AL-AMEEN ENGINEERING COLLEGE

(Autonomous)

Accredited by NAAC with "A" Grade :: An ISO Certified Institution
(Affiliated to Anna University, Chennai & Approved by AICTE, New Delhi)
Karundevanpalayam, NanjaiUthukkuli Post, Erode – 638 104, Tamilnadu, INDIA.

CURRICULUM & SYLLABI

SEMESTERS – I to VIII

(Regulations 2020)

CHOICE BASED CREDIT SYSTEM

B.E. CIVIL ENGINEERING

Applicable to the Students admitted from the AY 2021-22 onwards

KNOWLEDGE LEVELS (BLOOM'S TAXONOMY)

Notation	Knowledge Levels
K1	Remembering
K2	Understanding
K3	Applying
K4	Analysing
K5	Evaluating
K6	Creating

INSTITUTION VISION
To be a multi-disciplinary institute of academic excellence in Engineering, Technology and allied fields for uplifting the under-privileged and rural; inculcating brotherhood and positivism among its students.

INSTITUTION MISSION
To groom confident, wholesome students with social consciousness and values, by endeavoring experiences for the ever-changing world of work.

DEPARTMENT VISION
To establish an outstanding centre of regional and national reputation for providing a quality engineering education to the students from the rural areas, excellent services to the professional and the community; to produce quality civil engineers; and to employ principles of continual quality improvement to enhance its programme and faculty.

DEPARTMENT MISSION	
M1	To serve the people and the country by providing a broad and high-quality education to its student for a successful professional career.
M2	To conduct strong basic for national needs.
M3	To serve the construction industry; civil engineering profession and rural community through dissemination of knowledge and technical services.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO 1	To train the students so that they can work and contribute to the infrastructure development projects being undertaken by Govt. and private or any other sector companies.
PEO 2	To train students in such as a way that they can pursue higher studies so that they can contribute to the teaching profession / research and development of civil engineering and other allied fields.
PEO 3	To train students in a manner that they should function effectively in the multicultural and multidisciplinary groups for the sustainable development and growth of civil engineering projects and profession.

PROGRAM OUTCOMES (POs)	
PO 1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	**Design/Development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	**Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1	Apply interdisciplinary engineering knowledge and skills, specifically for integrated infrastructural systems in order to fit into socially acceptable, economically viable, aesthetically appealing and technically feasible Civil engineering systems.
PSO 2	Designing, detailing, constructing and maintaining environmentally sustainable systems promoting locally available materials and labour, preserving the regional and national culture.

CURRICULUM

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA1T1	Engineering Mathematics I	BS	40	60	3	1	0	4
2	20CY1T2	Engineering Chemistry	BS	40	60	3	0	0	3
3	20EN1T3	Communicative English I	HS	40	60	3	1	0	4
4	20PH1T4	Engineering Physics	BS	40	60	3	0	0	3
5	20CS1T5	Fundamentals of Computing and Programming	ES	40	60	3	0	0	3
LABORATORY COURSES									
6	20GE1L1	Physics and Chemistry Laboratory	BS	60	40	0	0	3	1.5
7	20CS1L2	Computer Practices Laboratory	ES	60	40	0	0	3	1.5
MANDATORY COURSE									
8		Universal Human Values 1 - Induction Programme	MC	-	-	-	-	-	-
Total						**15**	**2**	**6**	**20**

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA2T1	Engineering Mathematics II	BS	40	60	3	1	0	4
2	20CE2T3	Engineering Geology	ES	40	60	3	0	0	3
3	20CE2T4	Civil Engineering Materials and Construction-I	ES	40	60	3	0	0	3
4	20ME2T5	Engineering Mechanics	ES	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
5	20ME2LT	Engineering Drawing Practices	ES	50	50	2	0	2	3
LABORATORY COURSES									
6	20EM2L1	Engineering Practices Laboratory	ES	60	40	0	0	3	1.5
7	20ENCL1	Communication Skills Laboratory	HS	60	40	0	0	2	1
MANDATORY COURSE									
8	20CY2T2	Environmental Sciences	MC	100	--	3	0	0	0
Total						**17**	**2**	**7**	**19.5**

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA3T2	Probability and Statistics	BS	40	60	3	1	0	4
2	20CE3T3	Mechanics of Solids-I	ES	40	60	3	0	0	3
3	20CE3T4	Civil Engineering Materials and Construction-II	ES	40	60	3	0	0	3
4	20CE3T5	Fluid Mechanics	PC	40	60	3	0	0	3
5	20CE3T6	Surveying	PC	40	60	3	0	0	3
LABORATORY COURSES									
6	20CE3L1	Surveying Laboratory	PC	60	40	0	0	2	1
7	20CE3L2	Strength of Materials Laboratory	PC	60	40	0	0	2	1
8	20CE3L3	Computer Aided Building Drawing	ES	60	40	0	0	2	1
MANDATORY COURSE									
9	20HSCT1	Universal Human Values 2 : Understanding Harmony	HS	100	--	2	1	0	3
Total						**17**	**2**	**6**	**22**

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE4T1	Mechanics of Solids–II	PC	40	60	3	0	0	3
2	20CE4T2	Applied Hydraulic Engineering	PC	40	60	3	0	0	3
3	20CE4T3	Concrete Technology	PC	40	60	3	0	0	3
4	20MA4T4	Numerical Methods	BS	40	60	3	1	0	4
5		Professional Elective– I	PE	40	60	3	0	0	3
6		Open Elective–I	OE	40	60	3	0	0	3
LABORATORY COURSES									
7	20CE4L1	Fluid Mechanics and Machinery Laboratory	PC	60	40	0	0	2	1
8	20CE4L2	Concrete& Highway Engineering Laboratory	PC	60	40	0	0	2	1
Total						**18**	**1**	**4**	**21**

SEMESTER V

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE5T1	Structural Analysis-I	PC	40	60	3	1	0	4
2	20CE5T2	Design of Reinforced Concrete Elements and Structures	PC	40	60	3	1	0	4
3		Open Elective–II	OE	40	60	3	0	0	3
4		Professional Elective–II	PE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
5	20CE5LT1	Geotechnical Engineering-I	PC	50	50	2	0	4	4
ENHANCEMENT COURSE									
6	20CE5L1	Internship & Innovation Practices	EEC	100	--	0	0	3	1.5
MANDATORY COURSE									
7	20MCCT1	Constitution of India	MC	100	--	2	0	0	0
Total						**16**	**2**	**7**	**19.5**

SEMESTER VI

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE6T1	Structural Analysis-II	PC	40	60	3	1	0	4
2	20CE6T2	Design of Steel Structures	PC	40	60	3	1	0	4
3	20CE6T3	Geotechnical Engineering-II	PC	40	60	3	1	0	4
4		Professional Elective –III	PE	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENTS									
5	20CE6LT1	Environmental Engineering	PC	50	50	2	0	4	4
6	20CE6LT2	Structural Design and Drawings	PC	50	50	2	0	4	4
LABORATORY COURSES									
7	20CE6L1	Comprehensive Course	EEC	100	-	0	-	2	2
8	20CE6L2	Design Project	EEC	60	40	0	0	4	2
Total						**16**	**3**	**14**	**27**

SEMESTER VII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE7T1	Quantity Surveying and Estimation	PC	40	60	3	1	0	4
2	20HSCT2	Professional Ethics	HS	40	60	3	0	0	3
3		Professional Elective–IV	PE	40	60	3	0	0	3
4		Professional Elective–V	PE	40	60	3	0	0	3
5		Professional Elective-VI	PE	40	60	3	0	0	3
6		Professional Elective-VII	HS	40	60	3	0	0	3
LABORATORY COURSE									
7	20CE7L1	Computer Analysis and Design Laboratory	PC	60	40	0	0	4	2
ENHANCEMENT COURSE									
8	20CE7L2	Project Work–Phase I	EEC	60	40	0	0	6	3
Total						**18**	**1**	**10**	**24**

SEMESTER VIII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
LABORATORY COURSES									
1	20CE8L1	Project Work-Phase II	EEC	60	40	0	0	16	8
2	20CE8L2	Industrial Training	EEC	100	0	0	0	4	2
Total						**0**	**0**	**20**	**10**

Total Credits: 163

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HS)

S. No.	Course Code	Course Title	L	T	P	C
1	20EN1T3	Communicative English	3	1	0	4
2	20ENCL1	Communication Skills Laboratory	0	0	2	1
3	20HSCT1	Universal HumanValues2: Understanding Harmony	2	1	0	3
4	20HSCT2	Professional Ethics	3	0	0	3

BASIC SCIENCES (BS)

Sl.No.	Course Code	Course Title	L	T	P	C
1	20MA1T1	Engineering Mathematics – I	3	1	0	4
2	20PH1T4	Engineering Chemistry	3	0	0	3
3	20CY1T2	Engineering Physics	3	0	0	3
4	20GE1L1	Physics and Chemistry Laboratory	0	0	3	1.5
5	20MA2T1	Engineering Mathematics II	3	1	0	4
6	20MA3T2	Transforms and Partial Differential Equations	3	1	0	4
7	20MA4T4	Numerical Methods	3	1	0	4

ENGINEERING SCIENCES (ES)

Sl.No.	Course Code	Course Title	L	T	P	C
1	20CS1T5	Fundamentals of Computing and Programming	3	0	0	3
2	20CS1L2	Computer Practices Laboratory	0	0	3	1.5
3	20ME2T5	Engineering Mechanics	3	1	0	4
4	20CE2T3	Engineering Geology	3	0	0	3
5	20CE2T4	Civil Engineering Materials and Construction-I	3	0	0	3
6	20ME2LT	Engineering Drawing Practices	2	0	2	3
7	20EM2L1	Engineering Practices Laboratory	0	0	3	1.5

8	20CE3T3	Mechanics of Solids-I	3	0	0	3
9	20CE3T4	Civil Engineering Materials and Construction-II	3	0	0	3
10	20CE3L3	Computer aided Building Drawing	0	0	2	1

PROFESSIONAL CORE (PC)

Sl.No.	Course Code	Course Title	L	T	P	C
1	20CE3T5	Fluid Mechanics	3	0	0	3
2	20CE3T6	Surveying	3	0	0	3
3	20CE3L1	Surveying Laboratory	0	0	2	1
4	20CE3L2	Strength of Materials Laboratory	0	0	2	1
5	20CE4T1	Mechanics of Solids–II	3	0	0	3
6	20CE4T2	Applied Hydraulic Engineering	3	0	0	3
7	20CE4T3	Concrete Technology	3	0	0	3
8	20CE4L1	Fluid Mechanics and Machinery Laboratory	0	0	2	1
9	20CE4L2	Concrete &Highway Engineering Laboratory	0	0	2	1
10	20CE5T1	Structural Analysis-I	3	1	0	4
11	20CE5T2	Design of Reinforced concrete Elements and Structures	3	1	0	4
12	20CE5LT1	Geotechnical Engineering-I	3	0	2	4
13	20CE6T1	Structural Analysis-II	3	1	0	4
14	20CE6T2	Design of Steel Structures	3	1	0	4
15	20CE6T3	Geotechnical Engineering-II	3	1	0	4
16	20CE6LT1	Environmental Engineering	3	0	2	4
17	20CE6LT2	Structural Design and Drawing	3	0	2	4
18	20CE7T1	Quantity Surveying and Estimation	3	1	0	4
19	20CE7L1	Computer Analysis and Design Laboratory	0	0	4	2

PROFESSIONAL ELECTIVES (PE)

Semester –IV (Elective I)						
Sl. No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE4E1	Highway and Railway Engineering	3	0	0	3
2	20CE4E2	Remote Sensing and GIS	3	0	0	3
3	20CE4E3	Industrial Structures	3	0	0	3

Semester –V (Elective II)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE5E1	Air pollution management	3	0	0	3
2	20CE5E2	Industrial safety	3	0	0	3
3	20CE5E3	Traffic Engineering and Management	3	0	0	3

Semester –VI (Elective III)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE6E1	Prefabricated Structures	3	0	0	3
2	20CE6E2	Irrigation Engineering and Hydraulic Structures	3	0	0	3
3	20CE6E3	Industrial Waste Management	3	0	0	3

Semester –VII (Elective IV)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE7E1	Basics of Dynamics and Aseismic Design	3	0	0	3
2	20CE7E2	Design of Reinforced Concrete & Brick Masonry Structures	3	0	0	3
3	20CE7E3	Ground Improvement Techniques	3	0	0	3

Semester –VII (Elective V)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE7E4	Urban Planning and Development	3	0	0	3
2	20CE7E5	Municipal Waste and Management	3	0	0	3
3	20CE7E6	Housing, Planning and Management	3	0	0	3

Semester –VII (Elective VI)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE7E7	Design of Bridge Engineering	3	0	0	3
2	20CE7E8	Design of Tall Buildings	3	0	0	3
3	20CE7E9	Prestressed Concrete Structures	3	0	0	3

Semester –VII (Elective VII)						
Sl.No.	**Course Code**	**Course Title**	**L**	**T**	**P**	**C**
1	20CE7E10	Maintenance and Rehabilitation of Structures	3	0	0	3
2	20CE7E11	Construction Safety Practices	3	0	0	3
3	20CE7E12	Smart Materials and Smart Structures	3	0	0	3

OPEN ELECTIVES (OE)

Sl.No.	Course Code	Course Title	L	T	P	C
1	20CEO01	Disaster Management	3	0	0	3
2	20CEO02	Environmental and Agriculture Engineering	3	0	0	3
3	20CEO03	Corrosion for Civil Engineering	3	0	0	3
4	20CEO04	Global Warming and Climate Change	3	0	0	3
5	20CEO05	Water Pollution and its Management	3	0	0	3
6	20CEO06	Basics of Civil Engineering	3	0	0	3
7	20CEO07	Civil Engineering Materials	3	0	0	3
8	20CEO08	Green Building	3	0	0	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No.	Course Code	Course Title	L	T	P	C
1	20CE5L1	Internship &Innovation Practices	0	0	3	1.5
2	20CE8L2	Industrial Training	0	0	4	2
3	20CE6L2	Design Project	0	0	4	2
4	20CE7L2	Project Work-Phase I	0	0	6	3
5	20CE8L1	Project Work- Phase II	0	0	16	8
6	20CE6L1	Comprehensive Course	0	2	0	2

MANDATORY COURSES (MC)

Sl.No.	Course Code	Course Title	L	T	P	C
1		Universal Human Values 1 - Induction Programme	0	0	0	0
2	20CY2T2	Environmental Sciences	3	0	0	0
3	20MCCT1	Constitution of India	3	0	0	0
4	20HSCT1	Universal Human Values 2: Understanding Harmony	2	1	0	3

VALUE ADDED COURSES (VAC)

S.No.	Course Code	Course Title	Credit
1	20CEV01	Total Station Surveying	1
2	20CEV02	Tender Document Preparation	1
3	20CEV03	3D Software for Modeling and Rendering Revit Architecture	1

CURRICULUM BREAKDOWN STRUCTURE

Subject	AICTE suggested breakdown of credits	Total number of credits	Curriculum Content (% of total number of credits of the program)
Humanities and Social Sciences including Management (HS)	**15**	**11**	**6.75**
Basic Sciences (BS)	**26**	**23.5**	**14.42**
Engineering Sciences (ES)	**29**	**26**	**15.95**
Professional Core (PC)	**47**	**57**	**34.97**
Program Electives (PE)	**23**	**21**	**12.88**
Open Electives (OE)	**11**	**6**	**3.68**
Employability Enhancement Courses (EEC) – Practical Courses and Project Work	**12**	**18.5**	**11.35**
Mandatory Courses (MC)	**0**	**0**	**0**
Total	**163**	**163**	**100.00**

CREDIT SUMMARY

Sl. No.	Subject Area	Credits per Semester								Total Credits	AICTE Suggested Credits
		I	II	III	IV	V	VI	VII	VIII		
1	**HS**	4	1	3				3		**11**	**15**
2	**BS**	11.5	4	4	4					**23.5**	**26**
3	**ES**	4.5	14.5	7						**26**	**29**
4	**PC**			8	11	12	20	6		**57**	**47**
5	**PE**				3	3	3	12		**21**	**23**
6	**OE**				3	3				**6**	**11**
7	**EEC**					1.5	4	3	10	**18.5**	**12**
TOTAL		**20**	**19.5**	**22**	**21**	**19.5**	**27**	**24**	**10**	**163**	**163**

HS – Humanities and Social Sciences including Management
BS – Basic Sciences
ES – Engineering Sciences
PC – Professional Core
PE – Professional Electives
OE – Open Electives
EEC – Employability Enhancement Courses
MC – Mandatory Courses

SEMESTER I

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA1T1	Engineering Mathematics I	BS	40	60	3	1	0	4
2	20CY1T2	Engineering Chemistry	BS	40	60	3	0	0	3
3	20EN1T3	Communicative English I	HS	40	60	3	1	0	4
4	20PH1T4	Engineering Physics	BS	40	60	3	0	0	3
5	20CS1T5	Fundamental of Computing and Programming	ES	40	60	3	0	0	3
LABORATORY COURSES									
6	20GE1L1	Physics and Chemistry Laboratory	BS	60	40	0	0	3	1.5
7	20CS1L2	Computer Practices Laboratory	ES	60	40	0	0	3	1.5
MANDATORY COURSE									
8		Universal Human Values 1 - Induction Programme	MC	-	-	-	-	-	-
Total						**15**	**2**	**6**	**20**

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20MA1T1	**ENGINEERING MATHEMATICS I**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify Eigen values and Eigenvectors and apply orthogonal diagonalization to convert quadratic form to canonical form.	K3	1
CO2	Apply differentiation and integration technique to solve algebraic and transcendental function	K3	2
CO3	Evaluate the total derivative of the function, expand the given as series and locate the maximum and minimum for multivariate function	K5	3
CO4	Solve first order Ordinary Differential Equations and apply them to certain physical situations	K3	4
CO5	Choose appropriate integral techniques to find area and volume of the given region	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3				1	3	3		3		
CO2	3	3		3				1	3	3		3		
CO3	3	3		3				1	3	3		3		
CO4	3	3		3				1	3	3		3		
CO5	3	3		3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments and Tutorials
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**MATRICES**	**9 + 3**
Eigen values and Eigen vectors of a real matrix – properties of Eigen values and Eigen vectors (without proof) – Cayley-Hamilton theorem (statement and applications) – orthogonal transformation of a symmetric matrix to diagonal form (concept only) – Reduction of quadratic form to canonical form by an orthogonal transformation		
Topic - 2	**DIFFERENTIATION AND INTEGRATION**	**9 + 3**
Basic differentiation formula for algebraic and transcendental functions – derivatives – differentiability rules and properties (without proof) – basic integral formula for algebraic and transcendental functions – integration by parts – partial fraction methods.		
Topic - 3	**FUNCTIONS OF SEVERAL VARIABLES**	**9 + 3**
Total derivatives – Taylor's series expansion – maxima and minima – Lagrange's multipliers method – Jacobian's method		
Topic - 4	**FIRST ORDER ORDINARY DIFFERENTIAL EQUATION**	**9 + 3**
Leibnitz's equations – Bernoulli's equation – equation of first order and higher degree – Clairaut's form – Linear first order differential equations and its applications.		
Topic - 5	**MULTIPLE INTEGRALS**	**9 + 3**
Double integrals: Double integration in Cartesian co-ordinates – change of order of integration – area as a double integration in Cartesian – volume as a triple integral in Cartesian co-ordinates (simple problems)		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics", 3rd Edition, Narosa Publishing House, New Delhi, Reprint 2009.
2	Ramana B.V., "Higher Engineering Mathematics", Tata Mcgraw Hill Publishing Company, New Delhi, 2008.
3	Kreyszig E., "Advanced Engineering Mathematics", 9th Edition, John Wiley Sons, 2012.
4	Glyn James., "Advanced Modern Engineering Mathematics", Pearson Education Limited, 2007.
5	N P Bali, Manish Goyal, "A Text Book of Engineering Mathematics", 3rd Edition, Laxmi Publication Private Limited, 2009.

OTHER REFERENCES	
1	https://www.slideshare.net/mailrenuka/matrices-and-application-of-matrices
2	https://www.slideshare.net/mailrenuka/matrices-and-application-of-matrices
3	https://youtu.be/wtuq1oSButE
4	https://www.slideshare.net/abhinavsomani3/applications-of-maths-in-our-daily-life-41607055

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20CY1T2	**ENGINEERING CHEMISTRY**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Explain the properties & working techniques along with potential applications.	K2	1
CO2	Choose the appropriate method for specific application in engineering technology.	K3	2
CO3	Analyse new solutions to problems in materials and energy usage in daily life	K4	3
CO4	Identify the structure of unknown/new compounds with their properties.	K3	4
CO5	Categorize the important features of various materials and methods for burgeoning society.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		2					1	3	3		3		
CO2	3	2						1	3	3		3		
CO3	3	2						1	3	3		3		
CO4	3		2					1	3	3		3		
CO5	3	2	2					1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**WATER CHEMISTRY**	**9**
Hardness of water – types – units –boiler troubles (scale and sludge) – treatment of boiler feed water – Internal treatment (phosphate, colloidal, carbonate and calgon conditioning) external treatment – Ion exchange process, zeolite process – desalination of brackish water – Reverse Osmosis.		
Topic - 2	**FUELS AND COMBUSTION**	**9**
Fuels: Introduction - classification of fuels – Combustion- coal – Analysis of coal - carbonization - manufacture of metallurgical coke (Otto Hoffmann method) - petroleum - knocking - octane number - diesel oil - cetane number - natural gas - compressed natural gas (CNG) - liquefied petroleum gases (LPG) - power alcohol.		
Topic - 3	**ENERGY STORAGE DEVICES**	**9**
Batteries - Types of batteries – primary battery - dry cell. Secondary battery - lead acid battery, Nickel- Cadmium battery, fuel cells – Hydrogen -Oxygen fuel cell. - Solar energy conversion - solar cells – Application.		
Topic - 4	**SPECTROSCOPY**	**9**
Introduction – Laws of spectroscopy - Block diagram, Instrumentation, Working and application of Visible spectroscopy and Ultra Violet spectroscopy – Infrared spectroscopy – Flame photometry – Atomic adsorption spectroscopy.		
Topic - 5	**ENGINEERING MATERIALS**	**9**
Polymer – Types of polymerization – Preparation, properties, uses of Nylon(6,6), Poly Vinyl Chloride (PVC). Plastics – Types - Rubbers – SBR – Nanomaterial – Synthesis and its applications of Nanomaterial. Abrasives – Classification, Properties- Manufacture of SiC.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	S.S Dara and S.S. Umare ‘Engineering Chemistry’, S.Chand Publication, 2013
2	Jain & Jain ‘Engineering chemistry’ Dhanpat Rai Publishing Company, 2012
3	Shikha Agarwal , Engineering Chemistry, Cambridge University Press, 2015 edition
4	Manas Senapati, Advanced Engineering Chemistry, Firewall Media, 2006

OTHER REFERENCES	
1	https://www.freebookcentre.net/chemistry-books-download
2	https://nptel.ac.in/course.html
3	https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm
4	https://edu.rsc.org/resources/collections/analytical-chemistry-introductions

Semester	Programme	CourseCode	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20EN1T3	**COMMUNICATIVE ENGLISH I**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Apply the rules of grammar to parts of speech, tenses, voices, degrees of comparison, compound nouns and articles	K3	1
CO2	Interpret graphical representation for composing passages and paraphrase technical texts	K4	2
CO3	Analyze different spoken discourses like, short talks, comprehend different dialogues, practice conversation for speaking skills	K4	3
CO4	Examine grammatical errors using correct vocabulary and generating ideas logically on a topic	K5	4
CO5	Develop language and vocabulary effectively for our real-life contexts	K6	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						3			2	3		3		
CO2						2			2	3		2		
CO3						3			2	2		1		
CO4						2			2	3		2		
CO5						3			1	3		2		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Grammar Quizzes
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**GRAMMAR AND VOCABULARY**	**9 + 3**
Word formation with Prefix and Suffix – Parts of Speech – Tenses - Voices – Degrees of comparison –Compound Nouns - Basic Vocabulary – Homonyms and Homophones – Articles- Idioms – Phrasal verbs – Subject-Verb Agreement.		
Topic - 2	**LISTENING**	**9 + 3**
Introduction to Listening – Listening Comprehension – Extensive and Intensive listening – Pronunciation – Intonation – Stress – Pause – Rhythm – Short and Long conversations.		
Topic - 3	**SPEAKING**	**9 + 3**
An introduction to Speech sounds – Verbal and Non-verbal Communication – Describing places, people, Technical Processes – Telephonic skills – Different types of Interview – Group Discussions – Debates.		
Topic - 4	**READING**	**9 + 3**
Skimming and Scanning – Reading Newspaper articles – Reading different types of texts – Speed Reading – Reading to identify Stylistic Features (Syntax, Lexis, Sentence Structures) – Comprehension.		
Topic - 5	**WRITING**	**9 + 3**
Introduction to aspects of technical writing – Letter writing – Formal Letters – Job application letter with CV and Resume - Official letters- Business letters- Circular letters- Employment letters – Punctuation – Writing reviews on books and movies – recommendations – Creative writing – email writing.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Board of Editors, Using English, Orient Black Swan, 2015.
2	Practical English Usage, Michael Swan, OUP 1995.
3	Communicative English, J.Anbazhagan Vijay, Global Publishers – Chennai 2018.
4	Effective Communication, Adair, John. London: Pan Macmillan Ltd., 2003.
5	Brilliant Communication Skills, Hasson, Gill. Great Britain: Pearson Education, 2012.

OTHER REFERENCES	
1	http://networketiquette.net/
2	http://www.englishdaily626.com/c-errors.php
3	http://www.dailywritingtips.com/

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20PH1T4	**ENGINEERING PHYSICS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Classify the extensive properties of solid materials to use in current field.	K2	1
CO2	Identify and develop the knowledge of atoms in solid crystals to apply recent engineering fields.	K3	2
CO3	Describe the fundamentals of lasers, laser systems, their characteristics and diversified applications including industry and medicine.	K4	3
CO4	Demonstrate a mastery of the core knowledge base in thermal physics.	K3	4
CO5	Evaluate the nano materials and its fabrication with behaviour by using advanced technical methods.	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			1	3	2	3	3	3	3	3		
CO2	2	1				3	2	3	3	3	3	3		
CO3	3	2	2			3	2	3	3	3	3	3		
CO4	2					3	2	3	3	3	3	3		
CO5	3	2				3	2	3	3	3	3	3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Mini Project
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**PROPERTIES OF MATTER**	**9**
Hooke's Law - Stress-Strain Diagram - Elastic moduli - Poisson's Ratio - Expression for bending moment of beam and depression of Cantilever - Expression for Young's modulus by Non-uniform bending and its experimental determination.		
Topic - 2	**CRYSTAL PHYSICS**	**9**
Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distances - coordination number and packing factor for SC, BCC, FCC, HCP and diamond structures - growth of single crystals: solution and melt growth techniques.		
Topic - 3	**LASER TECHNOLOGY**	**9**
Introduction – principle of spontaneous emission and stimulated emission, population inversion, pumping mechanism. Laser characteristics - Einstein's A and B coefficients derivation. Two, three and four level systems. Threshold gain coefficient- Component of laser. Solid state laser (Nd:YAG). Diode lasers –Application of laser in science and engineering.		
Topic - 4	**THERMAL PHYSICS**	**9**
Transfer of heat energy - thermal conduction, convection and radiation – heat conductions in solids – thermal conductivity - Lee's disc method - theory and experiment - conduction through compound media (series and parallel) – thermal insulation – applications: heat exchangers, refrigerators, ovens and solar water heaters.		
Topic - 5	**NANO TECHNOLOGY**	**9**
Introduction to Nano materials- Moore's law- Properties of Nano materials- Quantum well, wire and dot- Fullerene, Carbon Nanotubes- Application of Nanotechnology in industry.		

THEORY	**45**		**TUTORIAL**	**00**		**PRACTICAL**	**00**		**TOTAL**	**45**

BOOK REFERENCES	
1	Serway and Jewett, "Physics for Scientists and Engineers with Modern Physics", 6th Edition, Thomson Brooks Cole, 2008
2	Charles P. Poole and Frank J.Owens, "Introduction to Nanotechnology", 2nd Edition, Wiley, Delhi, 2008.
3	S.O. Pillai, "Solid state Physics", 6th Edition, New Age International Publishers, 2008.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/115/105/115105099/
2	https://nptel.ac.in/courses/115/106/115106061/
3	https://www.youtube.com/watch?v=_JOchLyNO_w
4	https://www.journals.elsevier.com › Journals
5	https://nptel.ac.in/courses/118/104/118104008/

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20CS1T5	**FUNDAMENTALS OF COMPUTING AND PROGRAMMING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the word processing tools with text documents	K2	1
CO2	Organize spreadsheet manipulation tools with sheets also describe the presentation and sliding with layouts	K3	2
CO3	Develop C program using managing input and output operations.	K6	3
CO4	Design array and string implementation in C	K6	4
CO5	Evaluate the function and structure concepts in C	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3		3	1	3	3		3		
CO2	3		2		2			1	3	3		3		
CO3	3		2		3			1	3	3		3		
CO4	3							1	3	3		3		
CO5	3				2			1	3	3		3	2	
CO6	3				3		3	1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION TO MS-WORD AND MS-EXCEL**	**9**
Introduction to word – Creating, editing, saving and printing text documents - Font and paragraph formatting - Simple character formatting -Inserting tables, smart art, page breaks -Using lists and styles-Working with images -Using Spelling and Grammar check -Understanding document properties Introduction to Spreadsheet basics - Creating, editing, saving and printing spreadsheets -Working with functions & formulas -Modifying worksheets with color & auto formats -Graphically representing data : Charts & Graphs - Data Menu, Subtotal, Filtering Data -Formatting worksheets -Securing & Protecting spreadsheets		
Topic - 2	**MS-POWERPOINT AND INTERNET**	**9**
Introduction to Powerpoint- Opening, viewing, creating, and printing slides -Applying auto layouts -Adding custom animation -Using slide transitions -Graphically representing data : Charts & Graphs -Creating Professional Slide for Presentation. Internet - Understanding how to search/Google -bookmarking and Going to a specific website -Copy and paste Internet content into your word file and emails -Understanding social media platforms such as Facebook & Many more -learn with best practices		
Topic - 3	**C PROGRAMMING BASICS**	**9**
Problem formulation – Problem Solving - Introduction to ‘ C’ programming –fundamentals – structure of a ‘C’ program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.		
Topic - 4	**ARRAYS AND STRINGS**	**9**
Arrays – Initialization – Declaration – One dimensional and Two dimensional arrays. String- String operations – String Arrays. Simple programs- sorting- searching – matrix operations.		
Topic - 5	**FUNCTIONS, STRUCTURES AND UNIONS**	**9**
Function – definition of function – Declaration of function – Pass by value – Pass by reference – Recursion - Structure – need for structure data type – structure definition – Structure declaration – Structure within a structure - Union - Programs using structures and Unions – Storage classes, Pre-processor directives.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Microsoft Office 2010 In Depth 1st Edition by Joe Habraken (Author) ,2010
2	Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill,2006.
3	“Computer basics absolute beginners”9thEdition, Michale Miller,2019

OTHER REFERENCES	
1	https://youtu.be/ZXAPCy2c33o
2	https://courses.lumenlearning.com/wm-compapp/chapter/internet-and-powerpoint/
3	https://www.geeksforgeeks.org/c-language-set-1-introduction/
4	https://www.studytonight.com/c/string-and-character-array.php
5	https://www.geeksforgeeks.org/difference-structure-union-c/

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20GE1L1	**PHYSICS & CHEMISTRY LABORATORY**	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Physics & Chemistry laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Lab Record
	2	End Semester Examinations
INDIRECT	1	Course exit Survey

LIST OF EXPERIMENTS	
PHYSICS LABORATORY **(Any Five Experiments)**	
1	Torsional pendulum - determination of moment of inertia and rigidity modulus
2	Determination of young's modulus by non- uniform bending
3	(a) Determination of Wavelength, and particle size using Laser (b) Determination of acceptance angle in an optical fiber.
4	Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
5	Air wedge – determination of thickness of a thin wire.
6	Determination of band gap of a semiconductor.
LIST OF EXPERIMENTS	
CHEMISTRY LABORATORY **(Any Five Experiments)**	
1	Determination of total, temporary and permanent hardness of water by EDTA method.
2	Estimate the dissolved oxygen content of the given water sample by Winkler's method.
3	Determine the chloride content of the given potassium chloride sample using standardized silver nitrate solution.
4	Determination of iron content of the given solution using a potentiometer
5	Determination of strength of acid using conductivity meter.
6	Using conductance measurements, determine the strength of acids in a mixture.

THEORY	0		TUTORIAL	0		PRACTICAL	45		TOTAL	45

BOOK REFERENCES	
1	C. Ramesh Kumar & Y. Devakumari, "Physics Laboratory Manual", Al-Ameen Publications, 2020.
2	N. Jafarulla & C. Krishna Moorthy C "Chemistry Laboratory Manual", Al-Ameen Publications, 2020.

Semester	Programme	Course Code	Course Name	L	T	P	C
I	B.E. / B.Tech., Common to all	20CS1L2	**COMPUTER PRACTICES LABORATORY**	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Computer Practices Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Study Experiment a) Hardware specification and PC Assembly b) Getting connected to internet
2	Word processing a) Documentation creation, Text Manipulation with scientific notation b) Table Creation, Table Formatting and Conversion c) Mail Merge d) Flow Chart Preparation.
3	Spread Sheet a) Charts- Bar Chart, Pie Chart, Line Chart, X,Y-Chart b) Object Inclusion, Picture and Graphics c) Protecting the Document
4	Power Point Presentation and Access a) Creation of Presentation b) Generation of Report Using Access
5	C Programming a) Simple C Program with Data Types, Expressions and Comment Lines b) Programming with Conditional Statements c) Programming with Branching and Looping Statements d) Programming with Arrays and String e) Programming with Function and Structure

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**45**		**TOTAL**	**45**

BOOK REFERENCES	
1	Computer Practices Laboratory manual, Al - Ameen Publications 2020
2	Microsoft Office 2008 In Depth 2nd Edition by Joe (Author), 2010

OTHER REFERENCES	
1	https://youtu.be/ftyWKjT20S4
2	https://nptel.ac.in/about_nptel.html
3	https://nptel.ac.in/courses/106/106/106106092/

SEMESTER II

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA2T1	Engineering Iathematics II	BS	40	60	3	1	0	4
2	20CE2T3	Engineering Geology	ES	40	60	3	0	0	3
3	20CE2T4	Civil Engineering Materials and Construction-I	ES	40	60	3	0	0	3
4	20ME2T5	Engineering Mechanics	ES	40	60	3	1	0	4
THEORY COURSES WITH LABORATORY COMPONENTS									
5	20ME2LT	Engineering Drawing Practices	ES	50	50	2	0	2	3
LABORATORY COURSES									
6	20EM2L1	Engineering Practices Laboratory	ES	60	40	0	0	3	1.5
7	20ENCL1	Communication Skills Laboratory	HS	60	40	0	0	2	1
MANDATORY COURSE									
8	20CY2T2	Environmental Sciences	MC	100	--	3	0	0	0

Sl. No.	Course Code	Course Title	Category	CIA

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	20MA2T1	**ENGINEERING MATHEMATICS II**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Solve higher order differential equations and apply them to certain physical situations	K3	1
CO2	Apply various integral theorems for solving engineering problems involving cubes and parallelepipeds.	K3	2
CO3	Solve linear differential equations using Laplace transform techniques.	K3	3
CO4	Construct analytic function of complex variables and transform functions from z- plane to w- plane and vice-versa using conformal mappings. .	K3	4
CO5	Apply the techniques of complex integration to evaluate real and complex integrals over suitable closed paths or contours	K3	5

PRE-REQUISITE	**ENGINEERING MATHEMATICS I**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3				1	3	3		3		
CO2	3	3		3				1	3	3		3		
CO3	3	3		3				1	3	3		3		
CO4	3	3		3				1	3	3		3		
CO5	3	3		3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments and Tutorials
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SECOND AND HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS**	**9 + 3**
Second order linear differential equations with constant co-efficient – Cauchy equation – Euler equation– Cauchy – Legendre equation– Method of variation of parameters– Solution of simultaneous equation with constant coefficients		
Topic - 2	**VECTOR CALCULUS**	**9 + 3**
Introduction– gradient–directional derivative–divergence and curl–angel between the surfaces–solenoidal and irrotational vector fields–Green's theorem in a plane–Gauss divergence theorem–Stoke's theorem (without proof).		
Topic - 3	**LAPLACE TRANSFORMS**	**9 + 3**
Condition for existence– Transform of elementary function– Basic properties (without proof)– Derivatives and integrals of transforms– Transform of unit step function– Initial and final value theorem (statement only)– Transform of a periodic function– Inverse Laplace transform– Partial fractions method–convolution theorem (statement only) – Solution of linear ODE of second order with constant co-efficients.		
Topic - 4	**ANALYTIC FUNCTIONS**	**9 + 3**
Analytic function – Necessary and sufficient condition – Cauchy Rieman equation (without proof) – Properties of analytic function (statement only) – Harmonic function – Constructions of analytic function – Bilinear transformation – Conformal mappings $w = z + a$, $w = az$, $w = \frac{1}{z}$		
Topic - 5	**COMPLEX INTEGRATION**	**9 + 3**
Cauchy's integral theorem (without proof) –Cauchy integral formula –Taylor's and Laurent's series (without proof) – Singularities –Cauchy's residue theorem – Contour Integration: Circular and Semi circular contour (excluding polar on real axis).		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Grewal B.S., "Higher Engineering Mathematics", 42nd Edition, Khanna Publications New Delhi, 2011
2	Jain R.K and Iyengar S.R.K, "Advanced Engineering Mathematics",4th Edition, Narosa Publishing House, New Delhi, Reprint 2014.
3	Ramana B.V., "Higher Engineering Mathematics",Tata Mcgraw Hill Publishing Company, New Delhi, 2011.
4	Kreyszig E., "Advanced Engineering Mathematics", 10th Edition, John Wiley Sons, 2010..

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. CIVIL	20CE2T3	**ENGINEERING GEOLOGY**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Analyze the relevance of Engineering Geology in Civil Engineering.	K4	1
CO2	Understand the common rock forming minerals and common rocks based on their physical properties.	K2	2
CO3	Evaluate the earthquakes in relation to internal structure of theearth	K5	3
CO4	Understand processes and geological agents involved in the shaping surface of the earth and explain the internal structure of the Earth.	K2	4
CO5	Understand the hazards due to volcanic and seismic activity.	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1						2		1	3	3		3		
CO2	3	3						1	3	3		3		
CO3			2					1	3	3		3		
CO4	3			2	2		2	1	3	3		3	2	
CO5	2	2	2	2				1	3	3		3	2	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**GENERAL GEOLOGY**	**9**
Importance of Geology in Civil Engineering – Branches of geology – Earth structures andcomposition - Earth processes – Weathering – work of rivers, wind and their Engineering importance. Groundwater : Mode of occurrence - Importance in Civil Engineering– Earthquake – causes - zones in India.		
Topic - 2	**MINERALOGY**	**9**
Elementary knowledge on symmetry elements of crystallographic systems (normal class)– Physical properties of minerals – Study of the rock forming minerals – Quartz family -Feldspar family – Pyroxene family minerals - Mica – Fundamentals of ore mineralformation.		
Topic - 3	**PETROLOGY**	**9**
Rocks - Rock cycle – Classification and Distinction of rocks - Igneous rocks: Granite,Syenite, Basalt and Dolerite - Sedimentary rocks: Conglomerate, Breccia, Sandstone, Shale and Limestone Metamorphic rocks: Gneiss, Schist, Quartzite and Marble.		
Topic - 4	**STRUCTURAL GEOLOGY AND GEOPHYSICAL INVESTIGATIONS**	**9**
Dip and Strike – Outcrops – Folds - Faults and joints: causes and types – bearing on engineering construction - Electrical survey for civil engineering investigations		
Topic - 5	**GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING**	**9**
Applications of remote sensing technique – Interpretation for civil engineering projects –Geological considerations for construction of dam, reservoir and Tunnels – Landslides –causes and preventions.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Duggal, SK,Rawal,N and Pandey, HK (2014) Engineering Geology, McGraw Hill Education, New Delhi
2	Garg, SK (2012) Introduction to Physical and Engineering Geology, Khanna Publishers, New Delhi
3	Gokhale, KVGK (2010) Principles of Engineering Geology, BS Pubications, Hyderabad
4	Kanithi V (2012) Engineering Geology, Universities Press (India) Ltd., Hyderabad
5	Singh, P (2004) Engineering and General Geology, S. K. Kataria and Sons, New Delhi

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/105/105105106/
2	https://nptel.ac.in/courses/105/105/105105170/
3	https://nptel.ac.in/courses/105/104/105104147/
4	https://www.youtube.com/watch?v=6k9mtTmvPjw
5	https://www.youtube.com/watch?v=NhrNJB-43bo

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. CIVIL	20CE2T4	**CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS-I**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concept of suitable building materials and its uses.	K2	1
CO2	Understand the typical and potential applications of lime, cement and aggregates	K2	2
CO3	Understand the production of concrete and also the method of placing and making of concrete elements.	K2	3
CO4	Understand the applications of timbers and other materials	K2	4
CO5	Analyze the modern materials for the buildings.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3	2	2	2	3	3		3	3	
CO2	3	2			3		2	2	3	3		3	3	
CO3	3	3			3		2	2	3	3		3	3	
CO4	3	3			3		2	2	3	3		3	3	
CO5	3	3			3		2	2	3	3		3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**STONES – BRICKS – CONCRETE BLOCKS**	**9**
Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classification – Manufacturing of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Efflorescence – Bricks for special use - Refractory bricks – Cement, Concrete blocks – Light weightconcrete blocks.		
Topic - 2	**LIME – CEMENT – AGGREGATES – MORTAR**	**9**
Lime: Characteristics, Classification, Manufacturing Process – Cement: Ingredients, Types and Grades, Properties, Manufacturing process, Testing of Cement– Industrial By-products: Fly ash – Aggregates: Natural Stone Aggregates, Classification Characteristics of Aggregates, Testing of Aggregates - Cement Mortar: Functions, Uses of Mortar, Types of Mortar, Ingredients of Mortar, Tests.		
Topic - 3	**CONCRETE**	**9**
Concrete – Ingredients – Manufacturing Process – Batching plants – RMC – Properties of fresh concrete – Slump – Flow and compaction Factor – Properties of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specification – Mix proportioning – BIS method – High Strength Concrete and HPC – Self compacting Concrete – Other types of Concrete – Durability of Concrete.		
Topic - 4	**TIMBER AND OTHER MATERIALS**	**9**
Timber – Market forms – Industrial timber– Plywood – Veneer – Thermacole – Panels of laminates – Steel – Aluminum and Other Metallic Materials – Composition – Aluminium composite panel – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Bitumens.		
Topic - 5	**MODERN MATERIALS**	**9**
Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textiles- Geo membranes and Geo textiles for earth reinforcement.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2	Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi,2002.
3	Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.
4	Glyn James., “Advanced Modern Engineering Mathematics”, Pearson Education Limited, 2007.
5	Mahesh Varma, “Construction Equipment and its Planning and Application”,Metropolitan Book Company, New Delhi, 1983.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105102088/L01.html
2	https://www.digimat.in/nptel/courses/video/105106053/L01.html
3	https://www.youtube.com/watch?v=wOyQBVfM1eo
4	http://www.nitttrc.edu.in/nptel/courses/video/105102088/L09.html
5	https://www.digimat.in/nptel/courses/video/105102088/L09.html

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. MECH & CIVIL	20ME2T5	**ENGINEERING MECHANICS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Explain the basic laws and resolution of forces.	K2	1
CO2	Construct free body diagram to resolve the forces in real world mechanical systems.	K3	2
CO3	Examine the appropriate support system for the given force system due to various reactions & moment created by the applied force.	K4	3
CO4	Determine the centroid and moment of inertia for two dimensional sections, centre of gravity for geometrical bodies.	K5	4
CO5	Analyse the frictional forces in wedge and ladder.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		3	2	3	3	3	3	3	3	
CO2	3	3	2	3		3	2	3	3	3	3	3	3	
CO3	3	3	3	2		3	2	3	3	3	3	3	3	3
CO4	3	3	3	3		3	2	3	3	3	3	3	3	3
CO5	3	3	3	3		3	2	3	3	3	3	3	3	3
CO6	3	2		1		3	2	3	3	3	3	3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Mini project
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**BASIC LAWS AND FORCE SYSTEMS**	**9**
Introduction to mechanics - Law of Mechanics – Lami's Theorem, Parallelogram, triangular and polygon law of forces – Principles of transmissibility – Force system – resultant force, composition of force, resolution of forces		
Topic - 2	**STATICS OF PARTICLES**	**9**
Free body diagram - Force on a particle – resultant of two forces and several concurrent forces – resolution of a force – equilibrium of a particle		
Topic - 3	**STATICS OF RIGID BODIES**	**9**
Equilibrium of rigid bodies– transmissibility – moment of a force – varignon's theorem– Simplification of forces and couple system – Beams – types of loads , supports and their reactions		
Topic - 4	**CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA**	**9**
Centroids of areas, composite areas, determination of moment of inertia of plane figures, polar moment of inertia-radius of gyration – mass moment of inertia of simple solids		
Topic - 5	**FRICTION**	**9**
Laws of friction – angles of friction- coefficient of friction - angle of repose - wedges Ladder.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bansal R K, "Engineering Mechanics", Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2	Young D H and Timashenko S, "Engineering Mechanics", Tata Mcgraw-Hill, 2006.
3	Bhavikatti S S, "Engineering Mechanics", New Age International Pvt. Ltd., New Delhi, 2003.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=LG0YzGeAFxk
2	https://www.youtube.com/watch?v=nGfVTNfNwnk
3	https://www.youtube.com/watch?v=v6VTMwxx4oA
4	https://www.youtube.com/watch?v=V0PLWR6mQkk
5	https://www.youtube.com/watch?v=yrJBouQkPhY

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. MECH & CIVIL	20ME2LT	**ENGINEERING DRAWING PRACTICES**	**2**	**0**	**2**	**3**

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify the drawing instruments effectively and able to dimension the figure.	K1	1
CO2	Appraise the usage of engineering curves in tracing the path of simple machine components.	K4	2
CO3	Interpret the concept of projection and acquire visualization skills, projectionof points.	K3	3
CO4	Construct the basic views related to projections of lines, planes.	K2	LAB
CO5	Plan to use the modern tool for drawing communication.	K4	
CO6	Express the symbolic representation as per BIS SP:4 -2003.	K4	

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3				3				2	3			3	2
CO2	3	2	3		2				2	3		2	3	3
CO3	3	2	3						2	3			3	3
CO4	3	2	2		2				2	3			3	3
CO5	3		3		3				2	3		3	3	3
CO6	3	2	3	2					3	3			3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	Laboratory Record
	4	Model Practical Examinations
	5	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**BASICS OF ENGINEERING DRAWING**	**10**
Introduction and its importance – conventions – Engineering drawing sheets, Drawing instruments as per BIS SP:4-2003. – Types of lines and its application. Geometric figures– Lettering and Numbering as per BIS SP:4-2003. Dimensioning – Types, Methods, Arrow head and leader line.		
Topic - 2	**ORTHOGRAPHIC PROJECTION**	**10**
Concept of axes, planes and quadrant – Projection of plane figure – Visualisation of object – Procedure of Orthographic projection – related exercise.		
Topic - 3	**ISOMETRIC DRAWING**	**10**
Types of pictorial drawing (Isometric, Oblique, Perspective drawing) - Procedure of isometric Drawing – Simple isometric related exercise.		

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**30**

LIST OF EXPERIMENTS		
Experiment -1	Draw the 2D line diagram using AutoCAD software.	**3**
Experiment -2	Draw the 2D rectangle block using AutoCAD software.	**3**
Experiment -3	Practice Dimensioning and all Commands using Auto CAD Software.	**3**
Experiment -4	Draw the Isometric diagram using AutoCAD software.	**3**
Experiment -5	Draw the home civil layout plan using AutoCAD software.	**3**

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**30**

BOOK REFERENCES	
1	Bansal R K, “Engineering Mechanics”, Laxmi Publications Pvt. Ltd., New Delhi, 2006.
2	Young D H and Timashenko S, “Engineering Mechanics”, Tata Mcgraw-Hill, 2006.
3	Bhavikatti S S, “Engineering Mechanics”, New Age International Pvt. Ltd., New Delhi, 2003.
4	R.K. Dhawan, “A text book of Engineering Drawing” , S.Chand Publishers, Delhi,2010.
5	Dhananjay. A.Jolhe, “Engineering Drawing with an introduction to AutoCAD”, Tata Mc Graw Hill Publishing Company Ltd., Delhi, 2008.
6	Basant Agarwal and Agarwal.C.M., “Engineering Drawing” Tata McGraw Hill Publishing Company Ltd., Delhi,2008.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=LG0YzGeAFxk
2	https://www.youtube.com/watch?v=nGfVTNfNwnk
3	https://www.youtube.com/watch?v=v6VTMwxx4oA
4	https://www.youtube.com/watch?v=V0PLWR6mQkk
5	https://www.youtube.com/watch?v=yrJBouQkPhY

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E./B.Tech (Common to all)	20EM2L1	**ENGINEERING PRACTICES LABORATORY**	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Engineering Practices Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	**GROUP A (CIVIL & MECHANICAL)** **I. CIVIL ENGINEERING PRACTICE** **Buildings:** a) Study of plumbing and carpentry components of residential and industrial buildings safety aspects. **Plumbing Works:** a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings. b) Preparation of plumbing line sketches for water supply and sewage works. c) Hands-on-exercise: Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components. d) Demonstration of plumbing requirements of high-rise buildings. **Carpentry using manual and power tools:** a) Study of the joints in roofs, doors, windows and furniture. b) Hands-on-exercise: Wood work, joints by sawing, planning and cutting.
2	**II.MECHANICAL ENGINEERING PRACTICE** **Welding:** a) Preparation of butt joints, lap joints and T- joints by Shielded metal arc welding. b) Gas welding practice **Basic Machining:** a) Simple Turning and Taper turning b) Drilling Practice **Sheet Metal Work:** a) Forming & Bending b) Model making – Trays and funnels. c) Different type of joints. **Machine Study practice:** a) Study of centrifugal pump b) Study of air conditioner
3	**GROUP B (ELECTRICAL AND ELECTRONICS)** **III.ELECTRICAL ENGINEERING PRACTICE** 1. Testing and connection of Fluorescent lamp wiring. 2. Stair case wiring. 3. Measurement of energy using single phase energy meter. 4. Assembly of Residential house wiring. 5. Measurement of earth resistance of an electrical equipment using meggar.
4	**IV.ELECTRONICS ENGINEERING PRACTICE** 1. Resistor colour coding & Measurement of AC signal parameters (Peak-Peak, RMS period, Frequency) using CRO. 2. Study of logic gates AND, OR, EX-OR and NOT. 3. Measurement of ripple factor of HWR and FWR. 4. Soldering practice for Components, Devices and Circuits. **5.** Generation of Clock Signal.

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**45**		**TOTAL**	**45**

BOOK REFERENCES	
1	"Engineering Practices Laboratory", Al-Ameen Publications, 2020.

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E., /B.Tech Common to all	20ENCL1	**COMMUNICATION SKILLS LABORATORY**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Communication Skills Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**COMMUNICATIVE ENGLISH I**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
Cos	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Laboratory Practice Sessions
2	Conversation Practice Sessions (To be done as real life interactions)
3	Group Discussion Sessions
4	Interview Sessions
5	Presentation

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**30**

BOOK REFERENCES	
1	Baul Emmerson and Nick Hamilton, „Five Minute Activities for Business English", Cambridge University Press, New York, 2005.
2	Arthur Brookes and Peter Grundy, „Beginning to Write: Writing Activities for Elementary and Intermediate Learners", Cambridge University Press, New York, 2003.
3	George, Livingston. „Using Communication Skills Lab in Enhancing Speaking Skills of Engineering Students" 2018.
4	NiraKonar: English Language Laboratory: A Comprehensive Manual, PHI Learning, 2011.
5	Pandey, Dr.Meenu. „A Practical Book of Communication Skills", NIRALI Prakashan advancement of knowledge, second edition 2018.

OTHER REFERENCES	
1	Khan Academy Videos on English Speaking and Writing
2	https://learningenglish.britishcouncil.org/en/listening
3	Adrian Duff et.al. (ed.): Cambridge Skills for Fluency
4	Mark Hancock: English Pronunciation in Use
5	Audio Cassettes/CD'S OUP 2004

Semester	Programme	Course Code	Course Name	L	T	P	C
II	B.E. / B.Tech., Common to all	20CY2T2	**ENVIRONMENTAL SCIENCES**	3	0	0	0

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Demonstrate the importance of interdisciplinary nature of environment and health risk assessment.	K2	1
CO2	Discuss the ecosystem and their importance in the environment and conservation of biodiversity.	K2	2
CO3	Design the rain water harvesting system in their living area.	K6	3
CO4	Analyze the impact of pollution and hazardous waste in a global and societal context.	K4	4
CO5	Understand contemporary issues that result in environmental degradation that would attempt to provide solutions to overcome the problems.	K3	5

PRE-REQUISITE	**ENGINEERING CHEMISTRY**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1					2	1	3	3		3		
CO2	2	2					1	1	3	3		3		
CO3	3	1	1					1	3	3		3		
CO4	3	2	1					1	3	3		3		
CO5	3	1					2	1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT

Topic - 1	ENVIRONMENT AND ECOSYSTEMS	9
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs – Introduction, types, characteristic features, structure and function of the forest ecosystem aquatic ecosystems (ponds, river and marine). Activity: Study of the ecosystem structure in Cauvery River.		
Topic - 2	**BIODIVERSITY**	**9**
Introduction to biodiversity definition: genetic, species and ecosystem diversity –value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity– endangered and endemic species of India – In-situ and ex- situ conservation of biodiversity. Activity: Study of common plants, insects, birds.		
Topic - 3	**ENVIRONMENTAL POLLUTION**	**9**
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Thermal pollution (d) Noise pollution – solid waste management: causes, effects and control measures of municipal solid wastes – Hazardous and biomedical waste management -pollution case studies. Activity: Study of air and water pollution in industry.		
Topic - 4	**NATURAL RESOURCES**	**9**
Forest resources: over-exploitation, deforestation, – Water resources: Rain water harvesting-watershed management - utilization of surface and ground water, conflicts over water, dams-benefits and problems Food resources: effects of modern agriculture, fertilizer-pesticide problems - Principles of Green Chemistry- Case studies Activity: Tree plantation and maintenance within the campus.		
Topic - 5	**SUSTAINABILITY AND POPULATION**	**9**
From unsustainable to sustainable development – environmental Impact Assessment (EIA) – environmental ethics: Issues and possible solutions – climate change, acid rain, ozone layer depletion, and case studies – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act - environment and human health – value education – HIV / AIDS – women and child welfare. Activity: Small group meetings about environment and human health in local area peoples and making poster and short films about HIV / AIDS – women and child welfare.		

THEORY	45	TUTORIAL	00	PRACTICAL	00	TOTAL	45

BOOK REFERENCES	
1	Erach Bharucha,"Textbook of Environmental Studies", Universities Press(I) Pvt, Ltd, Hydrabad,2015.
2	Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
3	Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill Education, 2014.

OTHER REFERENCES	
1	https://www.onlinebiologynotes.com/food-chain-food-web-and-ecological-pyramids/
2	https://vikaspedia.in/energy/environment/biodiversity-1/conservation-of-biodiversity
3	https://www.sciencedirect.com/topics/earth-and-planetary-sciences/ozone-layer-depletion

SEMESTER III

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20MA3T2	Probability and Statistics	BS	40	60	3	1	0	4
2	20CE3T3	Mechanics of Solids-I	ES	40	60	3	0	0	3
3	20CE3T4	Civil Engineering Materials and Construction-II	ES	40	60	3	0	0	3
4	20CE3T5	Fluid Mechanics	PC	40	60	3	0	0	3
5	20CE3T6	Surveying	PC	40	60	3	0	0	3
LABORATORY COURSES									
6	20CE3L1	Surveying Laboratory	PC	60	40	0	0	2	1
7	20CE3L2	Strength of Materials Laboratory	PC	60	40	0	0	2	1
8	20CE3L3	Computer Aided Building Drawing	ES	60	40	0	0	2	1
MANDATORY COURSE									
9	20HSCT1	Universal Human Values 2 : Understanding Harmony	HSMC	100	0	2	1	0	3
Total						**17**	**2**	**6**	**22**

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. CIVIL	20MA3T2	**PROBABILITY AND STATISTICS**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Relate and apply the concept of probability and random variables and predict probabilities of events in models following normal distribution.	K3	1
CO2	Identify the types of correlation, correlation between variables, and predict unknown values using regression.	K3	2
CO3	Justify the concept of testing of hypothesis for small and large samples and interpret the results.	K5	3
CO4	Classify the principles of design of experiments and perform analysis of variance.	K2	4
CO5	Sketch control charts and criticize on the process control.	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		2	3					1	3	3		3		
CO2	3		2					1	3	3		3		
CO3			2		3			1	3	3		3		
CO4	3				2			1	3	3		3	2	
CO5	3		3	3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments and Tutorials
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**PROBABILITY AND RANDOM VARIABLES**	**9 + 3**
Basic concepts of probability – Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Exponential and Normal distributions		
Topic - 2	**TWO – DIMENSIONAL RANDOM VARIABLES**	**9 + 3**
Joint distributions – Marginal and conditional distributions – Covariance – Correlation coefficient and linear regression – Transformation of random variables – Central limit theorem (statement only).		
Topic - 3	**TESTING OF HYPOTHESIS**	**9 + 3**
Sampling distributions – Estimation of parameters – Statistical hypothesis – Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion – Contingency table (test for independent) – Goodness of fit.		
Topic - 4	**DESIGN OF EXPERIMENTS**	**9 + 3**
One way and two way classifications – Completely randomized design – Randomized block design – Latin square design		
Topic - 5	**STATISTICAL QUALITY CONTROL**	**9 + 3**
Control charts for measurements (X and R charts) – Control charts f or attributes (p, c and np charts) – Tolerance limits – Acceptance sampling		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Cooper. G.R., McGillem. C.D., "Probabilistic Methods of Signal and System Analysis", Oxford University Press, New Delhi, 3rd Indian Edition, 2012
2	Miller. S.L. and Childers. D.G., — "Probability and Random Processes with Applications to Signal Processing and Communications ", Academic Press, 2013.
3	Vijay K. Rohatgi, Ehsanes Saleh,"An Introduction to Probability and Statisics", 2nd Edition,2009
4	N. G. Das.,"Statistical Methods", Tata McGraw Hill Publishing Ltd,2008

OTHER REFERENCES	
1	https://www.cuemath.com/learn/mathematics/probability-in-real-life/
2	https://sciencing.com/examples-of-real-life-probability-12746354.html
3	http://www.iraj.in/journal/journal_file/journal_pdf/14-358-149822091462-64.pdf

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. CIVIL	20CE3T3	**MECHANICS OF SOLIDS-I**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concept of simple stresses and strains and the various elastic constants.	K2	1
CO2	Analyse the shear force and bending moment diagrams and determine bending and shear stress distribution in beams	K4	2
CO3	Analyse the deflection of statically determinate beams.	K4	3
CO4	Apply the normal, shear, torsion and bending stresses and strains in structural member.	K3	4
CO5	Analyse stress at a point and determine the principal and maximum shear stresses using equations as well as the Mohr's circle.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2						1	3	3		3	3	
CO2	3	3		3				1	3	3		3		
CO3	3	3		3				1	3	3		3	3	
CO4	3	2						1	3	3		3		
CO5	3	3		3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**STRESS AND STRAIN**	**9**
Stress and strain at a point – Tension, Compression, Shear Stress – Hooke‟s Law – Relationshipamong elastic constants – Stress Strain Diagram for Mild Steel, TOR steel, Concrete – Ultimate Stress – Yield Stress – Factor of Safety – Thermal Stresses – Thin Cylinders and Shells – Strain Energy due to Axial Force – Resilience – Stresses due to impact and Suddenly Applied Load.		
Topic - 2	**SHEAR AND BENDING IN BEAMS**	**9**
Beams and Bending- Types of loads, supports – Shear Force and Bending Moment Diagrams for statically determinate beam with concentrated load, UDL, uniformly varying load. Theory ofSimple Bending – Analysis of Beams for Stresses – Stress Distribution at a cross Section due to bending moment and shear force for Cantilever, simply supported and overhanging beams with different loading conditions**.**		
Topic - 3	**DEFLECTION**	**9**
Double integration method - Macaulay's methods - Area moment method for computation of slopes and deflections of determinant beams.		
Topic - 4	**TORSION**	**9**
Torsion of Circular and Hollow Shafts – Elastic Theory of Torsion – Stresses and Deflection in Circular Solid and Hollow Shafts – combined bending moment and torsion of shafts - strain energy due to torsion - Modulus of Rupture – Power transmitted to shaft – Shaft in series and parallel – Closed and Open Coiled helical springs – Leaf Springs – Springs in series and parallel.		
Topic - 5	**COMPLEX STRESSES AND PLANE TRUSSES**	**9**
2 D State of Stress – 2 D Normal and Shear Stresses on any plane – Principal Stresses and Principal Planes – Mohr's circle - Plane trusses: Analysis of plane trusses - method of joints.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Timoshenko, Strength of Materials Vol. I & Vol. II , CBS Publishers & Distributers,New Delhi
2	S.S Bhavikatti , Structural analysis Vol, Vikas Publications (P) Ltd.4th Edition
3	James M Gere & Stephen P Timoshenko , Mechanics of Materials , CBS Publishers &Distributers, New Delhi
4	Rajput R.K. Strength of Materials, S.Chand&company Ltd., New Delhi
5	Bansal R.K., ―Strength of Materials‖, Laxmi Publications, New Delhi, 2007

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105106172/
2	https://nptel.ac.in/courses/105104160/
3	https://nptel.ac.in/courses/105106116/
4	https://nptel.ac.in/courses/105105108/
5	https://nptel.ac.in/courses/105105177/

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E CIVIL	20CE3T4	CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS-II	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Explain erection techniques and practice for high rise structures.	K4	1
CO2	Apply different construction techniques in under water construction.	K3	2
CO3	Apply grouting techniques.	K3	3
CO4	Analyze super structure construction.	K2	4
CO5	Show the output of earth moving equipment's.	K4	5

PRE-REQUISITE	CIVIL ENGINEERING MATERIALS AND CONSTRUCTIONS-I

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			3	3	2	3	3	3	3	3	3	
CO2	3	2			3	3	2	3	3	3	3	3	3	
CO3	3	2			3	3	2	3	3	3	3	3	3	
CO4	3	2			3	3	2	3	3	3	3	3	3	
CO5	3	2			3	3	2	3	3	3	3	3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Mini Project
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CONSTRUCTION TECHNIQUES**	**9**
Structural systems - Load Bearing Structure - Framed Structure - Load transfer mechanism – floor system - Development of construction techniques - High rise Building Technology - Seismic effect - Environmental impact of materials – responsible sourcing - Eco Building (Green Building) - Material used - Construction methods - Natural Buildings - Passive buildings - Intelligent(Smart) buildings - Meaning - Building automation - Energy efficient buildings for various zones-Case studies of residential, office buildings and other buildings in each zones.		
Topic - 2	**CONSTRUCTION PRACTICES**	**9**
Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry - concrete hollow block masonry – flooring – damp proof courses – construction joints – movement and expansion joints – pre cast pavements – Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick — weather and water proof – roof finishes – acoustic and fire protection.		
Topic - 3	**SUB STRUCTURE CONSTRUCTION**	**9**
Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunnelling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting - driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.		
Topic - 4	**SUPER STRUCTURE CONSTRUCTION**	**9**
Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in- situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.		
Topic - 5	**CONSTRUCTION EQUIPMENT**	**9**
Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching, mixing and concreting - Equipment for material handling and erection of structures – typesof cranes - Equipment for dredging, trenching, tunneling,		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Jha J and Sinha S.K., "Construction and Foundation Engineering", Khanna Publishers, 1999.
2	Sharma S.C. “Construction Equipment and Management”, Khanna Publishers New Delhi,
3	Kumar P Mehta., Paulo J M Monterio., “Concrete - Microstructure, Properties and Materials”,McGraw Hill Education (India) Private Limited, New Delhi,2016
4	Deodhar, S.V. “Construction Equipment and Job Planning”, Khanna Publishers, New Delhi, 2012.
5	Gambhir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi,2007

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105102088/L01.html
2	https://www.digimat.in/nptel/courses/video/105106053/L01.html
3	https://www.youtube.com/watch?v=wOyQBVfM1eo
4	http://www.nitttrc.edu.in/nptel/courses/video/105102088/L09.html
5	https://www.digimat.in/nptel/courses/video/105102088/L09.html

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. CIVIL	20CE3T5	**FLUID MECHANICS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the types of fluid and determine their properties	K2	1
CO2	Understand the kinematics that exists in the fluid flow and draw the flow net	K2	2
CO3	Apply Bernoulli's equation for real flow and deduce expressions for orifice meter and venturimeter	K3	3
CO4	Analyse major and minor losses in pipes	K4	4
CO5	Apply principles of dimensional analysis to design experiments	K3	5

PRE-REQUISITE	**ENGINEERING MATHEMATICS**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3			1	3	3		3		2
CO2	3	3	2					1	3	3		3		
CO3	3	3	2	2	3			1	3	3		3		
CO4	3	3	2	2				1	3	3		3		
CO5	3	3	2	3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**FLUID PROPERTIES AND STATICS**	**9**
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume – Pascal‘s Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium.		
Topic - 2	**FLUID KINEMATICS**	**9**
Fluid Kinematics - Stream, streak and path lines – Classification of flows – Continuity equation (one, two andthree dimensional forms) – Stream and potential functions – flow nets – Velocity measurement.		
Topic - 3	**FLUID KINETICS**	**9**
Euler and Bernoullis equations – Application of Bernoullis equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poisuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle.		
Topic - 4	**BOUNDARY LAYER AND FLOW THROUGH PIPES**	**9**
Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes inseries and in parallel.		
Topic - 5	**SIMILITUDE AND MODEL STUDIES**	**9**
Dimensional Analysis – Rayleigh‘s method, Buckingham‘s Pi theorem – Similitude and models – Scale effectand distorted models.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bansal, R.K., - Fluid Mechanics and Hydraulic Machines, Laxmi Publications Pvt. Ltd., New Delhi, 2008.
2	Rajput, R.K., - A Text Book Fluid Mechanics, S Chand & Co., New Delhi, 2013.
3	K.L. Kumar., - Engineering Fluid mechanics, 8th Edition S. Chand & Company Ltd.
4	P.M. Modi and S.M. Seth, - Hydraulics and Fluid Mechanics, Standard Book House
5	K. Subramanya, - Theory and Applications of Fluid Mechanics, Tata McGraw Hill.

OTHER REFERENCES	
1	http://www.nptel.ac.in/
2	https://www.youtube.com/watch?v=DW4rItB20h4
3	https://www.youtube.com/watch?v=9A-uUG0WR0w
4	https://nptel.ac.in/courses/105/103/105103095/
5	https://en.wikipedia.org/wiki/Similitude

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E., CIVIL	20CE3T6	**SURVEYING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand basic principles and concepts of different surveying methods	K2	1
CO2	Evaluate the measurements errors and apply correction	K5	2
CO3	Apply the various survey instruments for a particular survey work	K3	3
CO4	Evaluate areas and volumes of earth work	K4	4
CO5	Analyze horizontal and vertical angles	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			3		2	2	3	3		3	3	
CO2	3	3			2		2	2	3	3		3	3	
CO3	3				3		2	2	3	3		3	3	
CO4	3				2		2	2	3	3		3	3	
CO5	3				3		2	2	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic – 1	**FUNDAMENTALS AND CHAIN SURVEYING**	**9**
Definition- Classifications - Basic principles-Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting – applications- enlarging the reducing the figures – Areas enclosed by straight line irregular figures.		
Topic – 2	**COMPASS AND PLANE TABLE SURVEYING**	**9**
Compass – Basic principles - Types - Bearing - Systems and conversions- Sources of errors - Local attraction - Magnetic declination-Dip-Traversing - Plotting - Adjustment of closing error – applications -Plane table and its accessories - Merits and demerits - Radiation - Intersection - Resection – Traversing- sources of errors – applications.		
Topic – 3	**LEVELLING**	**9**
Level line - Horizontal line - Datum - Bench marks -Levels and staves - temporary and permanent adjustments – Methods of levelling - Fly levelling - Check levelling - Procedure in levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling – Sources of Errors in levelling- Precise levelling - Types of instruments - Adjustments - Field procedure.		
Topic – 4	**LEVELLING APPLICATIONS**	**9**
Longitudinal and Cross-section-Plotting - Contouring - Methods - Characteristics and uses of contours – Plotting – Methods of interpolating contours – Computations of cross sectional areas and volumes - Earthwork calculations - Capacity of reservoirs.		
Topic – 5	**THEODOLITE**	**9**
Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry Subtense method - Stadiaconstants - Anallactic lens.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Punmia, B.C., ―Surveying‖, Volume. I and II, Laxmi Publications, New Delhi, 2008.
2	Duggal, ―Surveying‖, Volumes - I and II, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2007.
3	Surveying and Levelling Vol. I and Vol. II by T. P. Kanetkar and S.V.Kulkarni , Pune VidyarthiGrihaPrakashan.
4	Surveying and Levelling by Subramanian, Oxford University Press
5	Textbook of Surveying by C. Venkatramaiah , University Press.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/104/105104101/
2	https://nptel.ac.in/courses/105/107/105107122/
3	https://nptel.ac.in/courses/105/107/105107157/
4	https://www.youtube.com/watch?v=7QyhK_1Ex-s
5	https://www.youtube.com/watch?v=c9U0xlmCzGI

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. CIVIL	20CE3L1	**SURVEYING LABORATORY**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Surveying Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**Surveying**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Study of chains and its accessories
2	Study of plain table surveying
3	Compass Traversing
4	Determination of area by triangulation method
5	Determination of area by trilateration method
6	Grid contouring
7	Radial contouring
8	Check leveling
9	Levelling – CS and LS
10	Experiments in total station.

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**30**		**TOTAL**	**30**

BOOK REFERENCES	
1	Surveying Laboratory, Al-Ameen Publications**.**
2	Punmia, B.C., ―Surveying‖, Volumes – I and II, Laxmi Publications, New Delhi,2008.

OTHER REFERENCES	
1	http://youtube.com/watch?v=VIEZXvHzf1Q
2	http://youtube.com/watch?v=hiCH-IS3LOI&t=146s
3	https://www.youtube.com/watch?v=ZRjD9XgMLsQ
4	https://www.youtube.com/watch?v=1apJJL4j7OI
5	https://www.youtube.com/watch?v=MhP8K_tWKeE

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E.CIVIL	20CE3L2	**STRENGTH OF MATERIALS LABORATORY**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Strength of Materials Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**MECHANICS OF SOLIDS-I**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Tension test on metal specimens.
2	Shear test on metal specimens.
3	Torsion test on metal specimen.
4	Impact tests on metal specimens.
5	Hardness tests on metal specimens.
6	Test on closed coil helical springs.
7	Test on open coil helical springs.
8	Deflection test on beam.
9	Tests on Brick i) Compressive strength ii) Water absorption
10	Tests on Cement i) Standard consistency ii) Setting time iii) Soundness iv) Compressive strength

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Strength Of MaterialsLaboratory: - Al-Ameen Publication
2	Shetty.M.S., "Concrete Technology (Theory and Practice)", S. Chand and Company Ltd.,2008.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105105108/L01.html
2	https://www.iare.ac.in/sites/default/files/lab1/IARE_Strength_of_Materials_Laboratory.pdf
3	https://www.youtube.com/watch?v=BDZhFZn2MQg
4	https://www.youtube.com/watch?v=pS2HSTwHpSw
5	https://www.youtube.com/watch?v=YNBAjIysQ0w

Semester	Programme	Course Code	Course Name	L	T	P	C
III	B.E. CIVIL	20CE3L3	**COMPUTER AIDED BUILDING DRAWING**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Computer Aided Building Drawing Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3				
CO2	3				3			2	3		1			
CO3	3	2		2		1				3				
CO4	3									3				
CO5	3									3		1		
CO6						2		2	2	2		1		

COURSE ASSESSMENT METHODS		
DIRECT	1	Laboratory Record
	2	Model Practical Examinations
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Study of Principles of Planning and Building Bye-Laws
2	Plan, Elevation and Cross Section of Residential Building – one storied & two storied
3	Plan, Elevation and Cross Section of RCC Framed structure - commercial and institutional
4	Plan, Elevation and Cross Section of Industrial Building with north light roof truss
5	Plan, Elevation and Cross Section of Rain water Harvesting and Septic tank
6	Preparation of Detailed drawing
7	Study of Building Information Modeling (BIM)

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Computer Aided BuildingDrawing: - Al-Ameen Publication
2	Dr. Balagopal T.S. Prabhu, Building Drawing and Detailing, Spades Publishers, Calicut
3	AutoCAD Essentials, Autodesk official Press, John Wiley & Sons, USA
4	M.G., Kale, C. M. and Patki, S.Y. Building Drawing With An Integrated Approach to Built Environment, Tata McGraw Hill Publishing Company Limited, New Delhi
5	M G Shah - Building Drawing with an integrated approach to Built Environment.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=CiVIk25kCaA
2	https://www.autodesk.com/solutions/cad-software
3	https://nptel.ac.in/courses/112/102/112102101/
4	https://www.youtube.com/watch?v=o4nJ6v501rs
5	https://www.youtube.com/watch?v=LgvGmwGMeKk

Semester	Programme	Course Code	Course Name	L	T	P	C
III – B.E. CIVIL IV – B.E. CSE, EEE, ECE, MECH & B.Tech. IT		20HSCT1	**UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY**	2	1	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand and aware of themselves, and their surroundings (family, society, nature)	K2	1,2
CO2	Build more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind	K3	2,3,5
CO3	Relate the critical ability and sensitive to their commitment towards what they have understood (human values, human relationship and human society).	K2	1,2,3
CO4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.	K3	2,3,4
CO5	Appraise local, regional and a national culture in harmony with others	K5	2,3,4,5
CO6	Leading to the development of a holistic and humane world vision: Universal Human Values of truth, love and compassion	K6	3,4,5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1		3					2					2		
CO2		3					3		2					
CO3								3				2		
CO4		2				2	2							
CO5								3		2		2		
CO6								3		2		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Practice sessions
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**Course Introduction - Need, Basic Guidelines, Content and Process for Value Education**	**9**

1. Purpose and motivation for the course, recapitulation from Universal Human Values-I
2. Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Topic - 2	**Understanding Harmony in the Human Being - Harmony in Myself!**	**9**

7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body'
8. Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
9. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
10. Understanding the characteristics and activities of 'I' and harmony in 'I'
11. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
12. Programs to ensure Sanyam and Health.

Topic - 3	**Understanding Harmony in the Family and Society- Harmony in Human Relationship**	**9**

13. Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
14. Understanding the meaning of Trust; Difference between intention and competence
15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
17. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Topic - 4	**Understanding Harmony in the Nature and Existence - Whole existence as Coexistence**	**9**

18. Understanding the harmony in the Nature
19. Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self regulation in nature
20. Understanding Existence as Co-existence of mutually interacting units in all pervasive space

21. Holistic perception of harmony at all levels of existence.		
Topic - 5	**Implications of the above Holistic Understanding of Harmony on Professional Ethics**	**9**
22. Natural acceptance of human values 23. Definitiveness of Ethical Human Conduct 24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order 25. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. 26. Case studies of typical holistic technologies, management models and production systems 27. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations 28. Sum up		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Jeevan Vidya: E.K. Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
3	The Story of Stuff (Book)by Annie Leonard , 2011
4	The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5	Small is Beautiful - E. F Schumacher.
6	Slow is Beautiful - Cecile Andrews
7	Economy of Permanence - J C Kumarappa
3	India Wins Freedom - Maulana Abdul Kalam Azad
4	Vivekananda - Romain Rolland (English)
4	Gandhi - Romain Rolland (English)

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=XGxNCFjDGEg
2	https://www.c-span.org/video/?292709-1/the-story-stuff

SEMESTER IV

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE4T1	Mechanics of Solids–II	PC	40	60	3	0	0	3
2	20CE4T2	Applied Hydraulic Engineering	PC	40	60	3	0	0	3
3	20CE4T3	Concrete Technology	PC	40	60	3	0	0	3
4	20MA4T4	Numerical Methods	BS	40	60	3	1	0	4
5		Professional Elective– I	PE	40	60	3	0	0	3
6		Open Elective–I	OE	40	60	3	0	0	3
LABORATORY COURSES									
7	20CE4L1	Fluid Mechanics and Machinery Laboratory	PC	60	40	0	0	2	1
8	20CE4L2	Concrete& Highway Engineering Laboratory	PC	60	40	0	0	2	1
Total						**18**	**1**	**4**	**21**

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4T1	**MECHANICS OF SOLIDS – II**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand strain energy stored in a body.	K2	1
CO2	Analyze statically Indeterminate structures.	K4	2
CO3	Analyze buckling load for columns & struts with different end conditions.	K4	3
CO4	Analyze principal stresses and planes	K4	4
CO5	Analyze Unsymmetrical bending of beams	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2											2		
CO2	3	2	2		2							2		2
CO3	3	2	3											
CO4	3	2	2				2		2			2		2
CO5	2	2												

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**ENERGY PRINCIPLES**	**9**
Strain energy and strain energy density – strain energy due to axial load, shear, flexure and torsion – Castigliano‟s theorems – Maxwell‟s reciprocal theorems -Principle of virtual work – application of energy theorems for computing deflections in beams and trusses.		
Topic - 2	**INDETERMINATEBEAMS**	**9**
Concept of Analysis - Propped cantilever and fixed beams-fixed end moments and reactions – Theorem of three moments – analysis of continuous beams – shear force and bending moment diagrams.		
Topic - 3	**COLUMNSANDCYLINDER**	**9**
Euler‟s theory of long columns – critical loads for prismatic columns with different endconditions; Rankine-Gordon formula for eccentrically loaded columns – Eccentricallyloaded short columns – middle third rule – coresection – Thick cylinders.		
Topic - 4	**STATE OF STRESS IN THREE DIMENSIONS**	**9**
Determination of principal stresses and principal planes – Volumetric strain –Theories offailure – Principal stress - Principal strain – shear stress – Strain energy and distortionenergy theories–applicationin analysis of stress,load carryingcapacity.		
Topic - 5	**ADVANCED TOPICS IN BENDING OF BEAMS**	**9**
Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – Shear Centre - curved beams – Winkler Bach formula.		

THEORY	**45**	**TUTORIAL**	**0**	**PRACTICAL**	**0**	**TOTAL**	**45**

BOOK REFERENCES	
1	Rajput R.K. "Strength of Materials (Mechanics of Solids)", S.Chand& company Ltd.,New Delhi, 2010.
2	PunmiaB.C."Theory of Structures" (SMTS) Vol 1&II, Laxmi Publishing Pvt Ltd, New Delhi 2004.
3	S.Ramamrutham, "Strength of Materials,DhanpatRai& Sons.
4	Bhavikatti , Structural analysis Vol, Vikas Publications (P) Ltd.4th Edition
5	Timoshenko, Strength of Materials Vol. I & Vol. II , CBS Publishers & Distributers, New Delhi

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=Y1KE8eAC9Bk
2	https://www.youtube.com/watch?v=kiiA6WTCQn0
3	https://www.youtube.com/watch?v=Uc2R7GND0Dk
4	https://www.youtube.com/watch?v=icxvLWEOzEA
5	https://www.youtube.com/watch?v=PzbdTfUatIY

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4T2	APPLIED HYDRAULIC ENGINEERING	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the different types of flows and channels.	K2	1
CO2	Understand gradually varied flow profile in detail.	K2	2
CO3	Understand rapidly varied flow profile in detail.	K2	3
CO4	Analyse the various components of pumps, efficiency and speed.	K4	4
CO5	Evaluate the working proportions of hydraulic turbines.	K5	5

PRE-REQUISITE	Fluid Mechanics

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2	2			2	1	3	3		3		
CO2	3	3	2	3				1	3	3		3		2
CO3	3	3	2	3				1	3	3		3		
CO4	3	2	2	2	3	2		1	3	3		3		2
CO5	2	3	3	2	3	-	2	1	3	3		3		2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**OPEN CHANNEL FLOW**	**9**
Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manningequation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specificforce - Critical depth and velocity.		
Topic - 2	**GRADUALLY VARIED FLOW**	**9**
Dynamic equations of gradually varied and spatially varied flows - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standardstep method, Graphical method – Applications.		
Topic - 3	**RAPIDLY VARIED FLOW**	**9**
Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges and surge through channel transitions.		
Topic - 4	**PUMPS**	**9**
Application of momentum principle - Classification of pumps - Centrifugal pump - Minimum speed to start thepump - Multistage pumps - Reciprocating pump - Negative slip - Air vessels - Indicator diagrams.		
Topic - 5	**TURBINES**	**9**
Impact of Jet on vanes - Turbines - Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bansal, R.K., - Fluid Mechanics and Hydraulic Machines, Laxmi Publications Pvt. Ltd., New Delhi, 2008.
2	Rajput, R.K., - A Text Book Fluid Mechanics, S Chand & Co., New Delhi, 2013.
3	K.L. Kumar., - Engineering Fluid mechanics, 8th Edition S. Chand & Company Ltd.
4	P.M. Modi and S.M. Seth, - Hydraulics and Fluid Mechanics, Standard Book House
5	K. Subramanya, - Flow in open channels, 3rd Edition, Tata McGraw Hill.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/105/105105203/#
2	https://www.brainkart.com/subject/Applied-Hydraulic-Engineering
3	https://ascelibrary.org/journal/jhend8
4	https://www.youtube.com/watch?v=tmzInxHyyFk&list=PLbRMhDVUMngdInIhHKoECcrz27t
5	https://www.youtube.com/watch?v=70mCj_QK8D0

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4T3	**CONCRETE TECHNOLOGY**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concept of building materials – Cement, Aggregate and Water.	K2	1
CO2	Analyze the suitable Admixtures used in concrete.	K4	2
CO3	Analyse the suitable mix design of concrete grade.	K4	3
CO4	Evaluate the fresh and hardened concrete.	K5	4
CO5	Analyze the different types of special concrete.	K4	5

PRE-REQUISITE	**CIVIL ENGINEERING MATERIALS-I , CIVIL ENGINEERING MATERIALS-II**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1		1	2	3	3	3	3	3	2	2
CO2	3			1		1	2	3	3	3	3	3	2	2
CO3	3	3	3	1		1	2	3	3	3	3	3	2	2
CO4	3			1		1	2	3	3	3	3	3	2	2
CO5	3			1		1	2	3	3	3	3	3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Mini Project
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CONSTITUENT MATERIALS**	**9**
Cement - Different types - Chemical composition and Properties – Hydration of cement - Tests on cement - IS Specifications - Aggregates – Classification - Mechanical properties and tests as per BIS - Grading requirements – Water - Quality of water for use in concrete.		
Topic - 2	**CHEMICAL ANDMINERAL ADMIXTURES**	**9**
Accelerators – Retarders - Plasticizers - Super plasticizers - Water proofers - Mineral Admixtures like Fly Ash, Silica Fume, Ground Granulated Blast Furnace Slag and Metakaoline - Effects on concrete properties.		
Topic - 3	**PROPORTIONING OF CONCRETE MIX**	**9**
Principles of Mix Proportioning - Properties of concrete related to Mix Design - Physical properties of materials required for Mix Design - Design Mix and Nominal Mix - BIS Method of Mix Design - Mix Design Examples		
Topic - 4	**FRESH AND HARDENED PROPERTIES OFCONCRET**	**9**
Workability - Tests for workability of concrete - Segregation and Bleeding - Determination of strength Properties of Hardened concrete - Compressive strength – split tensile strength - Flexural strength - Stress-strain curve for concrete - Modulus of elasticity – durability of concrete – water absorption – permeability – corrosion test – acid resistance.		
Topic - 5	**SPECIAL CONCRETES**	**9**
Light weight concretes - foam concrete- self compacting concrete – vacuum concrete - High strength concrete - Fibre reinforced concrete – Ferrocement - Ready mix concrete – SIFCON - Shotcrete – Polymer concrete - High performance concrete - Geopolymer Concrete		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Neville, A.M; "Properties of Concrete", Pitman Publishing Limited, London,1995
2	Gambhir, M.L; "Concrete Technology", 3rd Edition, Tata McGraw Hill Publishing Co Ltd, New Delhi,2007
3	IS10262-2009 Recommended Guidelines for Concrete Mix Design, Bureau of Indian Standards, New Delhi, 1998.
4	Job Thomas, “Concrete Technology”, Cengage Learning India Pvt. Ltd., Delhi,2015
5	Kumar P Mehta., Paulo J M Monterio., “Concrete - Microstructure, Properties and Materials”, McGraw Hill Education (India) Private Limited, New Delhi,2016

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/102/105102012/
2	https://nptel.ac.in/courses/105/106/105106176/
3	https://nptel.ac.in/courses/105/104/105104030/
4	https://onlinecourses.nptel.ac.in/noc19_ce20/preview
5	https://onlinecourses.nptel.ac.in/noc19_ce20/preview

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	Common to B.E. EEE & CIVIL	20MA4T4	**NUMERICAL METHODS**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify and apply various numerical techniques for solving non-linear equations and systems of linear equations.	K3	1
CO2	Categorize various types of interpolation with equal and unequal intervals and apply the concept of cubic spline, approximation of derivatives using interpolation polynomials.	K4	2
CO3	Analyse and apply the knowledge of interpolation and determine the integration and differentiation of the functions by using the numerical data.	K4	3
CO4	Determine the dynamic behaviour of the system through solution of ordinary differential equations by using numerical methods.	K5	4
CO5	Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.	K3	5

PRE-REQUISITE	Engineering Mathematics I & Engineering Mathematics II

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		3				1	3	3		3		
CO2	3	3		3				1	3	3		3		
CO3	3	3		3				1	3	3		3		
CO4	3	3		3				1	3	3		3		
CO5	3	3		3				1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments and Tutorials
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**	**9 + 3**
Solution of algebraic and transcendental equations - Fixed point iteration method – Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method.		
Topic - 2	**INTERPOLATION AND APPROXIMATION**	**9 + 3**
Interpolation with unequal intervals - Lagrange's interpolation – Newton's divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton's forward and backward difference formulae.		
Topic - 3	**NUMERICAL DIFFERENTIATION AND INTEGRATION**	**9 + 3**
Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule – Romberg's Method - Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.		
Topic - 4	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS**	**9 + 3**
Single step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne's predictor corrector methods for solving first order equations.		
Topic - 5	**BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**	**9 + 3**
Finite difference methods for solving second order two - point linear boundary value problems - Finite difference techniques for the solution of two dimensional Laplace's and Poisson's equations on rectangular domain – One dimensional heat flow equation by explicit and implicit (Crank Nicholson) method.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Gerald. C. F. and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education,Asia, 7th Edition, New Delhi, 2006.
2	Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi, 2010
3	Stevan C Chapra, "Applied Numerical Methods with MAT LAB for Engineers andScientist",Tata McGraw Hill Publishing Company Limited, 2nd Edition, 2007.
4	P.B Pasil, N P Varma.,"Numerical Computational Methods", Narosa Publishing House 2009
5	Burden, R.L and Faires, J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016.

OTHER REFERENCES	
1	https://www.sobtell.com/blog/38-real-life-applications-of-numerical-analysis
2	https://www.scienceabc.com/eyeopeners/why-do-we-need-numerical-analysis-in-everyday-life.html
3	https://leverageedu.com/blog/application-of-statistics/

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4E1	**HIGHWAY AND RAILWAY ENGINEERING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concept of road transportation and aligning of highway.	K2	1
CO2	Understand the geometric design of highways.	K2	2
CO3	Analyzing preliminary design of flexible and rigid pavement.	K4	3
CO4	Understand the methods of route alignment and design elements in Railway Planning and Constructions.	K2	4
CO5	Evaluate the requirements of railway track for high speed trains, safetyaspects and maintenance.	K5	5

PRE-REQUISITE	**SURVEYING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2			2	2	3	3		3		
CO2	3	3	3	2	2		2	2	3	3		3		2
CO3	2	2	3	2		2	2	2	3	3		3		2
CO4	3	2	3	2	2	3	2	2	3	3		3		
CO5	3	3	3		2	2	2	2	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**HIGHWAY PLANNING AND ALIGNMENT**	**9**
Role of Transportation - Characteristics, merits and demerits of road transportation - Historical development ofRoad Construction - Highway development in India - Classification of roads - Road patterns - Highway alignment - Engineering surveys for Highway location.		
Topic - 2	**GEOMETRIC DESIGN**	**9**
Highway cross sectional elements - Typical cross sections of Urban and Rural roads - Sight distance - Design ofHorizontal alignment - horizontal curves, camber, super elevation, widening of curve.		
Topic - 3	**DESIGN OF PAVEMENTS**	**9**
Flexible Pavements: materials – tests (CBR) - mix design - design factors - flexible pavement design as per IRC. Rigid Pavements: design of rigid pavements - general design considerations - stresses in rigid pavements - design of joints, dowel bar, tie bar - IRC method of design of concrete pavements.		
Topic - 4	**RAILWAY PLANNING AND DESIGN**	**9**
Railway track (Permanent way) its components and their functions –Gauge, tilting of rails Coning of wheels and theory of coning – Rails, Rail fastenings, Creep of rails – Sleepers – Ballasts – Ballast less tracks. Track alignment: Engineering surveys for track alignment – Obligatory points – Conventional methods –Modern methods. Geometric design of Railway Tracks: Gradient-Horizontal curve, super elevation, Transition curves, Summit Curves.		
Topic - 5	**RAILWAY TRACK CONSTRUCTION AND MAINTENANCE**	**9**
Points and crossing-Signalling and interlocking-Stations and Equipment-Yards and equipments-Track maintenance.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Khann a, S.K., Justo C.E.G. and Veeraragavan A., - Highway Engineering, 10th Edition, New Chand and Brothers, Roorkee, 2013.
2	Kadiyali.L.R. "Highway Engineering", Khanna Technical Publications.
3	SaxenaSubhash, C.andSatyapalArora, A Course in Railway Engineering, DhanapatRai and Sons,Delhi, 1998.
4	Mundrey J S, Railway Track Engineering, McGraw Hill Education (India) Private Ltd, New Delhi,2013.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/105/105105107/
2	https://www.youtube.com/watch?v=5zKC_aq4ypM
3	https://www.youtube.com/watch?v=37WMS483T7Y
4	https://en.wikipedia.org/wiki/Track_(rail_transport)
5	https://www.youtube.com/watch?v=JGOrwgECpHg

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4E2	**REMOTE SENSING AND GIS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concepts of Electro Magnetic energy, spectrum and spectralsignature curves in the practical problems.	K2	1
CO2	Explain the concepts of satellite and sensor parameters and characteristics ofdifferent platforms.	K2	2
CO3	Apply digital image processing techniques	K3	3
CO4	Evaluate the concepts of DBMS in GIS.	K5	4
CO5	Analyze raster and vector data and modelling in GIS.	K4	5

PRE-REQUISITE	**SURVEYING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			2		2	2	3	3		3	3	
CO2	3	3			3		2	2	3	3		3	3	
CO3	3	3			3		2	2	3	3		3	3	
CO4	3	3	2		3		2	2	3	3		3	3	
CO5	3	3			3		2	2	3	3		3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL**	**9**
Definition of remote sensing and its components - Electromagnetic spectrum - wavelength regions important to remote sensing - Wave theory, Particle theory, Stefan - Boltzman and Wein's Displacement Law - Atmospheric scattering, absorption - Atmospheric windows – spectral signature concepts - typical spectral reflective characteristics of water, vegetation and soil.		
Topic - 2	**PLATFORMS AND SENSORS**	**9**
Types of platforms - orbit types, Sun - synchronous and Geosynchronous - Passive and Active sensors - resolution concept - Pay load description of important Earth Resources and Meteorological satellites - Airborne and space borne TIR and microwave sensors.		
Topic - 3	**IMAGE INTERPRETATION AND ANALYSIS**	**9**
Types of Data Products - types of image interpretation - basic elements of image interpretation- visual interpretation keys - Digital image processing - Pre-processing - image enhancement techniques - multispectral image classification - supervised and unsupervised.		
Topic - 4	**GEOGRAPHIC INFORMATION SYSTEM**	**9**
Introduction - Maps- Definitions - Map projections - types of map projections - map analysis – GIS definition - basic components of GIS - standard GIS software - data type - Spatial and non spatial (attribute) data - measurement scales - Data base Management Systems (DBMS).		
Topic - 5	**DATA ENTRY, STORAGE AND ANALYSIS**	**9**
Data models - vector and raster data - data compression - data input by digitization and scanning - attribute dataanalysis - integrated data analysis - Modeling in GIS highway - alignment studies – land Information system.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Ian Heywood "An Introduction to GIS", Pearson Education, Asia, 2000.
2	Lo.C.P and A.K.W.Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2002.
3	Burrough P.A. and Rachel A. McDonell, Principles of Geographical Information Systems, Oxford Publication, 2004.
4	C.P.Lo and Albert K.W.Yeung, Concepts and Techniques of Geographical Information Systems, Prentice Hall India, 2006.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105103193/L19.html
2	https://www.digimat.in/nptel/courses/video/105103193/L24.html
3	https://www.youtube.com/watch?v=cn5CWu_zt_s
4	http://nitttrc.edu.in/nptel/courses/video/105103193/L20.html
5	https://www.digimat.in/nptel/courses/video/105103193/L01.html

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. CIVIL	20CE4E3	**INDUSTRIAL STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Prepare the layout for industrial buildings.	K1	1
CO2	Analyzing for functional requirements	K4	2
CO3	Analyzing steel girder, bunker and silos.	K4	3
CO4	Analyzing RC structures like chimneys and shell roofs.	K4	4
CO5	Analyzing Prestressed precast concrete units.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1					2	2	3	3		3	2	
CO2	3	2					2	2	3	3		3	2	
CO3	3	2					2	2	3	3		3	2	
CO4	2	1	3				2	2	3	3		3	2	
CO5	2	3	3				2	2	3	3		3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT										
Topic - 1	**PLANNING**									**9**
Classification of Industries and Industrial structures - General requirements for industries like cement, chemical and steel plants - Planning and layout of buildings and components.										
Topic - 2	**FUNCTIONAL REQUIREMENTS**									**9**
Lighting – Ventilation – Accounts - Fire safety - Guidelines from factories act.										
Topic - 3	**DESIGN OF STEEL STRUCTURES**									**9**
Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos.										
Topic - 4	**DESIGN OF R.C. STRUCTURES**									**9**
Silos and bunkers - Chimneys - Principles of folded plates and shell roofs.										
Topic - 5	**PREFABRICATION**									**9**
Principles of prefabrication - Prestressed precast roof trusses - Functional requirements for Precast concrete units.										
THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Ramamrutham .S. “Design of reinforced Concrete Structures”, DhanpatRai Publishing Company, 2007.
2	Varghese P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India Eastern Economy Editions, 2nd Edition, 2003.
4	Bhavikatti S.S., “Design of Steel Structures”, J.K. International Publishing House Pvt. Ltd., 2009.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/106/105106113/
2	https://nptel.ac.in/courses/112/107/112107292/
3	https://nptel.ac.in/content/storage2/courses/105106113/2_industrial_building/12_Example_Problem.pdf
4	https://nptel.ac.in/content/syllabus_pdf/105105162.pdf
5	https://www.youtube.com/watch?v=mtRR-5fzKo8

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. EEE	20CE4L1	**FLUID MECHANICS AND MACHINERYLABORATORY**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Fluid Mechanics and Machinery Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**Fluid mechanics & Applied hydraulic engineering**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3			1	3
CO2	3				3			2	3		1		2	3
CO3	3	2		2		1				3			2	3
CO4	3									3			1	3
CO5	3									3		1	1	3
CO6	3									2		1	1	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Determination of co-efficient of discharge of orifice and mouthpiece
2	Determination of co-efficient of discharge of notches
3	Determination of co-efficient of discharge of venturimeter
4	Determination of co-efficient of discharge of orifice meter
5	Determination of friction losses in pipes
6	Determination of minor losses in pipes
7	Study on performance characteristics of Pelton wheel turbine
8	Study on performance characteristics of Francis turbine
9	Study on performance characteristics of Centrifugal pump
10	Study on performance characteristics of reciprocating pump

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Fluid Mechanics Laboratory, Al-Ameen Publications.
2	Bansal, R.K., - Fluid Mechanics and Hydraulic Machines‖, Laxmi Publications Pvt. Ltd., New Delhi,2008.

OTHER REFERENCES	
1	https://eerc03-iiith.vlabs.ac.in/exp/venturi-meter/
2	https://eerc03-iiith.vlabs.ac.in/exp/orifices/
3	https://eerc03-iiith.vlabs.ac.in/exp/turbines/
4	https://www.youtube.com/watch?v=-bKy91W-BDg
5	https://www.youtube.com/watch?v=lLY4QMQIY5s

Semester	Programme	Course Code	Course Name	L	T	P	C
IV	B.E. EEE	20CE4L2	**CONCRETE AND HIGHWAY ENGINEERING LABORATORY**	0	0	2	1

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Concrete and Highway Engineering Laboratory Course	K3
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K4
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K4
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**FLUID MECHANICS & APPLIED HYDRAULIC ENGINEERING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3			1	3
CO2	3				3			2	3		1		2	3
CO3	3	2		2		1				3			2	3
CO4	3									3			1	3
CO5	3									3		1	1	3
CO6	3									2		1	1	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

LIST OF EXPERIMENTS	
1	Slump cone test & V-Bee test to determine the workability of concrete.
2	Determine the compressive strength and tensile strength of concrete by conducting tests on cubes and cylinders.
3	Determine the modulus of rupture of concrete.
4	Design one given concrete mix (M20, M25, M30, M35, M40)
5	Determination of impact value and elongation, flakiness indexof coarse aggregate.
6	Specific gravity test on coarse and fine aggregate.
7	Determination of los angels abrasion value.
8	Specific gravity test for bitumen.
9	Determination of penetration value of bitumen.
10	Determination of viscosity and softening point of bituminous material.

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Concrete and highway engineering laboratory:-- Al-Ameen Publication
2	Kadiyali.L.R. "Highway Engineering", Khanna Technical Publications.
3	2386 (Part 1 to Part 6) – 1963 – Indian Standard methods for test for aggregate for concrete
4	Indian Standard specification for coarse and fine aggregates from natural sources for concrete.
5	Khanna, S.K., Justo C.E.G. and Veeraragavan A., ―Highway Engineering‖, 10th Edition, New Chand and Brothers, Roorkee, 2013.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=8ZbhORA08qw
2	https://www.youtube.com/watch?v=t4RDdn6rOwU
3	https://ts-nitk.vlabs.ac.in/transportation-engineering/
4	https://cs-iitd.vlabs.ac.in/
5	https://www.youtube.com/watch?v=uJgvTheBhrM

SEMESTER V

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE5T1	Structural Analysis-I	PC	40	60	3	1	0	4
2	20CE5T2	Design of Reinforced Concrete Elements and Structures	PC	40	60	3	1	0	4
3		Open Elective–II	OE	40	60	3	0	0	3
4		Professional Elective–II	PE	40	60	3	0	0	3
THEORY COURSE WITH LABORATORY COMPONENTS									
5	20CE5LT1	Geotechnical Engineering-I	PC	50	50	2	0	4	4
ENHANCEMENT COURSE									
6	20CE5L1	Internship & Innovation Practices	EEC	100	0	0	0	3	1.5
MANDATORY COURSE									
7	20MCCT1	Constitution of India	MC	100	0	2	0	0	0
Total						**16**	**2**	**7**	**19.5**

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5T1	**STRUCTURAL ANALYSIS-I**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Analyze the member forces and deflection of determinate structures	K4	1
CO2	Analyze the continuous beams and frame by slope deflection method.	K4	2
CO3	Analyze the continuous beams and frame by moment distribution method.	K4	3
CO4	Analyze the forces for continuous beams, frames and trusses using flexibility method.	K4	4
CO5	Analyze the displacement for continuous beams, frames and trusses using stiffness method.	K4	5

PRE-REQUISITE	**MECHANICS OF SOLIDS–II**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3			3		1	3	3		3	3	3
CO2	3	3	3			3		1	3	3		3	3	3
CO3	3	3	3			3		1	3	3		3	3	3
CO4	3	3	3			3		1	3	3		3	3	3
CO5	3	3	3			3		1	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic – 1	**DEFLECTION OF DETERMINATE STRUCTURES**	9 + 3
Determination of Static and Kinematic Indeterminacy in Beams, plane. Deflection of statically determinate beams.		
Topic – 2	**SLOPE DEFLECTION METHOD**	9 + 3
Slope deflection equations – Equilibrium conditions - Analysis of continuous beams with and without sinking of supports - Analysis of single storey portal frames with and without sway.		
Topic – 3	**MOMENT DISTRIBUTION METHOD**	9 + 3
Stiffness and carry over factors – Distribution and carryover of moments - Analysis of continuous beams with and without sinking of supports - Analysis of single storey portal frames with and without sway.		
Topic – 4	**FLEXIBLITY MATRIX METHOD**	9 + 3
Equilibrium and compatibility - Determinate and Indeterminate structures – Degree of Indeterminacy - Primary structure - Compatibility conditions - Analysis of continuous beams, indeterminate frames and trusses with maximum two degrees of static indeterminacy.		
Topic – 5	**STIFFNESS MATRIX METHOD**	9 + 3
Element and global stiffness matrices - Analysis of continuous beams - Coordinate transformations - Rotation matrix - Transformations of stiffness matrices, load and displacements vectors - Analysis of pin jointed plane and rigid frames with redundancy restricted to two.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Vaidyanadhan, R and Perumal, P, ―Comprehensive Structural Analysis‖, Vol. 1 & Vol. 2, Laxmi Publications Pvt. Ltd, New Delhi, 2016.
2	Bhavaikatti, S.S, ―Structural Analysis‖, Vol. 1& Vol. 2, Vikas Publishing House Pvt. Ltd., New Delhi, 2013.
3	DevadasMenon, ―Structural Analysis‖, Narosa Publishing House, 2014.
4	B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ―Theory of Structures‖, 13th Edition, Laxmi Publications Pvt. Ltd., New Delhi, 2017.
5	Pandit G.S and Gupta S.P., ―Structural Analysis – A Matrix Approach‖ Tata McGraw-Hill Publishing Ltd. New Delhi, 2008

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105101085
2	http://nptel.ac.in/courses/105106050
3	http://nptel.ac.in/courses/10510519
4	https://nptel.ac.in/courses/105105108/
5	https://nptel.ac.in/courses/105105177/

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5T2	**DESIGN OF REINFORCED CONCRETE ELEMENTS AND STRUCTURES**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify and explain the methods for the design of Reinforced concrete (RC) elements.	K2	1
CO2	Design the beams by limit state method	K5	2
CO3	Design the slabs under different support condition by limit state method.	K5	3
CO4	Design the columns for axial and eccentric loadings by limit state method.	K5	4
CO5	Design of footing by limit state method.	K5	5

PRE-REQUISITE	**STRENGTH OF MATERIALS**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3				3	1	3	3		3	3	3
CO2	3	3	3				3	1	3	3		3	3	3
CO3	3	3	3				3	1	3	3		3	3	3
CO4	3	3	3				3	1	3	3		3	3	3
CO5	3	3	3				3	1	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignments
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**METHODS OF DESIGN OF CONCRETE STRUCTURES**	9 + 3
Properties of Concrete and Reinforcing Steel - Type of Loads on Structures and Load combinations- Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods - Advantages of Limit State Method over other methods - Code of practices and Specifications - Analysis and Design of singly, doubly and Flanged beams by working stress method		
Topic - 2	**DESIGN OF BEAMS**	9 + 3
Analysis and design of singly, doubly and Flanged beams – Use of design aids for Flexure - Behaviour of RC members in Shear, Bond and Anchorage - Design of RC members for combined Bending, Shear and Torsion- Design requirements as per current code.		
Topic - 3	**DESIGN OF SLABS**	9 + 3
Analysis and design of one way and two way simply supported and continuous slabs -Two way slab- Design of simply supported and continuous slabs using IS code coefficient.		
Topic - 4	**DESIGN OF COLUMNS**	9 + 3
Types of columns –Axially Loaded columns – Design of Rectangular, Square and circular short columns - Design for Uniaxial and Biaxially loaded Column using SP16 - Design of Slender columns.		
Topic - 5	**DESIGN OF FOOTING**	9 + 3
Design of wall footing – Design of axially and eccentrically loaded Square, Rectangular and sloped footings – Design of Combined Rectangular footing for two columns.		

THEORY	**45**	**TUTORIAL**	**15**	**PRACTICAL**	**0**	**TOTAL**	**60**

BOOK REFERENCES	
1	Varghese, P.C., ―Limit State Design of Reinforced Concrete‖, PHI, Pvt. Ltd., New Delhi, 2010.
2	Punmia. B.C., Ashok Kumar Jain, Arun Kumar Jain, ―Limit State Design of Reinforced Concrete‖, Laxmi Publication Pvt. Ltd., New Delhi, 2019.
3	UnnikrishnaPillai, S., Devdas Menon, ―Reinforced Concrete Design‖, Tata McGraw Hill Publishing Company Ltd., 2011
4	Gambhir. M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
5	Krishnaraju.N.,― Design of Reinforced Concrete Structures ―, CBS Publishers & Distributors Pvt. Ltd., New Delhi.

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105105105
2	http://nptel.ac.in/105102088
3	https://www.youtube.com/watch?v=mk71HTMBVhk
4	https://nptel.ac.in/courses/106104128
5	https://onlinecourses.nptel.ac.in/noc21_ce42/preview

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5E1	**AIR POLLUTION MANAGEMENT**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand about the nature and characteristics of air pollutants.	K2	1
CO2	Identify the basic elements of atmosphere and its stability.	K2	2
CO3	Design stacks and particulate air pollution control devices to meet applicable standards.	K4	3
CO4	Summarize air quality management.	K2	4
CO5	Identify, formulate and solve noise pollution problems.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2				3	2	2	3	3		3	2	2
CO2	2	2				3	2	2	3	3		3	2	2
CO3	2	2				3	2	2	3	3		3	2	2
CO4	2	2				3	2	2	3	3		3	2	2
CO5	2	2				3	2	2	3	3		3	2	2
CO6	2	2				3	2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SOURCES AND EFFECTS OF AIR POLLUTANTS**	9
Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and analysis – Basic principles of sampling – Source and ambient sampling – Analysis of pollutants – Principles.		
Topic - 2	**DISPERSION OF POLLUTANTS**	9
Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion models – Applications.		
Topic - 3	**AIR POLLUTION CONTROL**	9
Concepts, Principles and design of air pollution control measures –Particulates control by gravitational-centrifugal filtration- scrubbing-electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption absorption- condensation- combustion –Pollution control for specific major industries.		
Topic - 4	**AIR QUALITY MANAGEMENT**	9
Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement –Environmental impact assessment andAir quality.		
Topic - 5	**NOISE POLLUTION**	9
Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Anjaneyulu, D., Air Pollution and Control Technologies‖, Allied Publishers, Mumbai, 2014
2	Rao, C.S.Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 2015.
3	Garg,S.K.,EnvironmentalEngineeringVol.II‖,KhannaPublishers,NewDelhi,1998
4	Heumann.W.L.,"IndustrialAirPollutionControlSystems",McGrawHill,NewYark,1997
5	MahajanS.P.,"Pollution Control inProcessIndustries",Tata McGraw Hill Publishing Company, New Delhi, 1991.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/102/105104099
2	https://nptel.ac.in/courses/105/104/105104099
3	https://www.youtube.com/watch?v=OQWmaYjyolE
4	https://www.youtube.com/watch?v=ldR1RcOjVp8
5	https://www.youtube.com/watch?v=AQ4BakagMvM

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5E2	**INDUSTRIAL SAFETY**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the concept of Mechanical hazards.	K2	1
CO2	Understand the concept of chemical hazards.	K2	2
CO3	Understand the knowledge of noise pollution.	K2	3
CO4	Understand the principal of Safety Analysis.	K2	4
CO5	Understand the knowledge of Disaster management.	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1				3	2	2	3	3		3	2	
CO2	3	2				3	2	2	3	3		3	2	
CO3	3	2				3	2	2	3	3		3	2	
CO4	2	1	3			3	2	2	3	3		3	2	
CO5	3	2	2			3	2	2	3	3		3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Assignment
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION**	**9**
Evolution of modern safety concepts – Fire prevention – Mechanical hazards Boilers, Pressure vessels, Electrical Exposure.		
Topic - 2	**CHEMICAL HAZARDS**	**9**
Chemical exposure – Toxic materials – Ionizing Radiation and Non-ionizing Radiation - Industrial Hygiene – Industrial Toxicology.		
Topic - 3	**ENVIRONMEAL CONTROL**	**9**
Industrial Health Hazards – Environmental Control – Industrial Noise - Noise measuring instruments, Control of Noise, Vibration, - Personal Protection.		
Topic - 4	**HAZARD ANALYSIS**	**9**
System Safety Analysis –Techniques – Fault Tree Analysis (FTA), Failure Modes and Effects Analysis (FMEA), HAZOP analysis and Risk Assessment		
Topic - 5	**SAFETY REGULATIONS**	**9**
Explosions – Disaster management – catastrophe control, hazard control , Safety education and training - Factories Act, Safety regulations Product safety – case studies.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	John V.Grimaldi, "Safety Management", AITB SPublishers, 2003.
2	C. Ray Asfahl, Industrial Safety and HealthManagement, 5th Ed., Pearson Prantice Hal 2003
3	Safety Manual, "EDEL Engineering Consultancy",2000.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105/106/105106113/
2	https://nptel.ac.in/courses/112/107/112107292/
3	https://nptel.ac.in/content/storage2/courses/105106113/2_industrial_building/12_Example_Problem.pdf
4	https://nptel.ac.in/content/syllabus_pdf/105105162.pdf
5	https://www.youtube.com/watch?v=mtRR-5fzKo8

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5E3	**TRAFFIC ENGINEERING AND MANAGEMENT**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Analyze traffic problems and plan for traffic systems various uses.	K2	1
CO2	Design Channels, Intersections, signals and parking arrangements.	K2	2
CO3	Develop Traffic management Systems.	K4	3
CO4	Analyze a variety of traffic facilities and evaluate capacity and level of service.	K2	4
CO5	Evaluate traffic impacts on the environment and safety.	K4	5

PRE-REQUISITE	**HIGHWAY AND RAILWAY ENGINEERING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2	2	2	2	3	3		3	2	2
CO2	3	2			2	2	2	2	3	3		3	2	2
CO3	3	2			2	2	2	2	3	3		3	2	2
CO4	3	2			2	2	2	2	3	3		3	2	2
CO5	3	2			2	2	2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**TRAFFIC PLANNING AND CHARACTERISTICS**	9
Road Characteristics – Road user characteristics – PIEV theory – Vehicle – Performance characteristics – Fundamentals of Traffic Flow – Urban Traffic problems in India – Integrated planning of town ,country ,regional and all urban infrastructure – Towards Sustainable approach. – Land use & transport and modal integration.		
Topic - 2	**TRAFFIC SURVEYS**	9
Traffic Surveys – Speed, journey time and delay surveys – Vehicles Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation – Parking Survey – Accident analyses - Methods, interpretation and presentation – Statistical applications in traffic studies and traffic forecasting – Level of service – Concept, applications and significance.		
Topic - 3	**TRAFFIC DESIGN AND VISUAL AIDS**	9
Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.		
Topic - 4	**TRAFFIC SAFETY AND ENVIRONMENT**	9
Road accidents – Causes, effect, prevention, and cost – Street lighting – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non-motorized transport.		
Topic - 5	**TRAFFIC MANAGEMENT**	9
Area Traffic Management System - Traffic System Management (TSM) with IRC standards –- Traffic Regulatory Measures-Travel Demand Management (TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods - Coordination among different agencies – Intelligent Transport System for traffic management, enforcement and education		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Kadiyali.L.R. "Traffic Engineering and Transport Planning",Khanna Publishers, Delhi, 2013
2	Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.
3	Fred L. Mannering, Scott S. Washburn and Walter P.Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011
4	Garber and Hoel, "Principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010
5	Handbook on Precast Concrete Buildings‖, Indian Concrete Institute, 2016.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105101008
2	https://www.civil.iitb.ac.in/tvm/nptel/ceTseLn.html
3	https://nptel.ac.in/courses/105/105/105105107/
4	https://www.youtube.com/watch?v=5zKC_aq4ypM
5	https://www.youtube.com/watch?v=37WMS483T7Y

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5LT1	GEOTECHNICAL ENGINEERING-I	2	0	4	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Classify the soil and assess the engineering properties, based on index properties.	K2	1
CO2	Understand the stress concepts in soils.	K2	2
CO3	Understand and identify the settlement in soils.	K2	3
CO4	Describe the shear strength of soil.	K2	4
CO5	Demonstrate stress distribution, stress transformation and consolidation of soils.	K3	5

PRE-REQUISITE	ENGINEERING GEOLOGY

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			3	3	2	3	3	3	3	3	3	
CO2	3	2			3	3	2	3	3	3	3	3	3	
CO3	3	2			3	3	2	3	3	3	3	3	3	
CO4	3	2			3	3	2	3	3	3	3	3	3	
CO5	3	2			3	3	2	3	3	3	3	3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Mini Project &Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT - THEORY		
Topic - 1	**SOIL CLASSIFICATION AND COMPACTION**	6
History – formation and types of soil – composition - Index properties – clay mineralogy structural arrangement of grains – description – Classification – BIS – US – phase relationship – Compaction – theory – laboratory and field technology – field Compaction method – factors influencing compaction.		
Topic - 2	**EFFECTIVE STRESS AND PERMEABILITY**	6
Soil - water – Static pressure in water - Effective stress concepts in soils – Capillary phenomena– – Permeability – Darcy's law – Determination of Permeability – Laboratory Determination (Constant head and falling head methods) and field measurement pumping out in unconfined and confined aquifer – Factors influencing permeability of soils.		
Topic - 3	**STRESS DISTRIBUTION AND SETTLEMENT**	6
Stress distribution in homogeneous and isotropic medium – Boussines of theory – (Point load, Line load and udl) Use of New marks influence chart –Components of settlement – Immediate and consolidation settlement – Factors influencing settlement – Terzaghi's one dimensional consolidation theory.		
Topic - 4	**SHEAR STRENGTH**	6
Shear strength of cohesive and cohesion less soils – Mohr-Coulomb failure theory – shear strength - Direct shear, Triaxial compression.		
Topic - 5	**SLOPE STABILITY**	6
Infinite slopes and finite slopes – Use of stability number –Guidelines for location of critical slope surface in cohesive and c - soil – Slope protection measures.		

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**30**

COURSE CONTENT – LABORATORY	
Experiment -1	Specific gravity of soil solids
Experiment -2	Grain size distribution -Sieve analysis
Experiment -3	Grain size distribution – Hydrometer analysis
Experiment -4	Liquid limit tests
Experiment -5	Plastic limit tests
Experiment -6	Shrinkage limit
Experiment -7	Field density Test (Sand replacement method)

Experiment -8	Field density Test (core cutter method)
Experiment -9	Determination of moisture – density relationship using Standard Proctor Compaction Test
Experiment - 10	Direct shear test in cohesion less soil (Demonstration Only)
Experiment - 11	Triaxial shear test (Demonstration only)
Experiment - 12	Three Gang Consolidation test (Demonstration only)
Experiment - 13	CBR Apparatus (Demonstration only)

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**60**		**TOTAL**	**60**

BOOK REFERENCES	
1	Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2014
2	Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2017(Reprint).
3	Gopal Ranjan, A S R Rao, "Basic and Applied Soil Mechanics" New Age International Publication, 3rd Edition, 2016.
4	Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition, 2017.
5	McCarthy, D.F., "Essentials of Soil Mechanics and Foundations: Basic Geotechnics". Prentice-Hall, 2006.
6	Geotechnical Engineering, Al-Ameen publications.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=V1m3cB-Aqy8
2	https://www.youtube.com/watch?v=UZ4OSBkJZWY
3	https://www.digimat.in/nptel/courses/video/105104147/L01.html
4	http://nitttrc.edu.in/nptel/courses/video/105101084/L34.html
5	https://smfe-iiith.vlabs.ac.in/

Semester	Programme	Course Code	Course Name	L	T	P	C
V	B.E. CIVIL	20CE5L1	**INTERNSHIP & INNOVATION PRACTICES**	0	0	3	1.5

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	The intricacies of implementation textbook knowledge into practice	K2
CO2	The concepts of developments and implementation of new techniques	K2
CO3	Identify the real world civil Engineering related problems.	K2
CO4	Apply the theoretical concepts studied in the class rooms practically.	K3
CO5	Identify the real world civil Engineering new ideas.	K2

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			2					3	2		2	3	
CO2	3			2					3	2		2	3	
CO3	3			2					3	2		2	3	
CO4	3			2					3	2		2	3	
CO5	3			2					3	2		2	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

STRATEGY

The students individually undertake training in reputed civil engineering companies for the specified duration. At the end of the training, a report on the work done will be prepared and presented. The students will be evaluated through a viva-voce examination by a team of internal staff.

THEORY	0		TUTORIAL	0		PRACTICAL	45		TOTAL	45

Semester	Programme	Course Code	Course Name	L	T	P	C
V – B.E. CIVIL, MECH III – B.E. CSE, EEE, ECE & B.Tech. IT		20MCCT1	**CONSTITUTION OF INDIA**	3	0	0	0

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand and abide the rules of the Indian constitution.	K2	1
CO2	Applying the functions of Central government.	K2	2
CO3	Applying the function of state government.	K2	3
CO4	Evaluate the various constitutional functions.	K2	4
CO5	Explain the different culture among the people of India	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1							2	2	3	3		3		
CO2							2	2	3	3		3		
CO3							2	2	3	3		3		
CO4							2	2	3	3		3		
CO5							2	2	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Seminar
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION**	**9**
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Role of the Election Commission.		
Topic - 2	**STRUCTURE AND FUNCTION OF CENTRAL AND STATE GOVERNMENT**	**9**
Union Government – Structures of the Union Government and Functions – President – Vice President– Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review. State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.		
Topic - 3	**CONSTITUTION FUNCTIONS OF INDIA AND INDIAN SOCIETY**	**9**
Indian Federal System – Central – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India. Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections		
Topic - 4	**POLICIES AND ACTS – GENERAL**	**9**
Insurance and Bonding – Laws Governing Sale, Purchase and use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax , Excise and Custom duties and their Influence on Construction Cost – Legal Requirements for Planning – Property Law– Agency Law – Local Government Laws for Approval.		
Topic - 5	**POLICIES AND ACTS ON INFRASTRUCTURE DEVELOPMENT**	**9**
A Historical Review of the Government Policies on Infrastructure – Current Public Policies on Transportations – Power and telecom Sector – Plans for Infrastructure Development – Legal framework for Regulating Private Participation in Roads and Highways – Ports and Airport and Telecom		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Durga Das Basu, "Introduction to the Constitution of India", Prentice Hall of India, New Delhi,2018.
2	R.C.Agarwal, "Indian Political System", S.Chand and Company, New Delhi, 2004
3	Maciver and Page, "Society: An Introduction Analysis", Mac Milan India Ltd., New Delhi,2007
4	K.L.Sharma, "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi,2006.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/106/105/106105034/
2	https://www.youtube.com/watch?v=6XTYoZymbwE
3	https://www.youtube.com/watch?v=MP6VlAE_7WY

SEMESTER VI

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE6T1	Structural Analysis-II	PC	40	60	3	1	0	4
2	20CE6T2	Design of Steel Structures	PC	40	60	3	1	0	4
3	20CE6T3	Geotechnical Engineering-II	PC	40	60	3	1	0	4
4		Professional Elective –III	PE	40	60	3	0	0	3
THEORY COURSES WITH LABORATORY COMPONENTS									
5	20CE6LT1	Environmental Engineering	PC	50	50	2	0	4	4
6	20CE6LT2	Structural Design and Drawings	PC	50	50	2	0	4	4
LABORATORY COURSES									
7	20CE6L1	Comprehensive Course	EEC	100	0	0	0	2	2
8	20CE6L2	Design Project	EEC	50	50	0	0	4	2
Total						**16**	**3**	**14**	**27**

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6T1	**STRUCTURAL ANALYSIS - II**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Plot the ILD for Simply supported and over hanging beams subjected to moving load.	K5	1
CO2	Explain Muller Breslau principle and draw the influence lines for statically indeterminate beams.	K5	2
CO3	Analyze indeterminate beams and rigid frames.	K5	3
CO4	Identify the vertical reaction, horizontal thrust and bending moment for two and three hinged arches.	K5	4
CO5	Analyze the internal forces in the Cables and Suspension bridges.	K5	5

PRE-REQUISITE	**STRUCTURAL ANALYSIS - I**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2		3		1	3	3		3	3	3
CO2	3	3		2		3		1	3	3		3	3	3
CO3	3	3		2		3		1	3	3		3	3	3
CO4	3	3		2		3		1	3	3		3	3	3
CO5	3	3		2		3		1	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INFLUENCE LINES FOR DETERMINATE BEAMS**	9 + 3
Construction of Influence Line Diagram (ILD) for shear force and bending moment - Calculation of critical stress resultants due to concentrated and distributed moving loads for simply supported and overhanging beams - absolute maximum bending moment.		
Topic - 2	**INFLUENCE LINES FOR INDETERMINATE BEAMS**	9 + 3
Muller Breslau's principle– Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one).		
Topic - 3	**PLASTIC ANALYSIS**	9 + 3
Plastic theory - Statically indeterminate structures – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – collapse load - Static and kinematic methods – Upper and lower bound theorems - Plastic analysis of indeterminate beams and rigid frames.		
Topic - 4	**ARCHES**	9 + 3
Arches - Types of arches – Analysis of three hinged and two hinged arches - Parabolic and circular arches – Settlement and temperature effects.		
Topic - 5	**CABLES AND SUSPENSION BRIDGES**	9 + 3
Components and their Functions - Analysis of cable under concentrated loads and UDL - Shape of cable under self-weight - Anchorage of suspension cables - Bending Moment and Shear Force in suspension bridges with three hinged stiffened girders.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Vaidyanadhan, R and Perumal, P, ―Comprehensive Structural Analysis‖, Vol. 1 & Vol. 2, Laxmi Publications Pvt. Ltd,New Delhi, 2016.
2	Bhavaikatti, S.S, ―Structural Analysis‖, Vol. 1& Vol. 2, Vikas Publishing House Pvt. Ltd., New Delhi, 2013.
3	DevadasMenon, ―Structural Analysis‖, Narosa Publishing House, 2014.
4	B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, ―Theory of Structures‖, 12th Edition, Laxmi Publications Pvt.Ltd., New Delhi, 2017.
5	Pandit G.S and Gupta S.P., ―Structural Analysis – A Matrix Approach‖ Tata McGraw-Hill Publishing Ltd. New Delhi,2008.

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105101085
2	http://nptel.ac.in/courses/105106050
3	http://nptel.ac.in/courses/10510519
4	https://nptel.ac.in/courses/105105108/
5	https://nptel.ac.in/courses/105105177/

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6T2	**DESIGN OF STEEL STRUCTURES**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Design of structural steel connections.	K5	1
CO2	Design of tension members.	K5	2
CO3	Design of compression members.	K5	3
CO4	Design of structural steel beam and plate girder.	K5	4
CO5	Design of industrial building components and gantry girder.	K5	5

PRE-REQUISITE	Mechanics of Solids–I, Mechanics of Solids–II

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2		2		1	3	3		3	3	3
CO2	3	3	3	2		2		1	3	3		3	3	3
CO3	3	3	3	2		2		1	3	3		3	3	3
CO4	3	3	3	2		2		1	3	3		3	3	3
CO5	3	3	3	2		2		1	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CONNECTIONS**	9 + 3
Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Basics of riveted connection – Connections using bolting, welding – Design of bolted and welded joints – Efficiency of joints		
Topic - 2	**TENSION MEMBERS**	9 + 3
Types of tension members and sections Mode of failure – Net area – Net effective sections for plates and angles in tension – Design of plate and angle tension members – Connections in tension members –Design of tension splice.		
Topic - 3	**COMPRESSION MEMBERS**	9 + 3
Types of compression members and sections – Mode of failure – Effective length – Slenderness ratio – Design of axially loaded single and compound section compression members – Design of built up laced and battened type columns.		
Topic - 4	**BEAMS**	9 + 3
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uni axial and biaxial bending		
Topic - 5	**ROOF TRUSSES AND INDUSTRIAL STRUCTURES**	9 + 3
Roof trusses – Roof and side coverings – Purlin in roof trusses – Design of channel and I section Purlins.		

THEORY	**45**	**TUTORIAL**	**15**	**PRACTICAL**	**0**	**TOTAL**	**60**

BOOK REFERENCES	
1	Subramanian.N, ―Design of Steel Structures‖, Oxford University Press, New Delhi, 2013.
2	S K Duggal., ―Limit State design of steel Structures‖, Mc.Graw Hill Education (India) Private Limited, New Delhi, 2010.
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	IS 875:2015, Design Loads (Other than Earthquake) for Buildings and Structures, Code of Practice, Bureau of Indian Standards, New Delhi.
5	Jayagopal L S and Tensing.D, ―Design of steel structures‖, 1st edition, Vikas Publishing House private Ltd., 2016.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105105162
2	https://nptel.ac.in/courses/105106112
3	https://onlinecourses.nptel.ac.in/noc21_ce40/preview
4	https://nptel.ac.in/courses/105106113
5	https://www.digimat.in/nptel/courses/video/105105162/L28.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6T3	**GEOTECHNICAL ENGINEERING-II**	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Explain erection techniques and practice for high rise structures.	K4	1
CO2	Apply different construction techniques in under water construction.	K3	2
CO3	Apply grouting techniques.	K3	3
CO4	Show the output of earth moving equipment's.	K2	4
CO5	Explain soil stabilization techniques.	K4	5

PRE-REQUISITE	**GEOTECHNICAL ENGINEERING-I**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3			3	3	2	3	3	3	3	3	3	
CO2	3	2			3	3	2	3	3	3	3	3	3	
CO3	3	2			3	3	2	3	3	3	3	3	3	
CO4	3	2			3	3	2	3	3	3	3	3	3	
CO5	3	2			3	3	2	3	3	3	3	3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SITE INVESTIGATION AND SELECTION OF FOUNDATION**	**9 + 3**
Scope and objectives – Methods of exploration – Auguring and boring – Wash boring and rotary drilling – Depth and spacing of bore holes – Soil samples – Representative and undisturbed – Sampling methods – Split spoon sampler, Thin wall sampler, Stationary piston sampler.		
Topic - 2	**SHALLOW FOUNDATION**	**9 + 3**
Location and depth of foundation – Codal provisions – Bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – Factors affecting bearing capacity – Bearing capacity from in-situ tests (SPT, SCPT and plate load)		
Topic - 3	**FOOTINGS AND RAFTS**	**9 + 3**
Types of Isolated footing, Combined footing, Mat foundation – Contact pressure and settlement distribution – Proportioning of foundations for conventional rigid behaviour – Minimum thickness for rigid behaviour – Applications – Codal provision.		
Topic - 4	**PILE FOUNDATION**	**9 + 3**
Types of piles and their functions – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – Static formula – Dynamic formulae (Engineering news and Hileys) – Negative skin friction – Uplift capacity-Group capacity by different methods (Feld's rule, Converse– Settlement of pile groups – Interpretation of pile load test (routine test only) - Codal provisions.		
Topic - 5	**RETAINING WALLS**	**9 + 3**
Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Pressure on the wall due to line load – Stability analysis of retaining walls – Codal provisions.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Murthy, V.N.S., "Text book of Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2014.
2	Arora, K.R., "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 7th Edition, 2017 (Reprint).
3	Punmia, B.C., "Soil Mechanics and Foundations", Laxmi Publications Pvt. Ltd. New Delhi, 16th Edition 2017.
4	Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 2012.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=qeUMbBgKYGs
2	https://www.youtube.com/watch?v=MZax55HtHNw
3	https://nptel.ac.in/courses/105105176
4	https://www.digimat.in/nptel/courses/video/105105039/L01.html
5	http://www.digimat.in/nptel/courses/video/105105039/L10.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6E1	**PREFABRICATED STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the design principles and stages of loading in precast construction.	K2	1
CO2	Understand about the panel systems, roof and floor slabs, shear walls.	K2	2
CO3	Analyse and Solve the problems in joint flexibility, joint deformation and disuniting of structures	K4	3
CO4	Understand the precast joint and connections, sealants.	K2	4
CO5	Analyse the effect of abnormal loads in prefabricated structures.	K4	5

PRE-REQUISITE	**CONCRETE TECHNOLOGY**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			2	3		2	2	3	3		3	2	
CO2	3			2	3		2	2	3	3		3	2	
CO3	3			2	3		2	2	3	3		3	2	
CO4	3			2	3		2	2	3	3		3	2	
CO5	3			2	3		2	2	3	3		3	2	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**PRINCIPLES OF PREFABRICATION**	9
Need for prefabrication – Principles of prefabrication – Modular coordination – Standarization – Materials – Systems – Production– Transportation – Erection.		
Topic - 2	**PREFABRICATED COMPONENTS**	9
Behaviour of structural components - Large panel constructions - Roof and floor slabs - Wall panels – Beams - Columns – Shear walls.		
Topic - 3	**DESIGN PRINCIPLES**	9
Design of cross section based on efficiency of material used - Problems in design because of joint flexibility – Allowance for joint deformation - Disuniting of structures.		
Topic - 4	**JOINTS AND CONNECTIONS**	9
Types of Joints - based on action of forces - compression joints - shear joints - tension joints - based on function - construction, contraction, expansion. Types of sealants - Types of structural connections - beam to column - column to column - beam to beam -column to foundation.		
Topic - 5	**ABNORMAL LOADS**	9
Progressive collapse - Code provisions - Equivalent design loads for considering abnormal effects such as earthquakes, cyclones,etc., - Importance of avoidance of progressive collapse.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers, USA, 1991
2	Lewitt,M. " Precast Concrete- Materials, Manufacture, Properties And Usage", Applied Science Publishers , London And New Jersey, 1982.
3	Koncz T., ―Manual of precast concrete construction‖, Vol. I, II and III, Bauverlag, GMBH, 1976.
4	Structural design manual‖, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 2009..
5	Handbook on Precast Concrete Buildings‖, Indian Concrete Institute, 2016.

OTHER REFERENCES	
1	https://www.designingbuildings.co.uk
2	https://www.modular.org
3	https://www.youtube.com/watch?v=7vJF_zaLIHs
4	https://www.youtube.com/watch?v=FdbHC4sfqBo
5	https://www.youtube.com/watch?v=SllPqJEJVVo

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6E2	**IRRIGATION ENGINEERING AND HYDRAULIC STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the water requirement of crops.	K2	1
CO2	Understand the methods and types of irrigation.	K2	2
CO3	Analyse the different types of Impounding structures.	K4	3
CO4	Design the canal systems.	K5	4
CO5	Understand the irrigation system management.	K2	5

PRE-REQUISITE	**FLUID MECHANICS AND APPLIED HYDRAULIC ENGINEERING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2	3	2	2	3	3		3	3	3
CO2	3	2			2	3	2	2	3	3		3	3	3
CO3	3	2			2	3	2	2	3	3		3	3	3
CO4	3	2			2	3	2	2	3	3		3	3	3
CO5	3	2			2	3	2	2	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CROP WATER REQUIREMENT**	9
Need - Classification of irrigation - Merits and demerits of irrigation - types of crops –crop season - Duty, delta and base period - Consumptive use of crops - Estimation of evapotranspiration using experimental and theoretical methods		
Topic - 2	**IRRIGATION METHODS**	9
Tank irrigation - Well irrigation - Irrigation methods: Surface and Sub-Surface and Micro Irrigation - Design of drip and sprinkler irrigation - Ridge and furrow irrigation - Irrigation scheduling - Water distribution system - Irrigation efficiencies.		
Topic - 3	**DIVERSION AND IMPOUNDING STRUCTURES**	9
Types of Impounding structures - Gravity dam - Forces on a dams - Design - Earth dams, Arch dams - Diversion Head works - Weirs and Barrages.		
Topic - 4	**CANAL IRRIGATION**	9
Canal regulations - Direct sluice - Canal drop - Cross drainage works-Canal outlets - Design of prismatic canal – canal alignments - Canal lining - Kennedy‘s and Lacey‘s Regime theory - Design of unlined canal.		
Topic - 5	**WATER MANAGEMENT IN IRRIGATION**	9
Modernization techniques - Rehabilitation - Optimization of water use - Minimizing water losses - On form development works - Participatory irrigation management - Water resources associations - Changing paradigms in water management - Performance evaluation - Economic aspects of irrigation.		

THEORY	45	TUTORIAL	0	PRACTICAL	0	TOTAL	45

BOOK REFERENCES	
1	Santosh Kumar Garg, ― Irrigation Engineering and Hydraulics Structures‖, Khanna Publications Pvt.Ltd, New Delhi, 2009.
2	Dr. B. C. Punmia, ―Irrigation and Water Power Engineering‖, Lakshmi Publications, 2010.
3	Linsley R.K. and Franzini J.B, ―Water Resources Engineering‖, McGraw-Hill Inc, 2000
4	R. K. Sharma and T. K. Sharma, ―Irrigation Engineering‖, S. Chand & Co, 2006
5	Dilip Kumar Majumdar, ―Irrigation Water Management‖, Prentice-Hall of India, New Delhi, 2008.

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1	http://www. https://nptel.ac.in/courses/105/105/105105110
2	http://www. https://nptel.ac.in/courses/126/105/126105010
3	https://www.youtube.com/watch?v=r43eUxVuRC8
4	https://www.youtube.com/watch?v=4eMn_zUbaZ8
5	https://www.youtube.com/watch?v=UaDUhVEHPtE

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E.CIVIL	20CE6E3	**INDUSTRIAL WASTE MANAGEMENT**	**3**	**0**	**0**	**3**

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Summarize the basics of waste management.	K2	1
CO2	Understand cleaner production.	K2	2
CO3	Analyze elements of treatment technology.	K3	3
CO4	Apply pollution from industries.	K4	4
CO5	Apply design of hazard waste.	K3	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2			2	2	3	3		3		1
CO2	3	3		2			2	2	3	3		3	2	1
CO3	3	3		2			2	2	3	3		3		1
CO4	3	3	1	2	2		2	2	3	3		3		1
CO5	3	3		2			2	2	3	3		3		1

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION**	**7**
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 – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes		
Topic - 2	**CLEANER PRODUCTION**	**8**
Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.		
Topic - 3	**POLLUTION FROM MAJOR INDUSTRIES**	**10**
Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts		
Topic - 4	**TREATMENT TECHNOLOGIES**	**12**
Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal		
Topic - 5	**HAZARDOUS WASTE MANAGEMENT**	**8**
Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
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, 2000.
3	Cady, W. G., Piezoelectricity, Dover Publication

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1	https://youtu.be/uANAyo_1GsM
2	https://youtu.be/mn2KSRUPGC0
3	https://youtu.be/5v4fnDP5ei0
4	https://youtu.be/_NkqwMitQ8o
5	https://youtu.be/bvFmnLmUMDo

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6LT1	**ENVIRONMENTAL ENGINEERING**	2	0	4	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Analyze and design the treatment units for various sources of water	K4	1
CO2	Design and prefer the various wastewater primary treatment units	K5	2
CO3	Design and choose the various wastewater secondary treatment units.	K5	3
CO4	Understand the Plan and select the sludge disposal methods	K2	4
CO5	Understand the wastewater disposal methods	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3		3	3	2	2	3	3		3		3
CO2	3		3		3	3	2	2	3	3		3		
CO3	3		3		3	3	2	2	3	3		3		3
CO4					3		2	2	3	3		3		
CO5					3	3	2	2	3	3		3		3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SOURCES OF WATER**	6
Public water supply system – Planning, Objectives, Design period, Population forecasting– Source Water quality – Characterization – Significance – Drinking Water quality standards.		
Topic - 2	**PRIMARY WASTE WATER TREATMENT**	6
Characteristics of sewage, Primary treatment: Principles, functions and design of screen, grit chambers and primary sedimentation tanks-operation and maintenance aspects.		
Topic - 3	**SECONDARY WASTE WATER TREATMENT**	6
Trickling filter (no design); Other treatment methods - oxidation ditches, UASB - Waste Stabilisation Ponds - Anaerobic Stabilisation units - Septic tanks, Advances in sewage treatment - waste water reuse and recycling.		
Topic - 4	**SLUDGE DISPOSAL**	6
Sources and characteristics of Sludge -Thickening – Sludge digestion – Biogas recovery - Sludge disposal - Drying beds – Conditioning and Dewatering		
Topic - 5	**WASTE WATER DISPOSAL METHODS**	6
Dilution – Self purification of surface water bodies – Oxygen sag curve – disposal to lakes and sea, Land disposal – Sewage farming – Deep well injection – Soil dispersion system.		

THEORY	**30**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**30**

List of experiments	
Experiment- 1	Determination of pH.
Experiment - 2	Determination of Turbidity.
Experiment - 3	Determination of hardness.
Experiment - 4	Estimation of acidity.
Experiment - 5	Estimation of alkalinity.
Experiment - 6	Determination of solids.
Experiment - 7	Determination of residual chlorides.
Experiment - 8	Determination of Available chlorine in bleaching powder.
Experiment - 9	Determination of Nitrate.
Experiment - 10	Determination of Sulphates.
Experiment - 11	Determination of Phosphate.
Experiment - 12	Determination of Conductivity.
Experiment - 13	Determination of iron and fluoride.
Experiment – 14	Determination of B.O.D.
Experiment - 15	Determination of C.O.D

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**60**		**TOTAL**	**60**

BOOK REFERENCES	
1	Garg, S.K., "Environmental Engineering", Vol.I and II, Khanna Publishers, New Delhi, 2005.
2	Modi, P.N. ―Water Supply Engineering‖, Vol. I Standard Book House, New Delhi, 2010
3	Punmia, B.C., Ashok K Jain and Arun K Jain, "Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2013
4	Government of India, ―Manual on Water Supply and Treatment‖, CPHEEO, Ministry of Urban Development, New Delhi, 2003.

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4	https://nptel.ac.in/courses/105106119
5	https://nptel.ac.in/courses/120108004

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E.CIVIL	20CE6LT2	**STRUCTURAL DESIGN AND DRAWINGS**	**2**	**0**	**4**	**4**

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Design and draw the reinforced concrete cantilever Retaining wall.	K6	1
CO2	Design and draw the reinforced concrete counter fort Retaining wall.	K6	2
CO3	Design and draw the flat slab as per code provisions.	K6	3
CO4	Design and draw reinforced concrete water tank.	K6	4
CO5	Design and draw the various industrial structures.	K6	5

PRE-REQUISITE	**Design of Reinforced Concrete Elements and Structures**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3			1	3	3		3	3	
CO2	3	3	3	3	3			1	3	3		3	3	
CO3	3	3	3	3	3			1	3	3		3	3	
CO4	3	3	3	3	3			1	3	3		3	3	
CO5	3	3	3	3	3			1	3	3		3	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Laboratory Record and Model Practical Examinations (Laboratory Component)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**CANTILEVER RETAINING WALL**	6
Reinforced concrete cantilever retaining walls – Horizontal backfill with surcharge – Design of shear key – Design and Drawing.		
Topic - 2	**COUNTERFORT RETAINING WALL**	6
Reinforced concrete counter fort retaining walls – Horizontal backfill with surcharge – Design of shear key – Design and Drawing.		
Topic - 3	**FLAT SLAB**	6
Design of flat slabs with and without drops by direct design method of IS code – Design and drawing		
Topic - 4	**LIQUID STORAGE STRUCTURES**	6
RCC Water tanks – on ground, elevated circular, underground rectangular tanks – Design and Drawing.		
Topic - 5	**INDUSTRIAL STRUCTURES**	6
Structural steel framing – Steel roof trusses– Codal provisions – Design and Drawing.		

THEORY	**30**	**TUTORIAL**	**0**	**PRACTICAL**	**0**	**TOTAL**	**30**

COURSE CONTENT	
Experiment - 1	Design and draw the Cantilever retaining wall
Experiment - 2	Design and draw the Cantilever retaining wall with Shear Key
Experiment - 3	Design and draw the Counter fort retaining wall
Experiment - 4	Design and draw the One way slab
Experiment - 5	Design and draw the two way slab
Experiment - 6	Design and draw the flat slab with drop
Experiment - 7	Design and draw the flat slab without drop
Experiment - 8	Design and draw the Foot over Bridge (Steel)
Experiment - 9	Design and draw the underground rectangular Water tank
Experiment - 10	Design and draw the Circular Water tank
Experiment - 11	Design and draw the resting on ground rectangular Water tank
Experiment - 12	Design and draw the Elevated Circular Water tank with top Dome
Experiment - 13	Design and draw the Hemispherical bottomed cylindrical Steel Water tank
Experiment - 14	Design and draw the Steel roof trusses
Experiment - 15	Design and draw the purlin for a Roof truss

THEORY	**0**	**TUTORIAL**	**0**	**PRACTICAL**	**60**	**TOTAL**	**60**

BOOK REFERENCES	
1	Krishnamurthy N, structural design and drawing, universities press, 2009.
2	Shah V L and Veena Gore, limit state design of steel structures
3	IS800-2007, Structures publications, 2009.
4	IS 456(2000) Indian standard plain and reinforced concrete-code of practice, Bureau of Indian standards, New Delhi.

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2	https://nptel.ac.in/courses/105/105/105105105/
3	https://nptel.ac.in/courses/105/106/105106113/
4	https://nptel.ac.in/courses/105/105/105105104/
5	https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-ce23/

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6L1	**COMPREHENSIVE COURSE**	0	0	2	2

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Summarize the basics of civil engineering formulation.	K2	1
CO2	Apply the shear force and bending moment.	K4	2
CO3	Apply structural analysis to structures.	K3	3
CO4	Analyze geotechnical investigations and properties.	K4	4
CO5	Understand basic civil engineering Problems.	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	2				1	3	3		3		1
CO2	3	3	1	2				1	3	3		3	2	1
CO3	3	3	1	2	2			1	3	3		3		1
CO4	3	3	1	2				1	3	3		3		1
CO5	3	3	1	2				1	3	3		3		1

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**BUILDING MATERIALS AND CONSTRUCTION PRACTICES**	**9**
Construction of stone masonry, brick masonry and R.C.C. and block masonry – construction equipments - Building bye - laws and Development regulations practiced in Tamil Nadu - Provisions for fire safety, lighting and ventilation- Acoustics.		
Topic - 2	**STRENGTH OF MATERIALS**	**9**
Stresses and strains -Thermal stresses- elastic constants - Beams and bending - Bending moment and shear force in beams - Theory of simple bending - deflection of beams - torsion - Combined stresses – stresses on inclined planes - Principal stresses and principal planes - Theories of Failure – Analysis of plane trusses.		
Topic - 3	**STRUCTURAL ANALYSIS**	**9**
Indeterminate beams - Stiffness and flexibility methods of structural analysis - Slope deflection - Moment Distribution method – Arches and suspension cables - Theory of columns - moving loads and influence lines – Matrix method- Stability of retaining walls – plastic theory.		
Topic - 4	**GEOTECHNICAL ENGINEERING**	**9**
Formation of soils - types of soils - classification of soils for engineering practice - Field identification of soils - Physical properties of soils - Three phase diagram - permeability characteristics of soils		
Topic - 5	**DESIGN OF REINFORCED CONCRETE**	**9**
Design of concrete members - limit state and working stress design concepts - design of slabs - one way, two way and flat slabs - Design of singly and doubly reinforced sections and flanged sections -design of columns and footings		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	TNPSC Group 1 Preliminary General Studies, Aptitude, and Mental Ability, VVK Subburaj
2	General Awareness, Arihant GK, Manohar Pandey
3	TNPSC Assistant Engineer - Civil Engineering (Tamil) Sakthi Publishing House

OTHER REFERENCES	
1	https://youtu.be/M_rPm-UEujI
2	https://youtu.be/OvrqyFYhhxQ
3	https://youtu.be/BHqMqBOSWzs
4	https://youtu.be/8n7ANzhQhY0
5	https://youtu.be/rkRV4RokyKE

Semester	Programme	Course Code	Course Name	L	T	P	C
VI	B.E. CIVIL	20CE6L2	**DESIGN PROJECT**	0	0	4	2

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Prepare the plan of a civil engineering structure	K2	1
CO2	Identify appropriate techniques to analyze civil engineering structures.	K2	1
CO3	Design the structure as per bureau of Indian standards.	K2	1
CO4	Prepare the detailed drawings for structural elements.	K3	1
CO5	Prepare the consolidated project report for tender or any other purpose.	K2	1

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3						3	3	3	3
CO2	3	3	3	3	3						3	3	3	3
CO3	3	3	3	3	3						3	3	3	3
CO4	3	3	3	3	3						3	3	3	3
CO5	3	3	3	3	3						3	3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

STRATEGY:										
This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC & Steel structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection, Design of bridges (ROB and RUB) and water tank etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.										
THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**75**		**TOTAL**	**75**

SEMESTER VII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
THEORY COURSES									
1	20CE7T1	Quantity Surveying and Estimation	PC	40	60	3	1	0	4
2	20HSCT2	Professional Ethics	HS	40	60	3	0	0	3
3		Professional Elective–IV	PE	40	60	3	0	0	3
4		Professional Elective–V	PE	40	60	3	0	0	3
5		Professional Elective-VI	PE	40	60	3	0	0	3
6		Professional Elective-VII	PE	40	60	3	0	0	3
LABORATORY COURSE									
7	20CE7L1	Computer Analysis and Design Laboratory	PC	60	40	0	0	4	2
ENHANCEMENT COURSE									
8	20CE7L2	Project Work–Phase I	EEC	50	50	0	0	6	3
Total						**18**	**1**	**10**	**24**

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7T1	QUANTITY SURVEYING AND ESTIMATION	3	1	0	4

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the estimation of buildings	K2	1
CO2	Apply the estimation of irrigation structures.	K3	2
CO3	Analysis for tenders and contracts.	K4	3
CO4	Analysis the valuation of building.	K4	4
CO5	Design of report for civil structures.	K5	5

PRE-REQUISITE	Surveying

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1		3	2	3	3	3	3	3	2	2
CO2	3			1		3	2	3	3	3	3	3	2	2
CO3	3	3	3	1		3	2	3	3	3	3	3	2	2
CO4	3			1		3	2	3	3	3	3	3	2	2
CO5	3			1		3	2	3	3	3	3	3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**ESTIMATIONS OF BUILDINGS**	9+3
Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Estimate of joineries for paneled and glazed doors..		
Topic - 2	**ESTIMATE OF OTHER STRUCTURES**	9+3
Estimating of sanitary installations – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts.		
Topic - 3	**SPECIFICATION AND TENDERS**	9+3
Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements.		
Topic - 4	**VALUATION**	9+3
Necessity – Basics of approximate estimation values in engineering – Capitalized value – Depreciation – Escalation – Value of building – Calculation of Standard rent.		
Topic - 5	**REPORT PREPARATION**	9+3
Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations.		

THEORY	**45**		**TUTORIAL**	**15**		**PRACTICAL**	**0**		**TOTAL**	**60**

BOOK REFERENCES	
1	Dutta, B.N., ―Estimating and Costing in Civil Engineering‖, UBS Publishers & Distributors Pvt. Ltd., New Delhi, 2013
2	Kohli, D.D and Kohli, R.C., ―A Text Book of Estimating and Costing (Civil)‖, S.Chand & Company Ltd., 2014.
3	PWD Data Book 2015
4	CMDA Hand Book

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=b3cG_gSO6gM
2	https://www.youtube.com/watch?v=GDMblsR0Zes
3	https://www.youtube.com/watch?v=r0aDjTLxy5c
4	https://www.youtube.com/watch?v=xsFHiAVdmwU
5	https://www.youtube.com/watch?v=H-z3CldkHB4

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E1	**BASICS OF DYNAMICS AND ASEISMIC DESIGN**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Construct the basics principles and vibration effects on structures	K3	1
CO2	Analyze the dynamic forces caused by earthquakes and structures	K4	2
CO3	Solve the phenomena, measurements and the factors that affect the design of structures in seismic areas	K3	3
CO4	Design of Earthquake resistant structures	K4	4
CO5	Summarize the codal provisions as well as the aseismic design methodology	K2	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
Cos	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	2	2	2		1	3		3	3	2	2
CO2	3	2	2	2	2			1	3		3	3	2	2
CO3	3	2	2	2	2			1	3		3	3	2	2
CO4	3	2	-	2	2			1	3		3	3	2	2
CO5	3	3	3	2	2			1	3		3	3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic – 1	**THEORY OF VIBRATIONS**	**9**
Theory of vibrations and harmonic motion -Dynamic Loads-D'Alembert's Principle and inertia forces- Degree of freedom- Equation of motion for SDOF - Damped and Undamped free vibrations - Undamped forced vibration - Natural frequencies.		
Topic – 2	**MULTIPLE DEGREE OF FREEDOM SYSTEM**	**9**
Two degree of freedom system - Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems -Decoupling of equations of motion - Concept of mode superposition (No derivations).		
Topic – 3	**ELEMENTS OF EARTHQUAKE ORIGIN**	**9**
Elements of Seismology - Causes of Earthquakes -Seismic waves - Magnitude - Intensity of earthquake-Seismogram-Information on some disastrous earthquakes - Seismic zone map of India - Strong motion characteristics.		
Topic – 4	**EARTHQUAKE RESISTANT DESIGN**	**9**
Principles of Earthquake Resistant Design - Response spectrum theory and Design spectra-Time Acceleration method, Effect of soil properties and damping -liquefaction, Types, effects and controlling factors.		
Topic – 5	**DESIGN METHODOLOGY**	**9**
IS1893-Codal provisions - Design horizontal seismic coefficient - Design base shear distribution, IS13920 and IS 4326 - Codal provisions - Base isolation techniques - Vibration control measures - Important points in mitigating effects of earth quake on structures.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	A K. Chopra, ―Dynamics of Structures – Theory and Applications to Earthquake Engineering‖, Printice-Hall India Pvt Ltd, Fourth Edition, 2003.
2	PankajAgarwal and Manish Shrikhande, ―Earthquake Resistant Design of Structures‖, Prentice Hall of India, 2006.
3	Mario Paz, ―Structural Dynamics – Theory and Computation", CBS Publications, Second Edition, 2004.
4	IS 1893 – 2002, Criteria for Earthquake Resistant Design of Structures.
5	IS 4326 – 1993, Earthquake Resistant Design and Construction of Buildings – Code of Practice.

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105111085
2	http://nptel.ac.in/courses/105116050
3	http://nptel.ac.in/courses/10511519
4	https://www.youtube.com/watch?v=PxFojWYsvVU
5	https://www.youtube.com/watch?v=-oN1dkTiIm0

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E.	20CE7E2	**DESIGN OF REINFORCED CONCRETE & BRICK MASONRY STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the design principles and stages of retaining walls.	K2	1
CO2	Understand about the water tanks.	K2	2
CO3	Analyse and Solve the problems in flat slabs and staircases.	K4	3
CO4	Understand the yield line theory..	K2	4
CO5	Analyse the brick masonry structures.	K4	5

PRE-REQUISITE	**DESIGN OF REINFORCED CONCRETE ELEMENTS AND STRUCTURES**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3	3		1	3		3	3	2	3
CO2	3	3	3		3	3		1	3		3	3	2	2
CO3	3	3	3		3	3	3	1	3		3	3		3
CO4	2	3			3			1	3		3	3	2	2
CO5	2	3			3	3		1	3		3	3	2	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**RETAINING WALLS**	**9**
Design of Cantilever and Counterfort Retaining walls		
Topic - 2	**WATER TANKS**	**9**
Design of rectangular and circular water tanks both below and above ground level – Design of circular slab.		
Topic - 3	**SELECTED TOPICS**	**9**
Design of staircases (ordinary and doglegged) – Design of flat slabs – Principles of design of mat foundation, box culvert and road bridges		
Topic - 4	**YIELD LINE THEORY**	**9**
Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment - Application of virtual work method - square, rectangular, circular and triangular slabs – Design problems		
Topic - 5	**BRICK MASONRY**	**9**
Introduction, Classification of walls, Lateral supports and stability, effective height of wall and columns, effective length of walls, design loads, load dispersion, permissible stresses, design of axially and eccentrically loaded brick walls		

THEORY	**45**		**TUTORIAL**	**0**	**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
2	Dayaratnam, P., “Brick and Reinforced Brick Structures”, Oxford & IBH Publishing House,1997
3	Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd.,New Delhi,2012
4	Mallick, D.K. and Gupta A.P., “Reinforced Concrete”, Oxford and IBH Publishing Company,1997
5	Syal, I.C. and Goel, A.K., “Reinforced Concrete Structures”, A.H. Wheelers & Co. Pvt.Ltd., 1998

OTHER REFERENCES	
1	Ram Chandra.N. and Virendra Gehlot, “Limit State Design”, Standard Book House, 2004.
2	Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi 2013
3	https://www.youtube.com/watch?v=qmuM-8tWtxM
4	https://www.youtube.com/watch?v=ba3mZhOpsTM
5	https://www.digimat.in/nptel/courses/video/105106197/L01.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E3	**GROUND IMPROVEMENT TECHNIQUES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the dewatering techniques.	K2	1
CO2	Apply the compaction and consolidation techniques to increase the density of soil.	K3	2
CO3	Analysis the carrying capacity of stone columns, lime piles and nailing.	K4	3
CO4	Analysis earth reinforcement through geosynthetics and application.	K4	4
CO5	Design of basic requirements of grouting techniques.	K5	5

PRE-REQUISITE	**FOUNDATION ENGINEERING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2		1	1	3		3	3	2	2
CO2	3	2	2	1	2		1	1	3		3	3	2	2
CO3	3	3	3	1			1	1	3		3	3	2	2
CO4	3	2	2	1	2		1	1	3		3	3	2	2
CO5	3	2	2	1	2		1	1	3		3	3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**DEWATERING**	9
Introduction - Scope and necessity of ground Improvement in Geotechnical Engineering - Ground Water lowering by well points, deep wells, vacuum and electro- osmotic methods. Stabilization by thermal and freezing techniques - Applications.		
Topic - 2	**COMPACTION AND SAND DRAINS**	9
In-situ compaction of granular and cohesive soils - Shallow and Deep compaction methods – Sand piles - factors influencing compaction. Blasting and dynamic consolidation - Preloading with sand grains - Theories of sand drain - relative merits of various methods.		
Topic - 3	**STONE COLUMN, LIME PILES AND SOIL NAILING**	9
Stone column, lime piles - Functions - methods of installation - design, estimation of load carrying capacity and settlement - Root piles and soil nailing - methods of installation - Design and applications - Soil liquefaction mitigation methods.		
Topic - 4	**EARTH REINFORCEMENT**	9
Earth reinforcement - Principles and basic mechanism of reinforced earth, simple design: Synthetic and natural fiber based geotextiles and their applications - Filtration, drainage, separation, erosion control - Electro-Chemical stabilization -Stabilization with cement, lime.		
Topic - 5	**GROUTING**	9
Grouting - Types of grout - Suspension and solution grouts - Basic requirements of grout. Grouting equipment – injection methods - Jet grouting - grout monitoring.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Dr. P. Purushothama Raj, ―Ground Improvement Techniques (PB)‖, Laksmi Publications (P) Ltd, 2005.
2	Jewell, R.A., ―Soil Reinforcement with Geotextiles‖, CIRIA, London, 1996.
3	Pappala, A.J., Huang,J., Han, J., and Hoyos, L.R., ―Ground Improvement and Geo synthetics‖, Geotechnical special publication No.207, Geo Institute, ASCE, 2010.
4	Koerner, R.M., ―Designing with Geosynthetics‖, Third Edition, Prentice Hall 1997.
5	Das, B.M., ―Principles of Foundation Engineering‖, Fourth Edition, PWS Publishing, 1999.

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105108075, ―Ground Improvement Techniques‖, Dr. G.L. SivakumarBabu, Civil Engineering, IISc Bangalore.
2	http://nptel.ac.in/courses/105104034, ―Ground Improvement Techniques‖, Dr. NiharRanjanPatra, Civil Engineering,IIT Kanpur.
3	https://www.digimat.in/nptel/courses/video/105108075/L25.html
4	https://www.digimat.in/nptel/courses/video/105108075/L03.html
5	https://www.digimat.in/nptel/courses/video/105108075/L02.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E4	**URBAN PLANNING AND DEVELOPMENT**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the Architecture that can enhance the building in terms of appearance and utility.	K2	1
CO2	Apply the interior planning and use of building materials.	K3	2
CO3	Analysis of suitable water supply and drainage patterns for different types of building.	K4	3
CO4	Analysis problem that is coming in Town Planning level.	K4	4
CO5	Design of Housing policy and its impact on housing development in Indian context.	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1		1	2	2	3	3		3	2	2
CO2	3	2		1		1	2	2	3	3		3	2	2
CO3	3	3	3	1		1	3	3	3	3		3	2	2
CO4	3	2		1		1	2	2	3	3		3	2	2
CO5	3	2		1		1	2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION TO ARCHITECTURE**	**9**
Fundamentals concepts of architecture – Principles of planning – Qualities, Strength, Refinement, Repose, Scale, Proportion, Colour, Solids and Voids and Symmetry.		
Topic - 2	**INTERIOR DECORATIONS**	9
Interior Planning and treatment - Use of natural and synthetic building materials – Thermal and Acoustical materials - Lighting & illumination		
Topic - 3	**PLANNING AND CONCEPTS OF TOWN PLANNING**	9
Planning Surveys - Importance of Climate topography, drainage and water supply in the selection of site for the development - Residential - Commercial – Industrial – Public – Transportation, Basic amenities and services.		
Topic - 4	**FUNCTIONAL PLANNING OF BUILDINGS**	9
Occupancy classification of buildings-general requirements of site and building – building codes and rules – licensing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings – the process of identifying activity areas and linkages.		
Topic - 5	**COUNTRY PLANNING AND HOUSING**	9
Plan implementation: Town planning legislation and municipal acts – Planning control development schemes – Urban financing – Land acquisitions – Slum clearance schemes. Examples of planned cities and housing in India – Applications of Remote Sensing & GIS in town planning.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Pramar. V.S. ―Design fundamental in Architecture‖, Somiya Publications Pvt. Ltd., New Delhi, 1997.
2	Biswas Hiranmay, ―Principles Of Town Planning And Architecture‖ ,VAYU Education of India, New Delhi., 1st edition .,2012
3	G.K. Hiraskar, ―Fundamentals of Town Planning‖, Dhanpat Rai Publications Pvt.Ltd., New Delhi.,2012
4	Arthur Gallion., Simon Eisner., ―The Urban Pattern: City Planning and Design‖, Charotar Publishing House Pvt. Ltd., Gujarat, 5th Edition, 1986.
5	S.C.Rangwala, K.S.Rangwala and P.S.Rangwala, _Town Planning‖, Charotar Publishing House,18th Edition,2003.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105103205/L40.html
2	https://www.youtube.com/watch?v=cjIacnNRLHE
3	https://nptel.ac.in/courses/124107158
4	https://www.digimat.in/nptel/courses/video/124107158/L37.html
5	http://www.nitttrc.edu.in/nptel/courses/video/124107007/L01.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E.	20CE7E5	**MUNICIPAL WASTE AND MANAGEMENT**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the the sources, types and characteristics of municipal solid waste management.	K2	1
CO2	Apply the waste minimization techniques of municipal solid waste.	K3	2
CO3	Analysis the suitable method of collection and conveyance of municipal solid waste.	K4	3
CO4	Analysis the offsite processing techniques and equipment of solid waste.	K4	4
CO5	Design of proper disposal method of solid waste.	K5	5

PRE-REQUISITE	**ENVIRONMENTAL ENGINEERING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1			2	2	3	3		3	2	2
CO2	3			1			2	2	3	3		3	2	2
CO3	3	3	3	1			3	3	3	3		3	2	2
CO4	3			1			2	2	3	3		3	2	2
CO5	3			1			2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SOURCES AND TYPES OF SOLID WASTE**	9
Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-Methods of sampling and characterization-Effects of improper disposal of solid wastes -Public health and environmental effects. Elements of solid waste management -Social and financial aspects - Municipal solid waste (M&H) rules – Integrated management-Public awareness; Role of NGO‟s.		
Topic - 2	**ON-SITE STORAGE AND PROCESSING**	9
On-site storage methods - Effect of storage- Materials used for containers - Segregation of solid wastes - Public health and economic aspects of open storage - Waste segregation and storage - Source reduction of waste - Reduction, Reuse and Recycling.		
Topic - 3	**COLLECTION AND TRANSFER**	9
Methods of residential and commercial waste collection system - Collection vehicles - Manpower requirement-Collection routes-Analysis of collection systems-Transfer stations - Selection of location, operation and maintenance; options under Indian conditions.		
Topic - 4	**OFF-SITE PROCESSING**	9
Objectives of waste processing - Physical processing techniques and Equipment -Resource recovery from solid waste - Composting-Methods-Factors affecting and Biomethanation-Thermal processing techniques.		
Topic - 5	**DISPOSAL**	9
Land disposal of solid waste- Sanitary landfills - Site selection, design and operation of sanitary landfills - Landfill liners -Management of leachate and landfill gas - Landfill bioreactor- Dumpsite rehabilitation.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	T.V.Ramachandra, ―Management of Municipal Solid Waste‖, Capital Publishing Company, New Delhi,2017.
2	Tchobanoglous, G., Theisen, H. M., and Eliassen, R. ―Solid. Wastes: Engineering Principles and Management Issues‖.McGraw Hill, New York, 2016.
3	Government of India, ―Manual on Municipal Solid Waste Management‖, CPHEEO, Ministry of Urban Development,New Delhi, 2000.
4	Bhide A.D. and Sundaresan, B.B. ―Solid Waste Management Collection‖, Processing and Disposal, 2001.

OTHER REFERENCES	
1	http://nptel.ac.in/courses/105106056/, ―Solid and Hazardous Waste Management‖, Dr. Indumathi Nambi, IIT Madras.
2	http://nptel.ac.in/courses/120108005, ―Municipal Solid Waste Management‖, Prof. T.V. Ramachandra, IISc Bangalore.
3	https://www.digimat.in/nptel/courses/video/105103205/L01.html
4	https://www.digimat.in/nptel/courses/video/105103205/L40.html
5	https://www.youtube.com/watch?v=cjIacnNRLHE

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E6	**HOUSING, PLANNING AND MANAGEMENT**	**3**	**0**	**0**	**3**

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify and explain the basics of housing and policies.	K2	1
CO2	Describe the housing programmes and their improvements.	K3	2
CO3	Plan and design the housing projects.	K2	3
CO4	Explain the new construction techniques and construction materials.	K3	4
CO5	Evaluate the housing finance strategies and project appraisal	K3	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)

COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3				2	2	3	3		3	3	2
CO2	2	2	2		2		2	2	3	3		3	3	2
CO3	2	2	2	3			3	3	3	3		3	3	2
CO4	3	2	2			2	2	2	3	3		3	2	2
CO5	3	2	2				2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION TO HOUSING**	**9**
Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.		
Topic - 2	**HOUSING PROGRAMMES**	**9**
Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Cooperative Housing, Slum Housing Programmes – Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing		
Topic - 3	**PLANNING AND DESIGN OF HOUSING PROJECTS**	**9**
Formulation of Housing Projects – Land Use and Soil suitability analysis -Building Byelaws and Rules and Development Control Regulations - Site Analysis, Layout Design, Design of Housing Units (Design Problems) – Housing Project Formulation.		
Topic - 4	**CONSTRUCTION TECHNIQUES AND COST-EFFECTIVE MATERIALS**	**9**
New Constructions Techniques – Cost Effective Modern Materials and methods of Construction- Green building concept- Building Centers – Concept, Functions and Performance Evaluation.		
Topic - 5	**HOUSING FINANCE AND PROJECT APPRAISAL**	**9**
Evaluation of Housing Projects for sustainable principles – Housing Finance, Cost Recovery – Cash Flow Analysis, Subsidy and Cross Subsidy- Public Private Partnership Projects – Viability Gap Funding - Pricing of Housing Units (Problems).		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Wiley- Blackwell, "Neufert Architects" Data, 4th Edition, Blackwell Publishing Ltd, 2012.
2	Donald Watson and Michael J.Crosbie, "Time Saver Standards for Architectural Design", 8th Edition, Tata McGraw Hill Edition, 2011.
3	Walter Martin Hosack, "Land Development Calculations", McGraw Hill 2nd Edition, USA 2010.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/124107001/Housing Policy & Planning, Dr. Uttam K. Roy, IIT Roorkee
2	https://nptel.ac.in/courses/105106188/ Infrastructure Planning and Managements, Dr. AshwinMahalingam, IIT Madras.
3	https://www.youtube.com/watch?v=VVuP27QGyuk
4	https://www.digimat.in/nptel/courses/video/105106149/L01.html
5	https://www.youtube.com/watch?v=EIDXE28_8eQ

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E7	**DESIGN OF BRIDGE ENGINEERING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Develop the forces acting on bridges as per IRC loading standards.	K3	1
CO2	Design short span bridges.	K5	2
CO3	Design long span bridges.	K5	3
CO4	Analysis and check the stability requirements of piers and abutments.	K4	4
CO5	Understand the balanced cantilever and rigid frame bridges.	K2	5
PRE-REQUISITE	**STRUCTURAL DESIGN AND DRAWING**		

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3		3	3	2	2	3	3		3	2	3
CO2	3	3	3		3	3	2	2	3	3		3	2	2
CO3	3	3	3		3	3	3	3	3	3		3		3
CO4	2	3			3		2	2	3	3		3	2	2
CO5	2	3			3	3	2	2	3	3		3	2	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**GENERAL INTRODUCTION**	9
Types of bridges and IRC loading– I.R.C specifications for road bridges - Investigation and preliminary survey – structural arrangement for various bridge deck - standard live loads, other forces acting on bridges - permissible stress - scour depth- depth of foundation.		
Topic - 2	**SHORT SPAN BRIDGES AND CULVERT**	9
Load distribution theory - General design principles for bridge deck and slab culverts - T beam and slab bridges.		
Topic - 3	**LONG SPAN BRIDGES**	9
General design principles for deck slab, girder, wing wall, return wall – Detailing of slab and girder bridges - Analysis of abutments.		
Topic - 4	**BEARING AND PIERS**	9
Reaction at support - Types of bearings– Design procedure for pedestal and pier caps - Jacking effect on pier cap - Layout of bearings - Expansion joints - Detailing of curved bridges - Analysis of Piers.		
Topic - 5	**BALANCED CANTILEVER BRIDGES**	9
Types of Superstructure –proportioning of members - Design procedure of rigid frame and balanced cantilever bridges: General-Method of analysis and design considerations –temperature effect- effect of shrinkage, wind and water current.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Krishna Raju N., ―Design of Bridges‖, 4th Edition, Oxford and IBH Publishing Company, New Delhi, 2009.
2	Ponnuswamy S., ―Bridge Engineering‖, 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.
3	Jagadeesh T.R., ―Design of Bridge Structures ‖, 2nd Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 2009.
4	Alagia J.S., ―Elements of Bridge Engineering‖, 5th Edition, Charotar Publishing House, Mumbai, 2004.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105105165/L01.html
2	http://nptel.ac.in/courses/105105165/1 ―Reinforced concrete road bridges‖, Prof.Nirjhar Dhang, IIT Kharagpur.
3	https: //www.udemy.com/course/fundamentals -of-bridge-designyour-way-to-be-bridge-designer/ ―Fundamental of bridge design‖ by Ayman Kandeel.
4	https://www.onlinecivil.net/2015/01/design-of-highway-bridges.html ―Design of highway Bridges‖ by Richard M. Barker and Jay A. Puckett.
5	http://www.digimat.in/nptel/courses/video/105105165/L19.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E8	**DESIGN OF TALL BUILDINGS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the Selection of materials and criteria.	K2	1
CO2	Apply the loading of tall structures.	K3	2
CO3	Analysis of loading and various structural systems.	K4	3
CO4	Analysis and design of tall buildings.	K4	4
CO5	Design of various high rise buildings.	K5	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2		1	2		2	2	3	3		3	2	2
CO2	3	2		1	2		2	2	3	3		3	2	2
CO3	3	3	3	1			3	3	3	3		3	2	2
CO4	3	2		1	2		2	2	3	3		3	2	2
CO5	3	2		1	2		2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**DESIGN CRITERIA AND MATERIALS**	9
Development of High Rise Structures – General Planning Considerations – Design philosophies – Materials used for Construction – High Strength Concrete – High Performance Concrete – Self Compacting Concrete – Glass – High Strength Steel		
Topic - 2	**LOADING**	9
Gravity Loading – Dead Load – Live Load – Live load reduction technique – Impact Load – Construction Load – Sequential Loading. Lateral Loading – Wind load – Earthquake Load. Combination of Loads.		
Topic - 3	**BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS**	9
Factors affecting growth, Height and Structural form. High rise behaviour of Various structural systems – Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wallframes, tubular structures, cores, outrigger – braced and hybrid mega systems.		
Topic - 4	**APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS**	9
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.		
Topic - 5	**OTHER HIGH-RISE BUILDING STRUCTURE**	9
Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bryan Stafford Smith, Alex coull, “Tall Building Structures, Analysis and Design”, John Wiley and Sons, Inc., 1991.
2	Taranath B.S., “Structural Analysis and Design of Tall Buildings”, McGraw Hill, 2011.
3	Lin.T.Y, Stotes Burry.D, “Structural Concepts and systems for Architects and Engineers”, John Wiley, 1988.
4	Lynn S.Beedle, “Advances in Tall Buildings”, CBS Publishers and Distributors, Delhi, 1986.
5	Wolfgang Schueller “High Rise Building Structures”, John Wiley and Sons, New York 1977.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105105162
2	https://www.youtube.com/watch?v=XCun_ewg-I8
3	https://www.youtube.com/watch?v=-syqppgcoVE
4	https://www.youtube.com/watch?v=EIDXE28_8eQ
5	https://www.digimat.in/nptel/courses/video/124105015/L39.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E9	**PRESTRESSED CONCRETE STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the Selection of various methods of prestressing	K2	1
CO2	Apply the applicable industry design codes relevant to the design Prestressed concrete structures.	K3	2
CO3	Analysis for deflection and crack control of prestressed concrete structures.	K4	3
CO4	Analysis and design of composite beam construction	K4	4
CO5	Design of various prestressed concrete members	K5	5

PRE-REQUISITE	**DESIGN OF REINFORCED CONCRETE ELEMENTS AND STRUCTURES**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1			2	2	3	3		3	2	2
CO2	3			1			2	2	3	3		3	2	2
CO3	3	3	3	1			3	3	3	3		3	2	2
CO4	3			1			2	2	3	3		3	2	2
CO5	3			1			2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**THEORY AND BEHAVIOUR**	9
Basic Principles of prestressing – Classification and types – Advantages over ordinary reinforced concrete – Materials – High strength concrete and high tensile steel – Methods of prestressing – Freyssinet, Magnel Blaton, Lee Mac Call anchorage systems- Analysis of sections for stresses by stress concept, Loss of Prestress.		
Topic - 2	**DESIGN FOR FLEXURE AND SHEAR**	9
Basic assumptions for calculating flexural stresses – Permissible stresses in steel and concrete as per IS1343 Code – Design of sections of Type I post-tensioned and pre-tensioned beams – Check for strength limit based on IS 1343 Code – Layout of cables in post-tensioned beams – Location of wires in pre-tensioned beams –Design for shear based on IS 1343 Code, Layout of Cables.		
Topic - 3	**DEFLECTION AND DESIGN OF ANCHORAGE ZONE**	9
Factors influencing deflections – Short term deflections of uncracked members – Check for serviceability limit state of deflection. Determination of anchorage zone stresses in post-tensioned beams by Magnel‘s method, Guyon‘s method and IS1343 code – design of anchorage zone reinforcement.		
Topic - 4	**COMPOSITE BEAMS AND CONTINUOUS BEAMS**	9
Analysis and design of composite beams – Methods of achieving continuity in continuous beams – Analysis for secondary moments – Concordant cable and linear transformation – Calculation of stresses – Principles of design.		
Topic - 5	**THEORY OF MISCELLANEOUS STRUCTURES**	9
Pipes– Partial prestressing – Definition, methods of achieving partial prestressing, Merits and demerits of partial prestressing.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Krishna Raju N., "Prestressed Concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012
2	Pandit G.S. and Gupta S.P. "Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, New Delhi, 2012.
3	Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, Bangalore, 2013.
4	Lin T.Y. and Ned.H.Burns, "Design of Prestressed Concrete Structures", Third Edition, Wiley India Pvt.Ltd. New Delhi, 2013.
5	IS 1343:2012, Code of Practice for Prestressed Concrete, Bureau of Indian Standards, New Delhi.

OTHER REFERENCES	
1	https://www.designinpresressed concrete.co.uk
2	https://www.psc.org
3	https://www.digimat.in/nptel/courses/video/105106118/L05.html
4	https://www.digimat.in/nptel/courses/video/105106118/L12.html
5	https://www.digimat.in/nptel/courses/video/105106118/L11.html

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E10	**MAINTENANCE AND REHABILITATION OF STRUCTURES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understanding the importance of maintenance and assessment method of distressed structures.	K2	1
CO2	Apply the strength and durability properties, their effects due to climate and temperature	K2	2
CO3	Apply the Recent development in concrete	K4	3
CO4	Apply the techniques for repair rand protection methods	K2	4
CO5	Analyse the Repair, rehabilitation and retrofitting of structures and demolition methods.	K4	5

PRE-REQUISITE	**CONCRETE TECHNOLOGY**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	3	1	2	2	2	3	3		3	1	3
CO2	2	3	2	3	2		2	2	3	3		3	1	3
CO3	2	2	2	3	2		3	3	3	3		3	1	3
CO4	3	3	1	3	2	2	2	2	3	3		3	1	3
CO5	3	1	3	3	2		2	2	3	3		3	1	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**IMAINTENANCE AND REPAIR STRATEGIES**	**9**
Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating damaged structure, causes of deterioration.		
Topic - 2	**STRENGTH AND DURABILITY OF CONCRETE**	**9**
Quality assurance for concrete–Strength, Durability- Cracks, different types, causes–Effects due to climate, temperature, Sustained elevated temperature, Corrosion		
Topic - 3	**SPECIAL CONCRETES**	**9**
Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes.		
Topic - 4	**TECHNIQUES FOR REPAIR AND PROTECTION METHODS**	**9**
Non-destructive Testing Techniques, Load Test for Stability-Epoxy injection, Shoring, Underpinning, Corrosion protection techniques–Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection.		
Topic - 5	**REPAIR, REHABILITATION AND RETROFITTING OF STRUCTURES**	**9**
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, leakage, earthquake-Transportation of Structures from one place to other –Structural Health Monitoring- demolition techniques-Engineered demolition methods-Case studies		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Shetty.M.S.ConcreteTechnology-Theory and Practice,S.Chandand Company, 2008.
2	Vidivelli.B Rehabilitation of Concrete Structures Standard Publishes Distribution.1st edition 2009.

OTHER REFERENCES	
1	https://www.designingbuildings.co.uk
2	https://www.modular.org
3	https://www.digimat.in/nptel/courses/video/105106202/L01.html
4	https://www.youtube.com/watch?v=q7sQd7NQ03s
5	https://www.youtube.com/watch?v=cIp0b13mD_g

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E11	**CONSTRUCTION SAFETY PRACTICES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify legal obligations in workplace health & safety,	K2	1
CO2	Understand the Permit-to-Work system	K4	2
CO3	Practice safety precautions when working with different hazards,	K3	3
CO4	Competent in wearing Personal Protective equipment	K3	4
CO5	Knowing the rights and responsibilities of workers.	K4	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3			1			2	2	3	3		3	2	2
CO2	3			1			2	2	3	3		3	2	2
CO3	3	3	3	1			3	3	3	3		3	2	2
CO4	3			1			2	2	3	3		3	2	2
CO5	3			1			2	2	3	3		3	2	2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**SAFETY, HEALTH AND ENVIRONMENT IN CONSTRUCTION**	9
Introduction and stages in construction – stages of project construction – Safety during receiving, unloading, shifting and storage – guidelines for storage – General safety facilities in construction sites – Interface between civil & erection works - Construction Safety - Contractors Safety		
Topic - 2	**CONSTRUCTION HAZARDS & SAFETY MEASURES - 1**	9
Asbestos - Cement Manufacture - Confined Spaces - Demolition and Explosives - Electrical Safety - Excavation Safety - Eye Safety - Falls - Fall Protection – Head Protection - Hearing Conservation - Heat Stress - Heavy Equipment Safety		
Topic - 3	**CONSTRUCTION HAZARDS & SAFETY MEASURES - 2**	9
Ladder Safety - Lockout/Tag out - Outdoor Safety - Painting Safety - Personal Protective Equipment Personnel Lift Safety - Respiratory Protection - Road Construction Safety - Scaffolding Safety - Subcontractor-Safety - Tools – Safety - Trenching and Shoring - Welding Safety		
Topic - 4	**MECHANICAL HANDLING OF MATERIAL & EQUIPMENT**	9
Hoisting equipment – tools & tackles – crabs & winches – conveyors – ropes – chains – sheaves – hooks – safe rigging methods – banks man – lifting plan – guidelines for safe lifting		
Topic - 5	**STORAGE AND HANDLING OF HAZARDOUS MATERIALS**	9
Storage & handling of compressed gases – Acetylene – Oxygen – LPG – Hydrogen - COSHH		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Bruggeling A.S. G and Huyghe G.F. "Prefabrication with Concrete", A.A. Balkema Publishers, USA, 1991
2	Lewitt,M. " Precast Concrete- Materials, Manufacture, Properties And Usage", Applied Science Publishers , London And New Jersey, 1982.
3	Koncz T., ―Manual of precast concrete construction‖, Vol. I, II and III, Bauverlag, GMBH, 1976.
4	Structural design manual‖, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009..
5	Handbook on Precast Concrete Buildings‖, Indian Concrete Institute, 2016.

OTHER REFERENCES	
1	https://www.designingbuildings.co.uk
2	https://www.modular.org
3	https://www.digimat.in/nptel/courses/video/105102206/L01.html
4	https://www.youtube.com/watch?v=dj5W6yL3NG8
5	https://www.youtube.com/watch?v=ZzBkLIJWBEk

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7E12	SMART MATERIALS AND SMART STRUCTURES	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Summarize the basics of vibrations formulation.	K2	1
CO2	Understand multi degree of freedom system Problems.	K2	2
CO3	Apply response of structures to earthquake Problems.	K3	3
CO4	Analyze elements of seismology problems.	K4	4
CO5	Apply design methodology and Problems.	K3	5

PRE-REQUISITE	NIL

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3		2			2	2	3	3		3		1
CO2	3	3		2			2	2	3	3		3	2	1
CO3	3	3	1	2	2		3	3	3	3		3		1
CO4	3	3		2			2	2	3	3		3		1
CO5	3	3		2			2	2	3	3		3		1

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION**	9
Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.		
Topic - 2	**MEASURING TECHNIQUES**	9
Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.		
Topic - 3	**SENSORS**	9
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.		
Topic - 4	**ACTUATORS**	9
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.		
Topic - 5	**SIGNAL PROCESSING AND CONTROL SYSTEMS**	9
Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non-Linear.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Brian Culshaw, Smart Structures and Materials, Artech House, 2000
2	Gauenzi, P., Smart Structures, Wiley, 2009
3	Cady, W. G., Piezoelectricity, Dover Publication
4	J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.
5	L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

Semester	Programme	Course Code	Course Name	L	T	P	C
VII - B.E. CIVIL, EEE		20HSCT2	**PROFESSIONAL ETHICS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.	K2	1
CO2	The student should be able to apply ethics in society.	K3	2
CO3	Discuss the ethical issues related to Engineering.	K3	3
CO4	Discuss the ethical issues related to Safety.	K2	4
CO5	Analyze the human safety, responsibility and rights in hazardous environments and explain about ethics in the global context.	K3	5

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2			1	3	3		3		
CO2	3		2	2	2			1	3	3		3		
CO3	3	2	2					1	3	3		3		
CO4	3							1	3	3		3		
CO5	3	2						1	3	3		3		

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT		
Topic - 1	**HUMAN VALUES**	**9**
Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.		
Topic - 2	**ENGINEERING ETHICS**	**9**
Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.		
Topic - 3	**ENGINEERING AS SOCIAL EXPERIMENTATION**	**9**
Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.		
Topic - 4	**SAFETY, RESPONSIBILITIES AND RIGHTS**	**9**
Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.		
Topic - 5	**GLOBAL ISSUES**	**9**
Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Mike W. Martin and Roland Schinzinger, ―Ethics in Engineering‖, McGraw Hill Education, New Delhi, 2016.
2	Govindarajan M, Natarajan S and Senthil Kumar V. S, ―Engineering Ethics‖, PHI Learning Pvt. Ltd, New Delhi, 2017.
3	Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, ―Engineering Ethics – Concepts and Cases‖, Cengage Learning, 2017.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/109/106/109106117/
2	https://nptel.ac.in/courses/110/105/110105097/
3	https://www.digimat.in/nptel/courses/video/110105097/L33.html
4	https://www.youtube.com/watch?v=ag1fHF7aL0A
5	https://nptel.ac.in/courses/110105079

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CE7L1	**COMPUTER ANALYSIS AND DESIGN LABORATORY**	0	0	4	2

COURSE LEARNING OUTCOMES (COs)		
After Successful completion of the course, the students should be able to		**RBT Level**
CO1	State the aim and develop the procedure to conduct the experiment / exercise in the Computer Analysis and Design Laboratory.	K1
CO2	Demonstrate skills at the level of precision (reliably, quickly, smoothly, and accurately with negligible guidance) in performing the experiment / exercise	K3
CO3	Draw inferences from the experiment / exercise conducted and present it professionally	K3
CO4	Demonstrate professionally the results obtained through the experiment / exercise and present conclusions	K3
CO5	Demonstrate an understanding of the concepts, procedures, and applications through verbal and written communication	K3
CO6	Demonstrating an attitude at the level of valuing (attaching values and expressing personal opinions by showing some definite involvement and commitment)	K3

PRE-REQUISITE	**COMPUTER AIDED BUILDING DRAWING**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3								3	3			1	3
CO2	3				3			2	3		1		2	3
CO3	3	2		2		1				3			2	3
CO4	3									3			1	3
CO5	3									3		1	1	3
C06	3									2		1	1	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

COURSE CONTENT	
Experiment - 1	Design and analysis of multi-storey framed structure (Beam, Column and Slab)
Experiment - 2	Design and drawing of RCC cantilever type retaining walls with reinforcement details
Experiment - 3	Design and drawing of RCC counterfort type retaining walls with reinforcement details
Experiment - 4	Design of solid slab bridges for IRC loading and reinforcement details
Experiment - 5	Design and drafting of circular RCC water tanks
Experiment - 6	Design and drafting of rectangular RCC water tanks
Experiment - 7	Design and drafting of Elevated Water Tank
Experiment - 8	Design of T-beam bridges for IRC loading and reinforcement details
Experiment - 9	Design and drafting of flat slab with drop
Experiment - 10	Design and drafting of flat slab without drop

THEORY	0		TUTORIAL	0		PRACTICAL	30		TOTAL	30

BOOK REFERENCES	
1	Computer Analysis and Design Laboratory:- Al-Ameen Publication
2	Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, ―Comprehensive Design of Steel Structures, Laxmi Publications Pvt. Ltd., 2015.
3	Krishnamurthy, D., ―Structural Design & Drawing – Vol. II and III, CBS Publishers, 2010.

OTHER REFERENCES	
1	https://nptel.ac.in/courses/105105105
2	https://www.youtube.com/watch?v=6LZiPNApaB8
3	https://www.youtube.com/watch?v=mUWCnANvJdE
4	https://www.youtube.com/watch?v=4_UJ1PrbvTw
5	https://www.youtube.com/watch?v=mk71HTMBVhk

OTHER REFERENCES	
1	https://youtu.be/7wMu6Yl4lgM
2	https://youtu.be/HC06-Zf0JpU
3	https://www.youtube.com/watch?v=b5IPJeCDEPw
4	https://www.youtube.com/watch?v=OfYdDEwe_mw
5	https://www.digimat.in/nptel/courses/video/112104251/L01.html

SEMESTER VIII

Sl. No.	Course Code	Course Title	Category	CIA	ESE	L	T	P	C
LABORATORY COURSES									
1	20CE8L1	Project Work-Phase II	EEC	60	40	0	0	16	8
2	20CE8L2	Industrial Training	EEC	100	0	0	0	4	2
Total						**0**	**0**	**20**	**10**

Semester	Programme	Course Code	Course Name	L	T	P	C
VIII	B.E. CIVIL	20CE8L2	**INDUSTRIAL TRAINING**	0	0	4	2

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify the real world civil Engineering related problems.	K2	1
CO2	Apply the theoretical concepts studied in the class rooms practically.	K3	1
CO3	The intricacies of implementation textbook knowledge into practice	K2	1
CO4	The concepts of developments and implementation of new techniques	K2	1
CO5	Identify the real world civil Engineering new ideas.	K2	1

PRE-REQUISITE	**NIL**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2			2					3	2		2	3	
CO2	2			2					3	2		2	3	
CO3	2			2					3	2		2	3	
CO4	2			2					3	2		2	3	
CO5	2			2					3	2		2	3	

COURSE ASSESSMENT METHODS		
DIRECT	1	Model Practical Examination
	2	Record
	3	End Semester Examinations
INDIRECT	1	Course Exit Survey

STRATEGY	
1	Students have to undergo two-week practical training before the commencement of Eighth semester in Civil Engineering related organisations of their choice but with the approval of the department for the entire course. At the end of the training student will submit a report as per the prescribed format to the department. The student shall make a power point presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made.

THEORY	**0**		**TUTORIAL**	**0**		**PRACTICAL**	**45**		**TOTAL**	**45**

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO01	DISASTER MANAGEMENT	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	To understand the basic conceptual of disasters and its relationship with development.	K2	1
CO2	To understand the approaches of disaster risk reduction.	K2	2
CO3	Assess disaster vulnerability of a location.	K4	3
CO4	Apply the remote sensing and GIS techniques for predicting the natural disasters.	K3	4
CO5	To understand recovery and rehabilitation due to disasters.	K2	5

PRE-REQUISITE	Nil

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1			3			3	2	2	3	3		3		2
CO2			3			3	2	2	3	3		3		2
CO3			3			2	2	2	3	3		3		2
CO4			3	2	3	2	2	2	3	3		3		2
CO5			3			3	2	2	3	3		3		2

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION TO DISASTERS**	**9**
Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc – Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability – Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.		
Topic - 2	**APPROACHES TO DISASTER RISK REDUCTION (DRR)**	**9**
Disaster cycle – Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.		
Topic - 3	**INTER RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT**	**9**
Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India – Relevance of indigenous knowledge, appropriate technology and local resources.		
Topic - 4	**DISASTER RISK MANAGEMENT IN INDIA**	**9**
Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, and Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy – Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment		
Topic - 5	DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES	**9**
Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2	Government of India, National Disaster Management Policy,2009.

OTHER REFERENCES	
1	https://www.youtube.com/watch?v=TB97oX7ANGo
2	https://www.youtube.com/watch?v=Eh8dAmiJ-fo
3	https://www.digimat.in/nptel/courses/video/124107010/L01.html
4	https://www.tcyonline.com/video-tutorials-disaster-management/94374/course
5	https://www.digimat.in/nptel/courses/video/124107007/L35.html

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO02	**ENVIROMENTAL AND AGRICULTURE ENGINEERING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Students will appreciate the role of environment in the current practice of agriculture and concerns of sustainability, especially in the context of climate change and emerging global issues.	K1	1
CO2	Ecological context of agriculture and its concerns will be understood	K4	2
CO3	Students must be able to identify climate changes.	K4	3
CO4	Students must be able to identify ecological diversity.	K4	4
CO5	Students must be able to identify emerging issues	K4	5

PRE-REQUISITE	**Nil**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1					2	2	3	3		3	2	
CO2	3	2					2	2	3	3		3	2	
CO3	3	2					2	2	3	3		3	2	
CO4	2	1	3				2	2	3	3		3	2	
CO5	3	2	2				2	2	3	3		3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**ENVIRONMENTAL CONCERNS**	**9**
Environmental basis for agriculture and food – Land use and landscape changes – Water quality issues – Changing social structure and economic focus – Globalization and its impacts – Agro ecosystems.		
Topic - 2	**ENVIRONMENTAL IMPACTS**	**9**
Irrigation development and watersheds – mechanized agriculture and soil cover impacts – Erosion and problems of deposition in irrigation systems – Agricultural drainage and downstream impacts – Agriculture versus urban impacts.		
Topic - 3	**CLIMATE CHANGE**	**9**
Global environment – Ecosystem changes – Changing blue-green-grey water cycles – Water scarcity and water shortages – Desertification. warming and changing		
Topic - 4	**ECOLOGICAL DIVERSITY AND AGRICULTURE**	**9**
Ecological diversity, wild life and agriculture – GM crops and their impacts on the environment– Insets and agriculture – Pollination crisis – Ecological farming principles – Forest fragmentation and agriculture – Agricultural biotechnology concerns.		
Topic - 5	**EMERGING ISSUES**	**9**
Global environmental governance – alternate culture systems – Mega farms and vertical farms –Virtual water trade and its impacts on local environment – Agricultural environment policies and its impacts – Sustainable agriculture.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	M.Lakshmi Narasaiah, Environment and Agriculture, Discovery Pub. House, 2006.
2	Arvind Kumar, Environment and Agriculture, ABH Publications, New Delhi, 2005.

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO03	**CORROSION FOR CIVIL ENGINEERING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the basics of corrosion in civil engineering.	K2	1
CO2	Understand the concepts of corrosion control.	K2	2
CO3	Understand the different types of coatings.	K2	3
CO4	Understand the concepts of corrosion effects.	K2	4
CO5	Understand the concepts of prevention in corrosion.	K2	5

PRE-REQUISITE	**Nil**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	1					2	2	3	3		3	2	
CO2	3	2					2	2	3	3		3	2	
CO3	3	2					2	2	3	3		3	2	
CO4	2	1	3				2	2	3	3		3	2	
CO5	3	2	2				2	2	3	3		3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**INTRODUCTION**	**9**
Introduction- chemical and electrochemical corrosions- mechanism of electrochemical and galvanic corrosions		
Topic - 2	**CORROSION AND ITS CONTROL**	**9**
galvanic series- factors influencing corrosion -measurement of corrosion rate. Corrosion control – material selection and design – electrochemical protection – sacrificial anodic protection and impressed current cathodic protection.		
Topic - 3	**METALLIC COATINGS**	**9**
Definition – methods of metallic coating, hot dipping – galvanizing, tinning, metal cladding, electroplating, electroless plating. Various other metallic coatings – displacement plating- Kanigen process – metal spraying or metallised coating – cementation or diffusion coatings.		
Topic - 4	**REACTION AND EFFECTS**	**9**
Copper Corrosion- Silver Tarnishing- Corrosion of Iron (Rusting)- Effects		
Topic - 5	**PREVENTION OF CORROSION**	**9**
Electroplating- Galvanization- Anodization- Passivation- Biofilm Coating- Anti-Corrosion Protective Coatings		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Balasubramaniam. R, “Environmental Degradation of Materials”, Cengage International, 2010.
2	Denny A. Jones,” Principles and Prevention of Corrosion”, 2nd Edition, Prentice Hall, 1995.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/113104082/L01.html
2	erna.digimat.in/nptel/courses/video/105104030/L26.html
3	https://www.digimat.in/nptel/courses/video/113105086/L01.html
4	https://www.youtube.com/watch?v=0XIGC5WwW-4
5	http://www.digimat.in/nptel/courses/video/113101098/L01.html

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO04	**GLOBAL WARMING AND CLIMATE CHANGES**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the basics, importance of global warming	K2	1
CO2	Understand the components of Atmosphere	K2	2
CO3	Understand the impact of Climate Change	K2	3
CO4	Understand the causes of Climate Change	K2	4
CO5	Understand the concept of mitigation measures against global warming	K2	5

PRE-REQUISITE	Nil

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2	2	3	3		3	3	3
CO2	3	3					2	2	3	3		3	3	3
CO3	3	3					2	2	3	3		3	3	3
CO4	3	3					2	2	3	3		3	3	3
CO5	3	3					2	2	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**EARTH'S CLIMATE SYSTEM**	**9**
Introduction to environment-Ozone, ozone layer and its functions-Ozone depletion and ozone hole-Global warming and its impacts-Green house gases and green house effect		
Topic - 2	**ATMOSPHERE & ITS COMPONENTS**	**9**
Atmosphere and its layers-Characteristics of Atmosphere-Structure of Atmosphere-Composition of Atmosphere-Temperature profile of the atmosphere		
Topic - 3	**IMPACTS OF CLIMATE CHANGE**	**9**
Causes of Climate change-Change of Temperature in the environment-Melting of ice and sea level rise-Impacts of Climate Change on various sectors		
Topic - 4	**OBSERVED CHANGES AND ITS CAUSES**	**9**
Climate change and Carbon credits-Climate Sensitivity-Montreal Protocol-Global change in temperature and climate and changes within India		
Topic - 5	**CLIMATE CHANGE AND MITIGATION MEASURES**	**9**
CDM and Carbon Trading-Clean Technology, biodiesel, compost, biodegradable plastics-Renewable energy usage as an alternative-Mitigation Technologies and Practices within India and around the world		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Dash Sushil Kumar, "Climate Change – An Indian Perspective", Cambridge University Press India Private limited 2007
2	Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006
3	Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4	Jan C. van Dam, Impacts of "Climate Change and Climate Variability on Hydrological Regimes", Cambridge university press ,2003.

OTHER REFERENCES	
1	https://onlinecourses.swayam2.ac.in/nou21_ge37/preview
2	https://www.youtube.com/watch?v=zQi3C_eZkLs
3	https://www.youtube.com/watch?v=8ZtA9TbZT5U
4	https://www.youtube.com/watch?v=VYAUiA5xogg
5	https://nptel.ac.in/courses/119106008

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO05	**WATER POLLUTION AND ITS MANAGEMENT**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Identify the chemical compositions of natural waters,	K2	1
CO2	Identify the main sources of water pollution, the main types of pollutant and how each type may be controlled.	K2	2
CO3	Outline the extent of water pollution in the selected global location.	K2	3
CO4	Identify the criteria for drinking water acceptability in the EU, and outline the processes used to treat water for a public water supply	K3	4
CO5	Outline how sewage may be treated before discharge to the environment	K2	5

PRE-REQUISITE	**Nil**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2	2	3	3	2	3	1	
CO2	2	3		2			2	2	3	3	3	3	1	2
CO3	1	1					2	2	3	3	2	3	1	
CO4	3	3	1		3		2	2	3	3	2	3	1	
CO5	1	1					2	2	3	3	3	3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	FUNDAMENTALS OF ENVIRONMENTAL SCIENCES-I	**9**
Concept of Ecosystem, Structure of ecosystem, development and evaluation of ecosystem components of ecosystem, Processes within the ecosystem, standing state of biotic components. Ecosystem functions, energy exchange between plant communities and their environment, tropic levels and energy flow.		
Topic - 2	FUNDAMENTALS OF ENVIRONMENTAL SCIENCES-II	**9**
Properties of fluid, velocity, acceleration, streamlines, One dimensional flow of fluids. Conservation of mass and momentum-energy equation Laminar and turbulent flow Resistance to flow in one dimensional systems, Darcy-Weis bach Manning and Hazen-William equations		
Topic - 3	ENVIRONMENT AND ITS POLLUTIONS-I	**9**
Definition:- Components-Atmosphere, hydrosphere, lithosphere, their compositions and interactions. Causes of environmental pollution, population, resource consumption, deforestation, industrialization, agriculture, urbanization and transport.		
Topic - 4	ENVIRONMENT AND ITS POLLUTIONS-II	**9**
Definition:- Air Quality standards, emission standard, sources and classification of air pollutants. Cliteria Pollutants: Carbon monoxide, Oxides of nitrogen and sulphur, particulate matter, hydrocarbons, photochemical smog and ozone. Effects of air pollution on human health, plants, materials, visibility and Climatic changes including global warming, green house effect		
Topic - 5	WATER RESOURCE MANAGEMENT	**9**
Drinking Water, water used as raw material, cooling water, irrigation water, fishing water, industrial water, recreation water, cultural water		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Water quality facts and statistics. By UNEP, UNWATER AND UNHANITAT. Iinformation obtained on May 16, 2012
2	Vié, J. -C., Hilton-Taylor, C. and Stuart, S.N. (eds.) (2009)

OTHER REFERENCES	
1	**https://www.youtube.com/watch?v=71IBbTy-_n4**
2	**https://www.youtube.com/watch?v=MEb7nnMLcaA**
3	**https://www.epa.gov/nutrientpollution/sources-and-solutions-wastewater**
4	**https://www.epa.gov/nutrientpollution/sources-and-solutions-agriculture**
5	**https://www.unep.org/news-and-stories/story/how-sierra-leone-taking-water-pollution**

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO06	**BASIC OF CIVIL ENGINEERING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Extend the knowledge about the characteristics, sources and defects in various materials.	K2	1
CO2	Test the materials either in the laboratory or in the field before their actual use at the site.	K2	2
CO3	Attain the knowledge of different components of building, their classification, materials and methods of construction and causes of their failures	K2	3
CO4	Know the various services to be provided and the defects in the buildings along with the remedial measures for proper maintenance of the buildings.	K3	4
CO5	Understand the properties and role of various constituent materials used in concrete making.	K2	5

PRE-REQUISITE	**Nil**

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2	2	3	3	2	3	1	
CO2	2	3		2			2	2	3	3	3	3	1	
CO3		2					2	2	3	3		3	1	
CO4	3	3	1		2		2	2	3	3		3		
CO5	1	2					2	2	3	3	3	3	1	

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**SCOPE OF CIVIL ENGINEERING**	**9**
Overview of Civil Engineering - Civil Engineering contributions to the welfare of Society - Specialized sub disciplines in Civil Engineering - Structural, Construction, Geotechnical, Environmental, Transportation and Water Resources Engineering		
Topic - 2	**SURVEYING**	**9**
Surveying: Objects- classification- principles - measurements of distances- angles — leveling - determination of areas– contours		
Topic - 3	**CIVIL ENGINEERING MATERIALS**	**9**
Civil Engineering Materials: Bricks- stones - sand –cement-- concrete - steel –timber- modern materials		
Topic - 4	**BUILDING COMPONENTS**	**9**
Foundations: Types of foundations - Bearing capacity and settlement -Requirement of good foundations. -water supply - sources and quality of water - Rain water harvesting-introduction to high way and rail way.		
Topic - 5	**STRUCTURES**	**9**
Civil Engineering Structures: Brick masonry -stonemasonry - beams - columns -lintels - roofing - flooring-plastering - floor area, carpet area and floor space index -Types of Bridges and Dams		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	"Basics of Civil Engineering" by S S Bhavikatti
2	Basic Civil Engineering" by B C Punmia and Ashok Kumar Jain

OTHER REFERENCES	
1	https://thecivilengineerings.com/practical-and-basic-knowledge-of-civil-engineering-civil-engineering-basics/
2	https://www.youtube.com/watch?v=vcXQc0E_6TQ
3	https://www.youtube.com/c/CIVILENGINEERINGBASICS
4	https://www.youtube.com/watch?v=HId6ABURydI
5	https://thecivilengineerings.com/basic-civil-engineering-knowledge-for-freshers-101-civil-engg-tips/

Semester	Programme	Course Code	Course Name	L	T	P	C
VII	B.E. CIVIL	20CEO07	**CIVIL ENGINEERING MATERIALS**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		**RBT Level**	**Topics Covered**
CO1	Understand the physical and mechanical properties of various construction materials	K2	1
CO2	Understand the properties of various miscellaneous materials	K2	2
CO3	Understand the construction technique to be followed in brick masonry	K2	3
CO4	Understand the construction technique to be followed in stone masonry	K2	4
CO5	Understand the various types of foundations.	K2	5

PRE-REQUISITE	Nil

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	**Programme Learning Outcomes (POs)**												**PSOs**	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2	2	3	3		3	3	3
CO2	3	3					2	2	3	3		3	3	3
CO3	3	3					2	2	3	3		3	3	3
CO4	3	3					2	2	3	3		3	3	3
CO5	3	3					2	2	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**PROPERTIES & TESTING OF MATERIALS**	**9**
Physical and Mechanical properties of construction materials – stones, brick, cement, aggregate, timber, tiles. Testing of said materials as per BIS specifications.		
Topic - 2	**PROPERTIES OF MISCELLANEOUS MATERIALS**	**9**
Structural Steel and Aluminium, Roofing Material, Physical descriptions of asbestos sheets, GI sheets, tubes and light weight roofing materials, Timber and its Products, Modern materials, Neoprene, thermocol, vinyl flooring, decorative panels and laminates, anodised aluminium, architectural glass and ceramics, Ferro cement, PVC, polymer base materials and Fibre Reinforced Polymer (FRP).		
Topic - 3	**BRICK MASONRY**	**9**
Brick masonry construction- Principles of construction, types of bonds, introduction to reinforced brick work, lintels and arches.		
Topic - 4	**STONE MASONRY**	**9**
Stone masonry – Types of stone masonry & method of its construction, lintels and arches.		
Topic - 5	**FOUNDATIONS**	**9**
Function of foundation, Types of foundation- Shallow and deep, there methods of construction.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	Rangwala, Engineering Materials, Charotar Publishing House Pvt. Ltd.
2	P.C.Varghese, Engineering Materials, 1st edition, PHI Learning.
3	S.K.Duggal, Building Materials, 3rd Edition, New Age International Publishers.
4	Sushil Kumar, Building Construction, Standard Publishers Distributors.
5	M.L.Gambhir, Concrete Technology, Tata McGraw Hill Education.

OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105106053/L01.html
2	https://nptel.ac.in/courses/105106206
3	https://nptel.ac.in/courses/105105108
4	https://www.digimat.in/nptel/courses/video/105102088/L01.html
5	https://www.digimat.in/nptel/courses/video/105102088/L09.html

Semester	Programme	Course Code	Course Name	L	T	P	C
	B.E. CIVIL	20CEO08	**GREEN BUILDING**	3	0	0	3

COURSE LEARNING OUTCOMES (COs)			
After Successful completion of the course, the students should be able to		RBT Level	Topics Covered
CO1	Understand the principles of building planning its bylaws	K2	1
CO2	Understand the concepts of green buildings	K2	2
CO3	Understand the principles of provide facilities for rainwater harvesting	K2	3
CO4	Understand the concepts of energy efficiency	K2	4
CO5	Understand the concepts of green buildings materials	K2	5

PRE-REQUISITE	Nil

CO / PO MAPPING (1 – Weak, 2 – Medium, 3 – Strong)														
COs	Programme Learning Outcomes (POs)												PSOs	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3					2	2	3	3		3	3	3
CO2	3	3					2	2	3	3		3	3	3
CO3	3	3					2	2	3	3		3	3	3
CO4	3	3					2	2	3	3		3	3	3
CO5	3	3					2	2	3	3		3	3	3

COURSE ASSESSMENT METHODS		
DIRECT	1	Continuous Assessment Tests
	2	Other Assessments (Assignment, Quiz etc.)
	3	End Semester Examinations
INDIRECT	1	Course End Survey

COURSE CONTENT		
Topic - 1	**PLANNING OF BUILDING**	**9**
Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, common errors in planning		
Topic - 2	**GREEN BUILDING TECHNOLOGIES**	**9**
Introduction- Necessity - Concept of Green building. Principles of green building		
Topic - 3	**RAIN WATER HARVESTING**	**9**
Introduction- Necessity - Provision of rain water harvesting		
Topic - 4	**ENERGY EFFICIENCY**	**9**
Environmental impact of building constructions, Concepts of embodied energy, operational energy and life cycle energy. Methods to reduce operational energy		
Topic - 5	**BUILDING MATERIALS**	**9**
Methods to reduce embodied energy in building materials: Use of natural and renewable materials like bamboo, timber, rammed earth, stabilized mud blocks.		

THEORY	**45**		**TUTORIAL**	**0**		**PRACTICAL**	**0**		**TOTAL**	**45**

BOOK REFERENCES	
1	IGBC Green Homes Rating System, Version 2.0., Abridged reference guide, 2013, Indian Green Building Council Publishers.
2	Mike Montoya, Green Building Fundamentals, Pearson, USA, 2010.
3	Alternative building materials and technologies by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
4	Non-Conventional Energy Resources by G. D. Rai, Khanna Publishers.
5	Sustainable Building Design Manual, Vol.1 and 2, TERI, New Delhi 2004.
OTHER REFERENCES	
1	https://www.digimat.in/nptel/courses/video/105102195/L43.html
2	https://www.youtube.com/watch?v=VE2tpwGCN0U
3	https://www.youtube.com/watch?v=nFBvLIfFFqI
4	http://www.nitttrc.edu.in/nptel/courses/video/105102195/L35.html
5	http://52.32.140.135/nptel/courses/video/124107011/L10.html