SYLLABUS III YEAR B.TECH. (CIVIL ENGINEERING)

AUTONOMOUS REGULATIONS 2015

(Effective for the batches admitted in 2015-16 onwards)

DEPARTMENT OF CIVIL ENGINEERING

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (A)

(Affiliated to AU, Approved by AICTE & Accredited by NBA)

SANGIVALASA, Bheemunipatnam Mandal, Visakhapatnam District-531162

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

B.TECH. 4 YEAR DEGREE COURSE STRUCTURE

(Effective for the B.Tech. students admitted into first year from the academic year 2015-16)

B.TECH. I Year - I Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV111	English	HS	3	1	-	4	40	60	100	3
CIV112	Engineering Mathematics – I	BS	3	1	-	4	40	60	100	3
CIV113	Engineering Physics	BS	3	1	-	4	40	60	100	3
CIV114	Engineering Drawing	ES	1	-	3	4	40	60	100	3
CIV115	Environmental Sciences	BS	3	1	-	4	40	60	100	3
CIV116	Engineering Physics Lab	BS	-	-	3	3	50	50	100	2
CIV117	Programming with C Lab	ES	2	-	3	5	50	50	100	3
CIV118	Workshop	ES	-	-	3	3	50	50	100	2
CIV AC1	NCC/NSS/Sports	AC	-	-	3	3	-	-	-	-
Total			15	4	15	34	350	450	800	**22**

B.TECH. I Year – II Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV121	Engineering Mathematics - II	BS	3	1	-	4	40	60	100	3
CIV122	Engineering Chemistry	BS	3	1	-	4	40	60	100	3
CIV123	Professional Ethics & Human Values	HS	2	1	-	3	100	-	100	2
CIV124	Mathematics for Civil Engineers	BS	3	1	-	4	40	60	100	3
CIV125	Civil Engineering Materials	PC	3	1	-	4	40	60	100	3
CIV126	Engineering Chemistry Lab	BS	-	-	3	3	50	50	100	2
CIV127	Language Lab	HS	-	-	3	3	50	50	100	2
CIV AC2	NCC/NSS/Sports	AC	-	-	3	3	-	-	-	-
Total			14	5	9	28	360	340	700	**18**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

B.TECH. 4 YEAR DEGREE COURSE STRUCTURE

B.TECH. II Year – I Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV211	Engineering Mathematics-III	BS	3	1	-	4	40	60	100	3
CIV212	Building Technology	PC	3	1	-	4	40	60	100	3
CIV213	Engineering Geology	PC	3	-	1	4	40	60	100	3
CIV214	Engineering Mechanics	ES	3	1	-	4	40	60	100	3
CIV215	Surveying– I	PC	3	1	-	4	40	60	100	3
CIV216	Strength of Materials	PC	3	1	-	4	40	60	100	3
CIV217	Surveying Field Work-I	PC	-	-	3	3	50	50	100	2
CIV218	Strength of Materials Lab	PC	-	-	3	3	50	50	100	2
Total			18	5	7	30	340	460	800	**22**

B.TECH. II Year - II Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV221	Concrete Technology	PC	3	-	-	3	40	60	100	3
CIV222	Environmental Engineering-I	PC	3	1	-	4	40	60	100	3
CIV223	Fluid Mechanics-I	PC	4	1	-	5	40	60	100	4
CIV224	Surveying – II	PC	3	1	-	4	40	60	100	3
CIV225	Structural Analysis – I	PC	4	1	-	5	40	60	100	4
CIV226	Building Planning & Drawing	PC	1	-	3	4	40	60	100	3
CIV227	Concrete Technology Lab	PC	-	-	3	3	50	50	100	2
CIV228	Fluid Mechanics Lab-I	PC	-	-	3	3	50	50	100	2
CIV229	Surveying Field Work –II	PC	-	-	3	3	50	50	100	2
CIV2210	Technical Seminar *	PC	-	-	2	2	-	-	-	-
Total			18	4	14	36	390	510	900	**26**

**To be evaluated continuously through II year -II semester and III year –I semester and results reported with III year –I semester*

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

B.TECH. 4 YEAR DEGREE COURSE STRUCTURE

B.TECH. III Year - I Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV311	Open Elective-I[#]	OE	3	1	-	4	40	60	100	3
CIV312	Environmental Engineering-II	PC	3	1	-	4	40	60	100	3
CIV313	Reinforced Concrete Structures-I	PC	4	1	-	5	40	60	100	4
CIV314	Structural Analysis – II	PC	3	1	-	4	40	60	100	3
CIV315	Fluid Mechanics-II	PC	4	1	-	5	40	60	100	4
CIV316	Geotechnical Engineering – I	PC	3	1	-	4	40	60	100	3
CIV317	Geotechnical Engineering Lab-I	PC	-	-	3	3	50	50	100	2
CIV318	Environmental Engineering Lab	PC	-	-	3	3	50	50	100	2
CIV319	Fluid Mechanics Lab-II	PC	-	-	3	3	50	50	100	2
CIV3110	Quantitative & Verbal Aptitude -I	HS	4	-		4	100	-	100	2
CIV3111	Technical Seminar *	PC	-	-	2	2	50	-	50	2
Total			24	6	11	41	540	510	1050	**30**

B.TECH. III Year - II Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV321	Reinforced Concrete Structures-II	PC	3	1	-	4	40	60	100	3
CIV322	Estimation & Costing	PC	3	1	-	4	40	60	100	3
CIV323	Geotechnical Engineering – II	PC	3	1	-	4	40	60	100	3
CIV324	Transportation Engineering-I	PC	3	1	-	4	40	60	100	3
CIV325	Water Resources Engineering – I	PC	3	1	-	4	40	60	100	3
CIV326	Professional Elective – I	PE	3	-	-	3	40	60	100	3
CIV327	Geotechnical Engineering Lab-II	PC	-	-	3	3	50	50	100	2
CIV328	Computer Applications in Civil Engineering Lab-I	PC	-	-	3	3	50	50	100	2
CIV329	Quantitative & Verbal Aptitude – II	HS	4	-		4	100	-	100	2
CIV3210	Soft Skills Lab	HS	-	-	3	3	100	-	100	2
CIV3211	Industrial Training**	PC	-	-	-	-	-	-	-	-
Total			22	5	9	36	540	460	1000	**26**

 # Student should take minimum ONE Open Elective from either III year I semester or IV year I semester

** To be evaluated continuously through II year -II semester and III year –I semester and results reported with III year –I semester*

******* *To be conducted after III year-II semester and evaluated in IV year-I semester*

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES (AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

B.TECH. 4 YEAR DEGREE COURSE STRUCTURE

B.TECH. IV Year - I Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV411	Open Elective-II[#]	OE	3	1	-	4	40	60	100	3
CIV412	Professional Elective – II	PE	3	-	-	3	40	60	100	3
CIV413	Project Planning & Management	PC	3	1	-	4	40	60	100	3
CIV414	Steel Structures	PC	3	1	-	4	40	60	100	3
CIV415	Water Resources Engineering - II	PC	3	1	-	4	40	60	100	3
CIV416	Transportation Engineering-II	PC	3	-	-	3	40	60	100	3
CIV417	Computer Applications in Civil Engineering Lab-II	PC	-	-	3	3	50	50	100	2
CIV418	Transportation Engineering Lab	PC	-	-	3	3	50	50	100	2
CIV419	Project work-I	PC	-	-	6	6	60	-	60	3
CIV4110	Industrial Training****	PC	-	-	-	-	50	-	50	2
Total			18	4	12	34	450	460	910	**27**

B.TECH. IV Year – II Semester

Code	*Subject*	*Cat.*	*Periods*				*Sessional Marks*	*End Exam Marks*	*Total Marks*	*Credits*
			L	*T*	*P*	**Total**				
CIV421	Professional Elective – III	PE	3	-	-	3	40	60	100	3
CIV422	Professional Elective – IV	PE	3	-	-	3	40	60	100	3
CIV423	Engineering Economics & Finance	HS	2	1	-	3	40	60	100	2
CIV424	Irrigation Structures Design & Drawing	PC	1		3	4	50	-	50	2
CIV425	Comprehensive Viva Voce	PC	-	-	3	3	50	-	50	2
CIV426	Project Work –II	PC	-	-	8	8	60	80	140	8
CIV427	MOOC[##]	ES	-	-	-	-	-	-	-	2
	Total		9	1	14	24	280	260	540	**22**

 # Student should take MINIMUM ONE Open Elective during either III year I semester or IV year I semester

*** To be conducted after III year-II semester and evaluated in IV year-I semester*

Massive Open Online Course: Method of evaluation will be decided by a Departmental Committee constituted for this purpose and students are graded accordingly

II B.Tech. Syllabus

ENGINEERING MATHEMATICS - III

CIV 211 **Credits : 4**
Instruction : 3 Lecture & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objective:

The knowledge of Mathematics is necessary for a better understanding of almost all the Engineering and Science subjects. Here our intention is to make the students acquainted with the concept of basic topics from Mathematics, which they need to pursue their Engineering degree in different disciplines.

Course Outcomes:

At the end of the course the student will be able to

1. Understand the concepts of Gradient, Divergence and Curl and finding scalar potential function of irrotational vector fields.
2. Understand the concepts of Green's Theorem, Stokes' Theorem and the Divergence Theorem and to evaluate line integrals, surface, integrals and flux integrals.
3. Understand some basic techniques for solving linear partial differential equations and how to identify a partial differential equation in order to determine which technique(s) can best be applied to solve it.
4. Understand the methods to solve the Laplace, heat, and wave equations.
5. Gain good knowledge in the application of Fourier Transforms.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	3	3	3	3	3	1	3	2	1	3	2	3
	2	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3
	3	-	2	2	3	2	3	3		1	2	3	1	3	2	3
	4	-	3	2	-	2	3	3	2	1	-	3	-	3	2	1
	5	-	3	2	-	2	3	3	2	1	-	3	-	3	2	1

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UNIT - I 12 Periods

Vector Differentiation: Differentiation of Vectors – Scalar and Vector point function – Del applied to Scalar point functions - Gradient geometrical interpretations – Directional Derivative - Del applied to vector point function – divergence - Curl – Physical interpretation of Divergence and Curl - Del applied twice to point functions- Del applied to product of point functions.

12 Periods

UNIT - II

Vector Integration: Integration of vectors – Line integral – Surface – Green's theorem in the plane – Stokes theorem – Volume integral – Gauss Divergence theorem (all theorems without proofs) – Irrotational fields.

UNIT - III 12 Periods

Partial Differential Equations: Introduction – Formation of Partial Differential Equations – Solution of Partial Differential Equations – Equations solvable by Direct Integration– Linear Equations of First order -Homogeneous Linear Equations with Constant Co-efficient – Rules for finding the complementary function - Rules for finding the Particular integral – Non-Homogeneous linear equations.

UNIT - IV 12 Periods

Application of Partial Differential Equations: Introduction – Method of separation of variables – Vibrations of a stretched string- Wave equation – One dimensional Heat flow - Two dimensional Heat flow – Solution of Laplace's equation.- Laplace's equation in Polar Co-ordinates.

UNIT - V 12 Periods

Fourier Transforms: Introduction – definition – Fourier integral theorem - Fourier sine and cosine integrals – Complex form of Fourier integrals – Fourier integral representation of a function – Fourier Transforms – Properties of Fourier Transforms – Convolution Theorem – Parseval's identity for Fourier transforms – Fourier Transforms of the Derivatives of functions – Application of Transforms to Boundary value problems – Vibrations of a string.

TEXT BOOKS

1. Dr. B.S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, New Dehli.

REFERENCES

1. A Text book on Engineering Mathematics by N.P. Bali Etal, Laxmi pub.(p)Ltd.
2. Advanced. Engineering Mathematics by H.K.Dass
3. Advanced Engineering Mathematics by Erwin kreyszig.
4. Higher Engineering Mathematics by Dr.M.K. Venkataraman, National Pub.Co.Madras.
5. Relevant NPTEL Courses.

BUILDING TECHNOLOGY

CIV 212 **Credits : 3**
Instruction : 3 Lecture & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

The objective of the course is to prepare the student to

1. Learn about building byelaws laid by planning authorities
2. Understand about masonry types in brick and stone construction
3. Learn about building components and foundations

Course Outcomes:

At the end of the course the student will be able to

1. Know the various building Bye-Laws laid by town planning authorities and local regulatory bodies for Planning various buildings like residential, educational, office buildings and hospital buildings.
2. Learn about masonry types in brick and stone construction
3. Understand about various Building components.
4. Learn about various types of foundation.
5. Know about damp prevention and fire protection methods.
6. Understand about various types of roofs.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	3	3	3	3	3	1	3	2	1	3	2	3
	2	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3
	3	-	2	2	3	2	3	3		1	2	3	1	3	2	3
	4	-	3	2	-	2	3	3	2	1	-	3	-	3	2	1
	5	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3
	6	-	2	2	3	2	3	3		1	2	3	1	3	2	3

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UNIT - I 12 Periods

Introduction: Component Parts of a Building - Load bearing construction - Framed buildings - Tall buildings, Advantages, problems - Other types of Buildings - Setting and laying out a building - Responsibilities and Duties of the Client and Engineer.

Walls: Classification of walls; Technical terms - Stone masonry construction - types and rules - Brick masonry walls - bonds and rules - cavity wall construction - Hollow concrete block masonry - Light weight wall construction - Prefabricated brick panel for walls – reinforced masonry - composite masonry - Arches and lintels

UNIT - II 12 Periods

Doors, Windows and Ventilators: Location of doors and windows, technical terms, Dimensions of doors and windows, Door frames, Types of doors and windows, Ventilators, Fixtures and fastenings.

Building Conveyance Verticality: Stair cases - Lifts - Escalators - Ramps - Basic terms - Types - Design considerations – Maintenance

UNIT - III 12 Periods

Floors: Terminology; Materials – Types of floors – suitability (Industrial, Indoor, Stilt & Terrace Floors) and construction; Concrete, mosaic, terrazzo, tiled, stone & synthetic floors and floor finish.

Roofs: Terminology; Classification of roofs - Steel sloping roofs - Roof covering materials - Types of flat roofs - Basic roofing elements - Roof coverings - Pitched, flat and curved roofs - Lean–to–roof - couple roofs, trussed roofs - roof drainage - roof cladding materials and their fixtures. Flat roofs: RCC roofs.

Surface Finishes: Plastering - Pointing - White washing - distempering – Painting - Pebble dash – Dado/Skirting, Tiles etc.

UNIT - IV 12 Periods

Foundations: Need for foundation - types of foundation - open foundation - Shallow foundations – Spread, combined- strap and raft foundation - deep foundations - pile foundation - well foundations and caissons - Factors affecting selection of foundations Foundation on black cotton soils; setting out of foundations - excavations for foundation trenches and base - general principles of dewatering foundation excavations - coffer dams.

Form Work, Scaffolding: Form work, Types of formwork; Centering - scaffolding - Types of scaffolding.

UNIT - V 12 Periods

Construction safety: safety in construction - general requirements - common hazards during excavation; piling and other deep foundations - common hazards during walling; roofing; additional safety requirements for erection of concrete framed structures - additional safety requirements for erection of structural steel work - general requirements; safety in demolition of buildings

Introduction to Green Buildings: Introduction - Necessity - Concept of Green building. Principles of green building - Selection of site and Orientation of the building - usage of low energy materials - effective cooling and heating systems - effective electrical systems - effective water conservation systems - Certification systems - GRIHA and LEED - case studies

TEXT BOOKS

1. The Text Book Of Building Construction by S.P.Arora, S.P.Bindra, Dhanpatrai Publications.
2. Building Construction by B.C. Punmia, Laxmi Publications (p) Ltd.

REFERENCES

1. TERI *"Sustainable Building Design Manual- Volume I & II"* Tata Energy Research Institute.
2. National Building Code of India, SP 7 (1): 1983, First Revision 1992, Bureau of Indian Standards
3. Building Construction by Sushil kumar, Standard publishers distributors.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.
5. Building Construction, Vol.II & III By W.B. Mckay, E.L.B.S. and Longman, London, U.K.
6. Green Building Design, Construction and Operations, Sustainable Building Technical Manual, U.S.Green Building Council, 1996, Public technology Inc.
7. Relevant NPTEL Courses.

ENGINEERING GEOLOGY

CIV 213 **Credits : 3**
Instruction : 3 Lecture & 1 Practical / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

The objective of the course is to prepare the students

1. To identify & classify different minerals and map the geological structures present in subsurface.
2. Investigate the selected project site to obtain data and determine the favourable considerations in study area.
3. Measure earthquakes and landslides to classify the hazardous zones and interpret geological maps.

Course Outcomes:

At the end of the course the student will be able to

1. Identify and classify the different minerals and rocks based on their physical properties and geological genesis
2. Map the various geological structures present in the subsurface and their importance in the study of natural hazards like earthquakes etc.
3. Apply the different investigation techniques from initial stage to final stage for the selection of proper project site.
4. Do the interpretation of available data to determine the favorable geological considerations (i.e., Lithological structural and ground water) in the study area for the construction of different civil engineering projects dams etc.
5. Classify and measure the earthquake, Landslides and subsidence prone areas to practice the hazard zonation.
6. Prepare, analyze and interpret the Engineering Geologic maps.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	-	1	1	2	1	2	2	1	-	1	1	1	1	1	2
	2	1	2	1	2	-	1	2	-	1	1	1	1	1	2	2
	3	-	2	1	2	2	2	2	1	1	2	2	1	2	2	2
	4	1	3	1	2	1	2	2	1	1	2	1	1	2	2	2
	5	1	-	-	-	2	2	1	1	2	1	1	1	1	2	1
	6	1	2	1	2	-	1	1	2	1	-	2	1	1	2	1

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UNIT - I 12 Periods

Introduction: Definition of Geology and Engineering Geology, Branches of Geology, Scope and 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. Role of engineering geologist in planning, design and construction stages in Civil Engineering works

Earth: Solar System, Origin of the Earth, Internal structure of the Earth and its composition, Elementary knowledge on isostasy, continental drift, plate tectonics and sea floor spreading.

Geological Cycle: Weathering, Effect of Weathering over the properties of rocks, Importance of Weathering with reference to civil engineering constructions like dams, reservoirs and tunnels-Land forms produced by, running water, and glaciers. Land forms produced by wind, sea waves and currents.

UNIT - II 12 Periods

Petrology: Definition of rock, Civil Engineering importance – Geological classification of rocks –Rock cycle, Formation, Structure, texture and mineralogical composition of igneous, sedimentary and metamorphic rocks, Study of physical properties of different types of igneous, sedimentary and metamorphic rocks. Igneous rocks: Granite, synite, dolerite, gabro, diorite, basalt. Sedimentary rocks, dykes and sills: Breccia, conglomerate, Sandstone, Shale, limestone. Metamorphic rocks: Gneiss, khondalite, schist, slate, marble, quartzite, charnokite. Engineering properties of rocks.

Soils: Soil formation, Soil profile, – Geological classification – Engineering classification and description of Indian soils; Soil erosion and conservation.

UNIT - III 12 Periods

Minerology: Definition of mineral, Importance of study of minerals, Different methods of study of minerals, Study of physical properties of different rock forming minerals: Silicate structures, Quartz, feldspars, pyroxenes, amphiboles, micas and clays, Introductory knowledge on Chemical and optical properties of minerals.

Structural Geology: Elements of structural geology: Strike, dip, outcrop, plunge – Study of folds, faults, joints, unconformities, Classification of folds, faults and joints. and their importance in Civil Engineering works. Potential problems from rock structures in engineering constructions, Treatment of rocks by grouting.

UNIT - IV 12 Periods

Geophysical Exploration: Principles of geophysical methods, Electrical, Seismic, Gravity and Magnetic methods. Principle of Resistivity method and configurations. Applications of Resistivity method in prediction of soil profile, hard rock and ground water table. Principles of Seismic refraction and reflections methods and their applications to Civil Engineering problems.

Geological Applications in Civil Engineering: Geological investigations for dams and reservoirs. Case histories of dam failures and their causes. Geology of the major dam sites of

India. Factors affecting the seepage and leakage of reservoir and the remedial measures. Geological investigations for bridges and Multi- storied structures. Geological investigations for highways, railways, canals, runways, powerhouses, power channels and flumes. Geological investigations for tunnels and coastal structures (Seawalls, groins and bulkheads); Environmental geology. Coastal Management, Underground water in relation to Engineering Works.

UNIT - V 12 Periods

Earthquakes: Terminology, Causes and effects, Classification, Earthquake waves, Seismograph, Locating Epicenter, Determination of depth of focus, Intensity, Magnitude, Mercalli & Richter scales, Prediction, Effects, Seismic belts, Shield areas – Seismic zones of India – Civil Engineering considerations in seismic areas – Precautions of building constructions in seismic areas. Safety measures for buildings and dams – Reservoir induced seismicity.

Landslides: Causes, effects, methods of mitigating impact of landslides.

Tsunamis: Meaning of Tsunami, causes & Effects of Tsunami, warning and mitigation.

TEXT BOOKS

1. Engineering Geology by D.Venkata Reddy, Vikas Publishing House Pvt Ltd. 2011.
2. Text book of Engineering Geology, by N.Chenna Kesavulu, MacMillan India Ltd, Hyderabad, 2014

REFERENCES

1. Engineering Geology by Subinoy Gangopadhyay, Oxford University Press. 2013.
2. Fundamental of Engineering Geology by F.G. Bell, Butterworth Publications, New Delhi, 1992.
3. Engineering Geology: Principles and Practice by David George Price, Springer, 2009.
4. Principles of Engineering Geology by KVGK Gokhale. B.S.Publications-2005
5. Engineering and General Geology by Parbin Singh, K Kataria & Sons, New Delhi, 2009
6. Engineering Geology for Civil Engineers by P.C. Varghese, PHI learning pvt. Ltd., 2012
7. Relevant NPTEL Courses.

ENGINEERING MECHANICS

CIV 214 **Credits : 3**
Instruction : 3 Lecture & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

The objective of the course is to enable the student

1. To develop logical thinking approach to engineering problems.
2. Learn about the basic concepts of force, moment, resultant forces.
3. Learn about centroid & centre of gravity, static analysis of simple plane trusses, area moment of inertia,

Course Outcomes:

At the end of the course the student will be able to

1. Analyze a given physical problem into a suitable forces and moments.
2. Identify the centroid of a given plane area and find its area/ mass moment of inertia.
3. Apply the concept of friction to simple engineering problems.
4. Calculate the displacement, velocity and acceleration of a moving particle.
5. Apply the work-energy, D ALEMBERTS principle to particles and connected systems.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	2	1	-	1	-	-	1	1	1	-	3	2	3
	2	3	2	1	1	-	-	-	-	1	1	-	-	3	2	3
	3	3	3	-	2	-	1	-	-	1	1	-	-	3	2	3
	4	3	3	2	2	-	1	1	-	1	1	1	1	3	2	1
	5	3	3	2	2	-	1	-	-	1	1	1	1	3	2	1

SYLLABUS

UNIT - I 12 Periods

Basic Concepts: Introduction to Engineering Mechanics – Scalar and Vector quantities – Forces – Characteristics of a force – Definitions and examples of various types of force systems – Definition of resultant – Composition and resolution of forces – Moment of a force – Principles of moments of force – Couples – characteristics of a couple – on Transformations of a couple – Resolution of a force into a force and couple. Resultants of Force Systems, possible resultants of different types of force systems.

UNIT - II 12 Periods

Equilibrium Analysis: Free body diagrams – Equations of equilibrium for a concurrent coplanar force system – Equilibrium of Bodies acted on by two or three forces – Equilibrium of bodies acted on by non-concurrent coplanar force system – Equilibrium of bodies acted on

by parallel, non-coplanar force system – Equilibrium of non-concurrent, non-coplanar non-parallel force system.

Analysis of trusses: Method of joints, Method of sections and tension coefficient method.

UNIT - III 12 Periods

Friction: Nature of friction – Laws of friction – Coefficient of friction – Angle of friction – Cone of friction – Problems involving frictional forces – Frictional forces on flexible bands and belts – Rolling friction – Thrust bearing.

Centroid and Centre of Gravity: Centre of gravity of parallel forces in a plane – Centre of gravity of parallel forces in space – centroids and centres of gravity of composite bodies – Theorems of Pappus.

UNIT - IV 12 Periods

Moments of Inertia: Definition – Parallel axis theorm for areas – Second moments of areas by integration – Radius of gyration of areas – Moments of inertia of composite areas.

Kinematics: Absolute Motion: Introduction – basic terminology of mechanics – Newton's Laws – Introduction to Kinematics of Absolute Motion – Rectilinear motion of a particle – Angular motion of a line.

UNIT - V 12 Periods

Kinetics: Introduction to kinetics – Force, mass and acceleration approach, Newton's laws of motion - D Alembert's principle – Work - Energy principle – Work done by a force – Work done by a varying force – Work done by a force system – Energy – Power – Work Energy equation for translation – Work done by a Spring – Principle of conservation of energy.

TEXT BOOKS

1. Engineering Mechanics by SS Bavikatti and Rajasekharappa, New Age International Pvt. Ltd.
2. Applied Mechanics by I.B. Prasad, Khanna Publishers.

REFERENCES

1. Engineering Mechanics by S. Timoshenko and D.H. Young, Pearson Prentice publication.
2. Engineering Mechanics by Basudeb Bhattacharyya, Oxford University Press.
3. Engineering Mechanics by F.L. Singer, HarperCollins Publishers.
4. Schaum's outline of engineering mechanics: Statics, by E. Nelson, Charles Best, W.G. McLean, Merle Potter.
5. Vector Mechanics & Statics by F.P. Beer and E.R. Jhonston Jr, McGraw Hill.
6. Engineering Mechanics: Statics by J.L. Meriam and L.G. Kraige. Wiley India Ltd.
7. Relevant NPTEL Courses.

SURVEYING - I

CIV 215 **Credits : 3**

Instruction : 3 Periods & 1 Tutorial / week Sessional Marks : 40

End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

The objective if the course is to prepare student

1. To measure the area by chaining.
2. To measure the area and distance between the points by compass.
3. To measure the elevation of points.

Course Outcomes:

At the end of the course the student will be able to

1. Calculate angles, distances and levels.
2. Identify data collection methods and prepare field notes.
3. Understand the working principles of survey instruments.
4. Estimate measurement errors and apply corrections.
5. Demonstrate an ability to compute volume of reservoirs using contours.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	-	-	3	2	-	1	2	2	1	2	3	3	2
	2	3	3	-	-	3	1	-	1	2	2	-	2	3	3	1
	3	3	2	1	-	2	-	-	-	1	2	1	2	3	2	3
	4	2	2	-	-	2	-	-	-	2	1	1	2	3	2	-
	5	3	3	2	-	2	-	-	-	2	2	1	1	3	2	2

SYLLABUS

UNIT - I 12 Periods

Introduction: Surveying – Definition; Objectives; Classification; Principles of surveying; Instruments for Surveying; Scale – Scales used for Maps and Plans; Preparation of Map and Plan.

Chain Survey: Classification of surveying-Principles of Surveying. Sources of errors-Linear measurements, direct measurement. Instrumentation for chaining – Errors due to incorrect chain-Chaining on un-even and sloping ground-Errors in chaining - Tape corrections – Problems: Base line measurement-Chain Triangulation – Check lines, Tie lines, Offsets. Basic problems in chaining obstacles in chaining-Problems - Conventional signs.

12 Periods

UNIT - II

Compass Survey: Introduction to compass survey Definitions of Bearing. True bearing, True meridian, Magnetic Meridian, Magnetic bearing – Arbitrary Meridian, R.B. & B.B of lines – Designation of bearings – W.C.B. & R.B. – Conversion of bearings from one system to the other Related problems – Calculation of angles for bearings, Calculation of bearing for

angles, Related problems – Theory of Magnetic compass (i.e. Prismatic compass) – Magnetic dip-Description of Prismatic compass. Temporary adjustments of compass-Magnetic Declination – Local attraction-Related Problems-Errors in compass survey.

UNIT - III 12 Periods

Traverse Surveying : Chain and compass traversing-Free or loose needle method – Fast needle method-Checks in closed and open traverse-Plotting methods of traverse Survey - Closing error-Balancing the traverse-Bowditch's method-Transist method, Gale's Travers table.

UNIT - IV 12 Periods

Levelling : Definitions of terms-Methods of leveling - Uses and adjustments of dumpy level-Temporary and permanent adjustments of dumpy level levelling staves - Differential leveling, Profile leveling - Cross sections - Reciprocal levelling. Precise leveling - Definition of BS, IS, FS, HI, TP-Booking and reduction of levels, H.I. methods-Rise and fall method-Checks-Related problems-Curvature and Refraction Related Problems-Correction-Reciprocal levelling-Related problems-L.S & C.S Levelling-Problems in leveling - Errors in levelling.

UNIT - V 12 Periods

Contouring: Definitions- Contour Interval and horizontal equivalent - Characteristics of contours-methods of locating contours-Direct and indirect methods-Interpolation of contours-Contour gradient-Uses of contour maps.

Minor instruments : Uses and adjustments of the following minor instruments:
Plane Table and its accessories, Line Ranger, Optical Square, Abney level, Clinometer, Ceylon Ghattracer, Pantagraph, Sextant and Planimeter.

TEXT BOOKS

1. Surveying By Dr. K.R. Arora, Standard Book House.
2. Surveying Vol.1, 2 and 3 – By Punmia, Standard Book House.

REFERENCES

1. Surveying Vol. 1 and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
2. A text book of Surveying by C.L. Kocchar, Dhanpatrai Publishing company.
3. A Text Book of Surveying and Levelling by R.Agor, Khanna Publishers
4. Surveying and Levelling Vol. I & Vol. II by T.P Kanetkar and S.V Kulkarni, Vidyarthi Griha Prakashan, 1988
5. Relevant NPTEL Courses.

STRENGTH OF MATERIALS

CIV 216 **Credits : 3**
Instruction : 3 Periods & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. To have basic knowledge of the stresses in springs, principal stresses, principal planes.
2. To have basic knowledge of the stresses in thin cylindrical, circular shafts and Springs.
3. To learn the concepts of stresses in compound sections and shear force and bending moment in different types of beams.

Course Outcomes:

At the end of this course student will be able to:

1. Understand and solve simple problems involving stresses and strain in two and three dimensions.
2. Analyses stress in two dimensions and understand the concepts of principal stresses and the use of Mohr circles to solve two dimensional stress problems.
3. Draw shear force and bending moment diagrams of simple beams and understand the relationships between loading intensity, shearing force and bending moment.
4. Compute the bending stresses in beams with one or two materials.
5. Apply sound analytical techniques and logical procedures in the solution of engineering problems.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	2	3	1	1	1	-	1	2	1	2	3	2	2
	2	3	3	2	2	-	1	1	-	1	1	1	1	3	2	2
	3	3	3	2	2	-	1	1	-	1	1	1	1	3	2	2
	4	3	3	2	2	-	1	1	-	1	1	1	1	3	2	2
	5	3	3	2	3	2	1	1	-	1	2	1	2	3	3	2

SYLLABUS

UNIT - I 12 Periods

Simple Stresses and Strains: Elasticity and plasticity – Types of stresses and strains – Hooke's law– stress – strain diagram for mild steel and HYSD-bars Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic constants and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

UNIT - II 12 Periods

Shear Force and Bending Moment in beams: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads, moment and combination of these loads – Point of contra flexure – Relation between S.F, B.M and rate of loading at a section of a beam.

UNIT - III 12 Periods

Bending Stresses: Theory of simple bending – Assumptions – Derivation of bending equations, Neutral axis – Determination of bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections.
Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT - IV 12 Periods

Principal Stresses and Planes: Introduction – Principal planes and Principal Stresses – Method of determining stresses on an inclined section of a member subjected to direct stresses in one plane – member subjected to direct stresses in two mutually perpendicular directions – member subjected to simple shear stress - member subjected to direct stresses in two perpendicular directions accompanied by a state of simple shear – Mohr's circle of stresses
Introduction to theories of failure: (i) Principal Stress theory, (ii) Principal Strain theory, (iii) Maximum Shear Stress theory and (iv) Maximum strain energy theory.

UNIT - V 12 Periods

Torsion of Circular Shafts: Theory of pure torsion – Derivation of Torsional Rigidity equation – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts.
Springs: Introduction – Types of springs – deflection of closed and open coiled helical springs under axial load and axial twist.
Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in diameter, and volume of thin cylinders.

TEXT BOOKS

1. Ramamrutham, Strength of materials, Dhanpat Rai & Sons.
2. R K Bansal, Strength of materials, Laxmi Publications Pvt. Ltd.

REFERENCES

1. Timoshenko and Young, Elements of strength of materials Affiliated East-West Press Pvt. Ltd.
2. Mechanics of Materials, Beer and Jhonston, Tata McGraw Hill.
3. P.N. Singer and P.K. Jha, Elementary mechanics of solids, New Age International Pvt.Ltd.
4. Mechanics of Solids by Egor P. Popov, Pearson Education.
5. Relevant NPTEL Courses.

SURVEY FIELD WORK - I

CIV 217 **Credits : 2**
Instruction : 3 Practical / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Course Objectives:

1. To know how to conduct the experiments by using different survey instruments.
2. To improve practical knowledge.

Course Outcomes:

At the end of this course student will be able to:

1. Improve ability to function as a member of a survey party in completing the assigned field work.
2. Conduct survey and collect field data
3. Prepare field notes from survey data
4. Learn the measurement of elevation difference between two points using Level instruments.
5. Interpret survey data and compute areas and volumes.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	2	-	2	1	-	1	2	2	-	2	3	2	1
	2	3	3	2	2	2	1	-	1	2	2	-	1	3	2	1
	3	3	2	1	2	2	1	-	1	2	1	-	-	2	2	1
	4	3	2	1	1	2	1	-	1	1	2	-	-	2	1	2
	5	3	2	-	-	2	1	-	1	1	2	-	1	3	2	1

LIST OF EXPERIMENTS:

1. Introduction & list of equipments
2. Chain surveying - Aligning, Ranging and Chaining
3. To determine the area of the given plot using chain, tape & cross–staff.
4. To find the distance between inaccessible points using Compass Surveying.
5. Traversing using prismatic compass.
6. Measurement of elevation difference between two points using and Leveling Instrument.
7. Elevation difference between two points by Reciprocal levelling method.
8. Differential levelling, reduction of levels by rise and fall method.
9. Differential levelling, reduction of levels by height of collimation method.
10. Longitudinal and Cross Sectioning.
11. Contouring of a small area by method of Blocks.

REFERENCES

1. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi Publications, 2005.
2. Relevant NPTEL Courses.

STRENGTH OF MATERIALS LABORATORY

CIV 218 **Credits : 2**
Instruction : 3 Practical / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Course Objectives:

The student shall have the knowledge of

1. The stress – strain characteristics of mild steel bar.
2. The methods of determining modulus of elasticity, modulus of rigidity of spring and shaft materials.
3. The concepts of hardness, compressive strength, shear strength, impact strength and tensile strength of different materials.

Course Outcomes:

At the end of this course student will be able to

1. Determine the strength of given steel bar.
2. Estimate compressive strength of wood.
3. Find the impact resistance of steel specimen.
4. Calculate Young's modulus of steel and wood using deflection tests.
5. Determine rigidity modulus of given spring.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	1	1	2	2	-	-	-	2	1	1	1	2	2	1
	2	1	1	1	2	2	-	-	-	2	1	1	1	1	2	1
	3	1	1	1	2	2	-	-	-	2	1	1	1	1	2	1
	4	1	1	1	2	1	-	-	-	2	1	1	1	1	2	1
	5	1	1	1	2	1	-	-	-	2	1	1	1	1	2	1

LIST OF EXPERIMENTS:

1. Tension test on Mild Steel / HYSD bars.
2. Compression test on wood (parallel to grains and perpendicular to grains)
3. Test on close coiled helical spring for the determination of rigidity modulus and spring constant
4. Hardness tests - Brinell's & Rockwell's.
5. Impact tests – Charpy and Izod
6. Torsion test.
7. Bending test.: Load deflection test for the determination of young's modulus on simply supported and cantilever beam for wood and steel.

REFERENCES

1. P.N. Singer and P.K. Jha, Elementary mechanics of solids, New Age International Pvt.Ltd.
2. Relevant NPTEL Courses.

CONCRETE TECHNOLOGY

CIV 221 **Credits : 3**
Instruction : 3 Periods & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. Learn about the manufacturing of cements and hydration process
2. Use different types of cement and admixtures as per their properties for different field applications.
3. Student shall learn about the various ingredients of concrete, admixtures, workability and strength of hardened concrete

Course Outcomes:

At the end of course student will be able to:

1. Understand the composition, manufacturing process and properties of cement.
2. Understand the classification, characteristics and properties of aggregate.
3. Acquire the skill of testing, supervision of concrete work & interpretation of tests results.
4. Understand the behaviour of hardened concrete.
5. Understand the need for special concretes.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	2	3	3	2	2	3	1	3	2	1	3	2	3
	2	2	2	2	2	3	-	-	-	-	-	-	-	2	2	3
	3	-	2	2	3	2	3	3		1	2	3	1	3	2	3
	4	-	3	2	-	2	3	3	2	1	-	3	-	3	2	1
	5	-	2	2	3	2	3	3		1	2	3	1	2	2	3

SYLLABUS

UNIT - I 12 Periods

Cement: Composition of ordinary Portland cement- oxide composition and compound composition- their functions in cement. Manufacture of ordinary Portland cement by wet process and dry process. Types of cement - OPC & blended (only fly ash & slag) and their uses. Tests on cement – field tests – laboratory test (Test procedure not required)

UNIT - II 12 Periods

Aggreagate: Classification of aggregate based on origin , shape , size, unit weight: Manufactured sand (M – Sand) – characteristics of aggregates – strength, particle shape and texture ,specific gravity ,bulk density ,voids, porosity and absorption of aggregates – moisture content of aggregate – bulking of fine aggregate. Tests on aggregates.

(Test procedure not required)

UNIT - III 12 Periods

Fresh Concrete: Manufacture of concrete – Batching, Mixing, Transportation, Placing, Vibrating, Finishing, Curing – Workability – Factors affecting workability – segregation and bleeding – Tests available for measurement of workability (Test procedure not required)
Admixtures: Admixtures – functions of admixtures – General purpose admixtures such as Retarding admixture, Accelerating admixtures, Air Entraining admixtures, Water reducing admixture

UNIT - IV 12 Periods

Hardend Concrete: Strength of concrete – water-cement ratio – gel-space ratio – gain of strength with age – effect of maximum size of aggregate on strength – compressive strength – flexural strength – tensile strength of concrete – bond strength – factors affecting the strength of concrete. Introduction to creep and shrinkage of concrete – Tests on hardened concrete (Test procedure not required)

UNIT - V 12 Periods

Special Concrete: Introduction to special concrete – lightweight concrete – no fines concrete – fibre reinforced concrete – self compacting concrete
Concrete Mix Design: Concrete mix design – BIS Method of mix design

TEXT BOOKS

1. Concrete Technology – M. S. Shetty – S Chand Co., Publishers – 2006.
2. Properties of Concrete – AM Nevelli – 5th Ed, Prentice Hall Publishers, 2012.

REFERENCES

1. Concrete Technology – M. L. Gambhir – Tata Mc Graw Hill Publishers – 2012.
2. Concrete Technology 3 Edition, Gupta B L, & Amit Gupta, Standard Publishers and Distributors
3. Concrete Technology, A.R.Santha Kumar, Oxford University Press
4. Relevant NPTEL Courses.

ENVIRONMENTAL ENGINEERING - I

CIV 222 **Credits : 3**
Instruction : 3 Periods & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. The principal objective of the course is to develop the technical knowledge for better understanding the concepts of water supply and its characteristics and enabling them to use these technical skills in solving the problems in industries.
2. To impart the knowledge in planning, design, construction, operation and maintenance aspects of water supply systems.
3. To provide theoretical and practical exposure in the field of water treatment and supply.
4. To increase the management skills with regard to collection, treatment and distribution of sustainable water.

Course Outcomes:

By the end of the course the student will be able to

1. Understand the sources of water, quality of water, types of water borne diseases.
2. Learn to estimate demand for water supply, and can apply the physical principles of flow in water distribution networks and pumping stations.
3. Design water treatment systems and operations and working of different units.
4. Design elements of public water systems, pumping and transportation of water, distribution systems, and components of water supply network in a town/city, functioning of water/sewer pipe appurtenances.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO	1	3	2	3	3	3	2	2	3	1	1	1	3	3	3	2
	2	3	3	3	3	3	2	2	3	1	1	3	3	3	3	2
	3	3	3	3	3	3	2	2	2	3	1	1	3	3	3	2
	4	3	3	3	3	3	2	2	3	3	1	1	3	3	3	2

SYLLABUS

UNIT - I 10 Periods

Introduction: 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, Agency activities.

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 Forecasting Studies.

UNIT - II 10 Periods

Quality: 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 - III 10 Periods

Sources of Water Supply: Surface sources of water: Lakes, Rivers, Impounding Reservoirs, Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from wells and infiltration galleries.

Collection and Conveyance: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, Laying of pipe lines.

UNIT - IV 12 Periods

Treatment of Water: Layout and general outline of water treatment units –Treatment methods (Theory and Design) - Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration, Chlorination and other Disinfection methods, Softening of Water, Defluoridation, Removal of Odours.

UNIT - V 12 Periods

Pumping: Necessity of pumping in water supply - classification and brief description of types of pumps - selection of pump - calculation of head, horsepower - economical diameter of pumping main.
Distribution System: Distribution of Water: Methods of Distribution system, Components of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks, Water connection to the houses.
Building Plumbing: Water Supply system – Fixing the pipes in building, high rise buildings – Maintenance of building pipe line – Water Meters.

TEXT BOOKS

1. Birdie G S and Birdie J S, "Water Supply and Sanitary Engineering", Dhanpat Rai and Sons, Delhi, Fifth Edition, 1997
2. Garg, S.K, "Environmental Engineering Vol. I ", Khanna Publishers, New Delhi, 1994.

REFERENCES

1. Modi, P.N, "Environmental Engineering Vol. I", Standard Book House, New Delhi, 2001.
2. Punmia B.C, "Environmental Engineering Vol. I", Lakshmi Publications (P) Ltd., New Delhi, 2002.
3. Deswal S and Deswal A, "A basic course in Environmental studies", Dhanpat Rai & Co, First edition, Delhi, 2004

4. Hand book on Water Supply and Drainage, SP35, B.I.S., New Delhi, 1987.
5. National Building Code of India, SP 7 (1) – 1983, Bureau of Indian Standards, First Reprint, May 1992.
6. Relevant NPTEL Courses.

FLUID MECHANICS - I

CIV 223 **Credits : 4**
Instruction : 4 Periods & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. To develop an insight into engineering problems related to fluids.
2. Student is expected to learn about the pressure at a point, forces on fluid element to solve complex problems in engineering.
3. Student shall be able to know different types of fluid flows and apply the principles of conservations of mass, momentum and energy.

Course Outcomes:

By the end of the course the student will be able to

1. Determine the physical properties of fluids and different types of forces acting on a fluid element extended to forces on various gates.
2. Determine the forces that are acting on immersed bodies in static fluids through application of buoyancy and floatation.
3. Determine different types of fluid flows to find out the local and convective accelerations in 1D, 2D flows fields and derive the Laplace equation.
4. Apply conservation principles of mass momentum and energy on fluids through system and control volume approaches.
5. Calculate the force exerted by the fluid on bends, nozzles, plates and vanes by impulse momentum principle.
6. Analyze the steady laminar and turbulent flows through pipes and solve pipe networks for series and parallel pipes to solve two reservoir and three reservoir problems.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	1	1	-	-	-	-	2	-	-	-	-	1	1	-	2
	2	1	1	-	-	-	1	1	-	-	1	-	1	1	-	1
	3	2	3	-	2	-	-	1	-	-	-	-	2	2	2	1
	4	2	3	1	2	-	-	2	-	-	-	-	3	3	2	2
	5	3	2	-	1	-	-	2	-	-	1	1	2	2	1	2
	6	2	3	2	2	1	-	2	-	-	-	-	2	3	2	2

SYLLABUS

UNIT - I 14 Periods

Basic Fluid Properties: Definition of Fluid, basic properties of fluid, Viscosity - Newton's Law of Viscosity, Capillarity and Surface Tension.
Fluid Pressure: Fluid Pressure at a point, Pascal's law, Variation of pressure with elevation, Hydrostatic law, Absolute, Gauge and Vaccum Pressures. Pressure measurement – Piezometers, Manometers and Pressure Gauges. Centre of Pressure, Forces on submerged surfaces, crest gates and lock gates.

UNIT - II 14 Periods

Buyoancy and Floatation: Archimedes Principle- Buoyancy & Floatation - Stability of Floating Bodies- Centre of Buoyancy - Metacentric Height and its Determination.

Fluid Kinematics: Types of fluid flow, Velocity, Rate of flow, Continuity Equation, Streamline, Path line, Streak line, Local, Convective and Total Acceleration; One & Two Dimensional Flows. Stream Function, Velocity Potential- Rotational & Irrotational Flows, Laplace Equation, Flow net.

UNIT - III 14 Periods

Fluid Dynamics: Energy possessed by fluid in motion, Euler's equation of motion - Bernoulli's equation. Energy correction factor.
Flow through orifices and mouth pieces: Types of orifices and mouth pieces, coefficient of contraction, velocity and discharge.
Flow through notches and weirs: Types of notches and weirs, Measurement of discharge.

UNIT - IV 14 Periods

Impulse momentum equation – Momentum correction factor, Forces on pipe bends and reducers. Angular Momentum – Torque and work done; Sprinkler Problems.
Laminar Flow: Relation between shear and Pressure Gradients in Laminar Flow; Reynold's experiment; Critical velocity; Steady laminar flow through a circular pipe – Hagen Poiseuille's Law.

UNIT - V 14 Periods

Flow through pipes: Flow measurement through pipes – Venturimeter, orificemeter, nozzle meter. Loss of head, head loss due to friction – Darcy –Weisbach equation, minor losses, Total Energy Line, Hydraulic Gradient Line. Pipes in Series, pipes in parallel. Problems on Two reservoir and three reservoir flows. Water hammer, surge tanks.

TEXT BOOKS

1. Fluid Mechanics and Hydraulic Machinery by P.N. Modi & S.M. Seth, Standard Book House.
2. Fluid Mechanics by A.K. Jain, Khanna Publishers

REFERENCES

1. Hydraulics Fluid Mechanics and Fluid Machines, S.Ramamrutham, Dhanpat Rai Publishing Co.
2. Engineering Fluid Mechanics by K.L. Kumar, S. Chand & Co
3. Fluid Mechanics and Hydraulic Machines by R.K. Bansal, Laxmi Publications.
4. F M White, Fluid Mechanics, Tata McGraw Hill Publication 2011.
5. Relevant NPTEL Courses.

SURVEYING - II

CIV 224 **Credits : 3**

Instruction : 3 Periods & 1 Tutorial / week Sessional Marks : 40

End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. To measure the height and distance by theodolite.
2. To measure the angles and distances by using tacheometric and trigonometric methods.
3. To measure distances and angles by total station.

Course Outcomes:

By the end of the course the student will be able to

1. Learn to determine horizontal and vertical angles between points.
2. To impart experimental skills to determine heights and distances of inaccessible objects.
3. Apply surveying skills in aligning highways and railway curves.
4. Demonstrate the ability to solve surveying problems.
5. Gain the ability to use modern survey equipment (Total Station) to measure angles and distances.
6. Learn basics in GIS and GPS.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	-	-	3	1	-	-	1	2	-	1	3	3	1
	2	3	3	1	-	3	-	-	-	2	2	-	1	3	3	-
	3	3	3	2	1	3	1	1	-	2	2	2	1	3	2	1
	4	3	3	2	1	1	1	-	1	2	2	3	1	3	1	1
	5	3	3	1	-	3	1	-	-	1	2	1	2	3	2	1
	6	3	2	2	2	3	1	1	-	1	1	-	2	2	3	1

SYLLABUS

UNIT - I 10 Periods

Theodolite Survey: Theodolite Component Parts, Classification, – Temporary Adjustments, Measurement of horizontal angle – Method of repitition, Method of reiterition – Uses of theodolities – Errors in theodolite or Permanent adjustments of a theodolite – Identification – Rectifying the errors.

UNIT - II 12 Periods

Theodolite Traversing: Open and closed traverse – Closing errors, Balancing the error – Bowditch method – Transit method, Omitted measurements – Gales traverse table – Axis Signal Correction.

Trigonometric leveling: Elevation of the tower - Base of the object accessible and

inaccessible – Reduced level of the elevated points – instrument axis at different levels.
Triangulation: Principle of triangulation - Purpose and classification of triangulation surveys – Layout of triangulation.

UNIT - III 10 Periods

Tacheometry : Instruments - Principle of techeometry – Methods of Tacheometry - Stadia methods – Fixed hair method – Movable hair method – Tangential method – Subtanse bar – Beaman's stadia, Arc – Reduction diagrams or Triangulation – Classification - intervisibility of station – Signals and towers-base line measurements.

UNIT - IV 12 Periods

Curves: Types of Curves - Simple curves – Elements of simple curves – Methods of setting simple curves – Rankines method – Two theodolite method – Obstacles in curve setting – Compound curves – Elements of compound curves or Reverse curves – Elements of reverse curve – Determination of various elements – Transition curves – Ideal shape – Spiral transition curves - length of transition curve - Setting out methods.

UNIT - V 10 Periods

Modern Surveying Instruments: Electronic Theodolite, Introduction to geodetic surveying, EDM Instruments, Total station and global positioning system- Introduction to Geographic Information System (GIS)

TEXT BOOKS

1. Surveying Vol.1,2 and 3 – By Punmia, Standard Book House.
2. Surveying By Dr. K.R. Arora, Standard Book House.

REFERENCES

1. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
2. A text book of Surveying by C.L. Kochhar, Dhanpatrai Publishing Company.
3. A Text Book of Surveying and Levelling by R.Agor, Khanna Publishers
4. Surveying and Levelling Vol. I & Vol. II by T.P Kanetkar and S.V Kulkarni, Vidyarthi Griha Prakashan, 1988
5. Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.
6. Relevant NPTEL Courses.

STRUCTURAL ANALYSIS - I

CIV 225 **Credits : 4**
Instruction : 4 Periods & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. Apply suitable methods for calculating deflections in statically determinate beams and trusses.
2. Apply suitable methods for analyzing statically indeterminate beams.
3. Analyze beams under moving loads.

Course Outcomes:

At the end of the course the student will be able to

1. Calculate deflections in statically determinate beams and trusses.
2. Analyze columns and struts under axial loading.
3. Calculate strain energy due to different types of forces.
4. Analyze statically indeterminate beams.
5. Analyze fixed and continuous beams.
6. Understand how shear force and bending moment vary with application of moving loads.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	2	3	1	1	1	-	1	2	1	2	3	2	2
	2	3	3	2	2	-	1	1	-	1	1	1	1	3	1	2
	3	3	3	2	2	-	1	1	-	1	1	1	1	3	1	2
	4	3	3	2	2	-	1	1	-	1	1	1	1	3	1	2
	5	3	3	2	2	-	1	1	-	1	1	1	1	3	1	2
	6	3	3	2	3	2	1	1	-	1	2	1	2	3	1	2

SYLLABUS

UNIT - I 13 Periods

Combined bending and direct stresses: Resultant stress when a column of rectangular section is subjected to eccentric load along one axis and along both the axes- kern of a section.
Columns and Struts: Euler's theory – end conditions. Rankine – Gordon formula – other empirical formulae – Eccentrically loaded columns – Perry's formula, Secant formula.

UNIT - II 15 Periods

Deflections of statically determinate beams: (a) Double integration method (b) Macaulay's method (c) Moment area method, (d) Conjugate beam method.

14 Periods

UNIT - III

Strain energy: Expression for strain energy stored in body due to
(i) Axial load, (ii) Shear force, (iii) Bending Moment and (iv)Torque
Deflections of Statically Determinate Beams: (a)Unit load method (b) Castigliano's theorm – 1.
Deflections of Statically Determinate Trusses: (a) Unit load method (b) Castigliano's theorm – 1.

UNIT - IV 14 Periods

Analysis of Statically Indeterminate Beams: (a) fixed beams, (b) three span continuous beams using (i) Theorem of three moments, (ii) Slope deflection method and (iii) Moment distribution method.

UNIT - V 14 Periods

Moving loads and Influence lines: Maximum Shear force and Bending moment diagrams for different types of loads. Maximum Bending moment at a section under a wheel load and absolute maximum Bending moment in the case of several wheel loads. Equivalent uniformly distributed live load for Shear force and Bending moment.

TEXT BOOKS

1. Theory of structures – Ramamrutham. Dhanpat rai Publishing company.
2. Theory of Structures by BC Punmia and Arun Kumar Jain and AK Jain, Laxmi Publications

REFERENCES

1. Theory of structures by S.P. Timoshenko and D.H. Young, McGraw Hill International Editions.
2. Basic Structural Analysis by CS Reddy, Tata McGraw Hill Education.
3. Analysis and Design of structures – Vazirani and Ratwani, vol 1, Khanna publishers.
4. Structural analysis by Thandavamoorthy, Oxford University Press.
5. Structural analysis by S.S.Bhavakatti. Vol I, Vikas Publishing House Pvt Ltd.
6. Relevant NPTEL Courses.

BUILDING PLANNING AND DRAWING

CIV 226 **Credits : 3**

Instruction : 1 Lecture & 3 Practical / week Sessional Marks : 40

End Exam : 3 Hours End Exam Marks : 60

Course Objectives:

1. To understand the principles of planning and bylaws.
2. To draw plan, elevation and section of load bearing and framed structures.
3. To prepare detailed drawings for doors, windows, etc.

Course Outcomes:

1. Understand various types of buildings and housing concept.
2. Apply the concepts of climatology and orientation of both residential and commercial buildings.
3. Apply the principles of planning and bylaws used for building planning.
4. Recommend appropriate planning for 2 Bed room and 3 Bed room houses.
5. Draw plan, elevation and section for various structures.
6. Design individual rooms with attention to functional and furniture requirements.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3
	2	1	1	1	1	1	1	3	3	3	1	1	3	1	1	2
	3	1	1	3	3	1	3	3	3	3	3	3	3	1	2	3
	4	3	3	3	3	3	2	3	3	2	3	3	3	3	2	2
	5	3	3	3	1	1	3	3	2	3	3	3	3	3	2	3
	6	1	1	3	3	1	3	3	3	3	3	3	3	1	2	3

SYLLABUS

UNIT - I 12 Periods

Climatology: Elements of climate: Sun, Wind, Relative Humidity, and Temperature. Mahoney Tables, Comfort conditions for house. Various types of Macroclimatic zones, Design of Houses and layouts with reference to climatic zones. Solar charts. Wind Roses, Ventilation.
Principles of Planning, Orientation of Buildings.

UNIT - II 12 Periods

Design of Individual rooms with particulars attention to functional and furniture requirements (for internal evaluation only). Residential Buildings: Different types of Residential Buildings, Selection of site for residential buildings. Guidelines for planning and drawing of residential building. General Building regulations and Bye laws for Residential Buildings.

UNIT - III 36 Periods

Drawing: At least ten sheets shall be drawn during the semester manually using mini-drafter/setsquares (along with AUTOCAD), (a) Conventional signs of materials, various equipment used in a Residential Building (copying exercise). Plan, Sectional Elevation, Front Elevation and site plan for the following.

(a) A Small House (One Room and Verandah) (Copying exercise), (b). Three bed roomed House in HOT and ARID zone, Hot and humid zone & Cold zone(copying exercise), (c) Houses with given Functional requirements and climatic data. Emphasis may be given to Hot and Humid (d) Duplex Type Houses.

Note:

1. AUTOCAD Drawings for internal assessment only.
2. The question paper consists of Part-A and Part-B. Part-A consists of 4 questions, 2 questions for each of Unit – I & II and Part-B consists of a compulsory question for 36marks

TEXT BOOKS

1. Building Planning and Drawing by Dr.N. Kumara Swamy and A.Kameswara Rao, Charotar Publishing House.
2. Building Planning Drawing and Scheduling by Gurucharansingh and Jagadish Singh, Standard Publishers Distributors.

REFERENCES

1. Building Drawing with an integrated approach to Built environment by M.G.Shah, C.M.Kale and S.Y.Patki, McGraw-Hill Publishing Company Limited, New Delhi.
2. Civil Engineering Drawing Series ‘B’ by R.Trimurty, M/S Premier Publishing House.
3. Relevant NPTEL Courses.

CONCRETE TECHNOLOGY LAB

CIV 227 **Credits : 2**
Instruction : 3 Practical / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Course Objectives:

1. To apply the basic knowledge of civil engineering in selecting appropriate cement, fine and coarse aggregates in making concrete.
2. To be able to make concrete of required strength.

Course Outcomes:

At the end of this course student will be able to

1. Conduct quality control tests on cement.
2. Conduct workability tests on fresh concrete.
3. Design Concrete Mix.
4. Conduct quality control tests on hardened concrete.
5. Conduct quality control tests on coarse aggregates.
6. Conduct quality control tests on fine aggregates.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	1	1	2	2	-	-	-	2	1	1	1	2	2	1
	2	1	1	1	2	2	-	-	-	2	1	1	1	1	2	1
	3	1	2	2	2	2	-	-	-	2	1	1	1	1	2	1
	4	1	1	1	2	2	-	-	-	2	1	1	1	1	2	1
	5	1	1	1	2	1	-	-	-	2	1	1	1	1	2	1
	6	1	1	1	2	1	-	-	-	2	1	1	1	1	2	1

LIST OF EXPERIMENTS:

1. Specific gravity and unit weight of cement
2. Specific gravity and unit weight of coarse aggregates.
3. Specific gravity and unit weight of fine aggregates.
4. Fineness of cement,
5. Consistency of cement
6. Initial and final setting time of cement.
7. Compressive strength of cement (for different grades of cement).
8. Bulking of sand.
9. Sieve analysis of coarse and fine aggregates
10. Workability tests on fresh concrete by using: Slump cone, Compaction factor apparatus, Flow table, Vee-Bee Consistometer.
11. Compressive Strength of concrete
12. Split tensile strength of concrete
13. Modulus of rupture of concrete

REFERENCES

1. Properties of Concrete – AM Nevelli – 5th Ed, Prentice Hall Publishers, 2012.
2. Concrete Technology – M. S. Shetty – S Chand Co., Publishers – 2006.
3. Relevant NPTEL Courses.

FLUID MECHANICS LAB - I

CIV 228 **Credits : 2**
Instruction : 3 Practical / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Course Objectives:

The objective of the course is to enable the student to calibrate different types of flow measuring devices to measure flow in tanks, pipes and open channels.

Course Outcomes:

At the end of this course student will be able to

1. Apply the dimensional analysis to design the experimental procedures.
2. Calibrate flow measuring devices such as orifice and mouth piece.
3. Calibrate the flow meters such as orifice meter, venturi meter and flow nozzle meter.
4. Calibration of meters used in channel flows such as trapezoidal and v notches.
5. Calibration of weirs, broad crested and sharp crested weirs.
6. Determine the time for emptying a tank through small orifice and a mouth piece.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	1	1	1	2	1	2	1	-	3	1	2	1	1	2	1
	2	2	-	1	3	-	-	1	-	2	-	1	1	2	3	1
	3	2	-	1	3	-	1	1	-	2	-	1	1	2	3	1
	4	2	-	1	3	-	2	2	-	2	-	1	1	2	3	2
	5	2	-	1	3	-	1	2	-	2	-	1	1	2	3	1
	6	1	-	-	1	-	-	1	-	2	-	1	1	1	1	1

LIST OF EXPERIMENTS:

1) Calibration of a small orifice by constant head method and falling head method
2) Time required for emptying the tank through the small orifice.
3) Calibration of a cylindrical mouth piece by constant head method and falling head method.
4) Time required for emptying the tank through the mouth piece.
5) Calibration of Venturi meter
6) Calibration of Orifice meter.
7) Calibration of Flow nozzle meter.
8) Calibration of a triangular V Notch
9) Calibration of a rectangular notch.
10) Calibration of a trapezoidal notch.
11) Experimental verification of laminar, transition and turbulent flows using Reynolds apparatus.
12) Verification of Bernoulli's Equation.

REFERENCES

1. Fluid Mechanics and Hydraulic Machinery by P.N. Modi & S.M. Seth, Standard Book House.
2. Relevant NPTEL Courses.

SURVEYING FIELD WORK - II

CIV 229 **Credits : 2**
Instruction : 3 Practical / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Course Objectives:

1. To know how to conduct the experiments by using different survey instruments.
2. To improve practical knowledge.

Course Outcomes:

At the end of this course student will be able to

1. Demonstrate an ability to conduct surveying for any infrastructure project.
2. Analyses data and report results.
3. Work in teams doing field work and computer analysis.
4. Demonstrate understanding of curve layout by setting a curve from more than a single point along the curve.
5. Compare and contrast textbook solutions with real world solutions.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	2	1	-	2	1	-	1	2	2	-	2	3	2	1
	2	3	3	2	2	1	1	-	1	2	2	-	1	3	2	1
	3	3	2	1	2	2	1	-	-	1	1	-	-	3	2	1
	4	3	2	1	1	1	1	-	-	1	2	-	-	3	1	1
	5	3	2	-	-	2	1	-	1	1	2	-	1	3	2	1

LIST OF EXPERIMENTS:

1. To determine horizontal angle by repetition method
2. To determine horizontal angle by reiteration method
3. To determine the vertical angles.
4. To determine Reduced level of different points.
5. To determine height of the object when base is accessible and base inaccessible.
6. To determine the Tacheometric Constants.
7. To determine gradient between two points
8. Setting of simple curve using tape, Rankine's Method and Two theodolite Method
9. Study of Instrument – Determination of Distances, Directions and Elevations (Total Station)
10. Determination of Boundaries of a Field and computation of area using Total Station.
11. Determination of Heights of objects using Total Station.

REFERENCES

1. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain., Surveying I & II, Laxmi Publications, 2005.
2. Relevant NPTEL Courses.

TECHNICAL SEMINAR

CIV 2210 **Credits : -**

Instruction : 2 Practical / week Sessional Marks : -

End Exam : - End Exam Marks : -

Course Objectives:

The objective of this course is

1. To enhance the communication skills of the students through participation and giving seminars.
2. To develop an overview of civil engineering and its applications in the students.
3. To promote teamwork and lifelong learning among the students.

Course Outcomes:

At the end of the course the students will be able to

1. Make presentation on a given topic related to civil engineering.
2. Improve the communication skills.
3. Broaden their knowledge about civil Engineering and its practical applications.
4. Update their knowledge on the latest developments in civil engineering.
5. Understand the environmental, safety, economical and sustainability aspects of any civil engineering structure.
6. Develop teamwork and lifelong learning skills.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	-	-	2	-	2	2	-	-	3	-	2	2	2	2
	2	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
	3	2	2	2	2	2	2	2	-	-	-	-	-	2	2	2
	4		2	2	2	2	2	2	-	-	-	-	-	2	2	2
	5	-	-	2	-	-	2	2	-	-	-	-	-	2	-	2
	6	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-

OUTLINE OF SYLLABUS

Students have to prepare a Report on a case study, design or practical application in civil engineering and make a presentation in teams of maximum 2 students. Duration of each seminar shall be 20 minutes per team including discussion. Evaluation to be done by a Panel of Examiners nominated by HoD with at least one faculty member of specialization related to the seminar topic.

REFERENCES

1. National & International Journals / Standard Magazines / Reports / Case Studies in civil engineering.
2. NPTEL courses in civil engineering.
3. World Wide Web resources on state of the art in civil engineering.

III B.Tech. Syllabus

ENVIRONMENTAL ENGINEERING – II

CIV312 **Credits: 3**
Instruction: 3 Lecture & 1 Tutorial / week Sessional marks: 40
End Exam: 3 hours End Exam Marks: 60

Prerequisites:

Engineering Chemistry; Environmental Engineering – I.

Course Objectives:

The objective of this course is to:

1. Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
2. Provide knowledge of characterisation of wastewater generated in a community.
3. Summarize the appurtenance in sewerage systems and their necessity and Impart understanding and need of treatment of sewage.
4. Teach planning, and design of septic tank and Imhoff tank and the disposal methods of the effluent from these low cost treatment systems and realise the importance of regulations in the disposal of effluents in rivers.

Course Outcomes:

At the end of this course, the students will be able to:

1. Plan and design the sewerage systems
2. Select the appropriate appurtenances in the sewerage systems
3. Selection of suitable treatment flow for sewage treatment
4. Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	3	3	3	3	3	1	3	2	1	3	2	3
	2	3	2	2	2	3	-	-	-	-	-	-	-	3	2	3
	3	-	2	2	3	2	3	3		1	2	3	1	3	2	3
	4	-	3	2	-	2	3	3	2	1	-	3	-	3	2	1

SYLLABUS

UNIT – I 12Periods

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 – design of sewers

Sewers and its appurtenances: types of sewers – materials for sewers- appurtenances in sewerage – cleaning and ventilation of sewers.

UNIT – II 12Periods

Hydraulics of sewers and storm drains: Hydraulic Design of Sewers and storm Drains

Sewage Characteristics: Decomposition of Sewage. Sewage characteristics – Physical, Chemical and Biological Characteristics and their testing–BOD-first stage BOD exertion-COD-Relative Stability and Population Equivalent.

UNIT – III 12Periods

Treatment of sewage - Primary treatment: Screens-grit chambers – grease traps – floatation – sedimentation – design of primary and pretreatment units.

UNIT – IV 12Periods

Secondary treatment: Aerobic and anaerobic treatment process-comparison.
Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, miscellaneous methods, Oxidation ponds, Oxidation ditches, Aerated Lagoons.
Attached Growth Process: Trickling Filters-mechanism of impurities removal-classification–filter problems-design and operation- recirculation. RBC's, Fluidized bed reactors

UNIT –V 12Periods

Anaerobic Processes: Septic Tanks and Imhoff tanks -Principles and Design
Bio-solids (Sludge) management: Characteristics- thickening – digestion , drying and sludge disposal
Disposal of sewage: methods of disposal – disposal into water bodies- Oxygen Sag Curve-disposal on land.

TEXT BOOKS

1. Garg, S.K. (2015), "Environmental Engineering (Vol.II): Sewage disposal and Air Pollution Engineering", Khanna Publishers, Delhi 33th Edition.
2. Modi, P.N. (2010), "Sewage Treatment Disposal and Waste Water Engineering" Standard Book House, Delhi, 4th Edition.

REFERENCES

1. Metcalf & Eddy (2002), "Wastewater Engineering: Treatment and Reuse" Tata McGraw-Hill, New Delhi, 4th Edition.
2. Raju, B.S.N. (1995), "Water supply and Waste Water Engineering" McGraw-Hill Education, New Delhi.
3. Peavy, H.S., Rowe, D.R., and Tchobanoglous, G, (1985), "Environmental Engineering" McGraw-Hill international edition, New York, 7th Edition.
4. BIS 3025 (Part 44): Method of Sampling and Test (Physical and Chemical) for Water and Wastewater, Part 44: Biochemical Oxygen Demand (BOD) (First Revision)
5. Relevant NPTEL Courses.

REINFORCED CONCRETE STRUCTURES - I

CIV 313 **Credits : 4**
Instruction : 4 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Engineering Mechanics; Strength of materials; Structural Analysis - I.

Course Objectives:

From this course students will learn the following

1. To understand the recommendations of IS: 456-2000
2. To master the concepts of limit state design
3. To learn how to design various types of beams, columns, slabs and footings

Course Outcomes:

At the end of the course, the students will be able to:

1. Understand the principles of limit state method and design of singly reinforced beams, doubly reinforced beams, flanged beams
2. Enable the students to understand the concept of shear; bond and design shear reinforcement in beams.
3. Enable the students to design one way and two way slabs
4. Enable the students to design columns, footings.
5. Draw the reinforcement detailing for all the structural elements of a reinforced concrete structure.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	2	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	3	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	4	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	5	2	3	1	-	-	1	-	1	1	-	1	-	2	-	1

SYLLABUS

UNIT – I 12 Periods

Design Philosophies – Working Stress Method, Ultimate Load Method and Limit State Method

Introduction to Limit State Design: Concepts of limit state design- Characteristic loads- Characteristic strength -Partial loads and Material Safety factors- Representative stress-Strain curves- Assumptions in limit state design – Stress block parameters – Limiting moment of resistance.

Singly And Doubly Reinforced Beams: Limit state analysis and design of singly reinforced, doubly reinforced beams.

UNIT – II 12 Periods

Flanged Sections: Design of T and L beam sections.

Shear, Torsion and Bond: Limit state analysis and design of sections for shear and torsion – Concept of bond, anchorage and development length, I.S Code provisions. Design examples in simply supported and continuous beams.

UNIT – III 16 Periods

Slabs: Design of one way slabs – Two way slabs –Continuous slabs using IS coefficients.

UNIT – IV 12 Periods

Columns: Short and Long columns, Minimum eccentricity, short column under axial compression, column with helical and tie reinforcement. Short columns subjected to uniaxial bending - Short columns subjected to biaxial bending and P-M interaction diagrams. (Only for Internal Assessment).

UNIT – V 12 Periods

Footings: Introduction: Different types of footings–Design of isolated square and rectangular footings.

TEXT BOOKS

1. Punmia, B.C., Jain, A.K. and Jain, A. K., "Limit State Design of Reinforced Concrete", Laxmi Publications (P) Ltd., New Delhi, (16th Edition, 2016)
2. Vazirani, V.N., and Ratwani, M.M., "Design of Reinforced Concrete Structures" ,Khanna Publishers., New Delhi,

REFERENCES

1. Varghese, P.C., **"**Limit State Design of Reinforced Concrete", Prentice Hall of India Private Limited" , New Delhi, 2009
2. Pillai, S.U., & Devdas Menon, "Reinforced concrete design", Tata McGraw Hill. New Delhi, (3rd Edition, 2009)
3. Jain, A.K., "Reinforced Concrete Design", Charotor Publications.Anand(Gujarat) (16th Edition, 2016)
4. Ramamrutham, S., "Design of Reinforced Concrete Structures", Dhanpat Rai Publishing Company (P) Ltd. New Dlehi(17th Edition, 2016)
5. B.I.S. 456-2000 "Code of practice for Plain and Reinforced Concrete"
6. Other Relevant B.I.S. Codes
7. Relevant NPTEL Courses.

STRUCTURAL ANALYSIS - II

CIV 314 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Strength of Materials; Structural Analysis-I.

Course Objectives:

1. Apply suitable methods for analyzing statically indeterminate frames.
2. Apply suitable methods for analyzing Trusses.
3. Apply suitable methods for analyzing Arches and suspension bridges.

Course Outcomes:

At the end of the course the student will be able to

1. Formulate equilibrium & compatibility equations for indeterminate structural members.
2. Analyze statically indeterminate trusses.
3. Analyze statically indeterminate frames.
4. Analyze cables and suspension bridges.
5. Analyze two and three hinged structural members.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	3	2	-	-	-	-	-	-	1	3	3	-
	2	3	3	3	3	2	-	-	-	-	-	-	1	3	3	-
	3	3	3	3	3	2	-	-	-	-	-	-	1	3	3	-
	4	3	3	3	3	2	-	-	-	-	-	-	1	3	3	-
	5	3	3	3	3	2	-	-	-	-	-	-	1	3	3	-

SYLLABUS

UNIT – I 12 Periods

Analysis of statically indeterminate trusses (having not more than 7 members and 3 supports) containing (a) External redundant supports (b) internal redundant members using (i) Method of consistent deformation (ii) Castigliano's theorem – II.

UNIT – II 12 Periods

Analysis of statically indeterminate frames (single storey, single bay portal frames only) using (i) Slope-deflection method (ii) Moment distribution method.

UNIT – III 12 Periods

Analysis of statically indeterminate frames (portal frames with single storey and single bay)

using (i) Kani's method, (ii) Column Analogy method.

Analysis of structures for lateral load using portal method and cantilever method. (Only for Internal Assesment)

UNIT – IV 12 Periods

Arches: Normal thrust, radial shear and bending moment in three hinged and two hinged parabolic and segmental arches. Effects of rib-shortening and temperature change.

UNIT – V 12 Periods

Suspension bridges: Stresses in loaded cables with supports at the same and different levels. Length of cable; Two and Three hinged stiffening girders.

TEXT BOOKS

1. Reddy C.S, (2010), "Basic Structural Analysis", Tata McGraw-Hill Education Pvt. Ltd, Third Edition, New Delhi.
2. Prakash Rao D.S, (1996), "Basic Structural Analysis", Universities Press, New Delhi.

REFERENCES

1. Wang C.K, (1982), "Statically indeterminate structures", Tata McGraw-Hill Education Pvt. Ltd.
2. Hibbeler R.C, (2012), "Structural Analysis,6e", Pearson Education, 8th Edition.
3. Bhavikatti S.S, (Vol II -, 2013), "Structural Analysis – II", Vikas Publishing House, 4th Edition.
4. Jindal R.L, (1980), "Indeterminate Structures", S. Chand Publishers, 3rd Edition.
5. Relevant NPTEL Courses.

FLUID MECHANICS - II

CIV 315 **Credits : 4**
Instruction : 4 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Engineering Mechanics; Fluid Mechanics - I

Course objectives:

1. To understand the design philosophy of turbines and pumps
2. To understand the fundamental concept for methods of dimensional analysis
3. To know the design used for supplying water and generating power

Course outcomes:

At the end of the course, the students will be able to:

1. Apply the principles of modeling pumps, turbines, propellers etc using various dimensionless numbers
2. Determine discharge and design most economical channel section for uniform flow in open channels
3. Use momentum and energy principles for design of turbines and pumps
4. Recommend suitable type of turbines and pumps for the given project.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	2	2	1	-	1	1	-	1	-	2	1	2	1	1
	2	1	2	3	1	-	1	2	2	1	1	2	1	2	1	2
	3	1	2	3	1	-	2	2	-	2	1	2	-	2	1	1
	4	-	2	2	2	-	3	2	3	1	2	3	1	2	1	2

SYLLABUS

UNIT – I 14 Periods

Dimensional Analysis and Similitude: Dimensional Homogeneity - Methods of Dimensional Analysis – Rayleigh's Method – Buckingham's π theorem – Superfluous and Omitted Variables - Similitude – Model Analysis – Dimensionless numbers – Similarity Laws – Model testing of partially submerged bodies – Types of models.

Boundary Layer Theory: Introduction – characteristics of laminar boundary layer – boundary layer growth over a flat plate (without pressure gradient) – Boundary thicknesses – Stability parameter – Turbulent boundary layer – boundary layer separation – Boundary layer on rough surfaces – laminar sublayer.

UNIT – II 14 Periods

Flow past submerged bodies: Introduction **–** Types of Drag – Drag on a sphere – Drag on a cylinder – Von Karman Vortex Trail – Drag on a flat plate – Development of Lift on immersed circular cylinder – Magnus effect.

Impact of Jets: Impulse momentum equation – Momentum Correction factor, Force on Stationary flat plate – moving flat plate - Force on Stationary curved vanes – moving curved vanes.

UNIT – III 14 Periods

Hydraulic Turbines: Introduction - Classification based on Head, Discharge, Hydraulic Action – Impulse and Reaction Turbines, Differences between Impulse and Reaction Turbine, Choice of Type of Turbine, Component Parts & Working principle of a Pelton Turbine, Francis Turbine - Velocity Triangles - Hydraulic and Overall efficiencies.

Performance of turbines: Performance under Unit head, power and speed – Performance under specific conditions - Specific Speed and its importance. Performance Characteristic Curves – Operating Characteristic Curves – Cavitation - Draft Tube.

UNIT – IV 18 Periods

Centrifugal Pumps: Types of Pumps – Selection Criterion – Comparison between Centrifugal & Reciprocating Pumps - Centrifugal Pumps – Component Parts & Working Principle – Classification of Centrifugal pumps - Cavitation – Maximum Suction lift – NPSH. Specific Speed of pumps – Performance Characteristics of Centrifugal Pumps – Dimensionless characteristics – Constant efficiency curves of Centrifugal Pumps

Reciprocating Pumps: Component Parts – Working Principle of single acting and double acting reciprocating pumps – Discharge Co-efficient, Volumetric efficiency and Slip. Work done and Power Input – Indicator Diagram, Effect of acceleration and friction on Indicator Diagram - Air Vessels.

UNIT – V 15 Periods

Flow through Open Channels: Classification of open channels, Uniform Flow: Chezy's and Manning's formula, Hydraulic mean depth, hydraulic radius. Most economical trapezoidal and rectangular channel section – Specific energy, Critical Flow.
Steady Rapidly Varied Flow: Hydraulic Jump in a horizontal rectangular channel, Specific force Computation of energy loss.

TEXT BOOKS

1. Modi, P.N. & Seth, S.M. (2009), "Fluid Mechanics and Hydraulic Machinery", Standard Book House, New Delhi, 19th Edition.
2. Jain, A.K. (2008), "Fluid Mechanics", Khanna Publishers, New Delhi, 4th Edition.

REFERENCES

1. Kumar, K.L., Chand, S. & Co. (2008), "Engineering Fluid Mechanics", Eurasia

Publishing House (P) Ltd, New Delhi, 8th Edition.
2. Subramanya, K. (2008), "Flow in Open Channels", McGraw Hill Education, New Delhi, 3rd Edition.
3. Chow, V.T. (2009), "Open-Channel Hydraulics", The Blackburn Press, Caldwell, NJ USA, 1st Edition
4. White, F. M. (2011) "Fluid Mechanics", Tata McGraw Hill Publication, New Delhi, 7th Edition.
5. Relevant NPTEL Courses.

GEOTECHNICAL ENGINEERING - I

CIV 316 **Credits : 3**

Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40

End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Engineering Mechanics; Engineering Geology.

Course Objectives:

1. To impart the fundamental concepts of soil mechanics.
2. To know the importance of index properties like grain size, consistency limits, soil classification
3. To understand the concept of compaction and consolidation of soils

Course outcomes:

By the end of the course, student will be able to:

1. Analyze the effect of seepage in soil
2. Classify the soil based upon various Soil classification systems
3. Calculate the settlements and increase in the vertical stress due to super structure loads

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	2	1	1	2	1	1	1	1	-	1	3	2	1
	2	1	-	1	1	-	1	1	1	-	2	1	1	2	1	-
	3	1	1	1	-	-	-	-	-	1	1	-	1	2	3	2

SYLLABUS

UNIT - I 12 Periods

Introduction: Origin and Formation of soils; Residual and Transported soils.

Physical Properties of Soil: Three phase system - phase diagram - physical properties-Functional Relationships between physical properties-determination of water content, specific gravity, In-situ density-Relative density and its determination**.**

UNIT - II 12 Periods

Plasticity Characteristics of soil: Atterberg's limits and their determination-liquid limit, plastic limit, shrinkage limit and index properties-Activity-Free swell index-Free swell ratio-Swell potential.

Soil Classification: Soil classification-need and criteria for soil classification-IS Particle size classification-Classification tests-grain size analysis, sedimentation analysis-hydrometer analysis- grain size distribution curves. Unified Soil Classification-AASHTO Classification-

Group Index- Indian Standard Soil classification- Coarse grained soils- Fine grained soils- Plasticity chart.

UNIT - III 12 Periods

Stress Distribution: Stresses due to self weight-total, neutral and effective stresses- Vertical stress due to applied loads- Boussinesq theory- Concentrated load-Strip footing-below centre of circular footing- Rectangular footing-Newmark's influence chart - Pressure bulb-Significant depth- Westergaard theory - 2:1 distribution method

Permeability: types of soil water, Permeability-Darcy's law-Factors effecting permeability-laboratory tests-Average permeability of stratified soils.

UNIT - IV 12 Periods

Seepage Analysis: Seepage pressure-quick sand condition-critical hydraulic gradient-flow nets, properties-uses of flow nets.

Compaction: Principle of compaction, OMC and MDD, Lab tests-IS light weight and heavy weight compaction tests, factors effecting compaction., zero air void line-effect of compaction on engineering properties of soil, field compaction-compaction equipment based on soils, relative compaction, field tests for compaction control.

UNIT - V 12 Periods

Consolidation: Definition and significance-mechanism-Terzaghi's soil-spring analogy -lab consolidation test-elog p curve-Coefficient of compressibility-coefficient of volume change-compression index-determination of consolidation settlement - Terzhaghi 1D theory-time settlement calculations. Determination of coefficient of consolidation-time fitting methods-Rectangular hyperbola method- Preconsolidation pressure-normally consolidated and over consolidated clay-Over consolidation Ratio - secondary consolidation.

TEXTBOOKS

1. Narasinga Rao, B.N.D.(2015), Soil Mechanics and Foundation Engineering, Wiley Publishers
2. Arora, K.R. (2001), "Soil Mechanics and Foundation Engineering", Standard Publishers, Delhi.

REFERENCES

1. Murthy, V.N.S. (2009), "A text book of Soil Mechanics and Foundation Engineering", UBS Publishers Distributors Ltd., New Delhi.
2. Punmia, B.C. (1995) "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi.
3. Braja M. Das, (2005), "Fundamentals of Geotechnical Engineering", Thomson Asia Pvt. Ltd., Singapore.
4. Craig, R.F. (2014), "Soil Mechanics", McGraw hill, New Delhi
5. Gopal Ranjan and Rao,A.S.R. (2007), "Basic and Applied Soil Mechanics", New age International (P) Ltd, New Delhi.
6. Relevant NPTEL Courses.

GEOTECHNICAL ENGINEERING LAB - I

CIV 317 **Credits : 2**
Instruction : 3 Practicals / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Prerequisites:

Geotechnical Engineering-I (Basics)

Course Objectives:

To enable a student to understand the various index and engineering properties of a soil by experimentation.

Course outcomes:

By the end of the course, student will be able to:

1. Determine properties of different types of soils and understand how they behave
2. Determine the rate of settlement

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	2	2	3	2	1	1	1	3	3	1	2	3	2	2
	2	2	1	2	2	1	2	1	1	2	2	2	2	2	2	2

SYLLABUS

LIST OF EXPERIMENTS

1. Determination of hygroscopic water content and specific gravity of soils
2. Grain size distribution - Sieve analysis
3. Hydrometer Analysis
4. Determination of Liquid and Plastic limits (Casagrande method)
5. Determination of Liquid limit (Cone Method)
6. Determination of Shrinkage limit of soil
7. Determination of Optimum moisture content and Maximum dry density (Standard Proctor's)
8. Determination of Permeability by Constant head method
9. Determination of in-situ density by sand replacement method
10. Determination of in-situ density by core cutter method.

Demonstration experiments

11. Consolidation test
12. Permeability by Variable head method

TEXTBOOKS

1. Narasinga Rao, B.N.D.(2015), “Soil Mechanics and Foundation Engineering”, Wiley Publishers
2. Arora, K.R. (2001), “Soil Mechanics and Foundation Engineering”, Standard Publishers, Delhi – 110 006.

REFERENCES

1. Punmia, B.C. (1995), "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi.
2. SP 36: Part 1: 1987 Compendium of Indian standards on soil engineering, Part 1: Laboratory testing of soils for civil engineering purposes, Bureau of Indian Standards, New Delhi
3. Other Relevant I.S. Codes
4. Relevant NPTEL Courses.

ENVIRONMENTAL ENGINEERING LAB

CIV 318 **Credits : 2**

Instruction : 3 Practical's / week Sessional Marks : 50

End Exam : 3 Hours End Exam Marks : 50

Prerequisites:

Engineering Chemistry; Environmental Engineering – I.

Course Objectives:

The course will address the following:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. It also gives the significance of the characteristics of the water and wastewater.

Course Outcomes:

At the end, the students will be able to:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. Draw some conclusion and decide whether the water is potable or not.
3. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments.
4. Estimation of the strength of the sewage in terms of BOD and COD

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO	1	3	3	3	3	3	3	3	2	-	2	-	-	3	3	2
	2	3	3	-	3	2	3	3	3	-	2	2	-	3	2	2
	3	-	-	-	3	1	3	2	3	-	-	-	-	3	3	3
	4	3	3	2	3	3	-	-	-	-	-	-	-	3	2	2

SYLLABUS

LIST OF EXPERIMENTS:

1. Determination of pH and Electrical Conductivity of Water.
2. Determination of turbidity in water.
3. Determination of Optimum coagulant dose.
4. Determination and Estimation of total solids, organic solids and inorganic solids and settle able solids by Imhoff Cone.
5. Determination and estimation of Total Hardness–Calcium & Magnesium.
6. Estimation of Acidity in water
7. Estimation of Alkalinity in water
8. Determination of Available and Residual Chlorine content in water
9. Determination of Dissolved Oxygen by Wrinklers Method.
10. Determination of Biological Oxygen Demand by Wrinklers Method

11. Estimation of Iron content in water.
12. Estimation of chloride content in water
13. Estimation of fluoride content in water.
14. Determination of C.O.D.

REFERENCES

1. Garg S. K. (2001), "Environmental Engineering Vol. I", Khanna Publications, New Delhi, 5th Edition.
2. Sawyer, C.N., McCarty, P.L., and Parkin, G.F. (2000), "Chemistry for Environmental Engineering", Tata McGraw-Hill Publishing Company Limited, New Delhi, 4th Edition.
3. BIS 10500- 1991, Indian Standard DRINKING WATER – SPECIFICATION (Second Revision).
4. BIS 3025 (Part 44): Method of Sampling and Test (Physical and Chemical) for Water and Wastewater, Part 44: Biochemical Oxygen Demand (BOD) (First Revision)
5. Relevant NPTEL Courses.

FLUID MECHANICS LAB - II

CIV 319 **Credits : 2**
Instruction : 3 Practicals / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Prerequisites:

Fluid Mechanics – I & II.

Course Objectives:

The objective of the course is to enable the student to calibrate different types of flow measuring devices to measure flow in tanks, pipes and open channels.

Course Outcomes:

At the end of this course student will be able to

1. Analyze the flow through a pipe with friction and determine the friction factor in Darcy-Weisbach equation.
2. Determine the coefficient of impact on a flat plate and curved vane by comparing the theoretical and actual forces by impact.
3. Analyze the working of the centrifugal pump and develop the characteristics of power input, head and efficiency under various discharges and plot the characteristic curves.
4. Analyze the working of the reciprocating pump and develop the characteristics of power input and discharge and efficiency under various heads and plot the characteristic curves.
5. Determine the performance characteristics of pelton wheel turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.
6. Determine the performance characteristics of Francis turbine and develop the characteristic curves of unit discharge, unit power and unit head under varying unit speed.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	1	2	1	-	-	1	-	-	2	-	1	1	1	2	1
	2	1	1	1	-	1	1	1	-	2	-	1	1	1	1	1
	3	3	2	2	1	2	3	2	-	2	1	2	1	3	2	2
	4	3	2	2	1	2	3	2	-	2	1	2	1	3	2	2
	5	3	2	2	1	2	3	2	-	3	1	2	1	3	2	2
	6	3	2	2	1	2	3	2	-	3	1	2	1	3	2	2

SYLLABUS

LIST OF EXPERIMENTS:

1. To Study major losses in pipes – Pipe friction – To compute Darcy- Weisbach friction factor.
2. To Study performance characteristics of centrifugal pump
3. To Study performance characteristics of reciprocating pump

4. To Study constant head characteristic curves of Pelton turbine
5. To Study performance characteristics of Francis turbine
6. To compute coefficient of impact of jet on flat and hemispherical vanes
7. To compute Chezy's Constant and Manning's Coefficient of an open channel.
8. To compute energy loss in a hydrualic jump.

REFERENCES

1. Modi, P.N. & Seth, S.M. (2009), "Fluid Mechanics and Hydraulic Machinery", Standard Book House, New Delhi, 19th Edition.
2. Jain, A.K. (2008), "Fluid Mechanics", Khanna Publishers, New Delhi, 4th Edition.
3. Relevant NPTEL Courses.

QUANTITATIVE & VERBAL APTITUDE – I

CIV 3110 **Credits : 2**
Instruction : 4 Periods / week Sessional Marks : 100
End Exam : 3 Hours End Exam Marks : -

Course objectives:

Quantitative Aptitude -I

1. To prepare the students on various principles related to numerical computations.
2. To explain concepts related to numerical estimation.
3. To illustrate and explain the fundamentals related to geometry and mensuration.

Verbal Aptitude-I:

1. To categorize and explain principles of grammar in order to minimize errors in English.
2. To list and quote high frequency words by giving relevant examples.
3. To categorize, apply and use data as per the requirement.
4. To construct and make use of idioms, phrasal verbs and other expressions used in professional contexts.
5. To critically evaluate reading material for better comprehension

Course Outcomes:

Quantitative Aptitude –I

The student will be able to

1. Solve problems related to numerical computations in company specific and other competitive tests.
2. Able to recall and use the concepts to solve problems numerical estimation with respect to company specific and competitive tests.
3. Apply basic principles related to geometry and mensuration & solve questions in company specific and competitive tests.

Verbal Aptitude-I

The student will be able to

1. Detect grammatical errors in the text/sentences and rectify them while answering their competitive/ company specific tests and frame grammatically correct sentences while writing.
2. Answer questions on synonyms, antonyms, hyponyms, hypernyms and other vocabulary based exercises while attempting company specific and other competitive tests.
3. Use their logical thinking ability and solve questions related to reasoning based exercises.
4. Choose the appropriate word/s/phrases suitable to the given context in order to make the sentence/paragraph coherent.
5. Analyze the given data/text and find out the correct responses to the questions asked based on the reading exercises; identify relationships or patterns within groups of words or sentences.

Mapping of Course Outcomes with Program outcomes:

CO		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
QA	1															
	2															
	3															
VA	1															
	2															
	3															
	4															
	5															

SYLLABUS

Section –A (Quantitative Aptitude –I)

UNIT I **6 Periods**

Numerical computation:
Applications based on Numbers, Chain Rule, Ratio Proportion

UNIT II **6 Periods**

Numerical estimation - I

Applications Based on Time and work, Time and Distance

UNIT III **4 Periods**

Numerical estimation – II
Applications based on Percentages, Profit Loss and Discount, Simple interest and Compound Interest
Partnerships, Shares and dividends

UNIT IV **4 Periods**

Data interpretation
Data interpretation related to Averages, Mixtures and allegations, Bar charts, Pie charts, Venn diagrams

UNIT V **4 Periods**

Application to industry in Geometry and Mensuration

Books for practice

1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications

References

1. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt. Ltd.)
2. Quantitative Aptitude by U Mohan Rao Scitech publications

3. Quantitative Aptitude by Arun Sharma McGrawhill publications
4. Quantitative Aptitude by Ananta Asisha Arihant publications
5. Quantitative Aptitude by Abhijit Guha
6. Quantitative Aptitude by Pearson publications
7. Material from 'IMS, Career Launcher and Time' institutes for competitive exams.
8. Elementary and Higher algebra by HS Hall and SR knight.

Websites:

1. www.m4maths.com
2. www.Indiabix.com
3. 800score
4. Official GRE site
5. Official GMAT site

Section –B (Verbal Aptitude –I)

UNIT I **7 Periods**

Grammar:

Parts of speech(with emphasis on appropriate prepositions, co-relative conjunctions, pronouns-number and person, relative pronouns), articles(nuances while using definite and indefinite articles), tenses(with emphasis on appropriate usage according to the situation), subject – verb agreement (to differentiate between number and person) , clauses (use of the appropriate clause , conditional clauses), phrases(use of the phrases, phrasal verbs), degrees of comparison(comparing apples and oranges, comparison and number), modifiers(misplaced and dangling modifiers, absence of modifiers), determiners, parallelism in structure(symmetry in two part sentences), word order, subjunctive mood, redundancy, special types of sentences, miscellaneous types, identifying errors in a given sentence, correcting errors in sentences.

UNIT II **4 Periods**

Vocabulary:

Synonyms and synonym variants (with emphasis on high frequency words), antonyms and antonym variants (with emphasis on high frequency words), homonyms, hyponyms, hypernyms and General idioms.

UNIT III **5 Periods**

Reasoning:

Critical reasoning (understanding the terminology used in CR- premise, assumption, inference, conclusion), Sequencing of sentences (to form a coherent paragraph, to construct a meaningful and grammatically correct sentence using the jumbled text), to use logical reasoning and eliminate the unrelated word from a group.

UNIT IV **4 Periods**

Usage:

Sentence completion (with emphasis on signpost words and structure of a sentence), contextual meanings (to use the appropriate word according to the situation), supplying a suitable beginning/ending/middle sentence to make the paragraph coherent, idiomatic language (with emphasis on business communication), punctuation depending on the meaning of the sentence, run on errors, sentence fragments, coma splices.

UNIT V **4 Periods**

Reading Comprehension:

Types of passages (to understand the nature of the passage), types of questions (with emphasis on inferential and analytical questions), style and tone (to comprehend the author's intention of writing a passage), strategies for quick and active reading(importance given to skimming, scanning), summarizing ,reading between the lines, reading beyond the lines, techniques for answering questions related to vocabulary (with emphasis on the context), supplying suitable titles to the passage, identifying the theme and central idea of the given passages.

Books for Practice

1. Practical English Grammar A. J. Thomson, A. V. Martinet by Oxford University press
2. Remedial English Grammar for Foreign Students by FT wood published by Macmillan *Publishers*
3. Objective English-Edgar Torpe, Showick Thorpe-Pearson Education
4. Cambridge and Oxford Dictionaries

Reference Books and websites:

1. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications Pvt.Ltd.)
2. Websites: Indiabix, 800 score, official CAT, GRE and GMAT sites
3. Material from 'IMS, Career Launcher and Time' institutes for competitive exams.
4. Collins Cobuild English Grammar by Goyal Publishers
5. Word Power Made Easy by Norman Lewis-Goyal Publishers

TECHNICAL SEMINAR

CIV 3111 **Credits : 2**
Instruction : 2 Practical / week Sessional Marks : 50
End Exam : - End Exam Marks : -

Prerequisites:

Basic Communication Skills; Basics in Civil Engineering.

Course Objectives:

The objective of this course is

1. To enhance the communication skills of the students through participation and giving seminars.
2. To develop an overview of civil engineering and its applications in the students.
3. To promote teamwork and lifelong learning among the students.

Course Outcomes:

At the end of the course the students will be able to

1. Make presentation on a given topic related to civil engineering.
2. Improve the communication skills and cultivate lifelong learning.
3. Broaden their knowledge about Civil Engineering and its practical applications.
4. Update their knowledge on the latest developments in civil engineering.
5. Understand the environmental, safety, economical and sustainability aspects of any civil engineering structure.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	-	-	2	-	2	2	-	-	3	-	2	2	2	2
	2	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-
	3	2	2	2	2	2	2	2	-	-	-	-	-	2	2	2
	4		2	2	2	2	2	2	-	-	-	-	-	2	2	2
	5	-	-	2	-	-	2	2	-	-	-	-	-	2	-	2

OUTLINE OF SYLLABUS

Students have to prepare a report on a case study, design or practical application in civil engineering and make a presentation in teams of maximum 2 students. Duration of each seminar shall be 20 minutes per team including discussion. Evaluation to be done by a Panel of Examiners nominated by HoD with at least one faculty member of specialization related to the seminar topic.

REFERENCES

1. National & International Journals / Standard Magazines / Reports / Case Studies in civil engineering.
2. NPTEL courses in civil engineering.
3. World Wide Web resources on state of the art in civil engineering.

REINFORCED CONCRETE STRUCTURES - II

CIV 321 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Reinforced Concrete Structures – I

Course Objectives:

From this course students will learn the following

1. To learn how to design various types of staircase.
2. To learn design of retaining walls.
3. To learn design of piles and pile caps
4. To learn the basic concepts of prestressed concrete.

Course Outcomes:

At the end of the course, the students will be able to:

1. Design and draw the reinforcement detailing of staircase.
2. Design and draw the reinforcement detailing of cantilever & counterfort retaining walls.
3. Design and draw the reinforcement detailing of pile and pile caps
4. Understand the basic concepts of pre-stressed concrete, know the different prestressing systems, analyze the prestressed concrete members and evaluate the losses in prestressing.
5. Understand the structural drawings for practical execution.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	2	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	3	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	4	2	3	1	-	-	2	-	1	1	-	1	-	2	-	2
	5	2	3	1	-	-	1	-	1	1	-	1	-	2	-	1

SYLLABUS

UNIT – I 12 Periods

Staircase: Introduction - Classification of staircase - Design of dog-legged staircase - design of open well staircase with quarter span landing

UNIT – II 12 Periods

Retaining Walls: Types of retaining walls - forces on retaining walls - active and passive earth pressure, stability requirements.

Cantilever Retaining Wall: Preliminary proportioning of cantilever retaining walls. Design of cantilever retaining wall - with horizontal back fill – with horizontal back fill and traffic load – with sloping back fill.

UNIT – III 12 Periods

Counterfort Retaining Wall: Preliminary proportioning of counterfort retaining walls. Design of counterfort retaining wall.

UNIT – IV 12 Periods

Piles and Pile caps: Classification of piles - Design of bored cast in situ piles, Pile Caps design for three or four piles.

UNIT – V 12 Periods

Prestressed Concrete: Introduction - Reinforced Concrete versus Prestressed Concrete - Use of high strength concrete and high tensile steel - Prestressing Systems (Freyssinet, Gifford Udall, Magnel Blaton) - Analysis of simple prestressed rectangular sections (Concentric tendon, Eccentric tendon, Parabolic tendon, Bent tendon) - Prestressing Losses

TEXT BOOKS

1. Punmia,B.C., Ashok Kumar Jain, and Arun Kumar Jain, (2016), "Limit State Design of Reinforced Concrete" Laxmi Publications (P) Ltd., New Delhi, 16th Edition.
2. Varghese, P.C., (2009) **"**Advanced Design of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi.
3. Krishnam Raju, N., "Prestressed Concrete", Tata McGraw Hill, New Delhi, 5th Edition.

REFERENCES

1. Pillai, S.U., & Devdas Menon, (2009), "Reinforced concrete design", Tata McGraw Hill, New Delhi, 3rd Edition.
2. Jain, A.K., (2016) "Reinforced Concrete Design", Charotor Publications Anand, Gujarat, 16th Edition.
3. I.S 456 – 2000 "Code of practice for Plain and Reinforced Concrete" 4th Revision, Bureau of Indian Standards, New Delhi, April 2007
4. Relevant I.S. Codes.
5. Relevant NPTEL Courses.

ESTIMATION & COSTING

CIV 322 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Civil Engineering Materials; Building Technology; Building Planning and Design.

Course Objectives:

1. To understand the types of estimates
2. To understand rate analysis and process of preparation of bills
3. To study about the specification writing
4. To understand the valuation of land and buildings

Course outcomes:

By the end of the course, student will be able to:

1. Estimate the construction cost from the rate analysis
2. Understand about specifications for various items in framed buildings
3. Do the detailed estimate of load bearing and framed buildings

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	2	1	1	1	2	1	2	2	2	2	2	2	-	1
	2	1	-	2	-	-	1	1	1	1	2	2	1	1	-	1
	3	2	1	1	1	1	2	2	2	2	2	2	1	2	1	2

SYLLABUS

UNIT – I 12 Periods

Introduction: Standard units, Units of measurement of different items of work. Meaning of estimating. Errors in estimation, Different types of estimates. Contingencies and related terms in the estimate, different types of approvals. Plinth area and related terms used in the estimation of various structures, rules and methods of measurements of different works.

UNIT – II 12 Periods

Specifications: Specifications for framed buildings: Meaning, purpose, types of specifications, Method of preparation of specification, general specification, detailed specifications of different items of framed buildings and other structures.

UNIT – III 12 Periods

Rate analysis: Data sheet for materials and various items of work in buildings and other structures, schedule of rates, abstract estimate of buildings .

UNIT – IV 12 Periods

Estimation: Estimation of load bearing structures by Long wall - short wall method and Centre line method.

Detailed estimate of framed buildings - Estimation of Different items of works in substructure, Earthwork, P.C.C, Foundation Concrete, D.P.C in R.C.C building- Single Bedroom, Double Bed Room and Triple bedroom with partition walls and verandah.

UNIT – V 12 Periods

Estimation of Superstructure: Estimation of various items of R.C.C building works in superstructure: Super structure walls and columns, slab beams, plinth beam, columns, Deductions, Plastering and White Washing and Color Washing, Sloped Roof Buildings; G.I. and A.C. Sheet, Electricity and water supply. Sanitation works etc

Estimation of Prefabricated structures.

TEXT BOOKS

1. Datta, B.N. (1998), "Estimating and costing", Charator Publishing House.
2. Chakraborti, M. (2001)," Estimating Costing", Specification and Valuation in Civil Engineering.

REFERENCES

1. Birdie .G.S. (2000), "A Text Book on Estimating and Costing", Dhanpat Rai and Sons, New Delhi.
2. Vajarani, V.N. (1997), "Estimating and costing", Khanna Publishers.
3. Bhasin, P.L. (2000), "Quantity Surveying", 2nd Edition, S. Chand & Co.
4. Relevant NPTEL Courses.

GEOTECHNICAL ENGINEERING – II

CIV 323 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisite:

Engineering Mechanics; Geotechnical Engineering – I.

Course Objectives:

1. To understand how to collect site soil information, analyze and interpret
2. To learn about design of various suitable foundation systems depending upon loads and type of soil.
3. To know about the importance of earth slope stability and the applications of earth pressure theories.

Course outcomes:

By the end of the course, student will be able to:

1. Analysis and design of foundations for various Civil Engineering structures
2. Estimate the shear parameters of soil
3. Calculate the earth pressure coming on to retaining structures

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	2	1	2	1	1	1	2	2	1	3	2	2
	2	2	1	1	2	1	2	1	1	1	1	2	1	2	2	1
	3	3	2	2	2	1	2	1	1	2	1	1	2	2	3	1

SYLLABUS

UNIT – I **10 Periods**

Subsurface Exploration: Introduction – Planning and stages in sub-surface exploration – Methods of exploration – Test pit – Trenches – Geophysical methods: Seismic refraction and Electrical resistivity method – Boring : Auger boring, Wash boring and Rotary drilling – Types of soil sample: disturbed and undisturbed soil samples – Design Features of soil sampler affecting soil disturbance – standard penetration test – static and dynamic cone penetration test – bore log report.

UNIT – II 12 Periods

Shear Strength: Introduction-Principal stresses and principal planes- Mohr's circle of stress– Mohr-Coloumb failure theory – Laboratory shear tests – Direct shear test – Triaxial compression test– Unconfined compression test – Vane shear test – Shear strength of saturated cohesive soils – Sensitivity and Thixotropy - Shear strength of cohesionless soils - liquefaction.

UNIT - III 12 Periods

Lateral Earth Pressure – Types of Lateral earth pressure - Rankine's theory - Active and passive earth pressure for cohesion less and cohesive soils - Earth pressure at rest - Coloumb's wedge theory - Rebhan's and Culmann's graphical solutions – Wall friction.

UNIT – IV 12 Periods

Bearing capacity of Shallow footings- definition –Bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's theory, types of shear failure - Effect of water table, shape of footing, eccentricity of load on bearing capacity- Meyerhof's theory- Skempton's theory- Vesic's theory- I.S.6403 method - Bearing capacity from SPT & SCPT- Allowable Bearing pressure-Causes and methods of minimizing settlement-Plate load test - Permissible Settlements - Differential Settlement.

UNIT – V 14 Periods

Pile Foundations: Introduction- Classification of piles- Load Transfer mechanism-load carrying capacity of pile - static and dynamic formula - pile load test - penetration test - pile groups - Efficiency - Feld's rule - Converse Lebarre formula, Settlement of piles and pile groups - Negative skin friction.

Stability of Slopes: Types of Slopes –types of slope failure– Factor of safety- Procedure for Swedish circle method and method of slices- Bishop's Simplified method of slices-Friction circle method-Taylor's stability number.

TEXT BOOKS

1. Narasinga Rao, B.N.D.(2015), Soil Mechanics and Foundation Engineering, Wiley Publishers
2. Arora, K.R. (2001), "Soil Mechanics and Foundation Engineering", Standard Publishers, Delhi – 110 006.

REFERENCES

1. Gopal Ranjan and Rao, A.S.R. (2007), "Basic and Applied Soil Mechanics", New age International (P) Ltd.
2. Murthy, V.N.S. (1999), "A text book of Soil Mechanics and Foundation Engineering", UBS Publishers & Distributors Pvt. Ltd., New Delhi.
3. Gopal Ranjan and Rao A.S.R. (2002), "Basic and Applied Soil Mechanics", New Age International (P) Limited, New Delhi.
4. Punmia, B.C., (1995), "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi.
5. Swami Saran (1998), "Analysis and Design of sub structures", Limit State Design, Oxford & IBH Publishing Co. Pvt Ltd., New Delhi.
6. Braja M. Das, (2005), "Principles of Foundation Engineering", Thomson Asia Pvt. Ltd., Singapore.
7. I.S. 6403 - 1981 Code of practice for determination of bearing capacity of shallow foundations, Bureau of Indian Standards, New Delhi,

8. I.S. SP 36 Part – II - 1988 Compendium of Indian standards on soil engineering, Part 2: Field testing, Bureau of Indian Standards, New Delhi.
9. Relevant NPTEL Courses.

TRANSPORTATION ENGINEERING - I

CIV 324 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Surveying – I & II.

Course Objectives:

The objective of the course is to prepare the student to

1. To know about the history of highway development, surveys and classification of roads.
2. To study about the pavement materials and design the geometric elements of highways.
3. To know about the construction procedure of various types of pavements and study the pavement maintenance.
4. To study about the traffic characteristics and design of intersections.

Course Outcomes:

At the end of the course the student will be able to

1. Carry out surveys involved in planning and highway alignment
2. Design cross section elements, sight distance, horizontal and vertical alignment
3. Design flexible and rigid pavements as per IRC
4. Learn various highway constructions techniques and its maintenance
5. Understand traffic studies, traffic regulations and control.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	2	2	1	-	-	1	-	1	2	1	2	3	2	2
	2	3	3	3	2	2	1	-	1	2	1	3	2	3	2	3
	3	3	3	3	3	2	1	-	-	1	1	2	3	3	2	3
	4	3	3	3	2	1	2	1	1	2	2	1	2	3	2	3
	5	3	3	3	2	1	-	1	1	2	2	1	2	3	2	3

SYLLABUS

UNIT – I 10 Periods

Highway development and planning – History of Roads - Classification of roads, necessity of highway planning surveys preparation of master plan highway planning in India. Classification of roads, Highway alignment - Factors controlling alignment, Engineering surveys, Drawing & report.

UNIT – II 10 Periods

Highway Geometric Design – Design of Cross sectional elements, Sight distance – Stopping Sight Distance & Overtaking Sight Distance, horizontal alignment – Super elevation & Transition Curves, vertical alignment – Summit Curves and Valley Curves.

UNIT – III 10 Periods

Pavement Design: Design Of Highway Pavements Design factors; Design of flexible pavements – IRC method,; Design of Rigid pavements - Westergard's stress equation for wheel loads and temperatures stress.

UNIT – IV 10 Periods

Highway construction and maintenance: Highway materials and their properties and tests - Construction of water bound macadam roads, Bituminous pavements and cement concrete pavements; Construction of joints in cement concrete pavements; Maintenance of highways; Importance of highway drainage; Requirements; Surface drainage; Sub–surface drainage.

UNIT – V 10 Periods

Traffic engineering: Introduction - Traffic characteristics- Road user, vehicular & travel pattern; Traffic studies (Surveys); Traffic Control devices ; Traffic operation- signal design; Types of intersections; Design of rotary intersection; Street lighting.

TEXT BOOKS

1. Khanna, S.K. and Justo C.E.G. (2015), "Highway Engineering", Nem Chand & Bros, ISBN-13: 978-8185240770.
2. Kadiyali, L.R., (2011), "Traffic engineering and Transport planning", Khanna Publishers, ISBN-13: 978-8174092205.

REFERENCES

1. Chakroborty, P. and Das, A. (2003), "Principles of Transportation Engineering" Prentice Hall of India, New Delhi, 6th Edition.
2. Sharma, R.C. and Sharma, R.K. (2012), "Principles, Practice and Design of Highway Engineering" S Chand & Company, ISBN-10: 8121901316.
3. Relevant NPTEL Courses.

WATER RESOURCES ENGINEERING - I

CIV 325 **Credits : 3**
Instruction : 3 Lectures & 1 Tutorial / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Engineering Geology; Fluid Mechanics – II.

Course Objective:

To provide the necessary background for understanding the occurrence and movement of water in hydrosphere and to enable the student to understand Irrigation Engineering Principles and practices.

Course Outcomes:

By the end of the course, the student will be able to

1. Measure and analyze the rainfall in any given area and prepare Intensity-Duration-Frequency curves.
2. Determine the run off in a catchment and prepare the unit hydrograph which in-turn determines the runoff for any given rainfall.
3. Determine hydraulic properties of an aquifer & specific capacity, efficiency and yield of a well.
4. Select a suitable site for the reservoir by conducting investigations and determine the capacity of the reservoir and its operating schedules.
5. Specify appropriate method of irrigation for different crops and cropping patterns and determine the quality and quantity of water required for a crop.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	-	2	1	1	2	-	2	1	1	1	3	2	2
	2	3	2	2	1	1	1	-	-	2	1	-	1	3	1	1
	3	2	2	1	2	1	1	1	-	1	-	1	1	2	2	1
	4	3	1	3	2	1	2	1	-	2	2	2	1	2	2	2
	5	2	2	1	-	-	2	2	-	-	-	-	1	2	-	2

SYLLABUS

UNIT – I 12 Periods

Surface Water Hydrology: Water Resources in India, Hydrology in water Resources Planning – Precipitation – Types, Measurement of rainfall, Average depth of rainfall over an area, Mean annual rainfall, consistency of rainfall record – Double mass curve, Infiltration – Factors affecting and its determination, Evaporation and Evapo – Transpiration. Runoff – factors affecting runoff, methods of determination of runoff, stream gauging, hydrograph analysis, base flow separation, unit hydrograph – Hydrograph of different durations, applications of unit hydrograph, S-hydrograph.

UNIT – II 12 Periods

Ground Water Hydrology: Definitions, sub surface distribution of water, ground water movement, Darcy's law–permeability. Well hydraulics – steady flow in different types of aquifers and wells – determination of hydraulic properties of aquifer, well losses, specific capacity of well, and well efficiency, pumping test and recovery test methods for determination of well yield, Data acquisition by using piezometers.

UNIT – III 12 Periods

Reservoir Planning: Types of reservoir investigations for reservoir planning, selection of site for a reservoir, zones of storage in a reservoir, purpose of reservoir, reservoir yield, mass curve and demand curve, determination of reservoir capacity, yield from a reservoir of given capacity, operating schedules, guide curve for reservoir operation, apportionment of total cost of a multipurpose project. Reservoir sedimentation, control of reservoir sedimentation, life of reservoir.

UNIT – IV 12 Periods

Irrigation: Definition of irrigation, types of irrigation systems – direct and indirect, lift and inundation irrigation system, methods of irrigation – surface and sprinkler methods, drip irrigation, Soil moisture constants, depth of water held by soil in root – zone. Water requirements of crops, duty, delta and base period their relationship, crops – seasons, factors affecting duty and methods of improving duty, consumptive use of water – determination of canal capacities for cropping patterns.

UNIT – V 12 Periods

Canal Systems: Classification of irrigation canals – canal alignment, design of unlined canals, regime theories – Kennedy's and Lacey's theories, tractive force method, design problems –balancing depth.

TEXT BOOKS

1. Punmia, B.C. and Lal Pande B.B. (1992), "Irrigation and Water Power Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 12th edition.
2. Garg, S.K. (1999), Irrigation Engineering and Hydrology Structures, Khanna Publishers, Delhi, 14th Edition.

REFERENCES

1. Modi, P.N. (2004), "Irrigation, Water Resources and Water Power Engineering", Standard Book House, Delhi, 6th Edition.
2. Jayarami Reddy, P. (1999), "A Text book of Hydrology", Laxmi Publication, Delhi.
3. Subramanya, K. (1994), Engineering Hydrology, Tata-Mc Graw Hill Publishing, Delhi, 1st Revised Edition.
4. Relevant NPTEL Courses.

PROFESSIONAL ELECTIVE - I

SOLID WASTE MANAGEMENT

CIV 326(A) **Credits : 3**
Instruction : 3 Lectures / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Environmental Science.

Course Objectives:

The course content enables students to:

1. Develop insight into the collection, transfer, and transport of municipal solid waste.
2. Explain the design and operation of a municipal solid waste landfill.
3. Examine the design and operation of a resource recovery facility.

Course Outcomes:

At the end of the course students are able to:

1. Understand the implications of the production, resource management and environmental impact of solid waste management;
2. Assimilate the significance of recycling, reuse and reclamation of solid wastes;
3. Familiar with relationships between inappropriate waste management practices and impacts on water, soil and sediment quality
4. Design the techniques for efficient solid waste disposal.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	1	3	1	2	-	3	3	2	1	-	1	-	3	3	2
	2	3	3	3	2	3	3	2	1	2	1	2	1	3	2	2
	3	3	2	-	2	2	3	1	2	1	1	3	2	3	3	3
	4	3	-	3	-	-	3	3	3	1	-	3	2	3	2	3

SYLLABUS

UNIT – I 9 Periods

Introduction: Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes. Characteristics of Solid Wastes: Physical, chemical and biological characteristics- Problems due to improper disposal of solid waste.

UNIT – II 9 Periods

Basic Principles: Definition of Solid Waste Management - Reduction, reuse, recycling and recovery principles of waste management - Waste generation and handling at source- Functional elements of solid waste management

UNIT – III 9 Periods

Collection, Transfer and Transport of Wastes: Collection of solid wastes- Collection methods and service. Transfer station-Processing and segregation of the solid waste- various methods of material segregation.

UNIT – IV 9 Periods

Processing and Transformation of Solid Wastes: Composting: definition-methods of composting-advantages of composting- Incineration: definition- methods of incineration advantages and disadvantages of incineration.

UNIT – V 9 Periods

Disposal of Solid Waste: Volume reduction, Open dumping, land filling techniques. Landfills: classification-Design and Operation of landfills, Land Farming, Deep well injection.

TEXT BOOKS

1. George Tchobanoglous, Hilary Theisen and Samuel Vigil (1993), "Integrated Solid Waste Management", McGraw Hill Publishers, USA, 2nd Edition.
2. Peavy, H.S., Rowe, D.R. and Tchobanoglous, G. (2013), "Environmental Engineering", McGraw-Hill, New York, 7th Edition.

REFERENCES

1. Oweis, I.S. and Khera, R.P. (1998), "Geotechnology of Waste Management", PWS Publishing Co., New York, 2nd Edition.
2. Bagchi, A. (2004), "Design of Landfills and Integrated Solid Waste Management", John Wiley & Sons, New Jersey, 3rd Edition.
3. Sharma, H. D. and Reddy, K. R. (2004) "Geoenvironmental Engineering", John Wiley & Sons, New Jersey, 1st Edition.
4. Relevant NPTEL Courses.

EVIRONMENTAL IMPACT ASSESSMENT

CIV 326(B) **Credits : 3**
Instruction : 3 Lectures / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Environmental Sciences.

Course objectives:

The objectives of this course is to

1. To study about the basics, methods of assessment and importance of Environmental Impact Assessment.
2. To know about the Environmental Management and Prediction Methods
3. To study about the Environmental Management Plan
4. The broad education necessary to understand the impact of engineering solutions in global economic, environmental and social context

Course outcomes:

By the end of the course the students will be able to

1. Understand the importance of Environmental Impact Assessment.
2. Implement different methods in preparing an Environmental Impact Statement
3. Identify various mitigation measures that can be used.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	2	2	3	2	3	2	-	-	2	1	3	3	2
	2	3	2	3	3	2	3	3	3	-	1	3	2	3	2	2
	3	3	-	3	2	3	3	2	-	-	2	2	2	3	3	3

SYLLABUS

UNIT – I 9 Periods

Introduction: Introduction to EIA. Definition of E IA and EIS, preparation of EIS, Elements of EIA, Agency Activities, Environmental setting.

UNIT – II 9 Periods

Environmental attributes: Environmental attributes, air, water, soil, ecology, noise Socio-Economic aspects, Culture and human aspects (Human settlements-Rehabilitations)

UNIT – III 9 Periods

Environmental impacts: Identification, measurement, Aggregation, Secondary and Cumulative Impacts.

UNIT – IV 9 Periods

Impact Assessment Methodologies: Criteria for selection of methodology, impact assessment methodologies, procedure for reviewing environment impact statement.

UNIT – V 9 Periods

Case studies: Economic impact analysis, energy production impact analysis, cost benefit analysis, Environmental impact mitigation and control measures.

TEXT BOOKS

1. Ravi Jain, Urban, L.V., Gary S. Stacey and Harold Balbach (2001), "Environmental Impact Analysis", McGraw Hill Professional, New York, 2nd Edition.
2. Anjaneyulu, Y., Valli Manickam (2011), "Environmental Impact Assessment Methodologies", B.S. Publication, New Delhi, 2nd Edition.

REFERENCES

1. Larry W. C. (1996), "Environmental Impact Analysis", Mc. Graw Hill Publishers, New York, 2nd Edition.
2. John Glasson, Riki Therivel and Andrew Chadwick. (2005), "Introduction to Environmental Impact Assessment" Routledge Publication, London, 3rd Edition.
3. Relevant NPTEL Courses.

REPAIR AND REHABILITATION OF STRUCTURES

CIV 326(C) **Credits : 3**
Instruction : 3 Lectures / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Engineering Chemistry; Concrete Technology; Reinforced Concrete Structures I & II.

Course Objectives:

1. To learn about the non-destructive testing
2. To know the corrosion control techniques in steel
3. To know about crack control techniques in concrete
4. To adopt different strengthening techniques in concrete structures.

Course outcomes:

By the end of the course, student will be able to:

1. Apply the knowledge of non-destructive testing in practical situation
2. Understand about the various techniques for corrosion control, crack control and strengthening of concrete structures.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	2	1	1	2	1	-	-	-	1	1	-	3	-	-
	2	3	2	1	1	2	-	-	-	-	1	-	1	3	1	-

SYLLABUS

UNIT – I 9 Periods

Non-destructive strength test

Techniques to test the existing strength- - Destructive tests- core sampling and testing -Non Destructive tests – rebound hammer test, ultrasonic pulse velocity test, pull out test, penetration techniques, acoustic emission techniques.

UNIT – II 9 Periods

Other non – destructive tests

Chemical test – carbonation and chloride content – Corrosion potential assessment – cover meter survey, half cell potential survey, resistivity measurement

Fire damage assessment – differential thermal analysis – X ray diffraction

Structural integrity/ soundness assessment – radiography, impact echo test, dynamic testing of structures –interpretation and evaluation of test result data

UNIT – III 9 Periods

Corrosion

Corrosion of reinforcement- Factors affecting corrosion of reinforcement embedded in concrete-Mechanism of electrochemical corrosion-Chloride attack-Carbonation-Corrosion Control.

UNIT – IV 9 Periods

Failures in concrete

Cracks in concrete-types and causes of concrete cracks-Repair of cracks-Common type of repairs-Sealing, Stitching, providing additional steel, Drilling & Plugging-Polymer based repairs-Resin based repairs.

UNIT – V 9 Periods

Strengthening of Reinforced Concrete structures

Retrofitting-Strengthening of structure-Strengthening methods-Jacketing-Beams, Columns-Grouting-External Prestressing.

TEXT BOOKS

1. "Handbook on Repair And Rehabilitation of RCC Buildings", CPWD Published (2002).

REFERENCES

1. Bungey, J. H., Millard, S.G. and Grantham, M.G. (2006), "Testing of Concrete in Structures", Taylor and Francis, London, 4th Edition.
2. Shetty, M. S., (2006), "Concrete technology" S. Chand Publications, New Delhi, 7th Edition,
3. Ghambir, M.L., (2013), "Concrete technology", McGraw-Hill Education, New Delhi, 5th Edition.
4. Neville, A.M. (2011), "Properties of Concrete", Prentice Hall, New Delhi, 5th Edition.
5. Relevant I.S. Codes.
6. Relevant NPTEL Courses.

RS & GIS APPLICATIONS IN CIVIL ENGINEERING

CIV 326(D) **Credits : 3**
Instruction : 3 Lectures / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisites:

Nil

Course Objectives:

1. To Learn about the principles of remote sensing and Electromagnetic radiations
2. To know about satellites, satellite parameters
3. To learn about the image interpretation and processing techniques
4. To study about GIS and various data models.
5. To know the applications of remote sensing and GIS in civil engineering projects.

Course outcomes:

By the end of the course, student will be able to:

1. Learn about the principles of remote sensing and GIS.
2. Understand about the various image interpretation techniques and image classification techniques.
3. Know about the various applications of remote sensing and GIS in civil engineering projects

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	-	-	-	3	2	1	1	1	2	1	2	2	1	1
	2	2	1	-	2	2	2	1	1	1	2	1	1	1	2	-
	3	2	2	2	1	2	1	2	1	2	2	2	1	3	2	2

SYLLABUS

UNIT – I 9 Periods

Remote Sensing – Principle - Electro-magnetic energy, spectrum - EMR interaction with atmosphere – Atmospheric Windows and its Significance – EMR interaction with Earth Surface Materials – Spectral Signature and Spectral Signature curves for water, soil and Earth Surface, Energy sources and radiation principles.

UNIT – II 9 Periods

Satellites - Classification – Satellite Sensors – satellite and sensor parameters - Resolution – Types of sensor systems used in RS, RS satellites, land sat, spot, IRS, IKONOS, QUICKBIRD., RS data products.

UNIT – III 9 Periods

Image interpretation - Elements of image interpretation, concepts of digital image processing image Rectification and Restoration, Image enhancement, Image classification. Characteristics of different platforms, Radar, LIDAR, SAR, MODIS, AMSRE, Sonar remote sensing systems.

UNIT – IV 9 Periods

Introduction, GIS overview, Introduction to GIS - elements of GIS, Computer hardware - Software. Data Input, Verification, data storage and database management and output applications, Map Overlay - Vector and raster data model , overlay operation Errors and quality control.

UNIT – V 9 Periods

RS and GIS in civil engineering projects: Soil mapping and characteristics. Application in water resource engineering. Environmental pollution monitoring. Regional and urban mapping, planning systems and waste disposal sites.

TEXTBOOKS

1. Lillesand, T.M. & Kiefer R.W. (2007), "Remote Sensing and image interpretation", John Wiley & Sons (Asia), Newyork.

REFERENCES

1. Anji Reddy, M. (2011), "Remote sensing and Geographical information system", B.S Publications.
2. Burrough, P. A. (1998), "Principles of Geographical information systems for land resource assessment", Clarendon Press, Oxford, 2nd Edition.
3. Stan Aronoff, (1991), "Geographic Information Systems - A Management Perspective", WDL Publications, Ottawa, Canada, Reprint Edition.
4. Kennie, J.J.M., Matthews, (2005), "Remote sensing in Civil Engineering", Mc-Millan.
5. Floyd F. Sabins, (2005), "Remote Sensing Principles and Interpretation", Jr. W.H. Freeman & Co., 3rd Edition.
6. Relevant NPTEL Courses.

URBAN PLANNING AND SMART CITIES

CIV 326(E) **Credits : 3**
Instruction : 3 Lectures / week Sessional Marks : 40
End Exam : 3 Hours End Exam Marks : 60

Prerequisite:

Building Planning & Drawing

Course Objectives:

To provide exposure to the student in urban planning and smart cities, the latter being the recent development.

Course outcomes:

By the end of the course, student will be able to:

1. Get exposure to the recent trends in urbanization in India and the world
2. Understand the principles of sustainable urban development.
3. Analyze the parameters that define a smart city under Star and ISO 37120 frameworks

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	3	-	3	-	3	3	-	-	2	-	-	2	3	3
	2	2	2	3	2	3	3	3	3	-	2	-	-	2	2	3
	3	3	3	3	3	3	3	3	-	-	3	-	-	3	3	3

UNIT – I 9 Periods

Introduction: Various definitions of town and country planning; Goals and objectives of planning; Components of planning; Benefits of planning;

Definition of Smart City; Evolution of Smart City concept; Smart City components and characteristics

UNIT – II 9 Periods

Urbanization Policies in India: Over view of world urbanization, National Urbanization policy, basic issues in urbanization policy; role of national and state level policies; five year plans, latest attempts at urbanization policy formulation in the country; salient features of the report of the National Commission of Urbanization; Census definition of urban places; functional classification of urban places; India's Smart City Mission

UNIT – III 9 Periods

Sustainable Urban Development: Changing perspectives in man-environment relationship with focus on issues of population, urbanization, resource depletion and pollution; limits to growth vis-a-vis sustainable economy; growth and environmental imperatives of developing vs. developed countries; definitions, concepts and parameters in sustainable development with particular reference to Brundtland Commission, Agenda 21, Eco-city approach.

UNIT – IV 9 Periods

STAR Framework of Sustainability: Introduction, Goals & Objectives; Built Environment: Ambient Noise & Light; Community Water Systems; Compact & Complete Communities ; Housing Affordability; Infill & Redevelopment ; Public Parkland; Transportation Choices;

Climate & Energy: Climate Adaptation; Greenhouse Gas Mitigation; Greening the Energy Supply; Energy Efficiency; Water Efficiency ; Local Gov GHG & Resource Efficiency; Waste Minimization;

Natural Systems; Green Infrastructure; Biodiversity & Invasive Species; Natural Resource Protection; Outdoor Air Quality; Water in the Environment; Working Lands;

Innovation & Process; Best Practices & Processes; Exemplary Performance; Local Innovation; Good Governance

UNIT – V 9 Periods

ISO 37120 City indicators: Core Indicator requirements; Supporting Indicator requirements; Data Sources; Environment; Solid waste; Transportation; Urban planning; Wastewater; Water and Sanitation; Reporting and record maintenance

TEXT BOOKS

1. Peter Hall, (2010), "Urban and Regional Planning", Routledge Publishing, 4th Edition.
2. Kulshrestha, S. K., (2012), "Urban and Regional Planning in India - A Handbook for Professional Practice," Sage Publications, New Delhi.

REFERENCES

1. STAR Community Rating System, Version 2.0, October 2016, STAR Communities Washington, DC
2. Sustainable development and resilience of communities-Indicators for city services and quality of life, ISO/DIS 37120, 2013, Switzerland.
3. Relevant NPTEL Courses.

GEOTECHNICAL ENGINEERING LAB - II

CIV 327 **Credits : 2**
Instruction : 3 Practicals / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Prerequisites:

Geotechnical Engineering - I

Course Objectives:

To provide an opportunity to learn how to measure the shear strength and swelling properties of the soil and its importance

Course outcomes:

By the end of the course, student will be able to:

1. Determine the shear parameters of various soil samples
2. Determine the swelling properties of soil.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	2	3	2	2	2	2	1	3	3	2	2	3	2	2
	2	3	2	2	2	1	2	2	1	3	3	2	2	3	2	2

SYLLABUS

LIST OF EXPERIMENTS

1. Field identification of soils
2. Relative density – Sand
3. Unconfined compression test for fine grained soils
4. California Bearing Ratio (CBR) Test
5. Direct shear test
6. Swell pressure test
7. Free swell Index
8. Vane shear test

Demonstration Experiments (Subject to availability)

9. Triaxial Compression Test
10. S.P.T
11. D.C.P.T

TEXTBOOKS

1. Narasinga Rao, B.N.D.(2015), "Soil Mechanics and Foundation Engineering", Wiley Publishers
2. Arora, K.R. (2001), "Soil Mechanics and Foundation Engineering", Standard Publishers, Delhi – 110 006.

REFERENCES

1. Punmia, B.C. (1995), "Soil Mechanics and Foundation Engineering", Laxmi Publications Pvt. Ltd., New Delhi.
2. SP 36: Part 1: 1987 Compendium of Indian standards on soil engineering, Part 1: Laboratory testing of soils for civil engineering purposes, Bureau of Indian Standards, New Delhi
3. Other Relevant I.S. Codes.
4. Relevant NPTEL Courses.

COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB - I

CIV 328 **Credits : 2**
Instruction : 3 Practicals / week Sessional Marks : 50
End Exam : 3 Hours End Exam Marks : 50

Prerequisites:

Remote Sensing & GIS (Basics)

Course Objective:

The objective of this course is to

1. Maximize the efficiency of planning and decision making
2. Integrate information from multiple sources
3. Eliminate surplus data and minimizing repetition

Course Outcomes:

1. To construct various GIS data models
2. To summarize about project system
3. To executing the applications areas of GIS

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	3	3	3	2	3	1	-	-	2	2	2	-	3	2	-
	2	2	2	2	-	2	-	-	-	2	2	2	1	3	2	1
	3	2	2	2	2	2	1	1	1	2	2	2	1	3	2	1

SYLLABUS

LIST OF EXPERIMENTS

Exercises in GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps
3. Estimation of features and interpretation
4. Developing digital elevation model
5. Simple applications of GIS in civil engineering

REFERENCES

1. Basudeb Bhatta, (2011), "Remote sensing and GIS", Oxford Higher Education, New Delhi, 2nd Edition.
2. Anji Reddy, M. (2011), "Remote sensing and Geographical information system", B.S Publications.
3. P. A. Burrough, (2nd Edition, 1998), "Principles of Geographical information systems for land resource assessment", Clarendon Press, Oxford.
4. Relevant NPTEL Courses.

QUANTITATIVE & VERBAL APTITUDE – II

CIV 329 **Credits : 2**
Instruction : 4 Periods / week Sessional Marks : 100
End Exam : 3 Hours End Exam Marks : -

Course Objectives:

Quantitative aptitude-II

1. To categorize, apply and use thought process to distinguish between concepts of reasoning
2. To prepare and explain the fundamentals related to various possibilities and probabilities related to quantitative aptitude.
3. To critically evaluate numerous possibilities related to puzzles.

Verbal aptitude-II

1. To prepare the students on the various aspects of writing, organizing data, and applying their writing skills in their professional career.
2. To demonstrate and recommend the techniques required when interacting in different situations.
3. To apply the professional qualities/skills necessary for a productive career and to instill confidence through attitude building.
4. To plan activities in order to expose students to the different abilities required for working in a team, encourage them to glean information on current affairs and promote factual reading.
5. To illustrate and explain the intricacies/nuances involved in framing responses to the questions asked, reading between lines and reading beyond lines.

Course Outcomes:

Quantitative Aptitude-II

The student will be able to

1. Use their logical thinking and analytical abilities to solve reasoning questions from company specific and other competitive tests.
2. Solve questions related to permutation & combinations and probabilities from company specific and other competitive tests.
3. Understand and solve puzzle related questions from specific and other competitive tests.

Verbal aptitude-II:

The student will be able to

1. Write paragraphs on a particular topic, essays (issues and arguments), e mails, summaries of group discussions, make notes, statement of purpose (for admission into foreign universities), letters of recommendation (for professional and educational purposes)

2. Converse with ease during interactive sessions/seminars in their classrooms, compete in literary activities like elocution, debates etc., raise doubts in class, participate in JAM sessions/versant tests with confidence and convey oral information in a professional manner using reason
3. Prepare his/her resume, apply the business English concepts learnt in the course, and refine one's overall demeanor which would be very essential to face the corporate world
4. Prepare his/her resume, apply the business English concepts learnt in the course, and refine one's overall demeanor which would be very essential to face the corporate world
5. Respond to their interviewer/employer with a positive mind, customize answers to the questions asked during their technical/personal interviews, exhibit skills required for the different kinds of interviews (stress, technical, HR) that they would face during the course of their recruitment process

Mapping of Course Outcomes with Program outcomes:

CO		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
QA	1															
	2															
	3															
VA	1															
	2															
	3															
	4															
	5															

SYLLABUS

Section –A (Quantitative Aptitude –II)

UNIT I **8 Periods**

Numerical Reasoning:
Problems related to Number series, Analogy of numbers, Classification of numbers, Letter series, Seating arrangements, Directions, blood relations and puzzle test.

UNIT II **4 Periods**

Combinatorics:
Counting techniques, Permutations, Combinations and Probability

UNIT III **4 Periods**

Data sufficiency
Syllogisms

UNIT IV **4 Periods**

Application of Base system:
Clocks (Base 24), Calendars (Base7), Cutting of Cubes and cuboids

UNIT V **4 Periods**

Puzzle Solving & Time Management using various problems solving tools and techniques:

Selective puzzles from previous year placement papers
Selective puzzles from book Puzzles to puzzle you by shakunataladevi
Selective puzzles from book more puzzles by shakunataladevi
Selective puzzles from book puzzles by George summers

Books for practice

1. Quantitative aptitude by RS Agarwal, S Chand Publications
2. Verbal and non verbal Reasoning by RS Agarwal from S Chand publications
3. Puzzles to puzzle you by shakunataladevi orient paper back publication
4. More puzzles by shakunataladevi orient paper back publication
5. Puzzles by George summers orient paper back publication.

References:

1. Barron's by Sharon Welner Green and Ira K Wolf (Galgotia Publications pvt. Ltd.)
2. Material from 'IMS, Career Launcher and Time' institutes for competitive exams.
3. Reasoning by BS Sijwali Arihant publications
4. Reasoning Arun Sharma McGrawhill publications

Websites:

1. www.m4maths.com
2. www.Indiabix.com
3. 800score
4. Official GRE site
5. Official GMAT site

Section –B (Verbal Aptitude –II)

UNIT I **4 Periods**

General Essay writing, writing Issues and Arguments(with emphasis on creativity and analysis of a topic), paragraph writing, story writing, guidance in framing a 'Statement of purpose', 'Letters of Recommendation', business letter writing, email writing, email and business letter writing etiquette, letters of complaints/responses to complaints. Information transfer is taught with the help of tables, bar diagrams, and pie charts while framing /sending lengthy data where testing is done through Reading comprehension and Critical reasoning. Contextual meanings with regard to inflections of a word, frequently confused words, words often mis-used, words often mis-spelt, multiple meanings of the same word (differentiating between meanings with the help of the given context), foreign phrases. Enhanced difficulty level in spotting errors will be taken up with reference to competitive test based exercises.

UNIT II **4 Periods**

Just a minute sessions, reading news clippings in the class, extempore speech, telephone etiquette, making requests/suggestions/complaints, elocutions, debates, describing incidents and developing positive non verbal communication. Analogies, YES-NO statements (sticking to a particular line of reasoning)

UNIT III **4 Periods**

Corporate readiness, business idioms and expressions, reading newspapers/magazines, brushing up on general awareness, latest trends in their respective branches, resume preparation, understanding business /corporate language, managing emotions, problem solving, importance of team work, goal orientation, professional grooming, positive attitude, assertiveness and inter personal skills. Data sufficiency (answering questions within the ambit of the given text), Fact-Inference-Judgment (to identify statements as FIJ), Syllogisms (with emphasis on fallacies in reasoning), strong and weak arguments.

UNIT IV **6 Periods**

Voice, direct & indirect speech, question tags, one word substitutes, and foreign phrases. An overview on group discussions, preparation for a group discussion, intricacies of a group discussion, topics for GDs (with special focus on controversial topics), structure of participation in a group discussion, roles played by the participants in a group discussion, constructive criticism, standard procedures followed whilst participating in a group discussion, frameworks that can be used for discussion, analysis of the discussion and exposure to case-based group discussions.

UNIT V **6 Periods**

Different types of interviews (with emphasis on personal interview), preparation for an interview, areas of questioning, answering questions on general traits like strengths/weaknesses/hobbies/extracurricular activities, choosing role models, importance of non verbal communication while participating in interviews, tips to reduce nervousness during personal interviews, handling stress, suggestions for responding to tough/unknown questions, preparation on self and personality development.

Note: The concepts learnt in Semester I will be tested in the Mid-term and Semester end exams during the II Semester as well.

Reading/ Listening material:

1. Newspapers like ‘The Hindu’, ‘Times of India’, ‘Economic Times’.
2. Magazines like Frontline, Outlook and Business India.
3. News channels NDTV, National News, CNN

References:

1. Books written by Stephen Covey and Dale Carnegie-Seven Habits of Highly Effective People etc-Simon & Schuster, Running Press book publishers
2. Books written by Bertrand Russell-Oxford University Press

Suggested General Reading

1. Who Moved My Cheese? By Spencer Johnson-GP Putnam's Sons
2. The art of War-Sun Tzu by Nabla, Barnes & Noble
3. The Monk Who Sold Ferrari-Robin Sharma by Harper Collins, Jaico Publishers
4. The Hobbit and other books by JRR Tolkein-Harper Collins

Suggested Authors

1. William Dalrymple
2. V.S.Naipaul
3. Kushwanth Singh
4. Ernest Hemingway
5. Charles Dickens
6. Leo Tolstoy
7. R.K. Narayan
8. Amitav Ghosh
9. Vikram Seth
10. Oscar Wilde

SOFT SKILLS LAB	
CIV3210	**Credits : 02**
Instruction: 3Period	Sessional Marks: 100

Prerequisites:

Basic English language skills- LSRW. English theory and English Language Lab.

Course Objectives:

1. To inculcate effective communication skills with appropriate body language.
2. To produce potent leaders, productive team players and effective individuals with proper professional ethics.
3. To enable students to make successful oral presentations using relevant content.
4. To train students for Group discussions and job Interviews which improves their employability skills.
5. To facilitate students the importance of setting realistic goals and achieving them using time management techniques.

Course Outcomes:

At the end of the course, students will be able to:

1. Comprehend the core engineering subjects using effective communication skills.
2. Present accurate and relevant information efficiently, using suitable material aids.
3. Work effectively as an individual as well in teams and emerge as responsible leaders.
4. Participate in group discussions and interviews using analytical and problem solving abilities, which enhance their employability skills.
5. Set time bound goals and realize them through strategic plans for successful career.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
CO	**1**	2	-	-	-	-	2	-	-	-	3	3	3	2	-	2
	2	-	2	2	2	2	-	-	-	-	3	2	2	-	2	-
	3	-	2	2	3	-	3	-	3	3	3	2	2	2	2	3
	4	-	2	2	3	-	2	-	-	3	3	2	2	2	2	2
	5	-	2	2	2	-	2	-	-	-	-	4	2	-	2	2

SYLLABUS

UNIT – I 9 Periods

Art of communication

1. Definition of Communication
2. Types of Communication
3. Non-verbal Communication
4. Listening skills
5. Feed back

D.A. - Practice of proper hand shake, practice of different postures and gestures and activity on giving feedback

UNIT – II 6 Periods

Presentation Skills

1. Purpose
2. Effective presentation strategies
3. Analysis of audience
4. Preparing an outline of the presentation,
5. Audio –visual aids
6. Body language**.**

D.A. -Group presentation by each team

UNIT – III 9 Periods

Group Discussions

1. Introduction- as a part of selection process-guidelines for GD
2. Types of GD
3. Nature of topics of G.D
4. Roles to be played by participants in a GD
5. Evaluation process

D.A–Group discussions

UNIT – IV 6 Periods

Team Building and Leadership

1. Importance of team work
2. Different stages of team formation
3. Good team vs. effective team
4. Team player and Team leader
5. Types of leadership
6. Decision making and negotiating skills

D.A-Decision making for a given situation

UNIT – V 3 Periods

Time- Management

1. Importance of time-management
2. Time-Management models
3. Prioritization
4. The art of saying 'No'
5. Identifying Time Wasters

D.A -Time- Bound activities devised by the facilitator

UNIT – VI 3 Periods

Goal-Setting

1. Different type of Goals (Immediate and Short term)
2. 'SMART' Goals

3. Strategies to achieve goals

D.A - Prepare a chart of immediate, short term and long term goals

UNIT – VII 9 Periods

Job- Interviews

1. Preparing Resumes and C.V's
2. Preparing for the interview
3. FAQ's (Integrity, Stress management, Close- Ask questions)

D.A –Mock interviews

REFERENCES

1. Sanjay Kumar and Pushpalata, *Communication Skills* ,Oxford University Press , 2011.
2. Allan Pease, Body Language, Sheldon Press,1997.
3. John A. Kline and BhavnaBhalla, *Speaking Effectively; Achieving Excellence in Presentations*, Pearson publication, 2013.
4. Marc Mancini, *Time Management*, Tata McGraw Hill publishing Comp.Ltd.,2003.
5. Peter Veruki, *The 250 Job Interview Questions,*Adams Media Corporation Avon, Massachusetts,1999.

INDUSTRIAL TRAINING

CIV 3211 **Credits : -**
Instruction : - Sessional Marks : -
End Exam : - End Exam Marks : -

Prerequisites:

Basic knowledge of Civil Engineering

Course objectives:

The objective of this course is to provide exposure to the students to the practical aspects of Civil Engineering projects

Course outcomes:

At the end of this course the student will be able to

1. Investigate and analyze at least one complex civil engineering problem with substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
2. Select and apply appropriate techniques, resources, and modern engineering and IT tools to complex civil engineering activities with an understanding of the limitations.
3. Assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to one civil engineering problem.
4. Function effectively as an individual, and as a member or leader in teams as well as to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
5. Demonstrate knowledge and understanding of the engineering and management principles and apply these to manage at least one civil engineering project, as a member and leader in a team.

Mapping of course outcomes with program outcomes:

		PO												PSO		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO	1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
	2	-	-	-	-	2		-	-	-	-	-	-	-	-	-
	3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
	4	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-
	5	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-

SYLLABUS

At the end of III Year II Semester, the Students have to undergo Industrial Training during Summer vacation, at Industries (Engineering Departments/ Companies) approved by the Department, for a minimum period of 4 weeks. The work done by the students shall be reported at regular intervals to the Guide. The quantum and quality of the work done by the student shall be of adequate standard and approved by the Guide/HoD. The work done by the

students shall be submitted to the Department at the end of the Training Period duly certified by the Guide along with a Certificate from the Industry. The evaluation of Industrial Training shall be carried by a Committee appointed by the Head of the Department during IV Year I Semester and the Marks shall be reported along with the Sessional Marks of IV Year I Semester.