerial photographs,.

Photogrammetry: stereoscopic vision, scale, relief displacement, parallax, vertical exaggeration.

Unit II

Satellite Remote Sensing: LANDSAT and IRS characteristics, products and FCC Interpretation Techniques, visual and digital in brief. Recognition of photoelements and terrain elements like size, shape, tone, texture, pattern, shadow etc. Terrain analysis: Relief, landform, drainage pattern.

Unit III

Use of remote sensing in Lithology, structure and Geomorphology

Application of Remote Sensing in Ground Water and Mineral Exploration.

Unit IV

Basic Concept of GIS, components, history and applications.

Hardware and Software requirements for GIS.

Map features, Scale, Resolution, accuracy and data base extent.

Unit V

Map projection and parameters: Geographycal Coordinate system, types of projection and parameters, projection transformation and mapping in GIS.

Geospatial data models: Spatial and nonspatial data, VECTOR and RASTER models.

Unit VI

GIS Analysis: Digitalization, editing and structuring of map data, overlay analysis,

Digital elevation and terrain model (DEM / DTM), buffer analysis and query analysis.

Introduction to GPS and their applications with limitations.

Applications of GIS in Civil Engineering.

Reference Books

Principles of geographical information system 2/e by Burrough- – Oxford University press.

Remote sencing & GIS by Bhatta – Oxford University press.

Principle and Application of Photogeology by S. N. Pande

Photogeology and Regional mapping by J. A. E. Allum

Remote sensing and Image Interpretation By Lilley Sand

Photogeology by Miller and Miller

401 008 ELECTIVE IV (OPEN ELECTIVE) HYDROPOWER ENGINEERING

Teaching Scheme:

Lectures: 4 Hrs/week

Examination Scheme:

Paper : 100 Marks

Duration : 3 Hrs.

Unit I

Energy Resources – Planning and Potential

Power resources – Conventional and Nonconventional, Need & advantages, Hydrological analysis, Hydropower development in India, Hydropower potential.

Unit II

Hydropower Plants

Classification of hydropower plants - Run of river plants, Storage or Valley dam plants, Pumped storage plants, Introduction to micro hydro, Base load and Peak load plants, advantages & disadvantages, Components of hydropower plants.

Unit III

Load Assessment

Estimation of electrical load on turbines. Load factor, Plant factor, peak demand and utilization factor, load duration curve, Prediction of load.

Unit IV

Powerhouse

Types of Powerhouses, Typical layout of powerhouse, Components, Power plant equipments, Instrumentation and control.

Unit V

Turbines

Selection, Classification, Principles and design of impulse & reaction turbines, Governing of turbines, Water hammer, Surge tanks, Draft tubes, Cavitation.

Unit VI

Economics of Hydroelectric Power

Economic considerations – pricing of electricity, laws and regulatory aspects, Policies, Electricity act – 2003, Investment in the power sector, Carbon credits, Participation of private sector.

Reference Books

Water Power Engineering – M. M. Dandekar and K. N. Sharma

Handbook of Hydroelectric Engineering – P.S. Nigam

Modern Power System Planning – Wang

Hydropower Resources in India – CBIP

401008 ELECTIVE IV (OPEN ELECTIVE) INDUSTRIAL WASTE WATER MANAGEMENT

Teaching Scheme:
Lectures: 4 Hrs / week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Physical unit process, Application, process and design parameters for activated carbon filtration for color and odour removal, ultra filtration, reverse osmosis, electro-dialysis for removal of colloidal and dissolved solids.

(8 Hrs)

Unit II

Chemical unit process Precipitation with alum, lime and ferrous sulphate for removal of phosphates, iron and heavy metals etc.chemical oxidation with peroxide and ozone for reduction in COD and color removal.

Biological process

Wetland treatment – root zone cleaning system (8 Hrs)

Unit III

Activated sludge process

Moving bed bioreactors, membrane reactor with submerged membrane, cyclic reactor, Nitrification and denitrification by aerobic and anaerobic process

Use of biological process for the removal of toxic chemicals like cyanides, phenols, heavy metals etc. Recycling of treated sewage after tertiary treatment

(8 Hrs)

Unit IV

Recycling and reuse and recovery

Introduction to 3 R principles to convert waste into

wealth Assimilative and supportive capacity of nature

Different methods of 3R principle to convert waste into wealth

Prohibitive factors for implementing 3R techniques

Cost benefit analysis of 3R principle

Use of waste water for irrigation (Specifications of waste water for irrigation, soil and crop, selection, preventive measures and health aspects). Reuse of sewage in residential complexes

Biogas recovery for high strength waste (Whey, spent wash, black liquor).

Soda recovery in pulp and paper mills.

Recovery of metals in electroplating, recovery of ammonia in urea manufacturing , recovery of plastic , paper and metal from MSW.

(8 Hrs)

Unit V

Introduction to the concept of zero discharge

Zero discharge technology based on 3R principle based on pulp and paper industry

Clusters of industries based on waste products in sugar cane processing

Case studies- Zero discharge of solid waste from residential complex

(8 Hrs)

Unit VI

Sorption mechanism – Theory of adsorption, design of adsorption column, using BDST model

Standard related to solid waste from residential complex.

Water requirement of various industries such as textiles, automobiles dairy and food industry, pharmaceutical industry.

Pollution hazard of radioactive materials

Introduction to green processes in the industries.

(8 Hrs)

Reference Books

Waste Water Treatment & Disposal – Metcalf & Eddy - TMH publication.

Environmental Engg. - Peavy, Rowe - McGraw Hill Publication.

Waste Water Treatment – Rao & Dutta.

Pollution Control in Process Industries-S.P.Mahajan,Tata McGraw Hill Publication.

Water and Wastewater technology-Mark J.Hammer and Mark J.Hammer.Jr.,Prentice Hall of India.

Waste water Treament for Pollution Control-Soli J.Arceivala,Tata McGraw Hill Publication.

e - Resources:

http://nptel.iitm.ac.in/courses-contents/IIT Kanpur and IIT Madras.

http://cpcb.nic .in

http://moef.nic .in

401 008 ELECTIVE IV

STATISTICAL ANALYSIS & COMPUTATIONAL METHODS IN CIVIL ENGG

Teaching Scheme:
Lectures: 4 Hrs/week

Examination Scheme:
Paper : 100 Marks
Duration : 3 Hrs.

Unit I

Statistical methods

Introduction, collection, classification and representation of data, measures of central value (mean, median mode), measures of dispersion, sampling.

Unit II

Various distributions

Binomial, poisson, normal, test of hypothesis, chi-square

test Unit III

Correlation analysis, regression analysis.

Coefficient of correlation, probable error, single and multiple regression, curve fitting, Interpolation and extrapolation

Unit IV

Optimization techniques

Introduction to optimization techniques-concepts and applications, direct solution of linear equations-Gauss elimination and Gauss Jordon method. Iterative solution of linear equations-Gauss Seidel method.

Unit V

Different numerical methods

Numerical methods roots of non linear equations-bisection method, false position method, Newton raphson, Secant method.

Unit VI

Numerical Integration

Need and scope, trapezoidal rule, Simpsons 1/3rd rule, Simpsons 3/8th rule, Gauss Quadrature method.

Reference Books

Statistical methods – S.P.Gupta

Numerical Methods – E Balagurusamy

Numerical methods for Engineers – S.Chapra, R.P.Canale

Higher Engg. Mathematics – B.S. Grewal

401009 QUANTITY SURVEYING, CONTRACTS AND TENDERS

Teaching Scheme:	**Examination Scheme:**
Lectures: 4 Hrs /week	**Paper : 100 Marks.**
Practicals: 4 Hrs /week	**Oral : 50 Marks**
	TW : 50 Marks
	Duration : 4 Hrs.

Unit I

Estimating: Definition, importance of quantity surveying for civil engineer. Purpose, type of estimates, data required for estimates. Items of work, description of an item of work, unit of measurement & principles deciding the units, mode of measurement of building works. Abstracting, bill of quantities. Provisional & prime cost items, contingencies, establishment charges, centage charges, Schedule of rates (D. S. R.)

Approximate Estimate: Definition, purpose, methods of approximate estimation of building & other civil engineering projects like roads, irrigation & water supply & sanitary engineering, electrical works.

Unit II

Taking out quantities: P.W.D method and centre line method of taking out quantities. Procedure of taking out quantities for different assignments in term work, using IS 1200 rules.

Unit III

Specifications: Definition & purpose, types, standard specifications- Red book. Legal aspect. Drafting detailed specifications with reference to materials, quality, workmanship, method of execution, mode of measurement and payment, for major items like stone/ brick masonry, plastering, ceramic tile flooring, R.C.C. work.

Analysis of rates: Factors affecting cost of an item of work, materials, sundries, labour, tools & plant, overheads & profit. Task work - definition & factors affecting task work. Analysis of rates of items mentioned in the specifications above.

Unit IV

Valuation of Properties: Purpose, nature of value, price, cost and value, types of value. Factors affecting value of property. Concept of free hold and lease hold property.

Depreciation & methods of working out depreciation, sinking fund, Years purchase, out goings.

Methods of Valuation of Building

Land & building basis, Rental basis, Reproduction & replacement cost basis. Belting of land.

Unit V

Methods of Executing Works :PWD procedure of execution of work, Administrative approval, budget provision,Technical Sanction, Different methods of execution of minor works in PWD, like piecework, rate list, day work, daily labour.

Introduction to registration as a contractor in the P.W.D.

Tenders: Definition. Methods of inviting tenders, tender notice,

Pre- qualifications of contractor, tender documents, preparation of tenders. Submission in 3 bid/ 2 bid or single bid system. Qualitative and quantitative evaluation of tenders, comparative statement, pre- bid conference, acceptance of tenders, various forms of BOT tenders, global tendering. (A mockup exercise of preparation, submission, opening of tender documents is suggested).

Unit VI

Contracts: General idea, types of contracts viz: lump sum, itemrate, cost plus, Engineering Procurement Construction (EPC). Conditions of contracts. FIDIC document, standard contract conditions published by MOS and PI, Law of contract. Definition, objective & essentials of valid contract.

Conditions of contract: General and Specific conditions. Condition regarding EM, SD, time as an essence of contract. Important conditions regarding addition, alteration, extra items, testing of materials, defective work, subletting, powers delegated to Engineer in-charge regarding the above aspect, defect liability period, retention money, interim payment or running account bills, advance payment, secured advance, final bill. Settlement of disputes viz. dispute resolving board, arbitration, concept of partnering. Liquidated damages, termination of contract.

Term Work

Estimating quantities using C-L and PWD method for a load bearing structure or for an industrial shed.

Detailed estimate of a single storied R. C. C. framed building using D.S.R. rates.

Detailed estimate of roadwork with cross slope / railway track / runway.

Working out quantities of steel reinforcement for a slab, a beam, a column, a column footing and preparing bar bending schedule.

Estimating quantities for any one of the following:-

- **House drainage & water supply arrangement**
- **Formwork items in a RCC structure.**
- **Pipe culvert or slab culvert.**
- **Septic tank with soak pit.**

Drafting detail specification of any two items and working out their rates using market prices.

Valuation report of a residential building using O-1 form.

Preparation of draft tender notice and collecting minimum 3 tender notices of Civil Engineering works.

Note: Any one of the above assignment should be done using estimating and costing software.

Oral: Oral shall be based on term work: Question paper shall be based on theory as well as term work.

Reference Books

Estimating and Costing in Civil Engineering: Theory and Practice By: B.N Dutta Published By: S. Dutta & Company, Lucknow.

Estimating, Costing Specifications & valuation in Civil Engineering By: M.Chakraborty Published By: Author.

Estimating and Costing By: G.S.Birdie

Estimating and Costing By: Rangwala Published By: Charotar Publishing House, Anand

Civil Engineering Contracts & Estimates By: B.S.Patil Published By: Orient Longman Ltd. Mumbai.

Valuation of Real Estates By:Rangwala Published By: Charotar Publishing House, Anand

Handbooks

Practical Information for quantity Surveyors, Property Valuers, Architects, Engineers and Builders.By:P.T Joglekar Published By: Pune Vidyarthi Griha Prakashan, Pune.

Standard Contract Clauses for Domestic Bidding Contracts : Ministry of Statistics and Programme Implementation, Government of India.

FIDIC Document: Federation International Des Ingenieurs Conseils i.e. International Federation of Consulting Civil Engineers, Geneva, Switzerland.

Codes

I.S.1200 (Part 01 to 25): Methods of Measurement of Building and Civil Engineering Works.

D.S.E: District Schedule of Rates

e - Resources

1. nptel.iitm.ac.in

4010010 TRANSPORTATION ENGINEERING- II

Teaching Scheme:
Lectures: 4 Hrs/week
Practicals: 2 Hrs/week

Examination Scheme:
Paper : 100 Marks
Oral : 50 Marks
TW : 25 Marks
Duration : 3Hrs.

Section I Highway Engineering

Unit I

Introduction:

Role of transportation, scope of road transportation, highway development in India. necessity of highway planning and development plans e.g. bombay plan lucknow plan.

Classification of road:

Classification of roads, road patterns, planning surveys and preparation of master plan based on saturation system, determination of road length by 3rd road development plan.

Traffic engineering:

Traffic characteristics-road user characteristics, vehicular characteristics (only name and significance)

Traffic studies –name of various studies and their uses, accident studies-objectives, causes of accident, condition and collision diagram, and measures for the reduction in accidents. Traffic regulation and control devices-traffic signs, traffic signals (types merits and demerits) road markings. Traffic islands, types of road intersections (sketch merits and demerits). Parking facilities.

Unit II

Highway alignment:

Basic requirements of an ideal alignment and factors controlling it, engineering survey for highway location, special requirements for hill roads,

Geometric design and traffic enginering:

Design controls and criteria for geometric design, cross sectional elements, sight distance requirements, stopping distance, overtaking sight distance, overtaking zones with irc recommendations, attainment of super elevation, radius of curves, methods of introduction of extra widening, widening of pavement on horizontal curves, horizontal transition curves- objects, necessity, types of transition curves, length and shift of transition curves. Design of vertical alignment, gradient and its type, irc recommendations, grade compensation on horizontal curve, vertical curves: - crest and sag curves, types of summit curves, length of summit curve for ssd and osd. requirements, types of valley curves, length of valley curve for comfort and head light sight distance criteria.

Highway drainage:

Importance of highway drainage, subsurface and surface drainage systems, scope of arboriculture for highway.

Unit III

Highway materials:

Importance and properties of sub-grade, pavement component materials. Tests on aggregates. Bitumen, types--cut back tar emulsion and tests, modified binders, bitumin mix design by marshall stability test, viscosity based gradation of bitumen

Pavement design:

Objects and requirements, types of pavements structres, functions of pavement components factors affecting pavement design,

Design of flexible pavement by group index method and C.B.R. Method, IRC 37-guidelines design of rigid pavements, actors affecting design & analysis of stress-wheel load stress & temp. Stress, criticalcombination of stress, irc 58- design guidelines, types of joints, requirements of joints.

Construction:

Construction process of WBM, WMM, GSB. Introduction to bituminous works such as prime coat tack coat seal coat MPM, AC or BC, BM, DBM and primix carpet. Strengthning of pavement – types of overlays.

Section II Airport Engineering:

Unit IV

Introduction:

Advantages and limitations of air transportation. Aeroplane component parts and important technical terms.

Airport planning:

Aircraft characteristics, which influence judicious and scientific planning of airports, Selection of sites, survey and drawings to be prepared for airport planning.

Airport layout:

Characteristics of good layout, runway configuration, airport obstruction, location of terminal buildings, aprons and hangers. Zoning requirements regarding permissible heights of constructions and landing within the airport boundary.

Runways and taxiways:

Runway orientation, wind coverage, use of wind rose diagram, basic runway length, corrections for elevation, temperature and gradient as per ICAO and FAA recommendation. Airport classification by ICAO.

Unit V

Bridge engineering:

Introduction:

Classification of bridges, components of bridges, preliminary data to be collected during investigation of site for bridges, determination of discharge – imperical formula, direct methods, economical span, afflux, HFL, scour depth and clearance, locations of piers and abutments, factors influencing the choice of bridge super structure,approach roads.

Loads on bridges:

Brief specifications of different loads, forces, stresses coming on bridges, IRC load specification, requirements of traffic in the design of highway bridges

Substructure:

Abutment, Piers, and wing walls with their types based on requirement and suitability.

Unit VI

Types of bridges

Various types of bridges:

Culvert: Definition, waterway of culvert and types.

Temporary bridges: Definition, materials used brief general ideas about timber, floating and pantoon bridges.

Movable Bridges: Bascule, cut boat, flying, swing, lift, transporter and transverse bridges, their requirement and suitability.

Fixed span bridges:

Simple, continuous, cantilever, arch, suspension, bowstring girder type and rigid rame and cable stayed bridges, materials for super structure.

Bearing:

Definition, purpose and importance. Types of bearings with their suitability,

Introduction to different techniques of erection of bridge super structure and maintenance of bridges.

Practicals:

A set of experiments based on following topics:

1. Aggregate Testing: (Any Six)

- **Aggregate Impact**
- **Aggraget Crushing Stength**
- **Los Angeles Abrasion Test**
- **Flakiness index and Elongation index under shape Test**

Specific Gravity and Water absorption

Stipping Value

Soundness

2. Bitumen test: (Any Six)

Penetration

Ductility

Softening Point

Flash Point & Fite Point

Specific Gravity

Bitumen extraction test

Marshall Stability

Technical visits to Bridge site/Airport AND Hot mix Plant

Reference Books

Highway engineering – S.K. Khanna and C.E.G. Justo, Nem Chand and Broththers, Roorkee (Uttaranchal)

A Course in Highway Engineering – S.P. Bindra, Dhanpat Rai and Sons, Delhi.

Principles of Transportation Engineering – G.V. Rao Tata MacGraw Hill Publication

Highway Engineering – Rangawala, Charotar publishing House, Anand 388001 (Gujrat)

Principles and practices of Highway engineering –Dr. L.R. Kadiyali, Khanna Publishers Delhi.

Principles of Transportation Engineering – Partha Chakraborty ,Animesh Das, Prentice Hall of India Pvt. Ltd., New Delhi.

Highway and Bridge Engineering – B.L. Gupta, Amit Gupta standard publishers Distributors, Delhi.

Principles and practice of Bridge Engineering – S.P. Bindra, Dhanpatrai and Sons, Delhi.

Bridge engineering – Rangawala, Charotar Publishing House, Anand –388 001.

Essentials of Bridge Engineering – D. Johnson and Victor, Oxford and IBH publishing co. Pvt. Ltd. , New Delhi.

Bridge engineering – S. Ponnuswamy, Tata Mc Graw – Hill publishing co. Ltd. New Delhi.

Airport planning and design – S.K. Khanna , M.G. Arora , S.S. Jain, Nem Chand and Brothers, Roorkee.

Airport Engineering - Rangawala, Charotar publishing House, Anand 388001 (Gujrat)

Codes

I.S. 1201 TO 1220-1978, IS 73, IS 2386 PART I toV

I.R.C. 58, IRC37

Specifications for Road and Bridge works (MORTH)-IRC New Delhi Specifi

Hand Book

Handbook of Road Technology_Lay M.G., Gorden Breach Science Pub.Newyork

Civil Engineering Handbook-Khanna S.K.

www.nptel.iitm.ac.in/courses/iitkanpur

www.cdeep.iitb.ac.in/nptel

401006 Project Work (Semester I)

Teaching Scheme:
Practicals: 2 Hrs/week

The project work shall consist any one of following nature in civil engineering related subjects

1.Exprimental investigation.
2.Software development.
3.Cost economic analysis.
4.Case study with own design.
5.Working model design and fabrication.

It is mandatory to present a seminar and submit preliminary project report based on worked done in first semister for the grant of semester I

The report shall contain finalization of topic, literature survey, planning schedule/ flow chart for completion of project. The report shall be typed or printed and hard/spiral bound.

The project work to be taken up individually or in groups. The group shall not be of more than five-six students. The references shall be mentioned at the end as per universal standards as mentioned in any international journal of professional body.

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401006 Project Work (Semester II)

Teaching Scheme:
Practicals: 6 Hrs/week

Examination scheme :
Termwork : 100 Marks.
Oral : 50 Marks

The Project Work shall be in continuation of Semester I. It shall contain methodology, results, analysis & discussion of the work carried out and the conclusions with future scope.

The report of Ist and II nd semester work shall be typed or printed in standard format as mentioned in Annexure A.

Oral and term work shall be based on the project work carried out by the students and jointly examined by an internal and external examiners appointed by University of Pune, Pune at the end of Semester II.

Annexure A – Format of project report

Sequence of pages

Blank Page

Printing details

1)Report shall be typed on A4 size on Executive Bond paper with spacing 1.5 on one side of paper.

Left Margin : - 37.5 mm
Right Margin : - 25 mm
Top Margin : - 25 mm
Bottom Margin : - 25 mm

Give page number at bottom margin at center

Size of Letters

Chapter Number: - 12 font size in Capital Bold Letters
Chapter Name: - 12 Font size in Capital Bold Letters
Main Titles (1.1, 3.4 etc):- 12 Font size in Bold Letters- Sentence case.
Sub Titles (1.1.4, 2.5.3 etc):- 12 Font size in Bold Letters-Sentence case.
All other matter: - 12 Font size sentence case

No blank sheet be left in the report
Figure name: - 12 Font size in sentence case-Below the figure.
Table title -12 Font size in sentence case-Above the table.

Binding details

Brown / maroon color with golden embossing for project report.
Black color with golden embossing for hard bound or else spiral bound for seminar report.

Format of front page

Project Report

On

(Title of the project)

In the partial fulfillment of the requirement for
Bachelor Degree in Civil Engineering

Submitted by

ABC (Exam. No.)
DEF (Exam. No.)
GHI (Exam. No.)

Guided by

Prof. XYZ

[Logo of Institution]

DEPARTMENT OF CIVIL ENGINEERING
NAME OF COLLEGE
University of Pune
20 - 20

ample of certificate

NAME OF THE COLLEGE

(UNIVERSITY OF PUNE, PUNE)

[logo of the college]

CERTIFICATE

This is to certify that Mr. /Ms. ---------- has satisfactorily carried out the investigation/ experimentation and completed the project work entitled "---------- ".

This work is being submitted for the award of degree of Bachelor of Civil Engineering. It is submitted in the partial fulfillment of the prescribed syllabus of University of Pune, Pune for the academic year 20 - 20

Prof .X.Y.Z.
(Guide)

Prof. A.B.C.
(Head of civil engineering department.)

Prof. L.M.N.
(Principal)

External Examiner

University of Pune
Board of Studies (Civil Engineering)
Program Educational Objectives (PEOs)

F. E. Civil Engineering (2008 Course):

107001 & 107008: Engineering Mathematics I & II:

By covering the course in Engineering Mathematics, the student will be able to:

Objectives:

Know the basics of Matrices, Complex Numbers & their Applications, Differential Calculus, Partial Differentiation and Applications, the Maxima and Minima of Functions of two variables, continuity and derivative of a single variable and their applications to engineering problems, the various methods of Absolute and Conditional Convergence, Range of Convergence,

Understand their engineering application. Solve related simple numerical problems, which will help them to understand the subject

.

107002 & 107009: Applied Science I &II:

Objectives:

To impart the basic principles of light, processes of light in its propagation and to understand Interference, Diffraction and Polarization of light.

To make them aware of different paths, trajectories of electron in different fields (Electric &Magnetic), Electrostatic lens, Magnetic lens for focusing electrons in different instruments to understand how to separate isotopes, Bainbridge mass spectrograph.

Also to demonstrate knowledge of production of ultrasonic sound by understanding magneto striction and Piezo electric oscillator, Applications of it in day to day life as well as in research areas and give basic information of nuclear energy for both merits & demerits of it. Semiconductors and superconductors are the base of Electronics & Material Science and hence students get acquainted by its knowledge and can apply it in most of the engineering branches.

To impart basic methods of production of quantum dots using the nano material and their properties and applications. Also, one of the important devices in today's world is the LASER and it is taught thoroughly to impart its complete knowledge for construction and application of it.

Outcomes:

In order to test their knowledge towards learning outcomes- experimental work, assignments, test papers are assigned to students and evaluated and are given back.

The students will be able to apply the principles studied in Applied Physics to different type of applications in medical, engineering, research and also in day-to-day life.

An engineering student will learn different types of forces acting on a particle/body and evaluate the motion of that particle/ body. Hence, it will be very easy for them to determine different properties of certain body.

Students will able to understand propagation of light through Fiber Optical wire, which helps them to get an idea of Communication, Transmission and Reception of a signal.

The knowledge of Applied Physics will helps them to understand the research ways of producing power using nuclear fission and Fusion.

Design solar wings for deep Space vehicles.

To understand production and application of material in nano scale.

To understand, simplify and analyze the problems related with mechanics, thermodynamics, and electronics and electrical.

Thus Applied Physics is the key subject for all the engineering branches.

110003: Fundamentals of Programming languages:

Objectives:

To learn and acquire art of computer programming

To know about some popular programming languages and how to choose a programming language for solving a problem using a computer. To learn programming in C At the end of the course:

103004: Basic Electrical Engineering:

Objectives:

The student should understand the basic principles of D.C.Cicuits & theorems, various types of Batteries & application, Electromagnetic, and Electrostatics.

The student should be prepared to continue the study of the a.c. circuit, a.c. fundamentals.

They should understand basics of Transformers & Polyphase ckt.

Student should be able to calculate efficiency of Transformer & under which condition we can get the maximum efficiency.

101005: Basic of Civil & Environmental Engineering :

Objectives:

I. Preparation:

To produce engineering graduates who are introduced with the basics of Civil engineering.

To produce engineering graduates who are introduced with all basic branches of civil engineering.

To produce graduates who have Knowledge of Civil engineering.

II. Core Competence:

To learn the all basic branches and their practical application.

To learn the inter relationship of all branches engineering.

To study basic principles of surveying & different types of surveying.

To study modern equipments of surveying.

To study different types of construction materials such as cement, brick, concrete, steel etc.

To study principles of building planning .
To study ecology and environment.
To study different types of environment pollution, its cause, effects and remedies.

III. Breadth
To train the students of engineering with all basic branches of civil engineering so that they can understand materials of construction, planning etc
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:
To develop the students approach to take leadership and teamwork.
To train the students to develop their carrier in execution of construction.
To produce engineering graduates, capable of involve in saving natural resources.
To crate the engineer having awareness of environment.

V. Learning Environment:
To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:
The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to perform all construction activity from foundation to final stage.
Engineers having the ability to improve the existing systems.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.

102006: Engineering Graphics I:

Objectives:
Students should be able to understand:
Various projection methods of drawing
Analysis of drafting principles for accurate drafting.
Drafting with softwares.
Freehand sketching of various standard m/c parts.
Various curves used in engineering.

Practices are conducted.
Assignments are to be given.
Students will be able to analyze objects in 2dimension, 3 dimensions.
Students will be able to read the drawing, to draw object.
5 Students will be able to use various drawing software.
6. Drawing sheets are given.

101010 : Engineering Mechanics :

Objectives:

I. Preparation:

To produce graduates who have a strong foundation of scientific and technical knowledge and are equipped with problem solving, teamwork, and communication skills that will serve them throughout their careers.
To produce graduates who have the ability to pursue careers as practicing civil engineers.

II. Core Competence:

Learn vector algebra and the representation of vectors and their components, analytically and graphically, including representation of forces, moments, and couples as vectors in two- and three-dimensions.
Develop capacity for visualizing physical configurations and learn how trusses, frames, machines, and beams are modeled in order to analyze relevant external and internal forces.
Learn to isolate a body or a member of a frame or machine and apply all forces acting on the body (i.e. construct free body diagrams).
By conducting analyses of forces acting on frames, machines, trusses, and beams, learn how these entities support and transmit loads.

III. Breadth:

Solve for the resultants of any force systems
Determine equivalent force systems
Determine the internal forces in plane frames, simple span trusses and beams
Solve the mechanics problems associated with friction forces
Obtain the centroid, first moment and second moment of an area
Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of reference
Analyze the forces causing the motion of a particle
Use the equation of motion to describe the accelerated motion of a particle
Apply work, energy, impulse and momentum relationships for a particle in motion
Describe the motion of a rigid body in different frames of reference

IV. Professionalism:

Maintain high productivity and high ethical standards.
Continually enhance their knowledge throughout their careers.

Communicate effectively to a broad range of audiences.

Function on and lead teams that engage in new areas of research and development in engineering, particularly those that cross the boundaries of traditional disciplines.

To produce graduates who can be successful in graduate level work in engineering, as well as in other professional schools.

Become closer to being an engineer.

To produce graduates with the oral and written communication skills needed to successfully work in a modern multidisciplinary environment.

V. Learning Environment:

To produce graduates with the ability to both seek out assistance when needed and to learn new skills throughout their careers

To produce graduates with the oral and written communication skills needed to successfully work in a modern multidisciplinary environment.

Develop capacity for logical, orderly, step-by-step methods of analysis and clear communication of results.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

An ability to apply fundamental knowledge of mathematics, science, and engineering

An ability to design and conduct mechanics experiments

An ability to analyze and interpret experimental and computational mechanics data

An ability to design a system, component, or process to meet desired needs by synergistically combining mechanics of materials, fluid mechanics, and dynamics, when necessary

An ability to effectively function as the leader, or member, of a multi-disciplinary team

An ability to identify, formulate, and solve engineering problems involving mechanics of materials, fluid mechanics, and/or dynamics

An understanding of professional and ethical responsibility

An ability to communicate effectively – orally, graphically, and in writing

The broad education necessary to understand the impact of engineering solutions on society and the environment

A recognition of the need for, and an ability to engage in, life-long learning and accomplishment

Knowledge of contemporary issues (e.g., social, political, technical, economic, etc.

A fundamental understanding that will enable the appropriate use and development of the techniques, skills, and modern engineering tools necessary for engineering practice

Recognition of the importance of safety in phases of engineering design and practice.

Recognition of the need for and the ability to engage in life-long learning.

An understanding of the role of the leader and leadership principles.

104011 : Basic Electronics Engineering :

Objectives:

Preparation: To understand working principles and applications of electronic devices and circuits.
Core competence: To design, analyze, build and test the electronic circuit.
Breadth: The integration of electronic engineering, electrical engineering, computer technology and control engineering forms a crucial part in the design, manufacture and maintenance of a wide range of engineering products and processes. To implement the ideas with well acquaintance of fundamental electronic principles. To correlate the requirements of industries and his knowledge to serve the industry for its best performance.
Professionalism: -Learning environment: To provide student with an excellent academic environment, leadership, learning skills for long-life successful professional

102012: Engineering Graphics II:

Objectives:
Students should be able to understand:
1.Various drafting software
2. To read, prepare, analyze the drawing data i.e. lines, planes, projection of points, solids, Section of solids, Development of surfaces.
In order to achieve PEO's following steps should be taken :
Practices are conducted.
Assignments are given.
Students will be able to read drawing & draw object.
Students will be able to use various drawing software.
Drawing sheets are given.

102013: Basic Mechanical Engineering:

Objectives:
Students should be able to understand:
Basic mechanical systems
Design, construction & working of machine elements, mechanism.
Introduction to thermal fluid science
Manufacturing process, m/c tools.
Energy conversion, absorption & energy producing devices.

In order to achieve PEOs following steps should be taken:
Demonstration is to be delivered
Tests are conducted
Practices are conducted
Assignments are to be given
Oral is to be conducted as a part of term work. Students should be able to understand:

Communication skill:

Objectives:

Fundamentals of communication skill.

Learning skill.

Speaking skill.

Writing skill.

Organization & Listening comprehension in communication.

Reports, Resumes & Job application.

In order to achieve PEO's following steps should be taken:

Group discussion is arranged

Assignments are to be given 3. Tests are conducted

S. E. Civil Engineering (2008 Course) :

207001 : Engineering Mathematics III :

Objectives:
Students should be able to understand:
Ways to apply mathematical methods to solve Engineering problems.
Complex analysis, Statistics & probability.
Vector calculus.
Error estimation & structural problem of algorithm.
Modern approaches to the area, ordinary differential equations, linear algebra.

In order to achieve PEOs following steps should be taken

1. Assignments are to be given 2. Tests are conducted

201001 : Building Materials and Construction :

Objectives:

I. Preparation:
To produce civil engineering graduates who are introduced with the basics of understanding and construction of Structures.
To produce civil engineering graduates who are introduced with all basic activity of construction from foundation to finishing.
To produce graduates who have the ability to pursue careers as practicing civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:
To learn the all basic activity of construction.
To learn the different types of foundation.
To study all component of building like masonry, doors , window, flooring, finishing materials.
To study vertical circulation in building.
To study various miscellaneous material.

III. Breadth
To train the students of civil engineering with all basic terms of construction activity so that they can do planning, design and execute the all construction activity.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:
To develop the students approach to take leadership and teamwork for execution of these public schemes.
To train the students to develop their carrier in execution of construction.

3) To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to perform all construction activity from foundation to final stage.
Engineers having the ability to improve the existing systems.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

201002 : Strength of Materials :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of understanding and designing of Structures.
To produce civil engineering graduates who are introduced with Analysis of Structures.
To produce graduates who have the ability to pursue careers as practicing civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different types of structures and different types of loading.
To learn behavior of different types of structures under different type of loading
To study and to analyze different types of structures.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse and design different types of structures
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.
To train the students to develop their carrier in Design of Structures.

3) To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze and design different types of structures.
Engineers having the ability to improve the existing Structures.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

201003 : Engineering Geology :

Objectives:

I. Preparation:

To produce civil engineering graduates who can understand the basics of engineering geology and Introductory part of the earth science.
To produce civil engineering graduates who can understand the basics of Building materials which are like to create the difficulties.
To produce graduates who have the ability to differentiate between the Building materials and the usage of them before using the sites.
To produce graduate civil engineers who can excel and pursue this in post graduate programs.

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyze, design and execute the engineering projects.
To train the students so that they can optimize the systems for safe and economical projects.

Core Competence:

To study the sources, and characterization of common Building materials
To learn sources of various Building materials, their characteristics, quality and other important aspects of them.
To learn the use of Building materials and to decide the feasibility of the project from geological point of view.
To study the basic aspects arise due to structural features like folds and faults.
To study the problems and difficulties those are likely to arise due to nature of the earth.

IV. Professionalism:

To develop the student's approach to take leadership and teamwork for execution of the various pubic schemes like dams , tunnels, roads. etc.
To train the students to develop their carrier in execution of the above mentioned projects.
To produce civil engineering graduates, capable of understanding the problems of the society.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide geological assistance as and when needed at the sites. .

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze design and execute the various pubic schemes like dams, tunnels, roads.

201004 : Geotechnical Engineering :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of soil mechanics, geotechnical engineering.
To produce civil engineering graduates who are introduced with basics of index & engineering properties of soil.
To produce graduates who have the ability to pursue careers as practicing geotechnical engineer.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn origin & formation process of soil.
To learn the types of soil depending on formation process.
To study classification systems.
To study of strength properties, seepage characteristics & compressibility characteristics.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse, design foundation works.
To train the students so that they can optimize the design for effectiveness and economy.

IV. Professionalism:

1) To train the students to develop their carrier as geotechnical consultant.

3) To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze design and execute the foundation works.
Engineers having the ability to improve the existing foundation systems.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

201005 : Fluid Mechanics I :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Fluid Mechanics.
To produce civil engineering graduates who are introduced with Fluid Static's, Fluid kinematics & Fluid dynamics.
To produce graduates who have the ability to pursue careers as practicing and Hydraulic Engineering.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different types of fluid flow.
To learn Dimensional Analysis.
To study and to analyze Characteristics of Turbulent flow & Flow through Pipes.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can be able to design the pressure measuring devices.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

1) To develop the students approach to take leadership and teamwork for execution of

Hydraulic Engineering.

2) To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to carry out the Calibration of Venturimeter , Orifice meter Notch.

Engineers having the ability to improve the existing pressure measuring devices

More and more students going for post graduation in this field.

201006 : Building planning:

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of planning of various types of structures.

To produce civil engineering graduates who are introduced with principles of planning and principles of architectures.

To produce graduates who have the ability to pursue careers as practicing civil engineers.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn effective planning of various types of buildings.

To learn how to use natural resources in the planning of buildings.

To study various factors related to building planning.

To learn different

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can do planning, designing of various types of building.

To train the students so that they can utilize this knowledge in career development.

To groom the students in

IV. Professionalism:

1) To develop the students approach to take leadership and teamwork for execution of

these public schemes.
To train the students to develop their carrier in Design of Structures.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:
To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:
The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze and design different types of structures.
Engineers having the ability to improve the existing Structures.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

201007 : Surveying I :

Objectives:

I. Preparation:
To produce civil engineering graduates who are introduced with the basics of Plane Surveying.
To produce civil engineering graduates who are introduced with Horizontal and vertical measurements.
To produce graduates who have the ability to pursue careers as practicing and consulting civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:
To learn different types of Instruments used for plane surveying.
To learn different methods of surveying.
To study and to analyze different types advancements in plane surveying such as electronic instruments and softwares.

III. Breadth
To train the students of civil engineering with good scientific and engineering breadth so that they can carry out field surveys for civil engineering works.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:
To develop the students approach to take leadership and teamwork for execution of civil engineering jobs.
To train the students to develop their carrier in civil engineering consultations.

3) To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to carry out field surveys and prepare different types of project proposals .
Engineers having the ability to improve the existing civil engineering projects.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

201008 : Concrete Technology :

Objectives:

I. Preparation:

To prepare the students to understand various types of cements and their chemical and physical properties and their suitability for a particular type of work.
To prepare the students to understand properties of sand , coarse aggregate and water for producing good quality concrete.

Breadth

To train the students of civil engineering with good scientific and engineering breadth about the use of mineral additives like fly ash in concrete for the preservation of natural resources.
To train the students of civil engineering with good scientific and engineering breadth about the use of chemical additives in concrete for the improvement of properties of concrete in wet and hardened state.

III. Core Competence:

To train the students to design concrete mix of various grades for compressive strength and desired durability.

IV. Professionalism:

To develop the students to check the qualities of various ingredients of concrete, properties of concrete in wet and dry condition.

V. Learning Environment:

To prepare the students to learn hoe to decide the quality of ingredients of concrete on visual inspection.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to decide which type of cement, mineral additive and which chemical admixture to be used to improve the overall quality of concrete..

Engineers having the ability to check the produced concrete for homogeneity and consistency.

3) Engineers having the ability to design concrete mix for a particular placing condition..

201009 : Structural Analysis I :

Objectives:

I. Preparation:

To prepare the students to understand the basics of configuration and classification of structures.

To prepare the students to understand the basics of structural analysis.

II Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyze the structures.

To train the students so that they can optimize structural systems for effectiveness and economy through proper configuration of structure.

III. Core Competence:

To perceive the proper structural system to withstand the loads likely to be imposed on it.

To train the students to analyze the structures using various softwares.

IV. Professionalism:

To develop the students approach to take leadership and teamwork in the structural design and execution of various structures.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to analyze the Structures manually and using soft computing tools.

Engineers having the ability to improve the existing systems.

Engineers having the ability to function as the leader, or member, of multi-disciplinary team.

More students working as entrepreneur in the field of analysis and design of tructures.

T. E. Civil Engineering (2008 Course):

301001: Structural Analysis II:

Objectives:

I. Preparation:

To prepare the students to understand the basics of configuration and classification of structures.

To prepare the students to understand the basics of structural analysis.

II Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyze the structures.
To train the students so that they can optimize structural systems for effectiveness and economy through proper configuration of structure.

III. Core Competence:

To perceive the proper structural system to withstand the loads likely to be imposed on it.
To train the students to analyze the structures using various softwares.

IV. Professionalism:

To develop the students approach to take leadership and teamwork in the structural design and execution of various structures.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze the Structures manually and using soft computing tools.
Engineers having the ability to improve the existing systems.
Engineers having the ability to function as the leader, or member, of multi-disciplinary team.
More students working as entrepreneur in the field of analysis and design of tructures.

301002: Infrastructure Engineering & Construction Techniques:

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of construction techniques.
To produce civil engineering graduates who are introduced with various equipments used in construction works.
To produce civil engineering graduates who are introduced with the basics of understanding of railways, Tunnel, Docks and Harbors.
To produce civil engineering graduates who are introduced with Railway and waterways as a means of communication.
To produce graduates who have the ability to pursue careers as practicing civil engineers in the field of railway engineering and offshore components require for waterways .
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn Mechanization in Construction industry, different types of Instruments used in construction industry.

To learn different Miscellaneous Techniques in construction works.

To learn different types modes of transportation and their basic elements.

To learn the need of railways , tunnels, and waterways

To study and to analyze different types advancements in construction Equipments, Economic, maintenance and repair of the construction Equipments

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can carry out the various constructions field works with different construction equipments.

To train the students so that they can optimize the use of construction equipments for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of civil engineering jobs.

To train the students to develop their carrier in civil engineering consultations.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to carry out field works and prepare different types of project proposals.

Engineers having the ability to improve the existing civil engineering projects.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.

301003: Structural Design I :

Objectives:

I. Preparation:

To provide a basic understanding of the mechanical properties and types of steels used in civil structures, and to develop technical competence in the design of tension and compression members, beams, and simple bolted and welded connections.
To produce graduates who have the ability to pursue careers as practicing civil engineers.

II. Core Competence:

Determine the ultimate tensile capacity of steel members considering both yielding and tensile fracture.
Determine the ultimate bending moment capacity of steel members considering both yielding and lateral buckling
Assess shear capacity of beams and design web bearing stiffeners if required
Determine the effective length of compression members in both braced and sway conditions
Describe different welding techniques and classify different types of bolts and their installation
Design bolted connections in shear, tension and combined actions
Design welded connections and fastener groups

III. Breadth:

Discuss properties of steel and concrete used in design of steel structures.
Introduce students to main load effects such as gravity, wind, seismic, snow and hydrostatic pressure and provide values of these loads as prescribed by the Indian Standard.
Discuss actual behavior of members and connections in steel structures when subjected to axial and shear forces, bending moment and combination of these load effects. In support of this objective, conduct actual tests of steel members subjected to tension, compression, bending and combination of these effects in the structural laboratory.
Discuss provisions of the Indian Standard for Structural Steel Buildings I.S.800:2007 with regard to design of tension members, columns, beams, beam columns, welds, bolts, and shear and moment connections.

IV. Professionalism:

Continually enhance their knowledge throughout their careers.
Communicate effectively to a broad range of audiences.
Function on and lead teams that engage in new areas of research and development in engineering, particularly those that cross the boundaries of traditional disciplines.
To produce graduates who can be successful in graduate level work in engineering, as well as in other professional schools.
Become closer to being an engineer.
To produce graduates with the oral and written communication skills.

V. Learning Environment:

To produce graduates with the ability to both seek out assistance when needed and to learn new skills throughout their careers

To produce graduates with the oral and written communication skills needed to successfully work in a modern multidisciplinary environment.
Develop capacity for logical, orderly, step-by-step methods of analysis and clear communication of results.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

An ability to apply fundamental knowledge of mathematics, science, and engineering
An ability to design and conduct mechanics experiments
An ability to analyze and interpret experimental and computational mechanics data
An ability to design a system, component, or process to meet desired needs by synergistically combining mechanics of materials, fluid mechanics, and dynamics, when necessary
An ability to effectively function as the leader, or member, of a multi-disciplinary team
An ability to identify, formulate, and solve engineering problems involving mechanics of materials, fluid mechanics, and/or dynamics
An understanding of professional and ethical responsibility
An ability to communicate effectively – orally, graphically, and in writing
The broad education necessary to understand the impact of engineering solutions on society and the environment
A recognition of the need for, and an ability to engage in, life-long learning and accomplishment
Knowledge of contemporary issues (e.g., social, political, technical, economic, etc.
A fundamental understanding that will enable the appropriate use and development of the techniques, skills, and modern engineering tools necessary for engineering practice
Recognition of the importance of safety in phases of engineering design and practice.
Recognition of the need for and the ability to engage in life-long learning.
An understanding of the role of the leader and leadership principles.
Ability to function effectively as an individual and in multi-disciplinary and multi-cultural teams, with the capacity to be a leader or manager as well as an effective team member
Understanding of professional and ethical responsibilities and commitment to them
Expectation of the need to undertake lifelong learning, and capacity to do so

301004 : Fluid Mechanics II :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Hydraulic machineries & Open Channel flow.
To produce civil engineering graduates who are introduced with Flow around submerged bodies & unsteady flow.
To produce graduates who have the ability to pursue careers as Hydraulic Engineer.

4) To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different types of Hydraulic Turbines.
To learn Performance of Centrifugal Pump.
To study and to analyze Characteristics of GVF profiles & computer program on GVF.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can be able to design the Hydraulic of Machineries.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of Hydropower Engineering.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to carry out different types of Hydraulic Projects.
Engineers having the ability to improve the existing Hydropower Plants.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

301005 : Advanced Surveying :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Geodetic Surveying.
To produce civil engineering graduates who are introduced with Horizontal and vertical controls.
To produce graduates who have the ability to pursue careers as practicing and consulting civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

1) To learn different types of Instruments used for Geodetic surveying.

To learn different methods of advanced surveying.
To study and to analyze different types advancements in Geodetic surveying such as electronic instruments and softwares.

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can carry out field surveys for civil engineering works.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of civil engineering jobs.
To train the students to develop their carrier in civil engineering consultations.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to carry out field Geodetic surveys and prepare different types of project proposals .
Engineers having the ability to improve the existing civil engineering projects.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

301006 : Hydrology and Water Resources Engineering:

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of hydrology and Irrigation engineering.
To produce civil engineering graduates who are introduced with meteorological measurements and abstracts of precipitation.
To produce graduates who have the ability to pursue careers as practicing and consulting civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different types of Instruments used in hydrology and meteorology .
To learn different methods of hydrologic and Irrigational analysis.

To study and to analyze different types advancements in hydrology and Irrigation engineering such as electronic instruments and softwares.

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can carry out field hydrologic surveys for civil engineering works.

To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of civil engineering jobs.

To train the students to develop their carrier in water resources and irrigation engineering consultations.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to carry out field hydrologic surveys and prepare different types of project proposals .

Engineers having the ability to improve the existing civil engineering projects.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.

301007 : Project Management & Engineering Economics:

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Project Management.

To produce civil engineering graduates who are introduced with various techniques such as CPM, PERT, updating, crashing, resource leveling.

To produce graduates who have the ability to pursue careers as project managers as decision making skills & analysis.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn Contract Administration &Material Management.

To learn different Numerical methods as Newton Rahson Method, Lagrangian

Interpolation, Simpson's3/8 rule, Gauss Quadrature

To study and to analyze different algorithms & flowcharts for the designing of softwares for network analysis.

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can use the different softwares on project management.

To train the students so that they can optimize the use of Project management for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of civil engineering jobs.

To train the students to develop their carrier in civil engineering consultations.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to carry out Computer program- software for programming in Fluid mechanics ,Soil mechanics, Project Mgt.

Engineers having the ability to improve the existing civil engineering projects.

Engineers having the ability to function as the leader, or member, of a multi-Disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.

301008 : Structural Design II :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with Analysis of Structures.

To produce civil engineering graduates who are introduced with the basics of understanding and designing of R.C.C. Structures.

To produce graduates who have the ability to pursue careers as practicing civil engineers.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

1) To learn different elements of the structure and their behavior under load.

To learn load calculations and load transfer phenomenon of the structure.
To analyze the structure for different load combinations.
To learn section design and detailing.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse and design different types of structures
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.
To train the students to develop their carrier in Design of Structures.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze and design different types of structures.
Engineers having the ability to strengthen the existing Structures.
Engineers with the ability to read the structural drawings and accordingly to execute the construction work.
Engineers having the ability to function as the leader, or member of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

301009 : Environmental Engineering I :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of water supply and treatment
To produce civil engineering graduates who are introduced with basics of Air pollution, noise pollution and solid waste management.
To produce graduates who have the ability to pursue careers as practicing civil engineers.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn sources of water, water demand, conveyance of raw water, quality and characteristics and other machineries of water supply.

To learn the water treatment process, other treatment alternatives

To study the water distribution system.

To study of air pollution sources, air pollution control and health and other factors associated with air pollution.

Study of noise pollution measurement and control.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse, design and execute the water supply works.

To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.

To train the students to develop their carrier in execution of waterworks.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to analyze design and execute the water works.

Engineers having the ability to improve the existing systems.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.

301010 : Foundation Engineering :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Foundation engg.

To produce civil engineering graduates who are introduced with concept of shear strength & settlement criteria.

To produce graduates who have the ability to pursue careers as practicing Geotechnical engineer.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn types of foundation of buildings.
To learn bearing capacity theories.
To study settlement analysis.
To study of improvement techniques .

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse, design foundation works.
To train the students so that they can optimize the design for effectiveness and economy.

IV. Professionalism:

To train the students to develop their carrier as geotechnical consultant .
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze design and execute the foundation works.
Engineers having the ability to improve the existing foundation systems.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

B. E. Civil Engineering (2008 Course) :

401001 : Environmental Engineering II :

Objectives:

I. Preparation:

To produce civil engineering graduates who can understand the basics of waste water engineering and waste management systems.

To produce civil engineering graduates who can understand the basics of Air solid and hazardous waste management.

To produce graduates who have the ability to pursue careers as practicing civil engineers.

To produce graduate civil engineers who can excel in post graduate programs. II Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyze, design and execute the sewerage and waste water treatment works.

To train the students so that they can optimize the systems for effectiveness and economy.

III. Core Competence:

To study the sources, and characterization of wastewater, pollutional problems.

To learn sources of wastewater, water demand, conveyance of raw water, quality and characteristics and other machineries of water supply.

To learn the wastewater treatment process, other treatment alternatives

To study the wastewater collection system.

To study the hazardous waste treatment, disposal and management

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these pubic schemes and waste management.

To train the students to develop their carrier in execution of sewerage and wastewater works.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to analyze design and execute the wastewater works.

Engineers having the ability to improve the existing systems.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
401002 : Dams & Hydraulic Structures :

Objectives:

I. Preparation:
To produce civil engineering graduates who are introduced with the basics of Gravity dams & Earth dams.
To produce civil engineering graduates who are introduced with Spillways & Diversion Head works.
To produce graduates who have the ability to pursue careers in Dam Design & Construction.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:
To learn different types of Hydro Power Plants.
To learn Canal Masonry Works & Canal Irrigation.
To study and to analyze Design of Spillway and stilling basin.

III. Breadth
To train the students of civil engineering with good scientific and engineering breadth so that they can be able to design cross drainage works
To train the students to evaluate the Benefit cost analysis of a water resources project.
To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:
To develop the students approach to take leadership and teamwork for execution of Hydropower Engineering.
To develop the students approach to prepare report based irrigation projects
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:
To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:
The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to prepare different types of Hydraulic Projects.
Engineers having the ability to improve the existing dam structures.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

401003 : Structural Design-III :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with Analysis of Structures.

To produce civil engineering graduates who are introduced with the basics of understanding and designing of R.C.C. and P.S.C. Structures.

To produce graduates who have the ability to pursue careers as practicing civil engineers.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different elements of some special structures like retaining walls, liquid retaining structures, combined footings and their behavior under load.

To learn load calculations and load transfer phenomenon of the structure.

To analyze the structure for different load combinations.

To learn section design and detailing.

To learn concept and application of Prestressing in structures.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can analyse and design different types of structures

To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.

To train the students to develop their carrier in Design of Structures.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to analyze and design different types of structures.

Engineers having the ability to strengthen the existing Structures.

Engineers with the ability to read the structural drawings and accordingly to execute the construction work.

Engineers having the ability to function as the leader, or member of a multi-disciplinary team.

More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

401004: Architecture and Town Planning:

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of architecture and planning of community.
To produce civil engineering graduates who are introduced with principles of planning and principles of architectures.
To produce graduates who have the ability to pursue careers as practicing civil engineers and town planners.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn effective planning of various types of buildings.
To learn how to use natural resources in the planning of buildings.
To study various zones factors related to building planning.
To learn different methods of construction using ecofriendly materials.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can do planning, designing of various types of building.
To train the students so that they can utilize this knowledge in career development.
To groom the students in this area.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.
To train the students to develop their carrier in designing and planning.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to analyze and design different types of structures.
Engineers having the ability to improve the existing Structures with advanced systems of planning and designing.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.

5) More students working as entrepreneur in this stream.

401004 : Construction Management :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Construction Management.
To produce civil engineering graduates who are introduced with Project Appraisal, Development & Financial Management.
To produce graduates who have the ability to pursue careers as practicing and Construction Manager.
To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn the role of CIDC in construction sector.
To learn different sources in Resource Management.
To study and to analyze different types of advancements in Disaster Management & Risk Management.

III. Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can prepare a safety programme for construction work.
To train the students so that they can optimize the. Construction Management systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of civil engineering jobs as a Construction Manager.
To train the students to develop their carrier in civil engineering consultations.
To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.
To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to prepare Risk Assessment tables & the report on Construction work.
Engineers having the ability to improve the existing civil engineering projects.
Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.
More and more students going for post graduation in this field.
More students working as entrepreneur in this stream.

401007 : System Approach Engineering :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of Identification of Civil engineering systems and their methods analysis.

To produce civil engineering graduates who are introduced with System Concepts, System Parameters and Objectives.

To produce graduate civil engineers who can excel in post graduate programs.

II. Core Competence:

To learn different types of Optimization Techniques.

To learn Linear & Nonlinear Programming.

To study and to analyze Dynamic Programming.

III. Breadth

1) To train the students of civil engineering with good scientific and engineering breadth so that they can be able to find the benefit –Cost analysis of the system.

To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to Construction Optimization.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability to carry out computer based programming on linear & linear programming.

Engineers having the ability to improve the Transportation Models.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.

401009 : Quantity surveying, Contracts and Tenders:

Objectives:

I. Preparation:

To prepare the students to understand the structure in its three dimensions.
To prepare the students to understand item of work and methods of calculating the quantities of various items of work.

To train the students of civil engineering with good scientific and engineering breadth so that they can work out the quantities, materials and labourers required for various items of work.

III. Core Competence:

To prepare the students to differentiate between estimating of a structure and valuation of structure.
To prepare the students to analyze the rate of various materials and labourers based on current market rates of materials and wages of labourers.

IV. Professionalism:

To develop the students to understand tendering and contract documents.
To train the students competent enough in filling the tender for different works.
To produce civil engineering graduates, capable of checking the rates quoted by the contractors and make the comparative statement.

V. Learning Environment:

To prepare the students to understand local and global tendering, BOT type, BOO type tendering etc.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.
Engineers with the ability to perform all operations leading to quantity evaluation.
Engineers having the ability to fill tender and check tender documents.
Engineers having the ability to decide the genuine contractor for particular type of work.
More and more students going for post graduation in this field.

401010 : Transportation Engineering II :

Objectives:

I. Preparation:

To produce civil engineering graduates who are introduced with the basics of understanding and designing of Highways, Bridges, and Airports
To produce civil engineering graduates who are introduced with Transportation Systems and Design
To produce graduates who have the ability to pursue careers as practicing civil engineers in the field of Transportation Engineering.

To produce graduate civil engineers who can excel in post graduate programs in transportation and Infrastructure developments.

II. Core Competence:

To learn different modes of transportation and a Geometric and structural design of flexible and rigid pavements.

To learn basics in highway planning, surveys, traffic studies, geometric design of roads. Basic elements of Airport Engineering. Types, classification, loading for design of bridges

To study and design of pavements. Materials characterization, construction, and Quality control.

Breadth

To train the students of civil engineering with good scientific and engineering breadth so that they can design and construct different types pavements, bridges and Airports.

To train the students so that they can optimize the systems for effectiveness and economy.

IV. Professionalism:

To develop the students approach to take leadership and teamwork for execution of these public schemes.

To train the students to develop their carrier in the field of Transportation Engineering and infrastructure development.

To produce civil engineering graduates, capable of involve in social works.

V. Learning Environment:

To produce graduates with the ability to learn new skills throughout their careers.

To produce the students who will provide assistance as needed.

Outcomes:

The programme outcomes are the skills and knowledge which the students have at the time of graduation. The outcomes essentially indicate what a student can do from subject-wise knowledge acquired during the programme.

Engineers with the ability of planning design and construction of different types of roads, Bridges and Airports.

Engineers having the ability to improve the existing pavements, Bridges and Airports.

Engineers having the ability to function as the leader, or member, of a multi-disciplinary team.

More and more students going for post graduation in this field.

More students working as entrepreneur in this stream.