JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

Course Structure for Civil Engineering
B.Tech(Regular)
(For batches admitted from the year 2013)

I YEAR **I SEMESTER**

Sl.No.	Subject		L	T	P	Credits
1	Theory	English-I	3	1	0	3
2	Theory	Mathematics-I	3	1	0	3
3	Theory	Environmental Studies	3	1	0	3
4	Theory and Practical	Engineering Graphics	2	0	2	3
5	Theory	Engineering Chemistry	3	1	0	3
6	Practical	Engineering Workshop & IT workshop	0	0	3	2
7	Practical	Engineering Chemistry Lab	0	0	3	2
8	Practical	Communication Skills Lab	0	0	3	2
	Total		**14**	**4**	**11**	**21**

I YEAR **II SEMESTER**

Sl.No.	Subject		L	T	P	Credits
1	Theory	English-II	3	1	0	3
2	Theory	Mathematics-II	3	1	0	3
3	Theory	Computer Programming	3	1	0	3
4	Theory	Engineering Physics	3	1	0	3
5	Theory	Building Materials and Construction	3	1	0	3
6	Theory	Engineering Mechanics	3	1	0	3
7	Practical	Engineering Physics Lab	0	0	3	2
8	Practical	Computer Programming Lab	0	0	3	2
	Total		**18**	**6**	**6**	**22**

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II B.Tech– I Sem

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Mathematical Methods	3	1	0	3
2	Theory	Electrical and Mechanical Technology	3	1	0	3
3	Theory	Strength of Materials - I	3	1	0	3
4	Theory	Surveying – I	3	1	0	3
5	Theory	Fluid Mechanics	3	1	0	3
6	Theory	Building Planning & Drawing	3	1	0	3
7	Audit Course	Human Values & Professional Ethics	2	-	-	-
8	Practical	Surveying Lab – I	0	0	3	2
9	Practical	Strength of Materials Lab	0	0	3	2
	Total		20	6	6	22

II B.Tech– II Sem

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Probability & Statistics	3	1	0	3
2	Theory	Strength of Materials – II	3	1	0	3
3	Theory	Hydraulics & Hydraulic Machinery	3	1	0	3
4	Theory	Managerial Economics & Financial Analysis (MEFA)	3	1	0	3
5	Theory	Structural Analysis – I	3	1	0	3
6	Theory	Surveying – II	3	1	0	3
7	Practical	Fluid Mechanics & Hydraulic Machinery Lab	0	0	3	2
8	Practical	Surveying Lab - II	0	0	3	2
	Total		20	6	6	22

Note:- Survey camp for a duration of two weeks to be conducted before the commencement of III B.Tech, I – Sem class work, in the II B.Tech, II-Sem break. This survey camp has to be evaluated for 50 marks by the internal faculty. It has a weightage of 2 credits. The marks and credits will be incorporated in IV – B.Tech, II – Sem marks memo.

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III B.Tech **I Sem**

Sl.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Design & Drawing of reinforced concrete Structures	3	1	0	3
2	Theory	Concrete Technology	3	1	0	3
3	Theory	Transportation Engineering - I	3	1	0	3
4	Theory	Water resources Engineering -I	3	1	0	3
5	Theory	Structural Analysis – II	3	1	0	3
6	Theory	Engineering Geology	3	1	0	3
7	Practical	Engineering Geology Lab	0	0	3	2
8	Practical	Concrete Technology Lab	0	0	3	2
	Total		18	6	6	22

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III B.Tech **II Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Design & Drawing of Steel Structures	3	1	0	3
2	Theory	Geotechnical Engineering – I	3	1	0	3
3	Theory	Environmental Engineering	3	1	0	3
4	Theory	Water Resources Engineering – II	3	1	0	3
5	Theory	Estimation & Costing	3	1	0	3
6	Theory	Green Buildings	3	1	0	3
7	Practical	Geotechnical Engineering Lab	0	0	3	2
8	Practical	Environmental Engineering Lab	0	0	3	2
9	Audit Course	Advanced Communication skills lab	-	-	2	-
	Total		18	6	6	22

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IV B.Tech **I Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Finite Element Methods in civil Engineering	3	1	0	3
2	Theory	Bridge Engineering	3	1	0	3
3	Theory	Geotechnical Engineering – II	3	1	0	3
4	Theory	Transportation Engineering – II	3	1	0	3
5	Theory	Open Elective	3	1	0	3
6	Theory	Elective-I (MOOC)	3	1	0	3
7	Practical	CAD Lab	0	0	3	2
8	Practical	Highway Materials Lab	0	0	3	2
9	Project	Part-A – Seminar	-	-	-	2
	Total		18	6	6	24

S.No	**Subject**
	OPEN ELECTIVE
1.	Building construction and Management
2.	Disaster Management & Mitigation
3.	Architecture & Town Planning
4.	Intellectual Property Rights

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IV B.Tech **II Sem**

S.No	Subject		**L**	**T**	**P**	Credits
1	Theory	Advanced Structural Engineering	3	1	0	3
2	Theory	Design and Drawing of Irrigation Structures	3	1	0	3
3	Theory	Elective-II	3	1	0	3
4	Theory	Elective-III	3	1	0	3
5		Comprehensive Viva-Voce & Seminar	-	-	-	3
6	Project	Part-B	-	-	-	8
		Survey Camp (Conducted before III – B.Tech I-Sem)	-	-	-	2
	Total		15	4	0	25

S.No	**Subject**
	ELECTIVE – II
1.	Advanced Foundation Engineering
2.	Remote Sensing & GIS
3.	Rehabilitation and Retrofitting of Structures
	ELECTIVE – III
1.	Experimental Stress Analysis
2.	Prestressed concrete
3.	Earth Quake Resistant design of structures

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B.Tech. III - I sem (C.E.)	**T**	**P**	**C**
	3+1*	**0**	**3**

DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES

OBJECTIVE: *Structural elements are subjected to different loading to with stand the structures, for external loading we need to design the structures for its safety and serviceability.*

UNIT –I

Concepts of RC. Design –Introduction to Working stress method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS: 456 – 2000.

Beams **:** Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections.

UNIT – II

Shear, Torsion and Bond **:** Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing

Limit state design for serviceability for deflection, cracking and codal provision.

UNIT - III

Design of Two-way slabs, one way slab, continuous slab Using I S Coefficients, Cantilever slab /Canopy slab.

UNIT –IV

Short and Long columns –axial loads, uni axial and biaxial bending I S Code provisions.

UNIT – V

Design of Footings - isolated (square, rectangular) and Combined footings.

Design of Stair case – Dog legged and Open well.

NOTE : All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. Reinforced Concrete Design by N. Krishna Raju and R.N. Pranesh, New Age International Publishres, New Delhi
3. Limit State Designed of Reinforced Concrete – P.C.Varghese, Prentice Hall of India, New Delhi

REFERENCES :

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
2. Fundamentals of Reinforced Concrete by N.C. Sinha and S.K Roy, S. Chand publishers
3. Analysis of skeletal structures by Seetharamulu Kaveti, TMH pubilications.
4. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
5. Principles and detailing of concrete structures by D.S.Prakash Rao, TMH pubilishers.
6. SP-16:Design Aids for Reinforced Concrete to IS 456

Codes/Tables: IS 456-2000 code book to be permitted into the examinations Hall.

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	3+1*	**0**	**3**

CONCRETE TECHNOLOGY

OBJECTIVE: *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT I

CEMENTS & ADMIXTURES: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures-Relavent Codes.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size-Relevant Codes.

UNIT – II

FRESH & HARDENED CONCRETE: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing. Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests – Relevant Codes

UNIT – III

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – -Relevant Codes

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - codal provisions for NDT.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson Publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co.
3. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi

REFERENCES:

1. Textbook of Concrete Technology by Kulkarni, P. D.-New Age Pubilishers
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers
4. Design of Concrete Mix by Krishna Raju, CBS pubilishers.
5. Non-Destructive Test and Evaluation of Materials by J.Prasad & C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi.
6. Testing of Concrete in Structures by John H.Bungey, Taylor & Francis.

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	3+1*	**0**	**3**

TRANSPORTATION ENGINEERING - I

OBJECTIVE: *It deal with different components of Highway Engineering. Emphasis is on Geometric Design of different elements in Highway Engineering.*

UNIT I
HIGHWAY DEVELOPMENT AND PLANNING:
Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II
HIGHWAY GEOMETRIC DESIGN:
Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients-Vertical curves.

UNIT – III
TRAFFIC ENGINEERING:
Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.
TRAFFIC REGULATION AND MANAGEMENT:
Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method – Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV
INTERSECTION DESIGN:
Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria-Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN:

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
3. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad

REFERENCES:

1. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Transportation Engineering an introduction by Khisty Lal, Pearson Pubilications
3. Highway Engineering – S.P.Bindra , Dhanpathi Rai & Sons. – 4th Edition (1981)
4. Introduction to Transportation Engineering by James.H.Banks, Tata Mc.Grawhill Edition, New Delhi
5. High way engineering by Paul .H.Wright & Karen K.Dixon,wiley india limited
6. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

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	3+1*	**0**	**3**

WATER RESOURCES ENGINEERING-I

OBJECTIVE:

To study the concepts of

i. *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, components of run-off; Estimation of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; Types of aquifers, aquifer parameters- porosity, Specific yield, Specific retention, storage coefficient-coefficient of permeability and transmissibility; well hydraulics- Darcy's law; Steady radial flow to a well in confined and unconfined aquifers; un Steady radial flow to a well in confined and unconfined aquifers.

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation;; vertical distribution of soil moisture; Limiting soil moisture conditions; Depth and frequency of irrigation; duty and delta, factors affecting duty, Gross command area; Culturable command area; Culturable cultivated and uncultivated area;

Kor depth and Kor period. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING: Water logging; Effects of water logging; Causes of water logging; Remedial measures;

UNIT – V

DIVERSION HEAD WORKS: Component parts of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on pereable foundations; Blighs creep theory; Khoslastheory.

CANALOUTLETS: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity.

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi Publications pvt. Ltd., New Delhi
2. Engineering Hydrology by Srinivasan ,Oxford Publishers, New Delhi
3.Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Water Resources Engineering : Principles and Practice by Murthy, Challa Satya- New Age Pubilishers
2. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
3. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
4. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

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	3+1*	**0**	**3**

STRUCTURAL ANALYSIS – II

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

UNIT-I

SLOPE-DEFLECTION & MOMENT DISTRIBUTION METHOD For Frames:- Analysis of single bay, single storey, portal frame including side sway– Stiffness and carry over factors – Distribution factors – Analysis of single storey portal frames – including Sway - Substitute frame analysis by two cycle method.

UNIT – II

KANI`S METHOD:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNI T – III

FLEXIBILITY & STIFFNESS METHODS FOR FRAMES :-

Flexibility methods, Introduction, application to continuous beams including support settlements-Introduction to stiffness method and its application application to continuous beams including support settlements.

UNIT IV

ARCHES : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT – V

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS:

1. Analysis of Structures – Vol. I & 2 by Bhavikatti, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Theory of structures by Ramamuratam, Jain Book Depot , New Delhi.

REFERENCES:

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Strength of Materials and Mechanics of Solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
3. Introduction to Structural Analysis by Nautiyal, B. D.- New Age Pubilishers.
4. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
5. Basic Structural Analysis by K.U.Muthu *et al.,* I.K.International Publishing House Pvt.Ltd

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	3+1*	**0**	**3**

ENGINEERING GEOLOGY

OBJECTIVES: *The objectives of this subject to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY :

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY :

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY :

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER ,EARTH QUAKE &LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS ,RESERVOIRS AND TUNNELS :

Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2) Engineerring geology by Prabin Singh, Katson Pubilcations
3) Engineerring geology by vasudev kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
2. Engineering Geology by Reddy, M.T.M.New Age Pubilishers
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
5. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
6. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

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	0	**3**	**2**

ENGINEERING GEOLOGY LAB.

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. Applied Engineering Geology Practicals (Lab. Practice) by M.T.M.New Age Pubilishers

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	0	**3**	**2**

CONCRETE TECHONOLOGY LAB

1. Normal Consistency of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
4. Compressive strength of cement.
5. Workability test on concrete by compaction factor, slump and Vee-bee.
6. Modulus of Elasticity of concrete.
7. Compressive strength, Modulous of Rupture and Split Tensile Strength of Concrete
8. Specific Gravity and Water Absorption of Coarse aggregate.
9. Bulking of Fine aggregate.
10. Non-Destructive testing on concrete (for demonstration)

REFERENCES:

1. Concrete Manual by M.L.Gambhir, Dhanpat Rai & Co
2. Relevant IS Codes

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	3+1*	**0**	**3**

DESIGN & DRAWING OF STEEL STRUCTURES

OBJECTIVE: *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Un-stiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates stiffeners – splicings and connections.
Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.
Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. Design of Steel Structures by K.S.Sai Ram , Pearson Pubilishers.
2. Limit State Design of Steel Structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
3. Design of Steel Structures by Bhavikatti. IK INT Publication House, New Delhi, 2010.

REFERENCES

1. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad.
2. Structural Design in Steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Steel Structures by Subramanyam.N, Oxford University press, New Delhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables:

IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code. and **steel tables** to be permitted into the examination hall.

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	3+1*	**0**	**3**

GEOTECHNICAL ENGINEERING – I

OBJECTIVE: *The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.*

UNIT – I

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II

PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory and Field determination of coefficient of permeability –Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III

STRESS DISTRIBUTION IN SOILS: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart .

COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

UNIT – IV

CONSOLIDATION : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement..

UNIT – V

SHEAR STRENGTH OF SOILS : Importance of shear strength **–** Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on

drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt . Ltd, New Delhi.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.

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ENVIRONMENTAL ENGINEERING

OBJECTIVE: *This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.*

UNIT – I

INTRODUCTION: Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer.

WATER DEMAND AND QUANTITY STUDIES : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies.

QUALITY AND ANALYSIS OF WATER: Characteristics of water – Physical, Chemical and Biological. Analysis of Water – Physical, Chemical and Biological. Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT - II

WATER TREATMENT: Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation clarifier design – coagulants – feeding arrangements. Filtration and Chlorination**:** Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices- Miscellaneous treatment methods

WATER DISTRIBUTION : Distribution systems – Requirements, Layout of Water distribution systems - Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house, waste detection and prevention.

UNIT – III

INTRODUCTION TO SANITATION :systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers .

WASTE WATER COLLECTION AND CHARACTERSTICS : Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT IV

WASTE WATER TREATMENT: Layout and general out line of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

SLUDGE TREATMENT: Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff Tanks, working principles and design – soak pits.

UNIT – V

SOLID WATE MANAGEMENT: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal).

AIR POLLUTION: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

NOISE POLLUTION: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water Supply Engineering, Vol. 1, Waste Water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd, New Delhi
3. Water supply and sanitary Engineering by S.K.Garg,Khanna Pubiilshers.

REFERENCS :

1. Water and Waste Water Technology by Mark J Hammar, Pearson Pubilshers.
2. Environmental Pollution Control Engg-C.S.RAO- New Age Pubilishers
3. Elements of Environmental Engineering by K.N.Duggal, S.Chand Pubilishers.
4. Water and Waste Water Engineering by Fair Geyer and Okun, Wiley Publications
5. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
6. Waste water Engineering by Metcalf and Eddy, TMH Pubilications.

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WATER RESOURCES ENGINEERING-II

OBJECTIVE: *To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.*

UNIT – 1

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; design of sarada type fall.

Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-II

STREAM GAUGING: Measurement of Stage, measurement of velocity, Area-Velocity method, dilution technique of stream flow measurement, electromagnetic method, ultrasonic method, indirect methods.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering, general features of meandering, Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries;

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT-V

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

WATER POWER ENGINEERING: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor and utilization factor .

TEXT BOOKS:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi Publications pvt. Ltd., New Delhi.
2. Irrigation and Water Resources Engineering by G.L. Asawa, New Age International Publishers
3. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Water Resources Engineering by Satyanarayana Murthy. Challa, New Age International Publishers
2. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
3. Irrigation and Water Power Engineering by Punmia and Lal, Laxmi Publications, New Delhi.
4. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication, New Delhi.

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	3+1*	**0**	**3**

ESTIMATION & COSTING

OBJECTIVE: *The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.*

UNIT – I
INTRODUCTION : General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. **STANDARDS SPECIFICATIONS :** Standard specifications for different items of building construction

UNIT – II
ESTIMATION OF BUILDINGS : Detailed Estimates of Buildings

UNIT – III
EARTHWORK ESTIMATION : Earthwork for roads and canals.
REINFORCEMENT ESTIMATION : Reinforcement bar bending and bar requirement schedules.

UNIT – IV
CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT – V
RATE ANALYSIS : Working out data for various items of work over head and contigent charges.
VALUATION : Valuation of buildings.
.

TEXT BOOKS
1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

REFERENCES :
1. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publishing Company (P) Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.Chand Pubilishers.

3. Standard Schedule of rates and standard data book by public works department.
4. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
5. National Building Code

Note : Standards scheduled of rates is permitted in the examination hall.

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GEOTECHNICAL ENGINEERING LAB

OBJECTIVE: *To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.*

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Specific gravity of soils by Density Bottle method & Pycnometer method
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test
11. Direct shear test.
12. Vane shear test

NOTE: At least **EIGHT** of the above experiments are to be conducted.

TEXT BOOKS:

1.Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

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ENVIRONMENTAL ENGINEERING LAB

OBJECTIVE: *The laboratory provides knowledge of estimating various parameters like PH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.*

LIST OF EXPERIMENTS

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least **EIGHT** of the above experiments are to be conducted.

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty,TMH Pubilications
2. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers.

REFERENCE

1. Relevant IS Codes.

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	3+1*	**0**	**3**

GREEN BUILDINGS

The objective of the course is to make the student to understand about recycled material top protect environment by providing energy efficiency models and eco friendly materials.

UNIT – I INTRODUCTION:

Fundamentals of Energy-Energy production systems-Energy Economic Analysis-Energy Conservation And Audits- Primary Energy use in Buildings-Residential Commercial-Institutional And Public Buildings. Energy and resource conservation-Principles, Design of green buildings-rating systems-LEED Standards-Evaluation Tools for Building Energy-Energy Efficient Design Strategies.

UNIT – II ENERGY EFFICIENCY

Energy in Building Design-Energy Efficient and Environmental Friendly Building- Climate, Sun and solar radiation-Psychometrics-Passive Heating and Cooling Systems-Energy flow diagram-Energy consumption/Unit production- Identification of wastage-Priority of conservative measures-Maintenance of Energy Management Programme

UNIT – III ENVIRONMENTAL IMPACT OF BUILDING MATERIALS

Measuring the impact of building materials- calculating embodied energy- recycling and embodied energy- processing and embodied energy- time and embodied energy- embodied energy of different building materials- low energy building and masonry materials- life cycle analysis- Case studies and analysis.

UNIT– IV GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY

Sustainable architecture and Green Building: definition- Green building Evaluation Systems; LEED Certification; Green Globe Certification; Case studies which look at the environmental approach renewable energy- controlling the water cycle- impact of materials on the environment – optimizing Construction- site management- environmental management of buildings.

UNIT –V ENERGY MANAGEMENT

Energy Management of Electrical Equipment-Improvement of Power Factor-Management of Maximum Demand- Energy Savings in Pumps-Fans-Compressed Air Systems-Energy Savings in Lighting Systems-Air Conditioning Systems-Applications-Facility Operation And Maintenance- Facility Modifications-Energy Recovery Dehumidifier- Water Heat Recovery-Steam Plants and Distribution Systems- Energy Savings In Pumps-Fans-Compressed air systems- Applications

TEXT BOOKS:-

1. Eco design - A Manual for Ecological design by Ken Yeang, Wiley- Academy
2. Ecohouse: A design Guide by Sue Roaf et all; Elsevier Architectural Press

3. Green Building Construction by Thomas E Glavinich; Wiley.

REFERENCES:

1. Sustainable Design- The science of sustainability and Green Engineering by Daniel Vallero and Chris Brasier, Wiley; 2008
2. Environmental control systems by Moore F., McGraw Hill, Inc., 1994.

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	3+1*	**0**	**3**

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

OBJECTIVE: *To familiarize the student with the latest developments in analysis for Civil Engineering problems.*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –II

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

UNIT –IV

ISOPARAMETRIC FORMULATION :

Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 – Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

UNIT-V

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrupatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers

3. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
2. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press, Hyderabad.
3. Finite element method and its application by Desai ,2012, Pearson Pubilications.

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BRIDGE ENGINEERING

OBJECTIVE: *It deal with different types of Bridges like deck slab bridge, T – Beam Bridge e.t.c and gives a god knowledge on different components of bridges.*

UNIT - I

INTRODUCTION:

Importance of site investigation in Bridge design – Design discharge – Linear water way-scour depth. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

BRIDGE BEARINGS :

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT - II

DECK SLAB BRIDGE :

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only by courbans method.

UNIT - III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE)

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only by courbans method.

UNIT – IV

PLATE GIRDER BRIDGE :

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

COMPOSITE BRIDGES :

Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders' including shear connectors

UNIT V

PIERS & ABUTMENTS:

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on

abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

TEXT BOOKS :

1. Design of Bridges Structure by D.J.Victor, Oxford Pubilishers.
2. Design of Bridges Structure by T.R.Jagadish & M.A.Jayaram Prentice Hall of India Pvt., Delhi.
3. Design of Bridges by N.Krishnam Raju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.

REFERENCE :-

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
3. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
4. Relevant – IRC & Railway bridge Codes.

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GEOTECHNICAL ENGINEERING – II

Objective: *To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.*

UNIT – I

SOIL EXPLORATION: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS: Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE : Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.

2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson Engineering
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, Newyork.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

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TRANSPORTATION ENGINEERING – II

OBJECTIVE: *It deal with different components of Transportation Engineering like Railway , Airport Engineering & harbours. Sound knowledge can aquire on components of airports, docks and harbours.*

UNIT – I

RAILWAY ENGINEERING:

Introduction – permanent way components – cross section of permanent way – functions and requirements of rails, sleepers and ballast – types of gauges – creep of rails – theories related to creep – coning of wheels – adzing of sleepers – rail fastenings.

UNIT – II

GEOMETRIC DESIGN OF RAILWAY TRACK:

Gradients – grade compensation – cant and negative super elevation – cant deficiency – degree of curves – safe speed on railway track – points and crossings – layout and functioning of left hand turn out and right hand turn outs – station yards – signaling and interlocking.

UNIT –III

AIRPORT ENGINEERING:

Airport site selection – factors affecting site selection and surveys- runway orientation – wind rose diagram – basic runway length – correction for runway length – terminal area – layout and functions – concepts of terminal building – simple building , linear concept, pier concept and satellite concept – typical layouts .

UNIT – IV

GEOMETRIC DESIGN OF RUNWAYS AND TAXIWAYS:

Aircraft characteristics – influence of characteristics on airport planning and design – geometric design elements of runway – standards and specifications as per - functions of taxiways – taxiway geometric design – geometric elements and standard specifications – runway and taxiway lighting.

UNIT – V

PORTS AND HARBOURS:

Requirements of ports and harbours – types of ports – classification of harbours – docks and types of docks – dry docks, wharves and jetties – breakwaters: layouts of different types of harbours and docks – dredging operations – navigation aids.

Text books:

1. A Text Book of Railway Engineering-S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi.
2. Satish Chandra and Agarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
3. Airport Planning and Design- S.K. Khanna and M.G Arora, Nemchand Bros.
4. A Text book of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).
5. Railway Track Engineering by J.S.Mundrey

References:

1. Highway, railway, Airport and Harbour Engineering – K.P. Subramanian, Scitech pubilishers.
2. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 2009
3. Dock and Harbour Engineering – Hasmukh P Oza, Gutam H Oza, Chartor Publishers pvt ltd.

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BUILDING CONSTRUCTION & MANGEMENT
(OPEN ELECTIVE)

Objective: The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT - I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

PREPARATORY WORK AND IMPLEMENTATION

Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – Falsework and Temporary Works.

UNIT - II

EARTHWORK :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT - IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems

– Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V

PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for T_E - Latest allowable occurrence time – Formulation for T_L - Combined tabular computations for T_E and T_L problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for T_E and T_L - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

TEXT BOOKS :

1. Construction project management by Jha ,Pearson pubilications,New Delhi.
2. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

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DISASTER MANAGEMENT AND MITIGATION
(OPEN ELECTIVE)

Objective:-The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types of hazards.

Unit-I

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

Unit –II

Types of Environmental hazards & Disasters: Natural hazards and Disasters - Man induced hazards & Disasters - Natural Hazards- Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards –

Unit–III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

Unit –IV

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes , distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves.Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion

Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion.Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes.Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation.Biological hazards/ disasters:- Population Explosion.

Unit –V

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage (preparedness)
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text books:

1. Disaster Management by Rajib Shah, Universities Press, India, 2003
2. Disaster Mitigation: Experiences And Reflections by Pardeep Sahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning

References

1.Kates,B.I & White, G.F The Environment as Hazards, oxford, New York, 1978

2.R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000

3.H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003

4.R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo, 1994

5.Dr. Satender , Disaster Management t in Hills, Concept Publishing Co., New Delhi, 2003

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ARCHITECTURAL AND TOWN PLANNING
(OPEN ELECTIVE)

Objective:- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT-I

History of Architecture:

a) **Western Architecture:** Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders.

b) **Indian Architecture:** Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II

Architectural Design:

a) **Principle of designing** : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.

b) **Principle of Compositions:** Unity, contrast, proportion, scale, Bab Rhuthm, character.

Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT – III

Introduction of Post-classic Architecture and contribution of eminent architects to modern

period.

Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

B) TOWN PLANNING:

UNIT – IV

Historical Back Ground:

Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputra vijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT – V

Components of Planning;

a) Zoning
b) Roads and road Traffic.
a) Housing-Slums, Parks, Play grounds.
b) Public Utility Services.
c) Surveys and maps for planning.
d) Neighbourhood Planning.

Planning New town, planning standards, National and regional Planning, town planning and legislation.

Garden cities and satellite town

REFERENCES:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
3. Modern Architecture and Design by Nikolans, Pevshar.
4. Modern Ideal Hol11nes for India by R.S.Deshpande.

B) TOWN PLANNING

1. Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2. Town Design .- Federik Gibbard, Architectural press, London.
3. National Building Code of India.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi 1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

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INTELLECTUAL PROPERTY RIGHTS
(OPEN ELECTIVE)

Objectives:The objective of the course is to make the student to understand about various trades and laws regarding registration and patents.

UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks : Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights : Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents : Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets : Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition : Misappropriation right of publicity, False advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law ; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, cengage learing.
2. Intellectual property right – nleashmy the knowledge economy, prabuddha ganguli,
Tate Mc Graw Hill Publishing company ltd.,

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CAD LAB

CAD:
SOFTWARE:
1. STAAD PRO or Equivalent

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:
1.Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh , Lakshmi Pubilishers

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	0	**3**	**2**

HIGHWAY MATERIALS LAB

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS :

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

TEXT BOOKS:-

1. Lab manual in High way Engineering by Ajay.K.Duggal & Vijay .P.Puri, New Age pubilications,New Delhi
2.Relevant IS Codes

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ADVANCED STRUCTURAL ENGINEERING

OBJECTIVE: *To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.*

1. Design of a flat slab(Interior panel only)
2. Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos
3. Design of concrete chimney
4. Design of circular and rectangular water tank resting on the ground
5. Design of cantilever and counter forte retaining wall with horizontal back fill

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

TEXT BOOKS :-

1. Structural Design and drawing (RCC and steel) by Krishnam Raju, Universites .Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :-

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

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DESIGN AND DRAWING OF IRRIGATION STRUCTURES

OBJECTIVE: *To make the student more detail studies about irrigation structures and its component parts.*

Design and drawing of the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Water Resources Engineering by Satyanarayana Murthy. Challa, New Age International Publishers.
2. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
3. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

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ADVANCED FOUNDATION ENGINEERING
(ELECTIVE –II)

OBJECTIVE: *To make the student about shallow and deep foundation and its importance in selection of foundation in problematic soils.*

UNIT - I

SHALLOW FOUNDATIONS:

General requirements of foundations. Types of shallow foundations and the factors governing the selection of a type of shallow foundation. Bearing capacity of shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification.

Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soils-Button's theory and Siva Reddy analysis.

UNIT - II

ANALYSIS AND STRUCTURAL DESIGN OF R.C.C. FOOTINGS:

Analysis and structural design of R.C.C. isolated, combined and strap footings.

UNIT - III

DEEP FOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests.

Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

UNIT - IV

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

DESIGN OF UNDER REAMED PILES FOUNDATIONS:

Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

UNIT - V

FOUNDATIONS IN PROBLEMATIC SOILS :

Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

TEXT BOOKS :

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, Gopal Ranjan and Swami Saran, Meerut : Sarita Prakashan, 1979.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

REFERENCES:-

1. Analysis and Design of Foundations – E.W.Bowles, TMH Publications.
2. Foundation engineering by Brije.M.Das, Cengage pubilications,New Delhi.
3. Foundations Design and Construction – Tomlinson, PHI Pubilications.
4. Foundation Design-Teng, PHI Pubilications..

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REMOTE SENSING AND GIS
(ELECTIVE –II)

Objective:-The objectives of this are to give the basic knowledge of Remote Sensing and GIS Techniques and its applications in civil engineering.

UNIT – I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

REMOTE SENSING:

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics.

Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2 Advanced surveying : Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.
3 Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4 Fundamentals of remote sensing by Gorge Joseph, Universities press, Hyderabad.

REFERENCES:

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
3. Remote Sensing and its applications by LRA Narayana University Press 1999.
4. GIS by Kang – tsung chang, TMH Publications & Co.,
5. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers 2004

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REHABILITATION AND RETROFITING OF STRUCTURES
(ELECTIVE –II)

OBJECTIVES: The main objective of this subject is to give knowledge on causes of failures in buildings and remedial measures to control & repair the damages by adopting rehabilitation techniques.

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCES

1. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
2. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre
   of Structural Designers & Consultants Pvt.Ltd., Mumbai, 1994.
3. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi,2002.
4. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.

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EXPERIMENTAL STRESS ANALYSIS
(ELECTIVE –III)

OBJECTIVES: The main objective of this subject is to give knowledge on stress developed in the structural bodies during loading and methods to evaluate stress by using available techniques.

UNIT – I

PRINCIPLES OF EXPERIMENTAL APPROACH :

Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods – Simplification of problems.

UNIT – II

STRAIN MEASUREMENT USING STRAIN GAUGES :

Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain – Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges.Inductance strain gauges – LVDT – Resistance strain gauges – various types – Gauge factor – Materials of adhesion base etc.

UNIT – III

STRAIN ROSETTES :

Introduction – The three element Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge.

UNIT – IV

NON-DESTRUCTIVE TESTING :

Ultrasonic Pulse Velocity method – Application to Concrete – hammer Test Application to Concrete.

BRITTLE COATING METHODS :

Introduction – Coating Stress – Failure Theories – Brittle Coating Crack Patterns – Crack Detection – Types of Brittle Coating – Test Procedures for Brittle Coating Analysis – Calibration Procedures – Analysis of Brittle Coating Data.

UNIT – V

THEROY OF PHOTOELASTICITY :

Introduction – Temporary Double refraction – The stress Optic Law – Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster's Stress Optic law.

TWO DIMENSIONAL PHOTOELASTICITY :

Introduction – Isochramic Fringe patterns – Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Text Books :

1. Experimental stress analysis by J.W.Dally and W.F.Riley, McGraw Hill Pubilications
2. Experimental stress analysis by Dr.Sadhu Singh.Khanna Pubilishers, New Delhi

Reference Books

1. Experimental stress analysis by U.C.Jindal, Pearson Pubilishers,New delhi
2. Experimental stress analysis by Abdul Mubeen, Dhanpati rai Pubilications

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COLLEGE OF ENGINEERING ANANTAPUR (Autonomous)

B.Tech. IV -II sem (C.E.)	**T**	**P**	**C**
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PRESTRESSED CONCRETE
(ELECTIVE –III)

OBJECTIVES: The main objective of this subject is to give idea on methods available on pre stressed concrete and analysis of pre stressed members and design of members.

UNIT – I

INTRODUCTION:

Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT – III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

COMPOSITE SECTION:

Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

UNIT – V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw HillPublications.
2. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications
3. Prestressed Concrete by N.Rajagopalan, Narosa publications.

REFERENCE:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Fundamentals of prestressed concrete by SK Roy , S.Chand Pubilications.
3. Prestressed Concrete Analysis & Design Fundamentals,Antoine E Naaman,Mcgraw-hill Pubilishers.

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall.

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	3+1*	**0**	**3**

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(ELECTIVE – III)

OBJECTIVES: The main objective of this subject is to give knowledge on seismic loads and designing of buildings to withstand seismic forces.

UNIT – I

INTRODUCTION TO STRUCTURAL DYNAMICS : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

MULTI-DEGREE OF FREEDOM (MDOF) SYSTEMS : - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT – III

EARTHQUAKE ANALYSIS : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

EARTHQUAKE ENGINEERING : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT – V

ASEISMIC PLANNING : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

SHEAR WALLS : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

TEXT BOOKS:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition.
3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Structural Dynamics by Mario Paaz , Academic Pubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
3. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.