

B.E.(CIVIL)SEM VII(Revised Course)

Sub code	Name of the subjects	Scheme of instruction Hrs/week			Scheme of Examination					
		L	T	P	Th. Dur (hrs)	Marks				
						Th	S	O	P	Total
7.1	Environmental Engg.II	3	1	2	3	100	25	25	-	150
7.2	Design of reinforced and prestressed concrete	3	1	2	3	100	25	25	-	150
7.3	Estimation and Costing	3	1	2	3	100	25	25	25	175
7.4	Elective I	3	2	0	3	100	25	25	-	150
7.5	Elective II	3	2	0	3	100	25	25	-	150
7.6	Civil Engg Project	-	-	4	-	-	25	50	-	75
	TOTAL	15	07	10	-	500	150	200	-	850

- Elective I**
- 7.4.1 Advanced Geotechnical Engineering
 - 7.4.2 Structural Dynamics
 - 7.4.3 Air Pollution
 - 7.4.4 Advanced Reinforced Concrete design
 - 7.4.5 Low Cost Housing

- Elective II**
- 7.5.1 Rock Mechanics
 - 7.5.2 Applied Engineering Geology
 - 7.5.3 Finite Elements in Civil Engineering
 - 7.5.4 Design of Hydraulic Structures

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to Co-ordinator Faculty for records

B.E. CIVIL (SEM VII)
CE 7.1 ENVIRONMENTAL ENGINEERING-II

Scheme of Instruction			Scheme of Examination				
I.	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	1	2	100	25	25	-	150

Module-I

1. Sewage, its origin & its physical, chemical and biochemical characteristics. Concept of Theoretical, Biochemical and Chemical Oxygen Demands. Determination of B.O.D. & C.O.D. & B.O.D. removal kinetics.
2. Quantity of sewage, & its variation, Sewage disposal systems, pumping of sewage.

Module-II

1. Methods of sewage disposal, Land disposal, sewage farming, self purification of streams.
2. Preliminary sewage treatment:- Bar screens, Grit chambers, their design and operation.
3. Primary sewage treatment:- Primary sedimentation tank, their geometry, design, operational difficulties and remedies.

Module-III

Secondary Sewage Treatment:-

1. Trickling filters, their geometry, design, operation, operational difficulties and remedies
2. Activated sludge process, Batch culture curves, Factors affecting growth of biomass, Types of aerators, Design, operation, operational difficulties and remedies for A.S.P. units.
3. Tertiary sewage treatment:-
Oxidation ponds, their types, geometry, loading rates, design, operation and operational difficulties, oxidation ditches, Lagoons.

Module -IV

1. Sludge collection, treatment and disposal methods. Sludge characteristics, Sludge drying beds.
2. Miscellaneous methods of sewage treatment:- Septic tanks, Imhoff tanks, Effluent disposal & reuse. Design, construction & layout of sewer networks. Sewer appurtenances, Environment impact assessment studies.

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TUTORIALS:

Atleast one Assignment from each module

PRACTICALS:

I. At least five laboratory experiments from the following

1. Determination of dissolved oxygen
2. Determination of BOD
3. Determination of total, suspended and dissolved solids
4. Determination of settleable and non settleable solids
5. Determination of sludge volume index
6. Determination of COD
7. Determination of chlorides
8. Determination of sulphates

II Report of visit to sewage treatment plant

ORALS: will be based on the practicals and tutorials

TEXT BOOKS:

1. Water and Waste Water treatment by Mark J. Hammer
2. Sewage and Waste Disposal by S.K. Garg

REFERENCE BOOKS:

3. Water supply and Waste Water Engineering by E.N.Steel
4. Waste Water Engineering by Metcalf and Eddy

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B.E. CIVIL (SEM VII)

CE 7.2 DESIGN OF REINFORCED AND PRESTRESSED CONCRETE

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	1	2	100	25	25	-	150

Module No. I

1. Design of multistoried Buildings: Design of all building components viz : Beams, slabs, columns, footings and staircases subjected to seismic forces also.

Module No. II

2. Yield line analysis of slabs: Introduction, basic concepts, location of yield lines for standard cases for uniformly distributed & point loads. Methods of Analysis -Virtual & equilibrium

Module No. III

3. Redistribution of moments for frames: Concepts , plastic hinge, advantages & analysis of portal frames . Design of flat slabs.

Module No. IV

Prestressed Concrete : Concept of prestressing , materials used , analysis of sections , Methods of prestressing, Load balancing concept. Losses of prestress. Design of simply supported prestressed member.

TUTORIALS

Analysis and design of building components using application softwares

PRACTICALS

At least one RCC drawings for each of the above modules

ORALS : will be based on the practicals and tutorials

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TEXT BOOKS:

Reinforced concrete structures - by Sinha, S.K.Roy
Reinforced concrete - by B.C.Punmia, A.K.Jain & A.K. Jain
Reinforced concrete by Menon & Pillai-Tata McGraw Hill
Prestressed Concrete - by Krishna Raju
Reinforced concrete by S.K. Mallick & A. P. Gupta
Advanced Reinforced Concrete design by P.C. Varghese

REFERENCES: All relevant IS codes

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CE 7.3 ESTIMATION AND COSTING

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	1	2	100	25	25	25	175

MODULE - I

I. Preparation of specifications for common materials of construction and items of work with reference to Indian standard specifications - analysis of rates and preparation of abstract of items of construction

MODULE - II

II. Quantity surveying - Preparation of approximate estimates-preparation of detailed estimates for buildings - reinforced concrete structures and steel structures - roads - irrigation structures - sanitary and water supply works

MODULE - III

III. Contracts - Legal aspects of Civil Engineering Contracts, pre-requisites, Contract documents, Earnest money deposit, Security deposit, modes of termination of Contracts, Arbitration and liquidated damages. PWD procedures for execution of works.

MODULE - IV

IV. Valuation - Definitions, Methods of Valuation, Book value, Market value, Single and Dual rates year's purchase. Depreciation, Sinking fund, rent fixation, Valuation for various purposes, Numericals on valuation

TUTORIALS: Atleast one assignment from each module

PRACTICALS : shall consist of minimum of 4 assignments involving estimation of buildings, roads ,sanitary and water supply works, structural steel works, culverts , irrigation works and valuation.

ORALS : Will be based on tutorials and practicals

PRACTICAL EXAMINATION: will be based on assignments from the syllabus

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TEXT BOOKS:

Estimating and Costing – by Chakraborty
Verma L.C., Standardisation - A New Discipline
Rangawala- Valuation of real properties
Rangawala, Valuation of Real Properties, Charotar publishing
Civil engineering Contracts and Estimates by B. S. Patil

REFERENCE BOOKS:

Dutta B.N., Estimation & Costing in Civil Engg, UBS
Chakrabarthi, Estimation, Costing, Specification in Civil Engg,
Shah N.A., Quantity Surveying & Specification in Civil Engg.,
IS 1200 (1968), Methods of Measurement of Building & Civil Engg. Works
Mahajan S.P., Civil Estimating & Costing, Satya Prakashan
Goa Schedule of rates for PWD

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Elective I Sem VII

CE 7.4.1 ADVANCED GEOTECHNICAL ENGINEERING

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25	-	150

Module I

1. Introduction to special geotechnical aspects: Shell foundations; foundations for special structures such as power transmission lines, communication towers, etc.; Elements of Centrifuge Modelling – case studies.
2. Reinforced Earth and Geosynthetics :
Introduction Material Application areas and construction; modern consolidation techniques such as use of band wicks and band drains along with surcharge.

Module II

3. Underpinning: Concept, reasons, different Methods; relocation of structures
4. Laterally loaded piles; pile testing- static and dynamic tests.
5. Soil structure interaction:
Concept and introduction. Importance of interaction complexities involved in interactive Analysis and Designs

Module III

6. Geotechnical Earthquake Engineering:
Earthquakes, Ground shaking, Liquefaction, Surface Rupture, Other Deformations, I.S. code provisions. Principles of geotechnical earthquake Engineering
7. Landslides – types and mitigation techniques.
8. Foundation problems in Expansive soils; Concept of Floating Foundations.

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Module IV

9. Flexible and Rigid Earth Retaining Structures:
Braced cofferdams, cantilever sheet pile walls. Anchored Bulkheads common section. Types of Retaining walls. Forces on Retaining walls, stability Analysis Aspects. Aspects of Soil nailing and rock bolts.
10. Geo-Environmental Engineering:
Types and sources of underground contaminations. Transport of underground Contaminants, Geo-environmental site characterizations, remedial measures, Landfills.

TUTORIALS : will consist of atleast one assignments from each module

ORALS : will be based on tutorials

Text Books :

Geotechnical Engg – Principles and Practice by D. P. Coduto
Engineering with Geosynthetics by G V Rao and G V S Raju
Earth Reinforcement and Soil Structures by C J F P Jones
Foundation Engg by S P Brahma
Geotechnical Earthquake Engineering by Steven L Kramer

Reference Books:

Foundation Design and Construction by M Tomlinson
Handbook of Foundation Engg by Kamraj
Principles of Foundation Engineering by Braja M Das
Foundation Engg Handbook by Winterkorn and Fang
Research Papers & Conference Volumes

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ELECTIVE I SEM VII

CE 7.4.2 STRUCTURAL DYNAMICS

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25	-	150

Module I

1. Single degree freedom system, free and forced vibrations, damped and undamped vibrations, critical damping, and response, periodic loading expressed in harmonics, dynamic load factor.
2. Single degree freedom system, response to impulsive loading, rectangular, triangular pulses, Duhamel Integral. Response to general dynamic loading, Numerical schemes such as Wilson-Theta, Newmark-Beta, constant linear acceleration, time domain and frequency domain analysis.

Module II

3. Multi-degree freedom system, stiffness and flexibility approaches, Lumped-mass matrix, free vibrations fundamental, Frequencies and mode shapes, orthogonality of modes, numerical schemes to find mode shapes and frequencies.

Module III

4. Multi degree freedom systems, response to dynamic loading, Formulations of equations of motion, normal coordinates, mode superposition method, Modal matrix, numerical scheme of Wilson and Newmark.

Module IV

5. Structural response to earthquake, wind and ground motion characteristics Response spectrum design earth quake, I.S. 1893 P-I, code provisions for multistory frames.

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TUTORIALS: will consist of assignments based on the following:

1. Free vibration test on SDOF system OR equivalent analytical analysis
2. Free vibration test on MDOF system OR equivalent analytical analysis
3. Dynamics of a multi storied building frame subjected to harmonic base motion OR equivalent analytical analysis
4. Dynamics of a one-storied building frame with planar asymmetry subjected to harmonic base motions. OR equivalent analytical analysis
5. Dynamics of a Multi- storied building frame subjected to periodic (non-harmonic) base motion OR equivalent analytical analysis

ORALS : will be based on tutorials

TEXT BOOKS:

1. Anil. K. Chopra: Dynamics of Structures-Theory and Applications to Earthquake Engineering
2. R.W.Clough, J.Penzian: Dynamics of Structures
3. J.M.Biggs: Structural Dynamics

REFERENCE BOOKS:

1. L.S.Jacobsen & R.S.Arye: Engineering Vibrations
2. S.P.Timoshenkoo: Vibration Problems in Engineering
3. G.B.Warburden: The Dynamical Behaviour of Structures

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TUTORIALS: shall consist of the following:

1. Atleast One assignments from each module and report on the following laboratory experiments:
 - A. Determination of concentration of SPM using High Volume Samplers
 - B. Determination of CO, SC concentrations of motor vehicles using Gas Analysers
2. Reports of atleast two field visits to any two industries possibly where air pollution control equipments are in use.

ORALS: will be based on tutorials

TEXT BOOKS:

Air Pollution by M. N. Rao,
Air Pollution by Rao & Rao

REFERENCE BOOKS:

Air Pollution by Muralikrishna.

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ELECTIVE I Sem VII
CE 7.4.4 ADVANCED REINFORCED CONCRETE DESIGN

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25	-	150

Module No. I

Redistribution of Moments – Concepts, plastic hinge. Advantages & Analysis of Portal Frames
Design of Folded Plates

Module No. II

Yield Line analysis of slabs: Characteristic features, Virtual & Equilibrium methods. Design of
Grid Floors & Flat Slabs

Module No. III

General Classification of Shells, Membrane Theory of Cylindrical Shells. Design of and
Applications to Spherical Domes, Conical Shells & Conical Water Tanks

Module No. IV

Design of Bunkers & Silos, Design of Pile Foundations

TUTORIALS

1. Problems using softwares – STAADPRO
2. RCC drawings – 3 NOS FOR ABOVE MODULES except module II

ORALS: Will be based on tutorials

TEXT BOOKS:

Reinforced Concrete – S.K Mallick & A.P Gupta Sinha, S.K.Roy
Advanced Reinforced Concrete Design - P.C. Varghese
Design & Construction of Concrete Shell Roof – G.S Ramaswamy
Design of Reinforced Concrete Structures – N. Krishna Raju

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REFERENCES:

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Advanced Reinforced Concrete Design – N. Krishna Raju
Theory & Design of Concrete Shells – B.K Chatterjee
Design of Roof Shells – J.E Gibson
Stresses in Shells – Wilhelm & Flugge

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ELECTIVE I Sem VII

CE 7.4.5 LOW COST HOUSING

Scheme of Instruction			Scheme of Examination					Module	Hours
L	T	P	Theory	Sessional	Orals	Pract	Total	I	16
3	2	0	100	25	25	-	150	II	16
								III	16
								IV	16

Module I

Introduction- Need for low cost housing - Housing Scenario.

Requirements of Low Cost Housing: Quantitative requirements and Qualitative requirements.

Introduction to work by national and international organisations dealing with low cost housing and by research organizations. Role of Nirmithi Kendras, low cost techniques promoted by Building Centres.

Module II

Financial assistance/subsidies/loans for low cost housing.

Materials: Use of locally available materials, Low cost materials for roofing, walling, doors, windows etc. Stabilized soil block. I.S Code specifications. The concept of cheaper materials/or better comfort Use of mine rejects and other rejects. Substitute materials for Timber. Use of Industrial wastes. Use of Agricultural wastes in low cost Housing.

Module III

Precast Technology - Introduction to Partial and Total prefabrication Techniques.

Basics of Green buildings Technology - Concept of Energy Audit in a Building

Design concepts: Row housing, community housing complexes. Advantages and disadvantages.

New design concepts for housing - harmonizing with the surroundings. Housing Pattern.

Low cost , Housing in Earthquake prone areas.

Module IV

Construction techniques: Block making machines. Typical hand operated and power operated machines for soil and concrete blocks in national and international field. Do it yourself techniques. Concept of involvement of end users in construction. Low cost Infrastructure services

Rural Housing - Mud Housing Technology, Soil Stabilisation, Rural Housing programmes, Social Housing programmes- Implementing Agencies, performance of Social Housing programmes.

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A. C. 28/9/10

TUTORIALS

1. Study of an existing house constructed using low cost housing Techniques.
2. Design and estimate a typical self contained low cost house
3. Make 3D detailed drawings of any 6 low cost techniques.

ORALS : will be based on the tutorials

TEXT BOOKS:

Handbook of low cost Housing by G.K Lal

REFERENCE BOOKS:

Relevant reports and conference/ Seminar Volumes of CBRI, NBO etc.
IS Codes IS 2185-1979(Part I)
IS 456-2000.

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ELECTIVE II Sem VII
CE 7.5.1 ROCK MECHANICS

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25	-	150

Module I

- 1 **Introduction:** Definition, Development of rock mechanics, Objectives of rock mechanics, Application of rock mechanics, Similarities and difference between soil mechanics and rock mechanics, discontinuities in rocks
- 2 **Physical Properties:** Specific gravity, porosity, void index, unit weight, water absorption, Degree of saturation, slake durability index, rock sampling.

Module II

- 3 **Compressive Strength Of Rock:** Stress distribution in specimens under compression, Modes of failure in compression, Failure mechanism of specimens in compression, Factors affecting compressive strength – End friction, specimen geometry, rate of loading, moisture and confining pressure.
- 4 **Elastic Constants:** Static and dynamic elastic constants, Significance and application, Determination of static and dynamic elastic constants, Typical stress-strain curves for rocks, Complete stress-strain curve,

Module III

- 5 **Tensile Strength:** Significance and application of tensile strength, Laboratory determination of tensile strength - Direct methods, Indirect methods-Bending tests, Hydraulic extension tests, Diametral compression tests, other methods, Factors affecting tensile strength of rock.
- 6 **Shear Strength:** Significance and application, Various methods of estimating shear strength – single shear test, double shear test, punch shear test, oblique shear test, rock core direct shear test, Concept of shear strength of jointed rock.

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Module IV

- 7 **Engineering Classification Of Rocks:** Necessity, aim, and process of classification, Classification of intact rocks- ISRM and Deere and Miller classification, Engineering Classification of rock mass- ROD, BGD and RMR systems of classifications.
- 8 **Insitu-Tests:** Necessity, plate bearing test, pressure tunnel test, pressure meter test and direct shear test and field permeability tests.

TUTORIALS: will consist of atleast one assignment from each module

ORALS: will be based on tutorials

TEXT BOOKS

Rock Mechanics- Verma B. P.
Introduction to rock mechanics - Jumikies
Engineering in Rocks-Ramamurthy

REFERENCE BOOKS

REFERENCE BOOKS
Hand book on rock mechanics(Vol I to IV) – Lama and Vutukuri
Rock mechanics – Stack and Zienkiwize
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ELECTIVE II Sem VII

CE 7.5.2 Applied Engineering Geology.

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25		150

MODULE-I

1. **Indian stratigraphy.** Geological history of Peninsula. Study of different geological formations of the peninsula. Occurrence of important economic minerals, building stones and construction materials of India. Geology and stratigraphy of Goa.

2. Coastal Engineering.

Waves and tides. - wave motion, Force and height of waves, beach zones, wave refraction, tides, changes in sea level

Coastal erosion and deposition - coastal erosion, beaches, longshore drift, Offshore bars

Shoreline Investigation and data acquisition - Recording devices, topographic and hydrographic surveys. Measurement of water levels, movement of sediments

Methods of Shoreline protection; Sea Walls, Embankments, revetments, bulkheads

Methods of Stabilization of long shore drift - Groynes, Beach Replenishment

MODULE-II

3. **Geology of dam and reservoir sites.** A) Dams: Geological investigation, Types dams. Influence of strength, stability, water tightness, physical characteristics and geological structures on dams. Suitable and unsuitable conditions. Precautions and Treatments.

4. **Groundwater:** Water table. Storage and circulation. Porosity and Permeability. Geological work of groundwater. Springs, wells and artesian wells. Cone of Exhaustion. Occurrence of groundwater in different rocks. Water quality, safe yield and contamination. Groundwater exploration.

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MODULE-III

5. Tunneling: Geological investigations for selecting tunnel routes. Influence of lithology, geological characters and structures of rocks and soils in tunneling. Tunnelling in soft ground. Effect of groundwater, gases and temperature variations in tunnels. Excavations of tunnels. Tunnel support analysis.

6. Landslides: Causes .Classification. Influence of geological characters, influence of structural features of rocks like faults, folds and joints on landslides. Safe and unsafe slopes. Controlling of landslides. Precautions while making cut in hill sites.

MODULE-IV

7. Building stones and aggregates: Requirements of good building stones, aggregates and other construction materials. Suitability of common rocks as building stones.

8. Engineering properties of rocks:

1. Physical properties, porosity, density, moisture content, degree of saturation, permeability, durability
2. Strength characteristics: Compressive strength, tensile strength, shear strength, point load strength, elasticity, plasticity and deformability

TUTORIALS:

1. Identification and study of natural construction materials, building stones and decorative stones.
2. Problems on water quality.
3. Problems on structural geology (thickness of strata, strike and dip).
4. Toposheet map reading.
5. Use of Brunten compass and Clinometer compass

ORALS : will be based on tutorials

TEXTBOOKS

1. Engineering geology and Geotechnics: B.P.Krynine and W.R.Judd
2. Geology for Engineers: Blyth and others.
3. Text book of Engineering geology: Dr.R.B.Gupte
4. Engineering and General geology: Parbin Singh

REFERENCE BOOKS:

1. Geology for Engineering: Legget
2. Mining Geology: Mckinstry.
3. Principles of Engineering geology R. Johnson and J.Graff.

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ELECTIVE II Sem VII
CE 7.5.3 FINITE ELEMENTS IN CIVIL ENGINEERING

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
3	2	0	100	25	25	-	150

MODULE I

FUNDAMENTAL CONCEPTS OF FEM: General, Historical background, stresses and equilibrium, Basic steps in FEA, boundary conditions, strain-displacement relations, stress-strain relations, Potential energy approach, Rayleigh-Ritz method, Galerkin's method. Advantages of FEM, Matrix algebra and Gaussian elimination

FEA FOR 1-D STRESS-DEFORMATION PROBLEMS: Introduction, FE modelling, Co-ordinate and shape functions, Potential energy and Galarkian approach, Assembly of global stiffness matrix and load vector, treatment of boundary conditions, Quadratic shape functions.

MODULE II

2-D STRESS-DEFORMATION FEA USING CST: Introduction, plane strain and plane stress problems, finite element modelling, Problem modelling, boundary conditions and solution.

FEA FOR 2-D STRESS-DEFORMATION WITH QUADRILATERAL: Introduction, Four noded quadrilateral element, Finite element formulation, Derivation of element equation, Problem solution.

MODULE III

FEA FOR PLANE TRUSS STRUCTURES: Introduction, Plane trusses, Formulation of problem, Temperature effects, introduction to three-dimensional trusses.

FEA FOR BEAMS AND FRAMES: Beams: Introduction, Potential energy, Finite element formulation, Load vector, Boundary conditions, Shear force and bending moment, Problem solution. Frames: Introduction, Plane frames, Finite element formulation, Load vector, Boundary conditions, Problem solution.

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MODULE IV

- 7 **DYNAMIC CONSIDERATIONS IN FEA:** Introduction, Formulation, Solid body with distributed mass, Element mass matrix for various types of elements, Evaluation of Eigenvalues and eigenvectors, Vector iteration method and Inverse iteration method.
- 8 **PREPROCESSING, PROCESSING AND POSTPROCESSING IN FEA:** Introduction, Mesh generation, Region and block representation, Block corner nodes, sides and subdivisions, Generation of node numbers, Co-ordinates and connectivity, Examples of mesh generation, Data handling and editing, Post processing.

TUTORIALS : will consist of atleast one assignment from each module

ORALS: will be based on tutorials

TEXT BOOKS:

Introduction to Finite Elements in Engineering – Chandrupatla and Belegundu

Finite Element Method – Desai

Introduction to Finite Element Method – Desai and Abel

REFERENCE BOOKS:

Finite Element Procedures – Bathe

The Finite Element Method – Zienkiewicz

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ELECTIVE II Sem VII

CE 7.5.4 DESIGN OF HYDRAULIC STRUCTURES

Scheme of Instruction			Scheme of Examination				
	T	P	Theory	Int. Asst.	Orals	Pract	Total
	2	0	100	25	25	-	150

Module No. I

Construction of Dams - Site investigation, engg surveys, geological & hydrological
Storage capacity, Reservoir- Operation, losses & sedimentation.
- Selection criteria of dam site, construction materials, joints, keys & water stops, temperature
Types of loads, stability & gravity analysis, safety. Design of overflow & non
ion by single & multi step method. Stress analysis & stress contours.
Dams & Cofferdams

Module No. II

Mass Dams, Design principles of Arch dam-constant angle & constant radius types.
Works-various outlet works- classification. Design principles of buttress dams

Fill dams-Advantages & limitations, Foundation for earth dams,
Design criteria, seepage line, stability analysis, Swedish circle methods with
construction details & maintenance, Rockfill Dams-Different types & stability

Module No. III

Design of principles of Ogee & bucket type Spillways, Energy dissipator stilling
Chute, siphon & shaft spillway design.

Design, choice & advantages. Design of radial gates. Intake structures

Module No. IV

Design of bridge and culverts: Data collection. High flood discharge Linear water way.
Principles of hydraulic design of causeways and box culverts.

Design of works: River pattern, regime flow, Guide Banks, Flood levels, Design of guide
Design of aprons and spurs. Bridge piers.

Development: Types of power plants, principles of planning of Hydro electric
Design of turbines, tail race channel, penstocks, Forebay, pressure shafts.

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TUTORIALS

Atleast one design problems on each module

ORALS : will be based on above tutorials

TEXT BOOKS:

Theory and Design of irrigation Structures - Varshney and Gupta.

Engineering for Dams Vol. I to III - Creager, Justin, Hinds

REFERENCES:

Goodman, A.S., Principles of water resource planning. Prentice Hall Publication, 1954.

Hydroelectric Hand Book - Guthrie Brown.

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B.E. CIVIL (SEM VII)
CE 7.6 Civil Engineering Project

Scheme of Instruction			Scheme of Examination				
L	T	P	Theory	Int. Asst.	Orals	Pract	Total
-	-	4	-	25	50	-	75

The project will include experimental or analytical studies or a combination of both on any of the civil engineering topics. A hard copy of progress report shall be submitted at the end of the semester.

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Semester VII
Project Report

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