Dr.M.G.R.
Educational and Research Institute
(DEEMED TO BE UNIVERSITY)
(An ISO Certified Institution)
University with Graded Autonomy Status
Maduravoyal , Chennai - 600 095

DEPARTMENT OF CIVIL ENGINEERING

B.Tech – Civil Engineering (Part Time)

Curriculum & Syllabus

2018 Regulation

SEMESTER I							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BMA18022	MATHEMATICS - I FOR CIVIL ENGINEERS	Ty	3	1/0	0/0	4
2.	BCE18001	MECHANICS OF SOLIDS	Ty	3	1/0	0/0	4
3.	BCE18002	BUILDING MATERIALS	Ty	3	0/0	0/0	3
4.	BCE18003	ENGINEERING GEOLOGY	Ty	3	0/0	0/0	3
5.	BARI8IL1	GEOLOGY AND BUILDING MATERIALS LAB	Lb	0	0/0	2/0	1

Credits Sub Total: 15

SEMESTER II							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BMA18025	MATHEMATICS – II FOR CIVIL & CHEMICAL ENGINEERS	Ty	3	1/0	0/0	4
2.	BCE18004	ENGINEERING SURVEY	TY	3	1/0	0/0	4
3.	BCE18005	STRENGTH OF MATERIALS	Ty	3	1/0	0/0	4
4.	BCE18006	MECHANICS OF FLUIDS	Ty	3	0/0	0/0	3
5.	BCE18L02	STRENGTH OF MATERIALS AND CONCRETE LAB	Lb	0	0/0	3/0	1

Credits Sub Total: 16

DEPARTMENT OF CIVIL ENGINEERING

SEMESTER III							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BMA18005	MATHEMATICS III FOR MECHANICAL & CIVIL ENGINEERS	Ty	3	1/0	0/0	4
2.	BCE18ET1	CONCRETE AND CONSTRUCTION TECHNOLOGY	ETL	2	0/0	2/0	3
3.	BCE18007	APPLIED HYDRAULIC ENGINEERING	Ty	3	1/0	0/0	4
4.	BEC18I09	SENSORS AND INSTRUMENTATION	Ty	3	0/0	0/0	3
5.	BCE18L03	FLUID MECHANICS & HYDRAULIC MACHINERY LAB	Lb	0	0/0	3/0	1

Credits Sub Total: 15

SEMESTER IV							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BCE18008	STRUCTURAL ANALYSIS	Ty	3	1/0	0/0	4
2.	BCE18ET2	WATER SUPPLY AND SANITARY ENGINEERING	ETL	2	0/0	2/0	3
3.	BCE18EXX	ELECTIVE I	Ty	3	0/0	0/0	3
4.	BCE18009	SOIL MECHANICS AND FOUNDATION ENGINEERING	Ty	3	1/0	0/0	4
5.	BCE18L07	SOIL MECHANICS LABORATORY	Lb	0	0/0	3/0	1

Credits Sub Total: 15

DEPARTMENT OF CIVIL ENGINEERING

SEMESTER V							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/**	**L**	**T/ SLr**	**P/R**	**C**
1.	BCE18010	ESTIMATION AND QUANTITY SURVEYING	Ty	3	1/0	0/0	4
2.	BCE18012	DESIGN OF STEEL STRUCTURES	Ty	3	0/0	0/0	3
3.	BCE18EXX	ELECTIVE-II	Ty	3	0/0	0/0	3
4.	BCE18ET3	REMOTE SENSING AND GIS	ETL	2	0/0	2/0	3
5.	BAR18IL2	BASICS OF AUTOCADD	Lb	0	0/0	2/0	1

Credits Sub Total: 14

SEMESTER VI							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BCE18011	DISASTER MITIGATION AND MANAGEMENT	Ty	3	1/0	0/0	4
2.	BCE18EXX	ELECTIVE III *(BASED ON STUDENTS INTEREST)	Ty	3	0/0	0/0	3
3.	BCE18ET4	TRANSPORTATION ENGINEERING	ETL	2	0/0	2/0	3
4.	BCE18L08	STRUCTURAL ANALYSIS AND DESIGN BASED ON CIVIL ENGINEERING SOFT WARE	Lb	0	0/0	3/0	1

Credits Sub Total: 11

DEPARTMENT OF CIVIL ENGINEERING

SEMESTER VII							
S.NO	**SUB. CODE**	**SUBJECT NAME**	**Ty / Lb/ ETL**	**L**	**T/ SLr**	**P/R**	**C**
1.	BCE18EXX	ELECTIVE IV	Ty	3	0/0	0/0	3
2.	BMG18001	PRINCIPLES OF MANAGEMENT	Ty	3	0/0	0/0	3
3.	BCE18L013	PROJECT	Lb	0	0/4	0/8	8

Credits Sub Total: 14

C : Credits L : Lecture T : Tutorial S.Lr : Supervised Learning P : Problem / Practical R : Research Ty/Lb/ETL : Theory/Lab/Embedded Theory and Lab.* Internal evaluation (Departmental level Refer Annexure for evaluation methodology)4 Credit papers should compulsorily have either P/R component.

Credit Summary

Semester 1 : 15
Semester 2 : 16
Semester 3 : 15
Semester 4 : 15
Semester 5 : 14
Semester 6 : 11
Semester 7 : 14

Total Credits : 100

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DEPARTMENT OF CIVIL ENGINEERING

Department of Civil Engineering

ELECTIVE CURRICULUM

DEPARTMENT OF CIVIL ENGINEERING

ELECTIVE-I						
SUBJECT CODE	**SUBJECT TITLE**	**Ty/Lb/ ETL**	**L**	**T/SLR**	**P/R**	**C**
BCE18E01	HYDROLOGY	Ty	3	0/0	0/0	3
BCE18E02	DAM ENGINEERING	Ty	3	0/0	0/0	3
BCE18E03	INDUSTRIAL STRUCTURES	Ty	3	0/0	0/0	3
BCE18E04	ENVIRONMENTAL IMPACT ASSESSMENT	Ty	3	0/0	0/0	3

ELECTIVE-II						
SUBJECT CODE	**SUBJECT TITLE**	**Ty/Lb/ ETL**	**L**	**T/SLR**	**P/R**	**C**
BCE18E05	DESIGN OF CONCRETE STRUCTURES	Ty	3	0/0	0/0	3
BCE18E06	HOUSING PLANNING AND DESIGN	Ty	3	0/0	0/0	3
BCE18E07	BUILDING TECHNOLOGY AND HABITAT ENGINEERING	Ty	3	0/0	0/0	3
BCE18E08	COST EFFECTIVE BUILDINGS	Ty	3	0/0	0/0	3

ELECTIVE -III						
SUBJECT CODE	**SUBJECT TITLE**	**Ty/Lb/ ETL**	**L**	**T/SLR**	**P/R**	**C**
BCE18E09	INDUSTRIAL WASTE MANAGEMENT	Ty	3	0/0	0/0	3
BCE18E10	CLEANER PRODUCTION	Ty	3	0/0	0/0	3
BCE18E11	ARCHITECTURE AND TOWN PLANNING	Ty	3	0/0	0/0	3
BCE18E12	CONSTRUCTION MANAGEMENT	Ty	3	0/0	0/0	3

DEPARTMENT OF CIVIL ENGINEERING

ELECTIVE -IV						
SUBJECT CODE	**SUBJECT TITLE**	**Ty/Lb/ ETL**	**L**	**T/SLR**	**P/R**	**C**
BCE18E13	STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING	Ty	3	0/0	0/0	3
BCE18E14	BRIDGE STRUCTURES	Ty	3	0/0	0/0	3
BCE18E15	PRESTRESSED CONCRETE STRUCTURES	Ty	3	0/0	0/0	3
BCE18E16	TALL BUILDINGS	Ty	3	0/0	0/0	3

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BMA 18022	Subject Name : MATHEMATICS – I (FOR CIVIL ENGINEERS)	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite:**None**	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

To impart knowledge on matrices,trigonometry and fourier series

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject the student shall be able

CO1	To understand the basic concepts in Algebra
CO2	To understand the basic concepts in Matrices
CO3	To understand the basic concepts in Trignometry
CO4	To understand the basic concepts in functions of several variables
CO5	To understand the basic concepts in Fourier series

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H					M			
CO2	H	H		H					M			
C03	H	H		H					M			
C04	H	H		H					M			
C05	H	H		H					M			

COs / PSOs	PSO1	PSO2
CO1	H	M
CO2	H	M
C03	H	M
C04	H	M
C05	H	M

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Soft Skills			
	√										

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BMA18022**	Subject Title : **MATHEMATICS – I FOR CIVIL ENGINEERS**	**Ty/Lb/ETL** **Ty**	**L** **3**	**T / S.Lr** **1/0**	**P/ R** **0/0**	**C** **4**

UNIT I ALGEBRA **12 Hrs**

Binomial, Exponential, Logarithmic Series (without proof of theorems) – Problems on Summation, Approximation and Coefficients.

UNIT II MATRICES **12 Hrs**

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values – Cayley - Hamilton theorem (without proof) – Orthogonal reduction of a symmetric matrix to Diagonal form.

UNIT III TRIGONOMETRY **12 Hrs**

Expansions of Sin nΘ, Cos nΘ in powers of SinΘ and CosΘ – Expansion of Tan nΘ – Expansions of $Sin^{n}Θ$ and $Cosn^{n}Θ$ in terms of Sines and Cosines of multiples of Θ – Hyperbolic functions – Separation into real and imaginary parts.

UNIT IV FUNCTIONS OF SEVERAL VARIABLES **12 Hrs**

Partial derivatives – Total differential – Differentiation of implicit functions – Taylor's expansion – Maxima and Minima by Lagrange's Method of undetermined multipliers – Jacobians.

UNIT V FOURIER SERIES **12 Hrs**

Dirichlet's conditions – General Fourier series – Half range Sine & Cosine series – Parseval's identity – Harmonic Analysis.

Total No. of Hrs: 60

TEXT BOOKS:

1. Veerarajan T., Engineering Mathematics (for first year), Tata McGraw Hill Publishing Co., (2008).
2. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw Hill Publishing Co., (2005).
3. Singaravelu, Transforms and Partial Differential Equations, Meenakshi Agency, (P) Ltd., (2017).

REFERENCES

1. Kreyszig E., Advanced Engineering Mathematics (10 th ed.), John Wiley & Sons, (2011).
2. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, (2012).

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18001	Subject Name : MECHANICS OF SOLIDS	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To learn fundamental concepts of Stress, Strain and deformation of soild applications of bars and thin cylinders
- To know the mechanism of load transfer in beams, the induced stress resultants and deformations.
- To understand the effect of torsion on shafts and springs.
- To analyze a complex two dimensional state of stress and plane trusses

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	To apply the fundamental concepts of stress and strain in the design of various structural components and machines
CO2	To analyze and design shafts to transmit required power
C03	To analyze about the force in member Truss with different methods
C04	To determine the bending, shear stresses and deflection produced in a beam subjected to system of loads
C05	To determine stresses due to impact and suddenly applied loads

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M								
CO2	H		H									M
C03	H			M	L							
C04	H	H		H								
C05	H	H				H					H	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H
C04	H	H
C05	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BCE18001**	Subject Title : **MECHANICS OF SOLIDS**	**Ty/Lb/ETL** **Ty**	**L** **3**	**T / S.Lr** **1/0**	**P/ R** **0/0**	**C** **4**

UNIT I INTRODUCTION TO FORCE CONCEPT 12 HRS

Equivalent system of forces, rigid bodies, external & internal forces-Application of Statics of Particles-Free body Diagram Concurrent & Non Concurrent Forces - Principles of transmissibility- Equivalent forces & Varignon's theorem. Tension, Compression and Shear stress – Lateral Strain- Poisson's Ratio-Volumetric Strain – Deformation of Simple and Compound Bars - Elastic constants – Composite Sections

.UNIT II CENTRE OF GRAVITY AND MOMENT OF INERTIA 12 HRS

Areas and volumes - Centroid of simple areas and volumes by integration - Centroid of composite areas - Second moment of areas - Radius of Gyration - Parallel axis and Perpendicular axis theorems - Moment of Inertia of simple areas by Integration -Moment of Inertia of Composite Areas - Mass Moment of Inertia of thin plates and simple solids.

UNIT III BENDING MOMENT & SHEAR FORCE 12 HRS

Introduction to Bending and S.F- Beams and support conditions – types of supports – types of loads - shear forces and bending moment diagrams for simply supported beams, cantilevers and overhanging beams with all loads.

UNIT IV ANALYSIS OF STATICALLY DETERMINATE PLANE TRUSSES 12 HRS

Stability and equilibrium of plane frames – Perfect frames - Types of Trusses – Analysis of forces in trusses member – Method of joints – Method of Sections – Tension co-efficient method – Graphical method

UNIT V BENDING STRESS IN BEAMS & TORSION OF SHAFTS 12 HRS

Theory of simple bending-expression for bending stress-Section modulus-bending stress in symmetrical sections-Theory of torsion-Torsion of circular, hollow circular shafts and power -close coiled helical springs and leaf springs

Total No of Hours:60

TEXT BOOKS

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007. 2.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010
3. Dr.R.K.Bansal A text book of Strength of Materials, Laxmi Publications,New Delhi 1996.
4. S. Ramamirutham and R.Narayanan, Strength of Materials, Dhanpat Rai Publications, New Delhi,1989.

REFERENCES

1. *Kazimi S.M.A. " Solid Mechanics ", Tata McGraw Hill Publishing Company, New Delhi, 1991.*
2. *Laudner T.J. and Archer R.R., " Mechanical of Solids in Introduction ",McGraw Hill International Editions*
3. *William A.Nash, " Theory and Problems of Strength of Material" Schaum's outline series, Mc Graw Hill International Editions 1994*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18002	Subject Name : BUILDING MATERIALS	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge on different materials and properties
- To understand the engineering aspects related to buildings

SUBJECT OUTCOMES (COs) : (3- 5)

At the end of the Subject, the student will be able to:

CO1	Identify and characterize building materials
CO2	Understand the manufacturing process of bricks and cement
CO3	To have a clear understanding about foundation and its type

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H										M	
CO2	H				M	M						
CO3	H								M			M
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
C03	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BCE18002**	Subject Title : **BUILDING MATERIALS**	**Ty/Lb/ETL** **Ty**	**L** **3**	**T / S.Lr**	**P/ R**	**C** **3**

UNIT I BRICKS, AGGREGATES AND CEMENT 9HRS

Bricks – Classification – Manufacturing process – Test on bricks – Aggregate: Natural Stone Aggregate – Industrial By- product – Crushing strength, impact strength, and flakiness – Abrasion resistance – Grading – sand – Bulking. Cement: Cement Ingredients – Manufacturing Process – Types – Testing of Cement

UNIT II MASONRY& MORTAR 9HRS

Masonry - stone masonry - rubble and Ashlar masonry - Brick masonry - Bond - Definition need and scope - Types of bonds - English and Flemish bond - merits and demerits - composite masonry - solid and hollow block masonry-soil-cement bricks-Load bearing and non-load bearing walls- Codal provisions.Mortar – Preparation of Lime and Cement Mortar- Concrete – Ingredients – Manufacturing Process – Batching Plant – Ready Mix Concrete - Paints - Plastics – Glass

UNIT III SUB STRUCTURE AND SUPER STRUCTURE 9HRS

Substructure – Setting Out of Foundation and Trenches – Excavation and Timbering – Foundation ShallowFoundation – Deep Foundation. Super Structure.

UNIT IV FLOOR, ROOF & STAIR CASE 9HRS

Floors - Types of floor - Details of concrete and terrazzo floors - Roofs - Types of Roofs - Types of Flat roofs - sloping roofs -different types and usage - shell roofs - roof coverings-AC sheets-GI sheets-FRP roofs Water proofing treatment of roofs -tar felt treatment- chemical treatment- Types of weathering Subjects .Stair Case – Definition – Types of Stair – General Dimension and Requirements – Layout of Stair Case.

UNIT V BUILDING SERVICES 9HRS

Damp Proofing- Acoustics Treatment – Thermal Insulation – Fire Protection – Ventilation – Earth Quake Protection- Integration of services in buildings - water supply & plumbing layout for a residential building - elevators & escalators - planning & installation - basic components of the electrical system for a residence .

Total No of Hours: 45

TEXT BOOKS

1. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, “Building Construction” - Laxmi Publications (P) ltd., New Delhi.
2. Rangwala, S.C. Engineering Materials, Charotar Publishing House, 8th ed.1983.
   Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and method of Construction, Dhanpat roy and Sons, 1997.

REFERENCES

1. *Taylor, G.D .Materials of Construction, USA Longman Inc, 1989.*
2. *Arora and Bindra, Building Materials and Building Construction, Dhanpat Raj*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE 18003	Subject Name : ENGINEERING GEOLOGY	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	0/0/	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To understand the importance of geological knowledge such as earth, earthquake and to apply this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundation

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject, the student will be able to:

CO1	Identify and classify rock using basic geologic classification systems
CO2	Understand geologic concepts and approaches.
CO3	Identify the various lithological units and its applications in civil engineering

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H						M				M	
CO2	H						M				M	
C03	H						M				M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18003	**ENGINEERING GEOLOGY**	**Ty**	**3**	**0/0**	**0/0**	**3**

UNIT I GENERAL GEOLOGY 9HRS

Geology in civil engineering - branches of geology - earth structure and composition - elementary knowledge on continental drift and plate tectonics. Seismo tectonics of the Indian plate, seismic zones of India, Weathering - work of rivers, wind, glaciers.

UNIT II MINERALOGY 9HRS

Physical properties of minerals - study of rock forming minerals - quartz family. Feldspar family, augite, hornblende, biotite, muscovite, calcite, garnet - properties, behavior and engineering significance of clay minerals –fundamentals of process of formation of ore minerals - coal and petroleum - their origin and occurrence in India.

UNIT III PETROLOGY 9HRS

Classification of Soil and Rock, Types of rock and origin: Igneous (extrusive and intrusive), sedimentary and metamorphic rocks, description occurrence, engineering properties of following rocks. Igneous rocks - granite, diorite, gabbro, pegmatite, dolerite and basalt sedimentary rocks sandstone, limestone, shale, conglomerate and breccia. Metamorphic rocks, quartzite, marble, slate, phyllite, gneiss and schist.

UNIT IV STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD 9HRS

Strength Behavior of Soil and Rock , Stress and strain in rock, failure and shear failure of soil and rock, folds, faults and joints in rock, consequences of failure (earthquakes), Bearing on engineering construction. Seismic and electrical methods for civil engineering investigations.

UNIT V GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING 9HRS

Geologic Mapping and Remote Sensing, Topographic maps, geologic maps, aerial photographs, LIDAR, SAR, interpretation for civil engineering projects - geological conditions necessary for construction of dams, tunnels, buildings, road cuttings, landslides - causes and preventions. Sea erosion and coastal protection.

Total No of Hrs : 45

TEXT BOOKS

1. Parbin singh, “Engineering and General geology ", S. K. Kataria & Sons, 2009
2. D. Venkat Reddy “Engineering Geology”, Vikas publishing House New Delhi, 2010
3. Krynine and Judd, “Engineering Geology and Geotechniques ", McGraw Hill Book Company, New Delhi 1990.

REFERENCE

1. *Legeet, “Geology and Engineering ", McGraw Hill Book Company, New Delhi*
2. *Blyth, “Geology for Engineers ", elbs, Pune 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BAR18IL1	Subject Name : GEOLOGY AND BUILDING MATERIALS LAB	T y/ Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Learn to appreciate field condition in relation to engineering projects/problems and understand the problems.

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject, the student will be able to:

CO1	Determine engineering properties of soils
CO2	Measure strike and dip of the bedding planes
CO3	Interpret geological Maps
CO4	Test on Physical Properties of Soil

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H					M	M					
CO2	H					M	M					
C03	H					M	M					
C04	H					M	M					

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H
C04	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T/S.Lr	P/R	C
BAR18IL1	**GEOLOGY AND BUILDING MATERIALS LAB**	**Lb**	**0**	**0/0**	**2/0**	**1**

SUBJECT CONTENT:

ENGINEERING GEOLOGY

1.Study of Geological map and section of local area

2. Study the various properties of igneous rocks, sedimentary and metamorphic through rocks samples.

3. Study the various properties of different minerals and mineral ores through samples.

4. Study the various types of folds and faults.

5. Physical properties of minerals such as, hardness, colour, streak, etc.

6. Numerical Problems related to Dip and Strike

7. Study of different geological features through models

8. Field visit

BUILDING MATERIALS

1.Assessment of physical properties of bricks such as absorption, shape and size, structure, soundness, Hardness, presence of soluble salts.

2. Hardness, impact and water absorption test etc for stones

3. Study on different types of bonds for bricks and stones

4. Study on defects in timber

Total No. of Hours: 30

DEPARTMENT OF CIVIL ENGINEERING

DEPARTMENT OF MATHEMATICS

Subject Code: BMA 18025	**Subject Name : MATHEMATICS – II (FOR CIVIL & CHEMICAL ENGINEERS)**	**Ty/Lb/ETL**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite:**MATHEMATICS I**	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To impart knowledge on partial differential equation, Laplace and Fourier transforms

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	To understand the basic concepts in partial differential equations
CO2	To understand the basic concepts in one & two dimensional heat and wave equations
CO3	To understand the basic concepts in Laplace Transforms
CO4	To understand the applications of Laplace Transforms
CO5	To understand the basic concepts in Fourier transforms

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H					M			
CO2	H	H		H					M			
C03	H	H		H					M			
C04	H	H		H					M			
C05	H	H		H					M			

COs / PSOs	PSO1	PSO2
CO1	H	M
CO2	H	M
C03	H	M
C04	H	M
C05	H	M

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Soft Skills			
	√										

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T/S.Lr	P/R	C
BMA18025	**MATHEMATICS – II (FOR CIVIL & CHEMICAL**	**Ty**	**3**	**1/0**	**0/0**	**4**

UNIT I PARTIAL DIFFERENTIAL EQUATIONS **12 Hrs**

Formation of PDE by eliminating arbitrary constants and eliminating arbitrary functions – Solutions of standard types of first order equations – Lagrange's equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **12 Hrs**

Classification of second order linear partial differential equations – Solutions of one dimensional wave equation, one-dimensional heat equation – Steady state solution of two dimensional heat equation (Cartesian coordinates only)– Fourier series solutions.

UNIT III LAPLACE TRANSFORMS I **12 Hrs**

Transforms of simple functions – Properties of Transforms – Inverse Transforms – Transforms of Derivatives and Integrals.

UNIT IV LAPLACE TRANSFORMS II **12 Hrs**

Periodic functions – Initial and final value theorems – Convolution theorem – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients.

UNIT V FOURIER TRANSFORM **12 Hrs**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's theorem.

Total no. of hrs: 60

TEXT BOOKS

1. Veerarajan T., Engineering Mathematics (for first year), Tata McGraw Hill Publishing Co., (2008).
2. Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw Hill Publishing Co., (2005).
3. Singaravelu, Transforms and Partial Differential Equations, Meenakshi Agency, (2017).

REFERENCES

1. *Kreyszig E., Advanced Engineering Mathematics (10th ed.), John Wiley & Sons, (2011).*
2. *Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, (2012).*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name : ENGINEERING SURVEY	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18004	Prerequisite: None	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To introduce the principles of various surveying methods and applications to Civil Engineering projects

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject, the student will be able to:

CO1	Understand the principles of basic survey instruments in civil engineering fields, concept of contouring and the ways of plotting.
CO2	Understand the concept of tachometric surveying, Control surveying, Survey adjustments, Astronomical surveying and Photogrammetric.
CO3	Understand the concept Photogrammetry, Total station, Hydrographic survey and cartography.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M		L			H			
CO2	H	M		M		L			H			
CO3	H	M		M		L			H			

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE 18004	**ENGINEERING SURVEY**	**Ty**	**3**	**1/0**	**0/0**	**4**

UNIT I TYPES OF SURVEY 12 HRS

Definition - principles - classification - survey instruments - ranging and chaining - reciprocal ranging - setting perpendiculars –errors - traversing. Prismatic compass - surveyor's compass - bearing - systems and conversions - local attraction – magnetic declination - dip - plane table instruments and accessories – merits and demerits - methods - radiation - intersection - resection.

UNIT II LEVELLING AND APPLICATIONS 12 HRS

Level line - horizontal line - levels and staves - sprit level - bench marks - temporary and permanent adjustments - fly and check leveling - reciprocal leveling - longitudinal and cross sections. Contouring - methods –characteristics and uses of contours - plotting - calculation of areas and volumes- earth work volume.

UNIT III TACHEOMETRIC SURVEYING 12 HRS

Theodolite - vernier - description and uses - temporary and permanent adjustments of vernier transit – swing-horizontal angles - vertical angles – measurements of angles and distances Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens – Subtense bar.

UNIT IV CONTROL SURVEYING AND PHOTOGRAMMETRY 12 HRS

Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line –Instruments and accessories - Corrections - Satellite station - Reduction to centre - Trignometric levelling – Single and reciprocal observations - Modern trends.

UNIT V SURVEY ADJUSTMENTS 12 HRS

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values – weighted observations - Principle of least squares - Normal equation – Correlates.

Total No of hours: 60

TEXT BOOKS

1. Kanetkar T.P., “Surveying and Levelling ", vols. I and II, United Book Corporation, Pune, 1994.
2. Punmia B.C., “Surveying ", Vols. I and II, Laxmi Publications, Mumbai, 1999.
3. N.N basak., “ Surveying and Levelling ", Tata McGraw Hill, New Delhi, 2004.

REFERENCES

1. *Clark D., Plane and Geodetic Surveying ", vols. I and II and C.B.S. Publishers,New Delhi, Sixth edition, 1991.*
2. *James M. Anderson and Edward M. Mikhail, “Introduction to Surveying ", Tata McGraw Hill, New Delhi, 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18005	Subject Name : STRENGTH OF MATERIALS	T y/ Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Mechanics of solids	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge about deflection in beams by various methods
- To impart knowledge about analyzing the structural elements by energy concepts and finding stresses and deflection
- To impart knowledge about behavior of columns, critical loads and design of columns

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject, Students will have

CO1	through knowledge in analysis of indeterminate beams and use of energy method for estimating the slope and deflections of beams and trusses.
CO2	they will be in a position to assess the behaviour of columns,
C03	To knew beams and failure of materials.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M					M	
CO2	H	H	H	H		M					M	
CO3	H	H	H	H		M					M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BCE18005**	Subject Title : **STRENGTH OF MATERIALS**	**Ty/Lb/ETL** **Ty**	**L** **3**	**T/S.Lr** **1/0**	**P/ R** **0/0**	**C** **4**

UNIT I ENERGY PRINCIPLES 11 HRS

Strain energy and strain energy density - Strain energy in tension, shear, flexure and torsion - Castigliano's & Engessor's energy theorems- Principle of Virtual Work- Application of energy theorems for computing deflection in Determinate structures – Maxwell's reciprocal theorem.

UNIT II DEFLECTIONS 13 HRS

Methods of Deflection Determination of Deflection curve – computation of slopes and deflections in Determinate Beams - Double Integration method – Macaulay's method – Area Moment method – Conjugate Beam method.

UNIT III INDETERMINATE BEAMS 13 HRS

Propped Cantilever and Fixed Beams - Fixed End Moments and Reactions for Standard cases of Loading - Continuous Beams - Theorem of Three Moments - Analysis of Continuous Beams - S.F. and B.M. Diagrams for Continuous Beams.

UNIT IV COLUMNS 13HRS

Eccentrically Loaded Short Columns Middle Third Rule - Core of Section - Columns of Unsymmetrical Sections - Rankine – Gordon Formula Eccentrically Loaded Long Columns. Theories of Failure - Principal Stress, Principal Strain, Shear Stress, Strain Energy and Distortion Energy Theories.

UNIT V BENDING OF BEAMS 10HRS

Bending of Beams of Symmetrical and Unsymmetrical Sections – Box sections and its importance — Winkler Bach Formula - Shear Center Simple problems

Total No of Hours :60

TEXT BOOKS

1. Rajput.R.K. "Strength of Materials", S.Chand and Co, New Delhi, 2007.
2. Bhavikatti. S., "Solid Mechanics", Vikas publishing house Pvt. Ltd, New Delhi, 2010.
3. R.S. Khurmi, "Engineering Mechanics of Solids ", Prentice Hall of India, New Delhi, 1997.
4. S.S Ratan, "Strength of Materials ", Tata McGraw Hill Publishing Company, New Delhi, 2008

REFERENCES

1. *Laudner T.J. and Archer R.R., " Mechanical of Solids in Introduction ",McGraw Hill International Editions, New Delhi,1994..*
2. *William A.Nash, " Theory and Problems of Strength of Material" Schaum's outline series, Mc Graw Hill International Editions, New Delhi, 1994*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name : MECHANICS OF FLUIDS	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18006	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To know the importance, application and inter-relationship of various properties of fluid.
- To study theories those explain the behavior and performance of fluid when the fluid is flowing through the pipe.
- To understand the utilization of dimensional analysis as a tool in solving problems in the field of fluid mechanics.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	To learn about the basics of fluid mechanics and various properties of fluids
CO2	To learn about the various forces on plane and curved surfaces and the concepts of buoyancy
C03	To have a clear understanding about fluid kinematics and dynamics
C04	To study the basics of boundary layer flow and flow through pipes
C05	To study about various models like distorted models and various dimensionless numbers

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				M	M						
CO2	H	M										
C03	H											H
C04	H				M							
C05	H	H		M								

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H
C04	H	H
C05	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18006	**MECHANICS OF FLUIDS**	**Ty**	**3**	**0/0**	**0/0**	**3**

UNIT I DEFINITIONS AND FLUID PROPERTIES 9 HRS

Definitions - Fluid and Fluid Mechanics - Dimensions and Units - Fluid properties –Viscosity, Compressibility, Surface tension and Capillarity, Continuum - concept of system and control volume.

UNIT II FLUID STATISTICS 9 HRS

Pascal's law and Hydrostatic equation - buoyancy -meta centric height – pressure measurement – gauges and manometers.

UNIT III FLUID KINEMATICS 9 HRS

Stream, streak and path lines - classification of flows - continuity equation - stream and potential functions –flow nets – velocity and acceleration measurement-Problems

UNIT IV FLUID DYNAMICS 9 HRS

Euler and Bernoulli's equations - application of Bernoulli's equation - discharge measurement -Hagen Poiseuille equation .

UNIT V FLOW THROUGH PIPES AND DIMENSIONAL ANALYSIS 9 HRS

Darcy Weisbach formula -Major and minor losses of flow in pipes – pipes in series and in parallel – Dimensional analysis - Buckingham π -theorem.

Total No of Hours: 45

TEXT BOOKS

1. Dr.R. K. Bansal., "Fluid Mechanics and Hydraulic Machines ", Laxmi Publications 2015.
2. Fox, Robert W. And McDonald, Alan T., “Introduction to Fluid Mechanics ",John Willey & sons

REFERENCES

1. *Streeter, Victor l. And Wylie, Benjamin E., “Fluid Mechanics ", McGraw-Hill Ltd., 1998.*
2. *Natarajan M.K., “Principles of Fluids Mechanics ", Anuradha Agencies, Kumbakonam, 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18L02	Subject Name : STRENGTH OF MATERIALS AND CONCRETE LAB	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Learn the properties of different materials like steel, concrete, timber, bricks and other materials
- Study the behavior of different structural elements and develop skill in use of measuring instruments

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	To do tests on cement as per IS codes of practice
CO2	To do tests on fine and coarse aggregates according to IS codes of Practice;
CO3	To do tests on fresh and hardened concrete as per IS codes of practice

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M					M		M	
CO2	H			M					M		M	
CO3	H			M					M		M	
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18L02	**STRENGTH OF MATERIALS AND CONCRETE LAB**	**Lb**	**0**	**0/0**	**3/0**	**1**

STRENGTH OF MATERIALS LAB

1. Tension test on mild steel and for steel rods.
2. Compression test on wooden specimen
3. Double shear test on mild steel and aluminum rods.
4. Torsion test on mild steel rod.
5. Impact test on metal specimen
6. Hardness tests on metals like mild steel, brass, copper and aluminum.
7. Deflection test on metal beam
8. Compression test on helical spring

Total No of Hours: 15

CONCRETE LAB

1. Tests on Cement
   a.Specific Gravity,
   b. Normal consistency,
   c. Initial and Final setting time of cement

2. Test on Aggregate
   a. Sieve analysis
   b. Specific gravity
   c. Water Absorption

3. Tests on Freshly Mixed Concrete
   Compaction Factor,
   Slump Value.

Total No of Hours: 15

References:

1. Davis H.E. Trophell.G.E & Hanck, G.F.W. , The Testing Of Engineering Materials – Mcgrew Hill, International Book Co.
2. Timoshenko S.P, &Young, D.H. Strength of Materials – East West Press Ltd. 3. Relevant 813 code. Venon john, Engineering Materials, 3rt Edition, McMillan Co.Ltd.,

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: **BMA18005**	Subject Name : **MATHEMATICS III FOR MECHANICAL & CIVIL ENGINEERS**	**Ty/Lb/ ETL**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite: **MATHEMATICS II**	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To introduce Fourier series analysis which is central to many applications in engineering apart from its use in solving boundary value problems.
- To acquaint the student with Fourier transform techniques used in wide variety of situations.
- To introduce the effective mathematical tools for the solutions of partial differential equations that model several physical processes and to develop Z transform techniques for discrete time systems.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	To understand the basic concepts in partial differential equations
CO2	To understand the basic concepts in fourier series
CO3	To understand the basic concepts in one & two dimensional heat and wave equations
CO4	To understand the basic concepts in Laplace Transforms
CO5	To understand the basic concepts in Fourier transforms

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**H**	**H**		**H**					**M**			
CO2	**H**	**H**		**H**					**M**			
C03	**H**	**H**		**H**					**M**			
C04	**H**	**H**		**H**					**M**			
C05	**H**	**H**		**H**					**M**			

COs / PSOs	**PSO1**	**PSO2**
CO1	**H**	**M**
CO2	**H**	**M**
C03	**H**	**M**
C04	**H**	**M**
C05	**H**	**M**

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
	√											

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode : **BMA18005**	Subject Title : **MATHEMATICS III FOR MECHANICAL & CIVILENGINEERS**	**Ty/Lb /ETL** **Ty**	**L** **3**	**T/ S.Lr** **1/0**	**P/ R** **0/0**	**C** **4**

UNIT I PARTIAL DIFFERENTIAL EQUATIONS **12HRS**

Formation of PDE by eliminating arbitrary constants and eliminating arbitrary functions – Solutions of standard types of first order equations – Lagrange's equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES **12HRS**

Dirichlet's conditions – General Fourier series – Half range Sine & Cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT III APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS **12HRS**

Classification of second order linear partial differential equations – Solutions of one dimensional wave equation, one-dimensional heat equation – Steady state solution of two dimensional heat equation (Cartesian coordinates only) – Fourier series solutions.

UNIT IV LAPLACE TRANSFORMS **12HRS**

Transforms of simple functions – Properties of Transforms – Inverse Transforms – Transforms of Derivatives and Integrals – Periodic functions – Initial and final value theorems – Convolution theorem – Applications of Laplace transforms for solving linear ordinary differential equations up to second order with constant coefficients and Linear simultaneous differential equations of first order with constant coefficients.

UNIT V FOURIER TRANSFORMS **12HRS**

Statement of Fourier integral theorem – Fourier transform pairs – Fourier Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's theorem.

Total No. of Hours: 60

TEXT BOOKS

1. Veerarajan T.,"Engineering Mathematics"(for first year), Tata McGraw Hill Publishing Co(2008).
2. Veerarajan T,,"Engineering Mathematics"(for semester III), Tata McGraw Hill Publishing Co. (2005).
3. Singaravelu,"Transforms and Partial Differential Equations"Meenakshi Agency,(2017

REFERENCES

1. Kreyszig E,"Advanced Engineering Mathematics"(9th ed.), John Wiley & Sons,(2011).
2. Grewal B.S,"Higher Engineering Mathmatics", Khanna Publishers, (2012).

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18ET1	Subject Name : CONCRETE AND CONSTRUCTION TECHNOLOGY	T y/ Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building materials	ETL	2	0/0	2/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To understand various construction procedures from sub structure to super structure and also the equipment needed for construction of various types of structures from foundation to super structure

SUBJECT OUTCOMES (COs) : (3- 5) At the end of the Subject, the student will be able to:

CO1	understand about concrete making materials and supplementary cementations materials.
CO2	Design the concrete mix for the required strength
CO3	Will acquire knowledge on handling of different types of construction equipments

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M			M					M	
CO2	H		H			M					M	
CO3	H		M			M					M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T / S.Lr	P/ R	C
BCE18ET1	**CONCRETE AND CONSTRUCTION TECHNOLOGY**	**ETL**	**2**	**0/0**	**2/0**	**3**

UNIT I CONCRETE MAKING MATERIALS 8 HRS

Manufacture and Components of Portland Cement- Hydration Process- Types of Cement, Aggregates - Classification and Properties Admixtures.

UNIT II MIX DESIGN 10 HRS

Properties of Fresh Concrete- Workability, Segregation and Bleeding of Concrete - Factors influencing Mix Proportions - I.S and ACI Methods of Mix Design.

UNIT III PROPERTIES OF HARDENED CONCRETE 8 HRS

Strength - Creep and Shrinkage - Durability of Concrete - Chemical Attack - Different Types of FRC - Properties and Applications.

UNIT IV SUB STRUCTURE CONSTRUCTION 9 HRS

Piling techniques – Sheet piles – Under water construction of Diaphragm wall and basement – Driving diaphragm walls – Driving well and caisson – Sinking coffer dam – Shoring for deep cutting – Well points – Dewatering and stand by plant equipment for underground open excavation

.

UNIT V SUPER STRUCTURE AND CONSTRUCTION EQUIPMENTS 10 HRS

Construction sequences in cooling Towers, Bunkers, Silos and Chimney – Pre- stressed construction – In situ pre-stressing in high rise structures – Erecting light weight components on tall structures. Types of earth work equipment's - Tractors, Motor graders, Scrappers - Equipment for compaction – Batching and mixing and concreting.

Total No of Hours : 45

TEXT BOOKS

1. Shetty. M.S., Concrete Technology, S.Chand and Co, Pune,1984
2. Arora S.P. And Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Roy and Sons, New Delhi, 1997.
3. Peurifoy, R.L., Ledbetter, W.D And Schexnayder, C., 'Consruction Plaaning, Equipment and Methods' V Edition McGraw Hill, Singapore, 1995

REFERENCES

1. *Krishnasamy. K.T., Concrete Technology, Dhanapt Rai - New Delhi – 1985*
2. *Neville, properties of concrete elbs, 1977.*
3. *Sharma S.C., Building Construction, Khanna Publishers, New Delhi.1998*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18007	Subject Name : APPLIED HYDRAULIC ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Mechanics of fluids	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To study theories those explain the behavior and characteristics of fluid in an open channel .
- To study the velocity and discharge measurement in open channel.
- To understand the working principle of hydraulic machines and its uses

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	The students will be able to apply their knowledge of fluid mechanics in addressing problems in open channels
CO2	They will possess the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions
C03	They will have knowledge in hydraulic machineries

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M		M							M	M
CO2	H	M		M							M	M
CO3	H	M		M							M	M
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18007	**APPLIED HYDRAULIC ENGINEERING**	**Ty**	**3**	**1/0**	**0/0**	**4**

FLOW IN OPEN CHANNEL

UNIT I INTRODUCTION 8 HRS

Open channel flow - types and regime of flow - velocity distribution in open channel - specific energy - critical flow and its computation.

UNIT II UNIFORM AND RAPIDLY VARIED FLOW 14 HRS

Uniform flow - velocity measurement - manning's and Chezy's formula - determination of roughness coefficients - most economical sections- Rectangular, Circular and Trapezoidal channel sections .Hydraulic jump - types - energy dissipation – surges

HYDRAULIC MACHINES

UNIT III ROTODYNAMIC PUMPS 12 HRS

Introduction – classification – Rotodynamic pumps: centrifugal pumps – work done – losses - specific speed - minimum speed to start the pump- multistage pumps- parallel and series.

UNIT IV POSITIVE DISPLACEMENT PUMPS 12 HRS

Positive displacement pumps- reciprocating pump –work done- slip - air vessels(theory only)

UNIT V TURBINES 14 HRS

Classification – Pelton wheel turbine –work done-Francis turbine –work done- draft tube –Kaplan turbine –work done.

Total No of Hours: 60

TEXT BOOKS

1. Subramanian k., “Flow in open channels ", Tata McGraw Hill Publishing Company, New Delhi, 1994

2. Dr. R.K.Bansal., "Fluid Mechanics and Hydraulic Machines ", Lakshmi Publications (p) ltd., Pune, 2015.

3. Kumar K.L., “Engineering Fluid Mechanics ", Eurasia publishing house (p) ltd. New Delhi, (7th edition), 1995.

REFERENCES

1. Ven Te Chow, “Open-channel hydraulics ", McGraw Hill Co., 1996 - , New York.

2. Ramamirtham S., “Fluid mechanics, Hydraulics and Fluid Machines ", Dhanpat Rai

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BEC 18I09	Subject Name : SENSORS AND INSTRUMENTATION	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- This Subject is designed to give an insight into the latest developments regarding smart materials and their use in structures. Further, this also deals with structures which can self adjust their stiffness with load.

SUBJECT OUTCOMES (COs) : (3- 5)

At the end of the Subject, the student will be able to:

CO1	to familiarize with the structure and physical properties of smart materials
CO2	Understand the stability properties and degradation processes.
CO3	To have a clear understanding about the selected technologies.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H										M	
CO2	H				M	M						
CO3	H								M			M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
		√										

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BEC 18I09**	Subject Title : **SENSORS AND INSTRUMENTATION**	**Ty/Lb/ETL** **Ty**	**L** **3**	**T/S.Lr** **0/0**	**P/ R** **0/0**	**C** **3**

UNIT I INTRODUCTION 9 HRS

Introduction to Smart Materials and Structures – Instrumented structures functions and response –Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.

UNIT II MEASURING TECHNIQUES 9 HRS

Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.

UNIT III SENSORS 9 HRS

Sensing Technology – Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques.Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fibre Optic Chemical Sensing Systems and Distributed measurement.

UNIT IV ACTUATORS 9 HRS

Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.

UNIT IV SIGNAL PROCESSING AND CONTROL SYSTEMS 9 HRS

Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.

Total No of Hours: 45

TEXT BOOKS

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-1996.

REFERENCES

1. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

2. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18L03	Subject Name : FLUID MECHANICS & HYDRAULIC MACHINERY LAB	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To learn the aim, working principle, components and function of hydraulic equipments.
- To get hand-on experience in the operation of hydraulic machines.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	Measure theoretical discharge in pipes, Venturimeter, orificemeter and notches
CO2	Demonstrate and conduct experiment to find characteristic curves of various pumps
CO3	Demonstrate and conduct experiment to find characteristic curves of various turbines

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M								M	M
CO2	H	M	M								M	M
CO3	H	M	M								M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L03	**FLUID MECHANICS & HYDRAULIC MACHINERY LAB**	**Ty**	**0**			**1**

UNIT I FLOW MEASUREMENT **6 HRS**

i. Venturimeter.
ii. Orifice meter.

UNIT II LOSSES IN PIPES **6 HRS**

Estimation of major energy and minor losses in pipes

UNIT III PUMPS **10 HRS**

Performance characteristics of

i. Rated speed centrifugal pump.
ii. Gear pump.
iii. Reciprocating pump.

UNIT IV TURBINES **8 HRS**

Performance characteristics of Pelton wheel turbine and Francis turbine.

Total No of Hours: 30 hrs

TEXT BOOKS

1. Dr. R. K.Bansal., "Fluid Mechanics And Hydraulic Machines ", Lakshmi Publications (P) Ltd.New Delhi 2005.
2. Fox, Robert w. and Mcdonald, Alan T., "Introduction to Fluid Mechanics ",John Willey & Sons, New Jersey

REFERENCES

1. *Streeter, Victor L. And Wylie, Benjamin e., "Fluid Mechanics ", McGraw-Hill Ltd.New Delhi, 1998.*
2. *Natarajan M.K., "Principles of Fluids Mechanics ", Anuradha agencies, Vidayal karuppur, kumbakonam, 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18008	Subject Name :STRUCTURAL ANALYSIS	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Strength of materials	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- This Subject introduces students to the classical methods of structural analysis, i.e., methods for calculating forces and displacements in structures due to given loads and imposed deformations. Both determinate and indeterminate structures are covered.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	analysis of suspension bridges and arches
CO2	will be conversant with classical methods of analysis.
CO3	analyse structures by plastic theory

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H			M	M			M	M
CO2	H	H		H			M	M			M	M
C03	H	H		H			M	M			M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
C03	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18008	STRUCTURAL ANALYSIS	Ty	3	1/0	0/0	4

UNIT I DEFLECTION OF DETERMINATE STRUCTURES 12Hrs

Principles of virtual work for deflections - Deflections of pin-jointed plane frames and rigid Plane Frames. Introduction to analysis of space trusses using method of tension coefficients – Beams curved in plan.

UNIT II SLOPE DEFLECTION AND MOMENT DISTRIBUTION METHOD 12Hrs

Analysis of continuous Beams – cantilever beams - Continuous beams and rigid frames (with and without sway) - Symmetry and Asymmetry -Portal Frames.Stiffness and carry over factors –Balance – Distribution and carryover of moments - Analysis of continuous Beams - Plane rigid frames with and without sway – Structural frames

UNIT III MOVING LOADS AND INFLUENCE LINES (DETERMINATE) 12 Hrs

Influence lines for reactions in statically determinate structures – influence lines for member forces in pin jointed frames – Influence lines for shear force and bending moment in beam sections

UNIT IV ARCHES AND SUSPENSION BRIDGES 12 Hrs

Arches structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches – Settlement and temperature effects

Analysis of suspension bridges – Un stiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders.

UNIT V MATRIX METHOD FOR INDETERMINATE FRAMES AND PLASTIC ANALYSIS 12 Hrs

Equilibrium and compatibility - Determinate Vs indeterminate structures –Indeterminacy - primary structure - Compatibility conditions - Analysis of indeterminate pin-jointed plane frames, continuous beams. Element and global stiffness and flexibility matrices– Co-ordinate transformations – transformations of stiffness matrices - Analysis of Continuous Beams.

Total no of hours: 60

TEXT BOOKS

1. R.Vaidyanathan,P.Perumal,, Comprehensive Structural Analysis Vol 1 and vol.2, Laxmi Publications,2004
2. Bhavikatti S.S Structural Analysis Vol 1 and vol.2 ,Vikas Publishing House Pvt. Ltd New Delhi
3. S.Ramamrutham,R.Narayan,Theory of structures,Dhanpatrai publications,1993

REFERENCES

1. *Analysis of Structures: Strength and Behaviors T.S. Thandavamoorthy, oxford University press, New Delhi, 2005.*
2. *Matrix analysis of framed structures – William Weaver, Jr & James M.Gere, CBS Publishers & Distributors, Delhi, 1995*
3. *Structural Analysis – A Matrix Approach – G.S.Pandit & S.P.Gupta, Tata McGraw-Hill, New Delhi ,1998*
4. *Manicka Selvam V.K.,Elementary Matrix Analysis of Structures, Khanna Publishers Mumbai,1990.*
5. *Coates R.C., Coutie M.G. and Kong F.K., Structural Analysis, ELBS and Nelson, Newjersey,1990.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18ET2	Subject Name : WATER SUPPLY AND SANITARY ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	ETL	2	0/0	2/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To impart knowledge in fundamental theory and design of conventional water treatment facilities.
To impart knowledge in fundamental theory and design of conventional wastewater treatment facilities .
To impart knowledge on the principles used to design advanced wastewater treatments.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	an insight into the structure of drinking water supply and waste water systems, including water transport, treatment and distribution
CO2	an understanding of water quality and waste water criteria and standards, and their relation to public health
CO3	the ability to design and evaluate water supply and waste water project alternatives on basis of chosen

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	M		H		H	H				M
CO2	H	M	M		H		H	H				M
CO3	H	M	M		H		H	H				M
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18ET2	Subject Title : WATER SUPPLY AND SANITARY ENGINEERING	Ty/Lb/ETL ETL	L 2	T/ S.Lr 0/0	P/ R 2/0	C 3

UNIT I PLANNING FOR WATER SUPPLY SYSTEMS 9 HRS

Scope of environmental engineering – role of environmental engineer – Public water supply systems – objectives – design period – population forecasting – water demand – sources of water – sources selection – water quality – characterization – sources of wastewater –estimation of storm runoff.

UNIT II WATER TREATMENT 9HRS

Screening - types of screening - plain sedimentation – sedimentation with coagulation – settling & flotation - filtration - disinfection

UNIT III SEWAGE TREATMENT – PRIMARY TREATMENT 9HRS

Objectives – unit operations & processes – principles, functions and design of screen, grit chambers and primary sedimentation tanks.

UNIT IV : SEWAGE TREATMENT – SECONDARY TREATMENT 9HRS

Secondary treatment – activated sludge process and trickling filter; other treatment methods – stabilization ponds and septic tanks – advances in sewage treatment.

UNIT V: SEWAGE DISPOSAL AND SLUDGE MANAGEMENT 9HRS

Methods – dilution – self purification of surface water bodies – oxygen sag curve – land disposal – sewage farming – deep well injection – soil dispersion system. Thickening – sludge digestion – biogas recovery - drying beds – conditioning and dewatering – sludge disposal.

Total No of Hours: 45

TEXT BOOKS

1. Garg, S.K., Environmental Engineering, Vols. I &II, Khanna Publishers, New Delhi, 1994
2. C.S.Shah, Water Supply And Sanitation, Galgotia Publishing Company, New Delhi, 1994

REFERENCES

1. *Manual on Water Supply And Treatment, Ministry Of Urban Development, Government Of India, New Delhi, 1999.*
2. *Manual on sewerage and sewage treatment, CPHEEO, Ministry Of Urban Development, Government Of India, New Delhi, 1993.*
3. *H.S.Peavy, D.R.Rowe and George Tchobanoglous, Environmental Engineering, Mcgraw-Hill Book Company, New Delhi, 1995.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18009	Subject Name : SOIL MECHANICS ANDFOUNDATION ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Engineering Geology	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE

- To understand the basic properties and strength nature of various soils and their settlement behaviour in foundations.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	Students will have the ability to select type of foundation required for the soil at a place
CO2	Able to design shallow, foundation, deep foundation and retaining structures.
CO3	At the end of this Subject student acquires the capacity to investigate the soil condition and to select and design a suitable foundation

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H		H		H				
CO2	H	H	H	H		H		H				
CO3	H	H	H	H		H		H				

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
	SOIL MECHANICS AND	Ty	3	1/0	0/0	4

UNIT I SOIL PROPERTIES AND COMPACTION OF SOIL 12 Hrs

Nature of Soil – phase relation – Index properties – Soil structure – particle size distribution – Atterberg limits – classification for engineering purposes – BIS Classification system – Soil compaction – factors affecting compaction – laboratory and field compaction methods and monitoring – Clay Minerology.

UNIT II SOIL MOISTURE – PERMEABILITY, STRESSES IN SOILS 12Hrs

Soil water – Various forms –Capillary rise – Suction – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil – Permeability – Darcy‟s Law- Permeability measurement in the laboratory – Factors influencing permeability of soil – quick sand condition – Stress distribution in soil media – Boussinesq‟s formula – stress due to line load, Circular and rectangular loaded area – approximate methods – Use of influence charts – Westerguard equation for point load.

UNIT III SHEAR STRENGTH AND SLOPE STABILITY 12Hrs

Shear strength of cohesive and cohesionless soil – Mohr, Coulomb failure theory –Measurement of shear strength – direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability – Drained and undrained behaviour of clay and sand. Slope failure mechanisms – Modes – Infinite slopes – Finite slopes – Total and effective stress analysis – Stability analysis for purely cohesive and C- Φ soils – Method of slices – Modified Bishop's method – Friction circle method – stability number.

UNIT IV SOIL EXPLORATION 12Hrs

Scope and objectives – Methods of exploration – averaging and boring – Wash boring and rotary drilling – Depth of boring – Spacing of bore hole – Sampling – Representative and undisturbed sampling – sampling techniques – Split spoon sampler, Thin tube sampler, Stationary piston sampler – Bore log report – Penetration tests (SPT and SCPT) – Geophysical methods.

UNIT VFOUNDATION – BEARING CAPACITY AND SETTLEMENT 12Hrs

Introduction – Types of foundation–Contact pressure distribution below footings – Location and depth of foundation – Selection of foundation based on soil condition – codal provisions – bearing capacity of shallow foundation on homogeneous deposits –Terzaghi‟s formula and BIS formula – factors affecting bearing capacity – problems – Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure, Settlement – Components of settlement – Determination of settlement of foundations on granular and clay deposits – Allowable settlements – Codal provision.

Total No. of Hours:60

TEXT BOOKS:

1. Punmia P.C, Soil Mechanics and Foundations, Laximi Publications Pvt. Ltd, New Delhi, 1995.
2. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1999.
3. Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013.

REFERENCES:

1. *Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1996.*
2. *Arora K.R., " Soil mechanics and Foundation Engineering" , Standard publishers and distributors, Newdelhi,1997.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18L07	Subject Name : SOIL MECHANICS LABORATORY	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To illustrate some of the principles taught during the soil mechanics Subject.
- To impart knowledge of laboratory and index testing methods commonly used in Soil & foundation engineering.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	Knowledge to determine Index properties of the soils like water content, specific gravity and Atterberg limits
CO2	Knowledge engineering properties like field density, shear strength, permeability, compaction and consolidation
CO3	Test the soil to assess its ability to withstand the load

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			H		H			H			
CO2	H			H		H			H			
CO3	H			H		H			H			
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L07	SOIL MECHANICS LABORATORY	Lb	0	0/0	3/0	1

LIST OF EXPERIMENTS

1. Specific gravity of soil solids
2. Grain size distribution - Sieve analysis - Hydrometer analysis
3. Atterberg limits test – Liquid limit, Plastic limit and shrinkage limit tests
4. Field density Test
5. Determination of moisture - Density relationship using standard proctor.
6. Permeability determination (constant head and falling head methods)
7. Direct shear test on cohesion less soil
8. Unconfined compression test in cohesive soil
9. Tri axial compression test in cohesion less soil
10. Laboratory Vane shear test in cohesive soil
11. One dimensional Consolidation test (Determination of coefficient of consolidation only)

Total No of Hrs : 30 hrs

REFERENCES

1. *"Soil Engineering Laboratory Instruction Manual ", Published by the Engineering College Co-operative Society, Chennai, 1996.*
2. *Lambe T.W., "Soil Testing for Engineers ", John Wiley and Sons, New York, 1990.*
3. *"I.S.Code of Practice (2720) Relevant Parts ", as amended from time to time..*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name: ESTIMATION AND QUANTITY SURVEYING	Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18010	Prerequisite: Concrete & construction technology, Water supply & sanitary	TY	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To study the functional planning of buildings as per standards; To study the estimate types and terms involved in estimation; To study the important specifications necessary for the works in buildings; To study the concepts of tenders and contracts;

SUBJECT OUTCOMES (COs) : (3- 5)

At the end of this Subject the student shall be able to

CO1	Prepare various types of estimation and find out the quantity of works involved.
CO2	Carry out analysis of rates and bill preparation.
CO3	Prepare specifications for various items of construction works
CO4	Estimate the quantity of works involved in road works, water supply and sanitary works

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H		M		M	H		H	H
CO2	H	H		H		M		M	H		H	H
CO3	H	H		H		M		M	H		H	H
CO4	H	H		H		M		M	H		H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H
CO4	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18010	ESTIMATION AND QUANTITY SURVEYING	Ty	3	1/0	0/0	4

UNIT I ESTIMATION 12 HRS

Types of estimates- units of measurements-methods of estimates – advantages- estimation of load bearing and framed structures –estimate of quantities in residential building- calculation of quantities of brick work, RCC, PCC, white washing ,color washing and painting / varnishing – calculation of brick work and RCC works in arches – estimate of joineries for paneled and glazed doors ,windows, ventilators, handrails etc.

UNIT II ESTIMATE OF OTHER STRUCTURES 12 HRS

Estimating of septic tank, soak pit – Sanitary and water supply installations – Water supply pipe line – Sewer line – Tube well – Open well – Estimate of bituminous and cement concrete roads-estimation of retaining walls and culverts.

UNIT III SPECIFICATIONS AND TENDERS 12 HRS

Data –schedule of rates- analysis of rates-specifications-sources-detailed and general specifications – tenders- e-tender contracts- contracts types– preparation of tender notice and documents-arbitration and legal requirements

UNIT IV VALUATION 12HRS

Necessity – basics of value engineering –capitalized value – depreciation and its methods – escalation _ value of building – calculation of standard rent – mortgage- lease.

UNIT V REPORT PREPARATION AND CASH FLOW 12 HRS

Principle of report preparation – report on estimate of residential building- commercial building -culvert – roads – water supply and sanitary installations – tube wells – open wells.

Total No of Hours: 60

TEXT BOOKS

1. B.N.Dutta, Estimating And Costing In Civil Engineering –UBS publishers and distribution Pvt Ltd, 2003.
2. Mr. B.Kanagasabapathy, M/S. Ehilalarasi Kanagasabapathy,Practical Valuation – Vol I, Thiruchirappalli, 1995.
3. Kohl, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S.Chand & CompanyLtd., 2004.
4. Rangwala, “Estimating, Costing and Valuation”, Charotar Publishing House Pvt Ltd., 2012.

REFERENCES

1. *G.S.Birdie, A Text Book On Estimating And Costing, Dhanpat Rai And Sons, New Delhi,1995.*
2. *Mr. B.Kanagasabapathy, M/S. Ehilalarasi Kanagasabapathy, Fixation of Fair Rent , Thiruchirappalli, 1995.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name : DESIGN OF STEEL STRUCTURES	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18012	Prerequisite: Structural analysis	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE:

- To introduce the student to material behaviour and Load and Resistance Factor Design methodology.
- To design and analyze tension members and compression members.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	The students would have knowledge on the design of structural steel members subjected to compressive, tensile and bending forces, as per current code .
CO2	To know to design structural systems such as roof trusses and gantry girders.
CO3	To design and analyze beams and connections

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M	M	M				
CO2	H	H	H	H		M	M	M				
CO3	H	H	H	H		M	M	M				

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								
Approval												

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18012	DESIGN OF STEEL STRUCTURES	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION **9 HRS**

Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Connections using rivets, welding, bolting – Design of bolted and welded joints – Eccentric connections - Efficiency of joints.

UNIT II TENSION MEMBERS **9 HRS**

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag

UNIT III COMPRESSION MEMBERS **9 HRS**

Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of laced and battened type columns – Design of column bases – Gusseted base

UNIT IV BEAMS **9 HRS**

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.

UNIT V ROOFTRUSSES AND INDUSTRIAL STRUCTURES **9 HRS**

Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing – Design of gantry girder.

Total No of Hours: 45

TEXTBOOKS:

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2 nd Edition, 2013.
3. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013.

REFERENCES:

1. Narayanan.R.et.al. "Teaching Resource on Structural Steel Design", INSDAG, Ministry of Steel Publications, 2002
2. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005
3. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800–2007, IK International Publishing House Pvt. Ltd., 2009
4. Shah.V.L. and Veena Gore, "Limit State Design of Steel Structures", IS 800–2007 Structures Publications, 2009.
5. IS 800 :2007, General Construction In Steel - Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18ET3	Subject Name : REMOTE SENSING AND GIS	Ty / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Engineering Geology, Engineering survey	ETL	2	0/0	2/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Introduce the principles of remote sensing to students who are beginners in this field.
- Fundamental knowledge on the physics of remote sensing.
- Aerial photographic techniques, image interpretation techniques ,to create basic understanding of GIS concepts

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	Apply the concepts of Electro Magnetic energy, spectrum and spectral signature curves in the practical problems
CO2	Apply the concepts of satellite and sensor parameters and characteristics of different platforms
CO3	Apply the concepts of DBMS in GIS
C04	Analyze raster and vector data and modeling in GIS
C05	Apply GIS in land use, disaster management, ITS and resource information system

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M	M	M						M
CO2	H			M	M	M						M
CO3	H			M	M	M						M
CO4	H			M	M	M						M
CO5	H			M	M	M						M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H
CO4	H	H
CO5	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18ET3	REMOTE SENSING AND GIS	ETL	2	0/0	2/0	3

UNIT I INTRODUCTION TO REMOTE SENSING 9 HRS

Definition – components of remote sensing – , Energy sources and radiation principles, electromagnetic radiation (EMR) –EMR spectrum, active and passive remote sensing – platforms — visible, infra red (IR), near IR, middle IR , thermal IR and microwave – black body radiation - Planck's law – Stefan-Boltzman law.

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIALS 9 HRS

Atmospheric characteristics, scattering of EMR – Raleigh, MIE, non-selective and Raman scattering – EMR interaction with water vapour and ozone – atmospheric windows – significance of atmospheric windows – EMR interaction with earth surface materials – radiance, irradiance, incident, reflected, absorbed and transmitted energy – reflectance – specular and diffuse reflection surface- spectral signature – spectral signature curves – EMR interaction with water, soil and earth surface

UNIT III OPTICAL AND MICROWAVE REMOTE SENSING SYSTEMS 9 HRS

Satellites - classification – based on orbits – sun synchronous and geo synchronous – based on purpose – earth resource satellites, communication satellites, weather satellites, spy satellites, spectral, radiometric and spatial resolutions, Multispectral, thermal and hyper spectral sensing, along and across track scanners – description of sensors in land sat, spot, irs series – current satellites - radar – speckle - back scattering – side looking airborne radar – synthetic aperture radar – radiometer – geometrical characteristics

UNIT IV GEOGRAPHIC INFORMATION SYSTEM 9 HRS

GIS – components of GIS, data – spatial and non-spatial – maps – types of maps – projection – types of projection - raster and vector data structures – comparison of raster and vector data structure – GIS analysis using raster and vector data – DEM for Slope, Aspect, Flow direction, Flow pathways, Flow accumulation, Streams, Catchment area delineation, retrieval, reclassification, overlaying, buffering – data output.

UNIT V IMAGE PROCESSING AND APPLICATIONS OF RS & GIS 9 HRS

Visual interpretation of satellite images – elements of interpretation - interpretation keys, Digital Image Processing - application of remote sensing and GIS – urban applications - integration of GIS and remote sensing – Remote sensing applications for watershed management, Rainfall runoff modeling, Irrigation management, Flood mapping, Drought assessment, Environment and ecology, urban analysis –resources information systems.

Total No of Hours : 45

TEXT BOOKS

1. Anji Reddy, Remote Sensing and Geographical Information Systems, B.S. Publications, New Delhi, 2001
2. M.G. Srinivas (edited by), Remote Sensing Applications, Nervosa Publishing House, New Delhi, 2001.

REFERENCE

1. Lillesand T.M. And Kiefer R.W. Remote Sensing And Image Interpretation, John Wiley And Sons, Inc, New York, 1987.
2. Janza.F.J., Blue, H.M., Johnston, J.E.., "Manual of Remote Sensing Vol.I American Society of Photogrammetry, Virginia, U.S.A, 1975.
3. Burrough P.A, Principle Of Gis For Land Resource Assessment, Oxford, 1990

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BAR18IL2	Subject Name : BASICS OF AUTOCADD	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building Drawing Practice	Lb	0	0/0	2/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To provide the student with an appreciation of the capabilities and limitations of the AutoCAD program.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	prepare the building plans satisfying the principles of planning and byelaws.
CO2	draw plan, section and elevation for various structures
CO3	prepare detailed working drawings of doors, windows, roof trusses and staircases

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		H			H		M				H
CO2	H		H			H		M				H
CO3	H		H			H		M				H
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					

DEPARTMENT OF CIVIL ENGINEERING

SubjectCode: **BAR18IL2**	Subject Title : **BASICS OF AUTOCADD**	**Ty/Lb/ETL** **Lb**	**L** **0**	**T / S.Lr** **0/0**	**P/ R** **2/0**	**C** **1**

EXPERIMENTS

1. Learn and use basic AutoCAD commands - manage drawing using layers, colour and line types - complete basic cad drawings, with borders, text and dimensions - use and edit text and text styles – Method of scales in various drawing - understand and the use of blocks.
2. Development of line plan for residential building. one for single storied building
3. Development of line plan for residential building. one for two storied building
4. Submission drawing for residential building including its planning and with area and parking statements and all other details as per the norms and local bye-laws.
5. Industrial buildings with roof truss.
6. To draw the 3D view of residential building.

Total No of Hours: 30 hrs

TEXT BOOKS

1. Civil Engg. Drawing & House planning – B.P.Verma, Khanna publishers, Delhi,1990
2. Building drawing & detailing – Dr. Balagopal & T.S.Prabhu, Spades publishers, Calicut,1989.

REFERENCES

1. *Building drawing – Shah, Tata McGraw-Hill, New Delhi,2000.*
2. *Building planning & drawing – Dr. N.Kumaraswamy, A.Kameswara Rao, Charotar publishing house. Mumbai,1997.*
3. *Shah, Kale and Patki, Building drawing, Tata McGraw-Hill New Delhi,,1998.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18011	Subject Name: **DISASTER MITIGATION AND MANAGEMENT**	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NONE	Ty	3	1/0	0/0	4

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : To understand various technological options especially Remote Sensing and GIS in Disaster management.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	At the end of the Subject the student will be able to understand the concepts of disaster and disaster management
CO2	Different techniques for analysis of disaster proneness and mitigation measures
CO3	The use of spatial science in four folds of disaster management

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						M		M		M	M	H
CO2						M		M		M	M	H
CO3						M		M		M	M	H

COs / PSOs	PSO1	PSO2
CO1	L	L
CO2	L	L
CO3	L	L

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Management Science		
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18011	DISASTER MITIGATION AND MANAGEMENT	Ty	3	1/0	0/0	4

UNIT I DISASTER PRINCIPLES 12 HRS

Basic concepts and principles – Hydrological and geological disasters, characteristics crisis and consequences – Role of Government administration, University research organization and NGO"s – International disaster assistance – Sharing technology and technical expertise.

UNIT II LONG TERM MITIGATION MEASURES 12 HRS

Needs and approach towards prevention – Principles and components of mitigation Disaster legislation and policy – Insurance – Cost effective analysis – Utilisation of resources -Training – Education – Public awareness – Roles of media.

UNIT III SAFETY RATING OF STRUCTURES 12 HRS

Slope stability of Ghat roads -Structural safety of Dams, Bridges, Hospitals, Industrial structures, – Disaster resistant structures – Low cost housing for disaster prone areas – Cyclone shelter projects and their implications – Reconstruction after disasters: Issues of practices.

UNIT IV SPACE SCIENCE INPUT IN DISASTER ANAGEMENT 12 HRS

Remote sensing in Hazard evaluation – Zonation – Risk assessment – Damage assessment- Land use planning and regulation for sustainable development –Communication satellite applicationNetwork- Use of Internet – Warning system – Post disaster review – Case studies.

UNIT V EMERGENCY PLANNING USING SPATIAL AND NON-SPATIAL ATA 12 HRS

Information systems management – Spatial and non-spatial data bank creation – Operational emergency management – Vulnerability analysis of infrastructure and settlements – Predisaster and post disaster planning for relief operations – Potential of GIS application in development planning – Disaster management plan – Case studies.

Total No of Hours: 60 HRS

TEXTBOOKS:

1. Bell, F.G. Geological Hazards: Their assessment, avoidance and mitigation. E & FN SPON Routledge, London. 1999.
2. David Alexander, Natural Disasters, UCL Press, London, Research Press, New Delhi, 1993.

REFERENCES :

1. *Nick Carter. W. Disaster Management – A Disaster Manager"s Handbook. Asian Development Bank, Philippines. 1991.*
2. *Mitigating Natural Disasters, Phenomena, Effects and options, A Manual for policy makers and planners, United Nations. New York,1991.*
3. *George G. Penelis and Andreas J. Kappos – Earthquake Resistant concrete Structures. E & FN SPAN, London, 1997.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18ET4	Subject Name : TRANSPORTATION ENGINEERING	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Soil Mechanics, Survey	ETL	2	0/0	2/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To understand the aspects of design, construction and maintenance of tracks for the safe and¬ efficient movement of public and goods. To have an overall knowledge of the design and construction of Highway, airport, docks, harbors and ports as a whole .

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	The students completing this Subject would have acquired knowledge on planning, design, construction
CO2	the students will have the ability to Plan and Design various civil Engineering aspects of Railways,
CO3	Knowledge of Airports and Harbour.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H		M			H		M			M	
CO2	H		M			H		M			M	
CO3	H					H		M			M	
COs / PSOs	PSO1		PSO2									
CO1	H		H									
CO2	H		H									
CO3	H		H									

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
				√								

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18ET4	TRANSPORTATION ENGINEERING	ETL	2	0/0	2/0	3

UNIT I :HIGHWAY PLANNING AND ALIGNMENT **9 HRS**

Significance of highway planning –History of road development in India – Classification of highways – Locations and functions – Factors influencing highway alignment – Soil suitability analysis - Engineering surveys for alignment, objectives, conventional and modern methods.

UNIT II: GEOMETRIC DESIGN OF HIGHWAYS **9 HRS**

Typical cross sections of Urban and Rural roads — Cross sectional elements - Sight distances – Horizontal curves, Super elevation, transition curves, widening at curves – Vertical curves - Gradients, Special consideration for hill roads - Hairpin bends – Lateral and vertical clearance at underpasses.

UNITIII: RAILWAYS PLANNING CONSTRUCTION AND MAINTENANCE **10 HRS**

Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings. Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks – Modern methods of construction & maintenance

UNIT IV: AIRPORT PLANNING & DESIGN **9 HRS**

Airport planning, components of airports, airport site selection Runway design- orientation, geometric design and correction for gradients Terminal area, airport layout, airport buildings, passenger facilities, parking area and airport zoning

UNIT V: HARBOUR ENGINEERING **8 HRS**

Definition of terms - harbors, ports, docks, tides and waves. Harbors – requirements, classification – site investigation for locations, planning and layouts Terminal facilities – port buildings, warehouse, transit sheds, inter-modal transfer facilities, mooring accessories, navigational aids coastal structures piers, breakwaters, wharves, jetties, quays.

Note: A Project report has to be submitted on any of the above topics which will be evaluated during the semester practical exams.

Total No of Hours: 45

TEXT BOOKS

1. Saxena Subhash C and Satyapal Arora, A Subject In Railway Engineering, Dhanpat Rai And Sons, Delhi, 1998.
2. Khanna S K, Arora M G and Jain S S, Airport Planning And Design, Nemchand And Brothers, Roorkee, 1994.
3. Khanna K And Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2001.
4. Kadiyali l r, Principles and Practice of Highway Engineering, Khanna technical Publications, Delhi
5. Dr K.P.Subramaniyam, Transportation Engineering, Scitech Publishers, Chennai 2003

REFERENCES

1. *IRC standards, 2002*
2. *Bureau of Indian Standards (bis) publications on highway materials, 1998*
3. *Rangwala, Railway Engineering, Charotar Publishing House, Mumbai, 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name :	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18L08	STRUCTURAL ANALYSIS AND DESIGN BASED ON CIVIL ENGINEERING SOFTWARE					
	Prerequisite: None	Lb	0	0/0	3/0	1

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Concurrent Engineering based user environment for model development, analysis, design, visualization and verification. The Subject covers the complete analysis and design of RCC structures.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	They will have knowledge of designing a beam ,column and slab as per code
CO2	They will get an idea about member selection and optimized members selection consisting of design .
CO3	able to visualize and interpret data in software

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H							H	H
CO2	H	H	H	H							H	H
CO3	H	H	H	H							H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							✓					

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18L08	STRUCTURAL ANALYSIS AND DESIGN BASED ON CIVIL ENGINEERING SOFTWARE	Lb	0	0/0	3/0	1

LIST OF EXPERIMENTS

1. Introduction to staad pro - Joint, Member/Element, Mesh Generation with flexible user-controlled numbering
2. Analyse and design any beam with any loading type and any kind of supports.
3. Analyse and design of any 2D Frame with any loading type for any load sets.
4. Portal frame with 5 load combinations- Analysis
5. Analysis of beam with moving load
6. Analyse steel structures with truss elements.

Total No of Hours: 30

TEXT BOOK

1. Structural design and drawing (Reinforced Concrete and Steel)-N. Krishna Raju, University publishers 3rd Edn, 2009.
2. Design Of Steel Structures- B.C.Punmia, Ashok Kumar Jain,Arun kumar Jain ,Lakshmi Publications Pvt Ltd, 1999.

REFERENCE

1. *Krishnamoorthy D- Structural Design and drawing Vol II CBS Publishers and distributors Delhi 1990.*
2. *Krishnamoorthy D- Structural Design and drawing Vol III (steel structures) CBS Publishers and Distributors Delhi 1990.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name: PRINCIPLES OF MANAGEMENT	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
BMG18001	Prerequisite: NONE	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To increasing organizational effectiveness, To achieve optimum utilization of various resources.To have co-ordination between various department in the organization.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling
CO2	Have same basic knowledge on international aspect of management
CO3	Able to apply managerial skill in working environment

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						M		M		M	M	H
CO2						M		M		M	M	H
CO3						M		M		M	M	H

COs / PSOs	PSO1	PSO2
CO1	L	L
CO2	L	L
CO3	L	L

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills	Management Science		
										√		

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BMG18001	PRINCIPLES OF MANAGEMENT	Ty	3	0/0	0/0	3

OBJECTIVES:

- To increasing organizational effectiveness, To achieve optimum utilization of various resources.
- To have co-ordination between various department in the organization.

UNIT-I **9HRS**

Management: Importance – Definition – Nature and Scope of Management Process – Role and Functions of a Manager – Levels of Management – Development of Scientific Management and other Schools of thought and approaches.

UNIT-II **9HRS**

Planning: Nature – Importance – Forms – Types – Steps in Planning – Objectives – Policies – Procedures and Methods – Natures and Types of Policies – Decision –making – Process of Decision – making – Types of Decision.

UNIT-III **9HRS**

Organisation: Types of Organisations – Organisation Structure – Span of Control and Committees – Departmentalisation – Informal Organisation.

UNIT-IV **9HRS**

Authority – Delegation – Decentralisation – Difference between Authority and Power – Responsibility – Recruitment – Sources, Selection, Training – Direction – Nature and Purpose.

UNIT-V **9HRS**

Co-ordination – Need, Type and Techniques and requisites for excellent Co-ordination – Controlling – Meaning and Importance – Control Process.

Total No of Hours :45

Reference Books

1.C.B.Gupta, Management Theory & Practice -Sultan Chand & Sons - New Delhi.
2. L.M.Prasad, Principles & Practice of Management - Sultan Chand & Sons - New Delhi.
3. P.C. Tripathi & P.N Reddy, Principles of Managements - Tata Mc.Graw Hill - New Delhi.
4. Weihrich and Koontz, Management – A Global Perspective.
5. N.Premavathy, Principles of Management - Sri Vishnu Publication - Chennai.
6. J.Jayasankar, Business Management - Margham Publication - Chennai.

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18L013	Subject Name: **PROJECT**	**Ty/Lb/ ETL**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite: ALL	Lb	0	0/4	0/8	8

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to civil engineering.

SUBJECT OUTCOMES (COs) : (3- 5) Students will be able to

CO1	Work in a team and develop multidisciplinary ,research skills
CO2	Explore innovative ideas in civil engineering field
CO3	Develop projects based on industrial and field requirements

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO2	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**
CO3	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**	**H**

COs / PSOs	**PSO1**	**PSO2**							
CO1	**H**	**H**							
CO2	**H**	**H**							
CO3	**H**	**H**							

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
							√					

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/S.Lr	P/R	C
BCE18L013	PROJECT	Lb	0	0/4	0/8	8

OBJECTIVE

The objective of project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to civil engineering. Every project work shall have a guide who is a member of the faculty of the university.

Fourteen periods per week shall be allotted in the time table for this important activity and this time shall be utilized by the students to receive directions from the guide, on library reading, laboratory work, computer analysis or field work as assigned by the guide and also to present in periodical seminars the progress made in the project. Each student shall finally produce a comprehensive report covering background information, literature survey, problem statement, project work details and conclusions. This final report shall be typewritten form as specified in the guidelines. The continuous assessment and semester evaluation may be carried out as specified in the guidelines to be issued from time to time.

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E01	Subject Name: HYDROLOGY	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To get exposure in the field of hydrology; To know the basic concepts in hydrology. To study the features of precipitation, evaporation and infiltration; To learn basics, estimation, and modeling of runoff;. To understand estimation, forecasting and control of flood; To familiarize computer applications in hydrology

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation
CO2	The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing
CO3	The students will know the basics of groundwater and hydraulics of subsurface flows

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H		H			M	M
CO2	H	H		H	H	H		H			M	M
CO3	H	H		H	H	H		H			M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E01	HYDROLOGY	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION 9HRS

Definition & Scope- Practical applications-Hydrological cycle – Transitory systems- formation, Types and forms of precipitation – Winds and their movement–Climate & weather season in India-Catchment area

UNIT II PRECIPITATION 9HRS

Measurement of Precipitation-Recording & Non- Recording Rain Gauges-Intensity duration Analysis-Intensity frequency duration Analysis- Average depth of precipitation over an areas-Depth area duration analysis- Rain gauge network.

UNIT III EVAPORATION & INFILTRATION 9HRS

Introduction- Evaporation process- Factors affecting Evaporation- Evaporation Eestimation-Evaporation measurement- Evapotranspiration- Factors affecting infiltration-measurement of infiltration- Infiltration Equations

UNIT IV STREAM FLOW MEASUREMENT & HYDROGRAPH ANALYSIS 9HRS

Introduction-Measurement of stage-discharge measument –area velocity method (Current meter method)-moving boat method- Stage discharge relationships – Flow measurements – Features of hydrograph- base flow-Hydrograph seperation

UNIT V GROUND WATER HYDROLOGY 9HRS

Occurrence of ground water – Types of aquifer – Dupuit's assumptions – Darcy's law – Estimation of aquifer parameters – Pump tests.

Total No. of Hours : 45

REFERENCES

1. *Jeya Rami Reddy.P,Hydrology, Laximi Publications, New Delhi, 2004.*
2. *Subramanya K.,Hydrology,Tata McGraw Hill Co., New Delhi, 1994*
3. *Patra.K.C, Hydrology and Water Resources Engineering, Narosa Publications, 2008, 2 nd Edition, New Delhi.*
4. *Chow V.T., Maidment D.R., Mays L.W., "Applied Hydrology,McGraw Hill Publications, NewYork, 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E02	Subject Name: DAM ENGINEERING	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart a knowledge on types of dam,its functions and design principles.

SUBJECT OUTCOMES (COs) : (3- 5)

At the end of the Subject, the student will be able to:

CO1	Analyse and design gravity dams
CO2	Analyse and design earth and rockfill dams
CO3	Design spillways and energy dissipation structures

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H	M	H		H			M	M
CO2	H	H	H	H	M	H		H			M	M
CO3	H	H	H	H	M	H		H			M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
Co3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E02	DAM ENGINEERING	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION 9HRS

Types of Dam, merits and demerits, dam site selection, selection of dam, Forces acting on gravity Dam, Methods of analysis of gravity Dam, Modes of failure and stability requirements, Design criteria and factor of safety.

UNIT II GRAVITY DAM 9HRS

Elementary profile of a gravity dam, Low and high gravity dams, Zoning of dams, Galleries in dams,Temperature control in mass concrete; gravity dams subjected to earthquakes.

UNIT III BUTTRESS AND ARCH DAMS 9HRS

Buttress and Arch dams, Types, selection, merits and demerits, Elementary design Principles of Arch and Buttress dams.

UNIT IV EARTH DAM 9HRS

Earth Dam their component and functions, causes of failure. Factors influencing the design of an earthdam. Design criteria for Earth Dam.

UNIT V SPILLWAY 9HRS

Elementary idea of design for spillway and energy dissipaters.

Total No of Hours: 45

TEXT BOOKS

1. R.S. Varshney “Concrete Dams”, by 1982, NCB, Roorkee
2. Design of Small Dams, USBR 1960, Calcutta, Oxford and IBH
3. W.P. Creager, J. Justin,.Daud Hinds, “Engineering for Dams” Vol. I-III, Wiley, N.Y., USA.
4. IS: 6512-1984, Criteria for Design of solid Gravity Dams.
5. IS:1893-1984, , Criteria for Earthquake resistant Design of structures.

REFERENCES

1. *NPTEL Course materials from different IITs*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E03	Subject Name : INDUSTRIAL STRUCTURES	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- This Subject deals with some of the special aspects with respect to Civil Engineering structures in industries.

SUBJECT OUTCOMES (COs) : (3- 5)
At the end of this Subject the student shall be able to.

CO1	Discuss the planning and functional requirements of Industrial structures**.**
CO2	Discover the need to learn about the design concepts, and constructional aspects of Industrial structure.
CO3	Analyse and evaluate the importance of various construction materials for Industrial Construction.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		M	M		M		M	
CO2	H	H	H	H		M	M		M		M	
CO3	H	H	H	H		M	M		M		M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E03	Subject Title : INDUSTRIAL STRUCTURES	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I PLANNING 9HRS

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

UNIT II FUNCTIONAL REQUIREMENTS 9HRS

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

UNIT III DESIGN OF STEEL STRUCTURES 9HRS

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

UNIT IV DESIGN OF R.C. STRUCTURES 9HRS

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

UNIT V PREFABRICATION 9HRS

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Total No. of Hours: 45

TEXT BOOKS

1. Reinforced Concrete Structural elements – P. Purushothaman
2. Pasala Dayaratnam – Design of Steel Structure - 1990

REFERENCES

1. *Henn W. Buildings for Industry, Vols. I and II, London Hill Books, 1995*
2. *Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990*
3. *Subject Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E04	Subject Name: ENVIRONMENTAL IMPACT ASSESSMENT	TY / LB/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: None	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE

- To know the objectives, capability, and limitations of environmental impact assessment.
- To learn methodologies and legal aspects of environmental impact assessment;

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	carry out scoping and screening of developmental projects for environmental and social assessments
CO2	explain different methodologies for environmental impact prediction and assessment
CO3	plan environmental impact assessments and environmental management plans

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H	H	H			H	H
CO2	H	H		H	H	H	H	H			H	H
CO3	H	H		H	H	H	H	H			H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E04	ENVIRONMENTAL IMPACT ASSESSMENT	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION 9HRS

Impact of development on environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) – Objectives – Historical development – EIA capability and limitations – Legal provisions on EIA.

UNIT II METHODOLOGIES 9HRS

Methods of EIA – Strengths, weaknesses and applicability – Appropriate methodology – Case studies.

UNIT III PREDICTION AND ASSESSMENT 9HRS

Socio Economic Impact – Assessment of Impact on land, water and air, energy impact; Impact on flora and fauna; Mathematical models; public participation – Reports – Exchange of Information – Post Audit – Rapid EIA.

UNIT IV MATHEMATICAL MODELS FOR ASSESSMENT 9HRS

Use the mathematical models in EIA – Water quality, air quality and noise; assumptions and limitations.

UNIT V ENVIRONMENTAL MANAGEMENT PLAN 9HRS

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna, addressing the issues related to the project affected people.

Total No. of Hours:45

TEXT BOOKS

1. Canter, R.L. Environmental Impact Assessment, McGraw Hill Inc., New Delhi, 1996.
2. S.K.Shukla and P.R.Srivastava, Concepts in Environmental Impact Analysis, Common Wealth Publishers, New Delhi, 1992.

REFERENCES

1. *John G.Rau and David C Hooten (Ed)., Environmental Impact Analysis Handbook, McGraw Hill Book Company, 1990.*
2. *Environmental Assessment Source book, Vol. I, II & III. The World Bank, Washington, D.C., 1991.*
3. *Judith Petts, Hand book of Environmental Impact Assessment Vol. I & II, Blackwell Science, 1999.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E05	Subject Name : DESIGN OF CONCRETE STRUCTURES	Ty/Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Strength of materials	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart comprehensive knowledge on the design of reinforced concrete structural elements such as beams, columns, slabs and footings.
- To bring about an understanding of the behaviour of reinforced concrete and the design philosophies

SUBJECT OUTCOMES (COs) : (3- 5) The student shall knew

CO1	to design and detailing a slab
CO2	to design and detailing a column
CO3	to design and detailing a footing.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H				M	M		M	M
CO2	H	H	H	H				M	M		M	M
CO3	H	H	H	H				M	M		M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E05	DESIGN OF CONCRETE STRUCTURES	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION, LIMIT STATE DESIGN OF BEAMS AND SLABS 9 HRS

Properties of different grades of concrete and steel, Behavior of RC members, Permissible stresses - Stress block parameters, Stress strain relationship - Failure criteria Analysis - Introduction to IS 456-2000, SP: 16 - Design and detailing of singly reinforced & doubly reinforced beam - Design and detailing of one-way and two-way slab panels – Flat Slabs (Design of beams and slabs for combined shear, bending and torsion).

UNIT II LIMIT STATE DESIGN OF COLUMNS AND FOOTINGS 9 HRS

Basic assumptions - Design and detailing of reinforced concrete short columns of rectangular and circular cross sections under axial load - Column under compression and bi axial bending using IS 456:2000 - Design and detailing of isolated footing for column subjected to axial loads, Design and detailing of Axially and eccentrically loaded Rectangular footings, Design and detailing of Combined Rectangular footings for Two Columns.

UNIT III DESIGN OF STAIRCASE AND WATER TANK 9 HRS

Introduction to ductile detailing & provisions of IS 13920, Design of Staircases - Design of circular and rectangular water tanks resting on ground. Design of staging and foundations

UNIT IV RETAINING WALLS 9 HRS

Design of retaining walls – Cantilever and Counter fort retaining walls

UNIT V YIELD LINE THEORY AND INTRODUCTION TO BRICK MASONRY 9 HRS

Application of virtual work method to square, rectangular, circular and triangular slabs, Design of masonry wallsand pillars as per NBC and IS codes

Total No of Hours: 45

TEXT BOOKS

1. N.Krishna Raju “Design of Reinforced Concrete Structures”, CBS publishers & Distributors. Latest Edition, IS456:200.
2. S.Ramamrudham ,Design of Reinforced Concrete Structures, Dhanpat Rai publishing company(p) Ltd New Delhi.
3. Varghese P C, Limit State Design of Reinforced Concrete, Prentice Hal of India, Private, Limited New Delhi, 1997.

REFERENCES

1. *Ashok K. Jain Reinforced concrete- Limit state design- New chand & Bros, Roorkee 1997.*
2. *Dayarathnam.P, Brick and Reinforced Brick Structures, Oxford and IBH Publishing House, 1999.*
3. *IS: 456- 2000 “Indian Standard for Plain and reinforced concrete – code of practice “Bureau of Indian Standard”.*
4. *A.P Arul Manikam “Structural Engineering” .*
5. *Design aids to IS 456-1978 (SP16).*
6. *SP 34 Handbook on Concrete Reinforcement and Detailing, BIS 1987.*
7. *IS 1905:1987, Code of practice for structural use of unreinforced masonry Bureau of Indian Standards.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E06	Subject Name: HOUSING PLANNING AND DESIGN	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Building Drawing Practice	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- A house plan is a set of construction or working drawings that define all the construction specifications of a residential House A truly successful project is one where project goals are identifies early on and where the interdependencies of all building systems are coordinated concurrently from the planning and programming phase.

SUBJECT OUTCOMES (COs) : (3- 5)

After successful completion of this Subject, the students should be able to

CO1	Plan the buildings, as per the law and rules and regulations
CO2	Analyze the slum clearance project and prepare plan for plot map cost flow
CO3	identify the financing agencies and its functions

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H				H		H			H	
CO2	H	H				H		H			H	
CO3	H	H				H		H			H	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E06	HOUSING PLANNING AND DESIGN	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION TO HOUSING 9HRS

Definition of Basic Terms – House, Home, Household, Apartments - Objectives of National Housing Policies, Principle of Sustainable Housing, Housing Laws at State level, Local bodies' Bye-laws at Urban and Rural Level and Development Control Regulations, Institutions for Housing at National, State and Local levels.

UNITII HOUSING PROGRAMMES 9HRS

Basic Concepts – Contents and Standards for Housing Programmes - Sites and Services, Neighbourhood, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programme, Role of Public, Private and Non-Government Organisations.

UNIT III PLANNING AND DESIGN OF HOUSING PROJECTS 9HRS

Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design Problems).

UNIT IV CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS9HRS

New Constructions Techniques – Cost Effective Modern Construction Materials, Building Centers – Concept, Functions and Performance Evaluation.

UNIT V HOUSING FINANCE AND PROJECT APPRAISAL 9HRS

Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy, Pricing o f Housing Units, Rents, Recovery Pattern (Problems).

Total No of Hours : 45

TEXT BOOKS

1. Meera Mehta and Dinesh Mehta, Metropolitan Housing Markets, Sage Publications Pvt. Ltd., New Delhi, 1999.
2. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997.

REFERENCES

1. *Development Control Rules for Chennai Metropolitan Area, CMA, Chennai, 200.*
2. *UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.*
3. *National Housing Policy, 1994, Government of India.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Name	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
BCE18E07	BUILDING TECHNOLOGY AND HABITAT ENGINEERING					
	Prerequisite: none	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

SUBJECT OUTCOMES (COs) : (3- 5)
After successful completion of this Subject, the students should be able to

CO1	Recognise the various materials used in building construction
CO2	Understand the importance of climate and its influence in construction
CO3	Understand the importance of thermal control, ventilation and air movement in building.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H				H		H				M	
CO2	H				H		H				M	
CO3	H				H		H				M	

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E07	BUILDING TECHNOLOGY AND HABITAT ENGINEERING	Ty	3	0/0	0/0	3

UNIT I BUILDING STONES **9HRS**

Requirement of good building stone- characteristics - testing.Lime: Properties- Classifications - Manufacture -Testing of lime. Pozzolona: Natural and Artificial pozzolonas. Timber - Defects - Seasoning - Decay - Preservation, Tiles- Flooring and roofing tiles-specification-tests. Paints varnishes and distempers, Common constituents, types and desirable properties.

UNIT II MISCELLANEOUS MATERIALS **9HRS**

Insulating Materials - Thermal and sound insulating material desirable properties and type. Geosynthetics and its applications .Lintels –Arches – Stairs- different types and its components. Doors, Windows and Ventilations -Classification - Technical terms-Classification and Types

UNIT III ROOF **9HRS**

Types of roofs – wooden trusses .Finishing works - Plastering, pointing, painting, white washing, colour washing, distempering; Damp proofing ant termite treatment.

UNIT IV CLIMATE AND COMFORT **9HRS**

Global climatic factors – Elements of climates –Classification of tropical climates- site climate .The desirable conditions- Thermal comfort factors-Thermal comfort indices – Effective temperature

UNIT V THERMAL CONTROL **9HRS**

Means of thermal control – Mechanical control- structural control- ventilation and air movement

Total No of Hours : 45

REFERENCES:

1. *Gurucharan Singh, Building materials,,1996*
2. *Rangwala S. C, Engineering Materials, Charotar Publishing House, 1992, Anand*
3. *Punmia B. C, Building Construction, Laxmi Publlications, 1999, New Delhi.*
4. *Rangwala S. C, Building Construction, Charotar Publishing House, 1992, Anand*
5. *Huntington W.C, Building Construction, John Wiley, 1959, New York.*
6. *Koenigsberger,Manual of Tropical Housing and Building, Orient Longman Ltd*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E08	Subject Name COST EFFECTIVE BUILDINGS	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Concrete and Construction Technology	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE : The goal of low-cost housing is to save money while also maintaining buildings quality without sacrificing the strength, performance and life of the structure.

SUBJECT OUTCOMES (COs) : (3- 5)
After successful completion of this Subject, the students should be able to

CO1	Identify the cost effective techniques and environmental friendly materials in construction
CO2	Identify the effects of global warming in construction
CO3	Understand the green building and its benefits in construction field.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H			H	H		H			H	H
CO2	H	H			H	H		H			H	H
CO3	H	H			H	H		H			H	H

COs /	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E08	COST EFFECTIVE BUILDINGS	Ty	3	0/0	0/0	3

UNIT I INTRODUCTION TO COST EFFECTIVE CONSTRUCTION 12HRS

Introduction to the concept of cost effective construction -Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime-Poszolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials-Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building materials.

UNIT II TECHNOLOGIES & METHODS IN CONSTRUCTION 12 HRS

Environment friendly and cost effective Building Technologies - Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies

UNIT III GLOBAL WARMING & THE RELEVANCE OF GREEN BUILDINGS 7 HRS

Global Warming – Definition - Causes and Effects - Contribution of Buildings towards Global Warming - Carbon Footprint – Global Efforts to reduce carbon Emissions - Green Buildings – Definition - Features-Necessity – Environmental benefit - Economical benefits- Health and Social benefits - Major Energy efficient areas for buildings – Embodied Energy in Materials- Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

UNIT IV GREEN BUILDING 7 HRS

Green Buildings – Definition - Features- Necessity – Environmental benefit - Economical benefits - Health and Social benefits - Major Energy efficient areas for buildings - Embodied Energy in Materials- Green Materials - Comparison of Initial cost of Green V/s Conventional Building - Life cycle cost of Buildings.

UNIT V GREEN DESIGN 7 HRS

Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)

Total No of Hours : 45

REFERENCES:

1. *K S Jagadeesh, B V Venkatta Rama Reddy & K S Nanjunda Rao ,Alternative Building Materials and Technologies , New Age International Publishers.*
2. *Asko Sarja ,Integrated Life Cycle Design of Structures , SPON Press.*
3. *D S Chauhan and S K Sreevasthava , Non conventional Energy Resources , New Age International Publishers.*
4. *Laurie Backer, Buildings How to Reduce Cost, Cost Ford.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E09	Subject Name: INDUSTRIAL WASTE MANAGEMENT	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Water supply and sanitary engineering	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge on various environmental legislations.
- To understand the treatment of industrial wastes.
- To impart knowledge on the pollution potential of major industries and the methods of controlling the same.

SUBJECT OUTCOMES (COs) : (3- 5)

After successful completion of this Subject, the students should be able to

CO1	Suggest the industrial waste disposal methods on land and water environment.
CO2	Conduct waste audit in an industry and implement waste minimization techniques.
CO3	Identify the impacts on environment due to various industrial effluents.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H			M	H	H	H	H		M	H	H
CO2	H			M	H	H	H	H		M	H	H
CO3	H			M	H	H	H	H		M	H	H

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E09	Subject Title : INDUSTRIAL WASTE MANAGEMENT	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I INTRODUCTION 9HRS

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Hazardous Wastes – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes – Pollution Control Boards.

UNIT II CLEANER PRODUCTION 9HRS

Waste management Approach – Waste Audit – Volume and strength reduction – material and process modifications – Recycle, reuse and byproduct recovery – Applications.

UNIT III TREATMENT OF INDUSTRIAL WASTEWATER 9HRS

Equalisation – Neutralisation – removal of suspended and dissolved organic solids - Chemical oxidation – Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management.

UNIT IV TREATMENT AND DISPOSAL OF HAZARDOUS WASTES 9HRS

Physio chemical treatment – solidification – incineration – Secured landfills – Legal Provisions.

UNIT V CASE STUDIES 9HRS

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants.

Total No. of Hours:45

TEXT BOOKS

1. M.N.Rao & A.K.Dutta, Wastewater Treatment, Oxford IBH Publication, 1995.
2. W .W. Eckenfelder Jr., Industrial Water Pollution Control, McGraw-Hill Book Company, New Delhi, 1994.

REFERENCES

1. *T.T.Shen, Industrial Pollution Prevention, Springer, 1999.*
2. *R.L.Stephenson and J.B.Blackburn, Jr., Industrial Wastewater Systems Hand book, Lewis Publisher, New York,*
3. *H.M.Freeman, Industrial Pollution Prevention Hand Book, McGraw Hill Inc., New Delhi, 1995.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E10	Subject Name: CLEANER PRODUCTION	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NIL	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits

T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To develop a basic knowledge about the cleaner production and apply the same in the field application.
- To educate the students on complete management principles related to Cleaner Production and Control of Industrial Pollution.

SUBJECT OUTCOMES (COs) : (3- 5)

The students completing the Subject will have an

CO1	insight to sustainable development and cleaner production concept
CO2	ability to plan and implement cleaner production program
CO3	ability to conduct waste audit in an industry and implement waste minimization techniques

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H		H	H	H	H	H			H	M
CO2	H	H		H	H	H	H	H			H	M
CO3	H	H		H	H	H	H	H			H	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E10	Subject Title : CLEANER PRODUCTION	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I INTRODUCTION 9 HRS

Sustainable Development - Indicators of Sustainability - Sustainability Strategies - Barriers to Sustainability –Cleaner Production (CP) in Achieving Sustainability - Environmental Policies and Legislations - Regulations to Encourage Pollution Prevention and Cleaner Production – Regulatory versus Market Based Approaches

UNIT II CLEANER PRODUCTION CONCEPT 9 HRS

Definition - Importance - Benefits - Promotion - Barriers - Role of Industry, Government and Institutions - Environmental Management Hierarchy - Source Reduction Techniques - Process and equipment optimisation, reuse, recovery, recycle, raw material substitution.

UNIT III CLEANER PRODUCTION PROJECT DEVELOPMENT AND IMPLEMENTATION 9 HRS

Overview of CP Assessment Steps and Skills, Preparing for the Site Visit, Information Gathering, and Process Flow Diagram, Material Balance, Establishing a Program - Organizing a Program - Preparing a Program Plan - Measuring Progress - Pollution Prevention and Cleaner Production Awareness Plan - Waste audit - Environmental Statement.

UNIT IV LIFE CYCLE ASSESSMENT 9 HRS

Elements of LCA - Life Cycle Costing - Eco Labelling - Design for the Environment – International Environmental Standards - ISO 14001 - Environmental audit.

UNIT V CASE STUDIES 9 HRS

Industrial applications of CP, LCA, EMS and Environmental Audits.

Total No of Hours :45

REFERENCES

1. *Paul L Bishop (2000) " Pollution Prevention: Fundamentals and Practice " McGraw-Hill International New York.*
2. *World Bank Group (1998) "Pollution Prevention and Abatement Handbook"*
3. *"Towards Cleaner Production ", World Bank and UNEP, Washington D.C.*
4. *Prasad modak, C.Viswanathan and Mandar parasnis (1995)"Cleaner Production Audit ", Environmental System Reviews, No.38, Asian Institute of*

DEPARTMENT OF CIVIL ENGINEERING

Technology, Bangkok.

Subject Code: BCE18E11	Subject Name: ARCHITECTURE AND TOWN PLANNING	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: NONE	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To impart knowledge on architectural design of structures as per the zoning regulations

SUBJECT OUTCOMES (COs) : (3- 5)

After successful completion of this Subject, the students should be able to

CO1	perform architectural design of structures
CO2	suggest the land requirement as per the zoning regulations
CO3	perform Land scape design

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M			H	H	H	M		H	M
CO2	H	H	M			H	H	H	M		H	M
CO3	H	H	M			H	H	H	M		H	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E11	ARCHITECTURE AND TOWN PLANNING	Ty	3	0/0	0/0	3

UNIT I ARCHITECTURAL DEVELOPMENT: 9HRS

Natural and built environment, historic examples, factors influence architectural development.

UNIT II PRINCIPLES OF ARCHITECTURAL DESIGN 9HRS

Design methods, primary elements, form, space, organization, circulation, proportion and scale, ordering principles;

UNIT III FUNCTIONAL PLANNING OF BUILDINGS: 9HRS

Planning, designing and construction, general building requirements, permit and inspection (as per the National building Code);

UNIT IV EVOLUTION OF TOWNS: 9HRS

History and trends in town planning: origin and growth, historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town; New Concepts in town planning: Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning;

UNIT V PLANNING PRINCIPLES, PRACTICE AND TECHNIQUES: 9HRS

Elements of City plan, Estimating future needs, Planning standards, Zoning - its definition, procedure and districts, height and bulk zoning, F. A. R., Master Plan; Concepts of Urban planning, Design and Landscaping.

Total No of Hours: 45

TEXT BOOKS

1. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers, 5th edition, 2005.
2. D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley, 2nd edition 1996.

REFERENCES

1. *National Building Code of India 2005, BIS, New Delhi.*
2. *S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, John Wiley 6th edition 1996.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E12	Subject Name: **CONSTRUCTION MANAGEMENT**	**Ty/Lb/ ETL**	**L**	**T / S.Lr**	**P/ R**	**C**
	Prerequisite: NONE	Ty	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To make the students aware of the various construction techniques and practices.
- To introduce a concepts of projects formulation

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	The student should be able to plan construction projects, schedule the activities using network diagrams,
CO2	Determine the cost of the project, control the cost of the project by creating cash flows and budgeting and to use the project information as decision making tool
CO3	Knowledge about different methods of planning

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**H**					**H**	**M**	**M**		**M**		**H**
CO2	**H**					**H**	**M**	**M**		**M**		**H**
CO3	**H**					**H**	**M**	**M**		**M**		**H**

COs / PSOs	**PSO1**	**PSO2**
CO1	**H**	**H**
CO2	**H**	**H**
CO3	**H**	**H**

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E12	Subject Title : CONSTRUCTION MANAGEMENT	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I NETWORK TECHNIQUES 9 HRS

Introduction to network techniques - Use of CPM and PERT for planning - Scheduling and control of construction work, bar charts Error in networks, Types of nodes and node numbering systems.

UNIT II CONSTRUCTION PLANNING 9HRS

Basic concepts in the development of construction plan - Planning for construction and site facilities using networks - Preparation of construction schedules for jobs, materials, and equipment using CPM.

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UNIT III COST CONTROL OF CONSTRUCTION 9 HRS

Construction quality control and inspection - Significance of variability and estimation of risks - Construction cost control - Crashing of networks.

UNIT IV QUALITY AND SAFETY DURING CONSTRUCTION 9 HRS

Importance of Quality and safety – Organizing for quality and safety – safety measures – Prevention of fire at construction site – Elements and organization of quality - Quality assurance techniques.

UNIT V MANAGEMENT INFORMATION SYSTEM 9 HRS

Definition of MIS – Requirement of MIS – Database approach – Types of project information – Accuracy and use of information.

Total No of Hours: 45

TEXT BOOKS

1. Chitkara, K.K “Consruction Project Management Planning “Scheduling And Control, Tata Mc Graw – Hill Publishing Co., Newdelhi, 1998.
2. S. Seetharaman - Construction Engineering & Management, Dhanpat Rai Publications ,Pune,1995.

REFERENCES

1. *Construction Management - Sangareddy And Meyyappan,Prathibha Publications,Cbe,1994.*
2. *Moder. J., C. Phillips And Davis, “Project Management With Cpm, Pert And Precedence Diagramming,1999.*
3. *Prasanna Chandra, " Project Management ", Tmh ,New Delhi,1997.*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E13	Subject Name: STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Structural Analysis	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To develop systematically from basic principles of structural dynamics the characteristic of dynamic behaviour of the structure, namely, response spectrum;
- To expose important aspects of various theories of cause of earthquake and measurement of its effects on the structure as loads

SUBJECT OUTCOMES (COs) : (3- 5)
At the end of the Subject, student will be able to

CO1	Identify, formulate and solve free and forced vibrations response of structural systems
CO2	The knowledge to analyse structures subjected to dynamic loading
CO3	The knowledge to design the structures for seismic loading as per code provisions.

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		M				M
CO2	H	H	H	H		H		M				M
CO3	H	H	H	H		H		M				M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E13	STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING	Ty	3	0/0	0/0	3

UNIT I SINGLE DEGREE OF FREEDOM SYSTEMS 9 HRS

Formulation of equation of motion-free and forced vibrations-response to dynamic Loading-effect of damping

UNIT II MODAL ANALYSIS 9 HRS

Free and forced vibration of un-damped and damped MDOF systems- equation of Motions- evaluation of natural frequencies and modes

UNIT III INTRODUCTION TOEARTH QUAKE ENGINEERING 9 HRS

Elements of engineering seismology- characteristics of earth quake engineering- earth quake history- Indian seismicity.

UNIT IV BEHAVIOUR OF STRUCTURES AND SOIL 9HRS

Performance of structures under past earth quakes- lessons learnt from past earth Quakes- behavior of soil under earth quake loading- soil liquefaction- soil structure Interaction effects.

UNIT V EARTH QUAKE RESISTANT DESIGN 9HRS

Concept of Earth quake resistant design- provisions of seismic code IS-1893 (part I)- 2002- response spectrum-design spectrum- seismic coefficient- design of buildings.

Total No of Hours: 45

TEXT BOOKS

1. Clough R. W, and Penzien J, Dynamics of structures, Second Edition, Mc Graw- Hill International edition,New Delhi, 1993
2. Mario Paz, structural dynamics- theory and computations, Third Editions CBS Publishers,New Delhi, 1990.

REFERENCES

1. *Minoru Wakabayashi, Design of earth quake resistant buildings,Mc Graw- Hill book company, New York 1986*
2. *Anil K Chopra, Dynamics Of Structures- Theory and applications to Earth quake engineering, Prentice hall inc, 2001*

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DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E14	Subject Name BRIDGE STRUCTURES	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Design of concrete structures	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To make the student to know about various bridge structures, selection of appropriate bridge structures and design it for given
- site conditions.

SUBJECT OUTCOMES (COs) : (3- 5)
At the end of the Subject, students will be able to

CO1	understand the basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.
CO2	identify the sizing of bridge elements ie., develop a clear understanding of conceptual design
CO3	understand the load flow mechanism and identify loads on bridges and carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	H	H		H		H			M	M
CO2	H	H	H	H		H		H			M	M
CO3	H	H	H	H		H		H			M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E14	Subject Title : BRIDGE STRUCTURES	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I INTRODUCTION 9HRS

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders.

UNIT II STEEL BRIDGES 9HRS

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

UNIT III REINFORCED CONCRETE SLAB BRIDGES 9HRS

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading.

UNIT IV REINFORCED CONCRETE GIRDER BRIDGES 9HRS

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

UNIT V PRESTRESSED CONCRETE BRIDGES 9HRS

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder – Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Total No. of Hours: 45

TEXT BOOKS

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.
2. Ponnuswamy S., " Bridge Engineering ", Tata McGraw Hill, New Delhi, 1996.

REFERENCES

1. Phatak D.R., " Bridge Engineering ", Satya Prakashan, New Delhi, 1990.

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E15	Subject Name: PRESTRESSED CONCRETE STRUCTURES	T / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Nil	TY	3	0/0	0/0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- Prestressing methods, principles and concepts are essential for the basic concept of the subject .
- Analysis of prestress and the resultant stresses using different concepts is dealt here;
- Determination of losses in concrete & Anchorage zone stresses in end block can be brought out using IS method

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	Student shall have a knowledge on methods of prestressing
CO2	Student should be able to design various prestressed concrete structural elements.
CO3	Possesses a knowledge on composite construction

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PO 9	PO10	PO 11	PO12
CO1	H	H	H	H		H	H	H	M		M	M
CO2	H	H	H	H		H	H	H	M		M	M
CO3	H	H	H	H		H	H	H	M		M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code:	Subject Title :	Ty/Lb/ETL	L	T/ S.Lr	P/ R	C
BCE18E15	PRESTRESSED CONCRETE STRUCTURES	Ty				

UNIT I INTRODUCTION – THEORY AND BEHAVIOUR 9HRS

Basic concepts – Advantages – Materials required – Systems and methods of pre -stressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons .

UNIT II DEFLECTION 9HRS

Deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of pre-stress – Losses of prestress - types - losses due to elastic deformation of concrete - shrinkage of concrete - creep of concrete - friction - anchorage slip – Estimation of crack width

UNIT III DESIGN 9HRS

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria.

UNIT IV CIRCULAR PRESTRESSING 9HRS

General features & Design of prestressed concrete tanks – Prestressed concrete Poles, Shapes, Features & Design- Prestressed concrete sleepers – Development – Types- Design, Static & dynamic loads

UNIT V COMPOSITE CONSTRUCTION 9HRS

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members– General aspects – pretension pre-stressed bridge decks – Post tensioned pre-stressed bridge decks –Advantages over R.C.C bridges- Design Principles of post tensioned prestressed concrete slab bridge deck, T Beam slab bridge deck & Continuous two span beam deck

Total No of Hours: 45

TEXT BOOKS

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi, 2011
2. S.Ramamrutham, Prestressed concrete,Dhanpatrai Publishing company,2014
3. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH Publishing Co.Pvt. Ltd. 1997.
4. Rajagopalan.N, Prestressed Concrete, Alpha Science, 2002.

REFERENCES

1. *Ramaswamy G.S., Modern Prestressed Concrete Design, Arnold Heinimen, New Delhi, 1990*
2. *Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995*

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E16	Subject Name TALL BUILDINGS	TY / Lb/ ETL	L	T / S.Lr	P/ R	C
	Prerequisite: Structural analysis	TY	3	0/0	0/ 0	3

L : Lecture T : Tutorial SLr : Supervised Learning P : Project R : Research C: Credits
T/L/ETL : Theory/Lab/Embedded Theory and Lab

OBJECTIVE :

- To introduce various aspects of planning of Tall Buildings ;
- To know about different types of loads ;
- To introduce various structural systems for medium rise buildings with their behaviour and analysis;
- To introduce various structural systems for high rise buildings with their behaviour and analysis;
- To impart knowledge about stability analysis of various systems and to know about advanced topics.

SUBJECT OUTCOMES (COs) : (3- 5)

CO1	At the end of this Subject the student should have an understanding on the behaviour of tall buildings subjected to lateral building.
CO2	The students should have knowledge about the rudimentary principles of designing tall buildings as per the existing codes.
CO3	implement design philosophies for the development of high rise structures

Mapping of Subject Outcomes with Program Outcomes (POs)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12
CO1	H	H	H	H		H	H	H	M		M	M
CO2	H	H	H	H		H	H	H	M		M	M
CO3	H	H	H	H		H	H	H	M		M	M

COs / PSOs	PSO1	PSO2
CO1	H	H
CO2	H	H
CO3	H	H

H/M/L indicates Strength of Correlation H- High, M- Medium, L-Low

Category	Basic Sciences	Engineering Sciences	Humanities and Social Sciences	Program Core	Program Electives	Open Electives	Practical / Project	Internships / Technical Skill	Soft Skills			
					√							

DEPARTMENT OF CIVIL ENGINEERING

Subject Code: BCE18E16	Subject Title : TALL BUILDINGS	Ty/Lb/ETL Ty	L 3	T/ S.Lr 0/0	P/ R 0/0	C 3

UNIT I INTRODUCTION 9HRS

The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading –Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.

UNIT II THE VERTICAL STRUCTURE PLANE 9HRS

Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behaviour of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.

UNIT III COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD 9HRS

The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms - The Counteracting Force or Dynamic Response.

UNIT IVAPPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDING 9HRS

Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall Structure The Rigid Frame Structure Approximate Analysis for Vertical Loading – Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.

UNIT V OTHER HIGH-RISE BUILDING STRUCTURE 9HRS

Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.

Total No. of Hours :45

TEXT BOOKS

1. Wolfgang Schueller " High-Rise Building Structures", John Wiley&Sons.
2. Bryan Stafford Smith And Alex Coull, " Tall Building Structures ", Analysis And Design, John Wiley And Sons, Inc., 1991.

REFERENCES

1. *Coull, A. and Smith, Stafford, B. " Tall Buildings ", Pergamon Press, London, 1997.*
2. *LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.*
3. *Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.*