B.E. CIVIL ENGINEERING

REGULATIONS – 2019

CHOICE BASED CREDIT SYSTEM

CURRICULUM AND SYLLABI

B.E. CIVIL ENGINEERING

Regulations 2019

Minimum credits to be earned: 160

Course Code	Course Title	Periods / week			Credits	CAT
		Lecture	Tutorial	Practical		
SEMESTER 1						
U19EGE01	Technical English	2	0	2	3	HS
U19MAT01	Engineering Mathematics I	3	1	0	4	BS
U19CYE01	Applied Chemistry	3	0	2	4	BS
U19ECT01	Elements of Electrical, Electronics and information science	3	0	0	3	ES
U19MET01	Engineering Graphics	2	0	4	4	ES
U19EEP01	Engineering Practices Laboratory	0	0	4	2	ES
U19MTA01	Induction Program*	0	0	0	0	MC
	Total 26 Periods	**13**	**1**	**12**	**20**	
SEMESTER 2						
U19EGE02	Communicative English	2	0	2	3	HS
U19MAT02	Engineering Mathematics II	3	1	0	4	BS
U19PYE02	Applied Physics	3	0	2	4	BS
U19MET03	Engineering Mechanics	3	1	0	4	ES
U19CSE01	Problem solving and Python Programming	3	0	2	4	ES
U19MEP01	Computer Aided Drafting Laboratory	0	0	4	2	ES
	Total 26 Periods	**14**	**2**	**10**	**21**	
SEMESTER 3						
U19MAT04	Transforms and Boundary Value Problems	3	1	0	4	BS
U19CET01	Engineering Geology	3	0	0	3	ES
U19CEE01	Mechanics of Deformable Bodies – I	3	0	2	4	PC
U19CET03	Fluid Mechanics	3	1	0	4	PC
U19CEE02	Engineering Surveying	3	0	2	4	PC
U19CEP01	Computer Aided Civil Engineering Drawing	0	0	4	2	ES
	Total 25 Periods	**15**	**2**	**8**	**21**	

* As per norms

CAT - Category; BS - Basic Science; HS - Humanities and Social Sciences; ES - Engineering Sciences;
PC - Professional Core; PE - Professional Elective; OE - Open Elective; EEC - Employability Enhancement Course;
MC – Mandatory Course.

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Course Code	Course Title	Periods / week			Credits	CAT
		Lecture	Tutorial	Practical		
SEMESTER 4						
U19MAT07	Numerical Methods	3	1	0	4	BS
U19CET02	Construction Materials and Technology	3	0	0	3	PC
U19CET04	Mechanics of Deformable Bodies - II	3	0	0	3	PC
U19CEE03	Hydraulic Engineering	3	0	2	4	PC
U19CEE04	Geo-Technical Engineering – I	3	0	2	4	PC
U19MTT01	Environmental Science*	2	0	0	0	MC
U19CEP02	Survey Camp*	0	0	6	3	EEC
	Total 28 Periods	**17**	**1**	**10**	**21**	
SEMESTER 5						
U19CET05	Design of R C Elements	3	1	0	4	PC
U19CET06	Structural Analysis I	3	1	0	4	PC
U19CET07	Geo-Technical Engineering - II	3	1	0	4	PC
U19CE_	Professional Elective I	3	0	0	3	PE
U19CE_	Professional Elective II	3	0	0	3	PE
U19MTT02	Indian Constitution*	2	0	0	0	MC
U19CEP03	Water & Waste Water Engineering Laboratory	0	0	4	2	PC
	Total 24 Periods	**17**	**3**	**4**	**20**	
SEMESTER 6						
U19CET08	Structural Analysis II	3	1	0	4	PC
U19CET09	Structural Design - Steel	3	1	0	4	PC
U19CE_	Professional Elective III	3	0	0	3	PE
U19___	Open Elective I	3	0	0	3	OE
U19___	Open Elective II	3	0	0	3	OE
U19CEP04	Design and Drawing (RCC & Steel)	0	0	2	1	PC
U19CEP05	Concrete and Highway Engineering Laboratory	0	0	4	2	PC
	Total 23 Periods	**15**	**2**	**6**	**20**	

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Course Code	Course Title	Periods / week			Credits	CAT
		Lecture	Tutorial	Practical		
SEMESTER 7						
U19CET10	Estimation and Quantity Surveying	3	1	0	4	PC
U19MGT02	Total Quality Management	3	0	0	3	HS
U19CE___	Professional Elective IV	3	0	0	3	PE
U19CE___	Professional Elective V	3	0	0	3	PE
U19___	Open Elective III	3	0	0	3	OE
U19CEJ01	Project Work Phase I	0	0	8	4	EEC
	Total 24 Periods	**15**	**1**	**8**	**20**	
SEMESTER 8						
U19MGT01	Principles of Management and Ethics	3	0	0	3	HS
U19CE___	Professional Elective VI	3	0	0	3	PE
U19CE___	Open Elective IV	3	0	0	3	OE
U19CEJ02	Project Work Phase II	0	0	16	8	EEC
	Total 25 Periods	**9**	**0**	**16**	**17**	

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PROFESSIONAL ELECTIVES

Course Code	Course Title
U19CET51	Water Supply Engineering
U19CET52	Concrete Technology
U19CET53	Fundamentals of Remote Sensing and GIS
U19CET54	Hydrology
U19CET55	Pollution Control and Monitoring
U19CET56	Waste Water Engineering
U19CET57	Transportation Engineering
U19CET58	Construction Management
U19CET59	Advanced Concrete Design
U19CET60	Ground Improvement Techniques
U19CET61	Water Resource and Irrigation Engineering
U19CET62	Pavement Engineering
U19CET63	Town Planning and Architecture
U19CET64	Fundamentals of Energy, Environment and climate Change
U19CET65	Traffic Engineering and Management
U19CET66	Design of Reinforced and Brick Masonry Structures
U19CET67	Building Services
U19CET68	Construction Scheduling
U19CET69	Valuation
U19CET70	Industrial Structures
U19CET71	Structural Dynamics and Earthquake Engineering
U19CET72	Repair and Rehabilitation of Structures
U19CET73	Disaster Management and Mitigation
U19CET74	Finite Element Method
U19CET75	Prestressed Concrete Structures
U19CET76	Prefabricated Structures
U19CET77	Housing Planning and Management
U19CET78	Municipal Solid Waste Management

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SUMMARY OF CREDIT DISTRIBUTION

CAT	Credits / Semester								Total Credits
	I	II	III	IV	V	VI	VII	VIII	
HS	3	3	0	0	0	0	3	3	**12**
BS	8	8	4	4	0	0	0	0	**24**
ES	9	10	5	0	0	0	0	0	**24**
PC	0	0	12	14	14	11	4	0	**55**
PE	0	0	0	0	6	3	6	3	**18**
OE	0	0	0	0	0	6	3	3	**12**
EEC	0	0	0	3	0	0	4	8	**15**
Total	**20**	**21**	**21**	**21**	**20**	**20**	**20**	**17**	**160**

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U19EGE01	TECHNICALENGLISH	L	T	P	C
	(Common to all Branches)	2	0	2	3

Pre-Requisites : None

Objectives:

To make the students to

- learn technical and non- technical vocabulary in speaking and writing
- read and comprehend engineering and technical texts
- learn the required format for business and official communication
- familiarize technical communication portfolio
- practice to speak and write in English

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : use more technical and non- technical vocabulary in speaking and writing

CO2 : read and comprehend engineering and technical texts

CO3 : the required format for business and official communication

CO4 : apply technical communication portfolio wherever necessary

CO5 : will be able to speak and write in English

Unit I INTRODUCTION TO TECHNICAL ENGLISH 6

Listening: Listening to scientific and technical talks. Speaking: Self Introduction, introducing others. Reading: Skimming and scanning the text and finding the answers for the given questions. Writing: Parts of speech, word Formation- prefix and suffix, One word Substitutes, Synonyms & Antonyms, Countable and Uncountable Nouns, technical Paragraph Writing, short essays related to various fields of engineering.

Unit II WORDS AND SENTENCES 6

Listening: Listening to longer technical talks and completing exercises based on that. Speaking: Describing a process, Reading: Note making on the given text. Writing: Matching words and phrases, Different forms of words, Types of sentences, Direct and Indirect Speech. instructions, Recommendations

Unit III ENGLISH FOR BUSINESS COMMUNICATION 6

Listening: Listening to talks on latest technology. Speaking: Giving summary of an article. Reading; Reading technical texts Journals/ Articles. Writing; - tenses, question tags. Writing reports, report on various projects, Formal Letter- business letter- calling for quotation, placing orders.

Unit IV TECHNICAL COMMUNICATION PORTFOLIO 6

Listening: Listening to documentaries. Speaking: Discussion on the documentaries related to the documentaries listened. Reading: Reading for technical information and comprehending. Writing: Gerund, Technical vocabulary, 'If' conditionals, Expansion of compound nouns, writing notice, e-mails, Agenda & Minutes of Meeting.

Unit V ESSENTIAL SOFTSKILLS FOR ENGINEERS 6

Listening: Listening to TED talks. Speaking: Group Discussion. Reading; Pre Reading and post reading and answering comprehension questions. Writing: Gap fillers, Punctuation for effective writing, collocations, Active and Passive voice, Formal Letter- official letter Article Writing for journals

Total Periods: 30

List of Exercise:

1. Listening to scientific and technical talks
2. Speaking: Self Introduction, introducing other
3. Listening to longer technical talks and completing exercises based on that.
4. Speaking: Describing a process,
5. Listening to talks on latest technology.
6. Speaking: Giving summary of an article
7. Listening to documentaries
8. Speaking: Discussion on the documentaries related to the documentaries listened.
9. Listening to TED talks
10. Speaking: Group Discussion.

Total Periods: 30

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jawahar Jewelcy and Dr. Ratna P	Technical English	VRB	2013

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mccarthy	Cambridge Grammar of English	Cambridge University press	2010
2.	Peck, J. and Coyle,M.	'The student's guide to writing'	Macmillan	2005
3.	Thornbury, S	Uncovering grammar	Macmillan Education	2005

Web URL(s):

1. https://www.google.com/search?client=ubuntu&channel=fs&q=ted+talk&ie=utf-8&oe=utf-8

U19MAT01	ENGINEERING MATHEMATICS - I	L	T	P	C
	(Common to All Branches)	3	1	0	4

Pre-Requisites : Concepts of basic matrices, differentiation and integration

Objectives:

- Interpret the introductory concepts of matrices which will enable the students to model and analyze physical phenomenon involving the multidimensional variable.
- Demonstrate the methodologies involved in solving problems using Jacobian method (at later stage).
- Understand differential calculus through geometrical interpretation.
- Exemplify the concepts of integration through various techniques.
- Develop enough confidence to identify the modern mathematical pattern in real world and offer an appropriate solution using the skills learned in their interactive and supporting environment.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Apply the knowledge of matrices to solve the problems for respective areas of specialization

CO2 : Implement the various differentiation and integral techniques in solving the system.

CO3 : Apply the knowledge of calculus that are essential for engineering and technology.

CO4 : Explore the basic concepts of integration methods through geometrical representation.

CO5 : Evaluate the functions to get the surface area and volume using multiple integrals.

Unit I MATRICES 9+3

Linear Independence and dependence, Determinant, Gramer's rule. Eigen values and eigenvectors of a real matrix, Properties of eigenvalues and eigenvectors, Cayley – Hamilton theorem (statement), Orthogonal matrices, Application-Elastic Membrane.

Unit II FUNCTIONS OF SEVERAL VARIABLES 9+3

Limits and Continuity (Geometrical interpretations) –Properties of continuous function – Partial derivatives-Total derivatives- Jacobians - Taylor's series for two variables.

Unit III DIFFERENTIAL CALCULUS 9+3

Curvature of a curve (Cartesian co-ordinates), centre and radius of curvature, circle of Curvature, Cartesian coordinates - Evolutes, Envelopes of family of curves.

Unit IV INTEGRATION METHODS 9+3

Basic integration formulae for algebraic and transcendental functions- Integration by special devices: Integration by parts – rationalizing substitution or trigonometric substitution-partial fraction – reduction formula's – Improper integrals.

Unit V MULTIPLE INTEGRALS 9+3

Double integration (Cartesian coordinates)-Region of integration, Triple integration in Cartesian Coordinates -Meaning and Application.

Total Periods 45+15=60

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers,43rd Edition Delhi	2015
2.	E.Kreyszig	Advanced Engineering Mathematics	John Wiley and Sons (Asia) Ltd, Tenth Edition. Singapore	2015

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Glyn James	Advanced Modern Engineering Mathematics	Wiley India	2014
2.	Samantha Pal, Subodha .C.Bhunia	Engineering Mathematics	Oxford University	2015
3.	C.Ray.Wylie, Loui's C.Barrett	Advanced Engineering Mathematics, 6^{th} edition	McGrawhill, 6^{th} edition, New Delhi	2014

U19CYE01	APPLIED CHEMISTRY	L	T	P	C
	(Common to CIVIL, MECH and MCT)	3	0	2	4

Pre-Requisites : Nil

Objectives:

To make the students

- understand the requirements of Boiler feed water, its problems and water treatment methods.
- familiar with the manufacture and properties of various engineering materials.
- learn the principles and generation of energy in solar cells, fuel cells and batteries.
- understand the basic concepts of phase rule and its application to one and two component systems and appreciate the purpose and significance of alloys.
- familiar with the nature of fuels and its combustion.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : explain the various water treatment process, which make it fit for industrial and domestic purpose.

CO2 : explain methods involved in the synthesis of different engineering materials and its properties.

CO3 : analyse various sources of energy and its storage in different batteries, which find its application in society including engineering fields.

CO4 : explain the principles involved in alloying metals and also its properties.

CO5 : analyse the combustion characteristics in engines and apply them in the design of combustion chambers.

Unit I WATER TECHNOLOGY 9

Hardness of water-types -expression-units-estimation of hardness of water by EDTA-numerical problems-boiler feed water-disadvantages of hard water in boilers-boiler troubles (scale & sludge, boiler corrosion)-water treatment zeolite process, Ion exchange process-desalination-reverse osmosis-instrumental methods for water analysis-AAS, flame emission spectroscopy and photocolorimetry.

Unit II ENGINEERING MATERIALS 9

Refractories-classification-properties (refractoriness, RUL, dimensional stability, thermal spalling, thermal expansion, porosity)-manufacture of silica and magnesite bricks-Abrasives-classification-properties-manufacture of SiC, alundum, norbide-Portland Cement-manufacture (wet process)-properties-setting and hardening of cement special cement-alumina cement and water proof cement.

Unit III ENERGY SOURCES AND STORAGE DEVICES 9

Energy sources-types-nuclear energy-nuclear fission-controlled nuclear fission-nuclear fusion-nuclear reactor power generator-breeder reactor-solar energy-solar energy conversion-wind energy-Batteries - primary (alkaline battery) - Secondary (lead storage battery, NICAD battery and lithium ion battery)-Fuel cells (H_2 -O_2 , direct methanol and solid oxide)-super capacitors.

Unit IV PHASE RULE AND ALLOYS 9

Phase Rule: Introduction-definition of terms with examples-one component system-water system-reduced phase rule – thermal analysis and cooling curves-two component system-lead-silver system-pattinson process.

Alloys: Introduction-definition-properties of alloys-significance of alloying, functions and effect of alloying elements-ferrous alloys (Nichrome and Stainless steel)-Heat treatment of steel-non ferrous alloys (Brass and Bronze).

Unit V FUELS AND COMBUSTION 9

Fuels: Introduction-classification of fuels-coal-analysis of coal (proximate and ultimate)-carbonization- manufacture of metallurgical coke (Otto Hoffmann method)-petroleum-manufacture of synthetic petrol (Bergius process)-knocking-octane number-diesel oil-cetane number-natural gas-compressed natural gas (CNG)-liquefied petroleum gases (LPG)-power alcohol and bio diesel.

Combustion of fuels: Introduction-HCV and LCV-theoretical calculation of calorific value-ignition temperature explosive range-flue gas analysis (gas chromatography).

Total Periods : 45

List of Experiments:

1. Estimation of Total, Temporary and Permanent Hardness of Water Sample by EDTA method.
2. Determination of DO content in Water by Winkler's method.
3. Determination of strength of acids in a mixture using conductivity meter.
4. Determination of strength of an acid using pH meter.
5. Estimation of iron content of the given solution using potentiometer.
6. Determination of calcium oxide in cement.
7. Estimation of Iron in a given sample by photocolorimetry.

Total Periods : 30

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Jain P.C. and Monica Jain	Engineering Chemistry, 16th edition	Dhanpat Rai Publishing Company (P) Ltd., New Delhi.	2017
2.	O.G.Palanna	Engineering Chemistry, 2nd edition	McGraw Hill Education (India) Pvt. Ltd., Chennai.	2017

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dara S.S Umare S.S	Engineering Chemistry, 12th edition	S.Chand & Company Ltd., New Delhi	2013
2.	Sivasankar.B	Engineering Chemistry	Tata McGraw-Hill Publishing Company, Ltd., New Delhi	2008
3.	S.Vairam P.Kalyani Suba Ramesh	Engineering Chemistry	Wiley India Pvt. Ltd, New Delhi, 1st Reprint	2014

Web URL(s):

1. http://www.erforum.net/2016/01/engineering-chemistry-by-jain-and-jain-pdf-free-ebook.html
2. https://www.mhhe.com/palanna/ec2e

U19ECT01	ELEMENTS OF ELECTICAL, ELECTRONICS AND INFORMATION SCIENCE	L	T	P	C
	(Common to Mechanical, Civil, Mechatronics)	3	0	0	3

Pre-Requisites : Mathematics and Physics at 10+2 level or equivalent level

Objectives:

- To understand the fundamental concepts of circuit elements, electrical connections, laws and networks.
- To realize the operational behaviour of semiconductor devices
- To impart the concepts of digital electronics.
- To categorize various types of communication systems.
- To Familiar with the concepts in Emerging fields of computer science.

Course Outcomes:
At the end of this course students will demonstrate the ability to

CO1 : Apply knowledge of fundamental concepts of circuits in engineering domains

CO2 : Understand and apply the concepts of semiconductor devices in engineering field

CO3 : Apply knowledge of digital electronics in engineering domain

CO4 : Understand different communication systems

CO5 : Get an exposure about various emerging areas

Unit I Electric Circuits **9**

Circuit Elements – Voltage, Current, Power and Energy, R, L and C - Series and parallel connections, Energy Sources, Source Transformation, Voltage division, Current division, Ohm's Law, Kirchhoff's Law – Voltage law, Current Law. Star and Delta Transformation, Power in series and parallel circuit.

Unit II Analog Electronics **9**

Diode - Characteristics & Applications (Zener Diode, LED, Photo diode Rectifier, Clipping circuits,). BJT Transistor and its configuration, Transistor applications. Op-amps characteristics-Inverting and Non-inverting amplifier-Instrumentation amplifier as signal conditioning Circuit.

Unit III Digital Electronics **9**

Introduction to numbers systems, basic Boolean laws, logic gates. Universal gates, Combinational circuit (Half-Adder, Full-Adder, Decoder), Sequential Circuit - Latch, Flip-Flop, Counters and Registers, Introduction to CMOS - Design of Universal gates using CMOS logic.

Unit IV Communication Fundamentals **9**

Analog Communication-Need for Modulation- AM and FM modulation. Introduction to Digital Communication-Sampling and Quantization-PCM; Digital Modulation -ASK, FSK, PSK. Introduction to Wireless Technology-Wifi, ZigBee, Bluetooth

Unit V Computer and Information Technology **9**

Introduction: Artificial Intelligence, Cloud Computing, Big data Analysis, Parallel Computing, Cyber Security, Machine Learning, IoT.

Total Periods: 45

Text/ Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Sudhakar A, Shyammohan S Pillai	Circuits and Networks Analysis and Synthesis	TMGH	2011
2.	Robert L. Boylestad, Louis Nasheresky	Electronic Devices and Circuit Theory	Pearson Education	2013
3.	M. Morris Mano, Michael D. Ciletti	Digital Design,With an Introduction to the Verilog HDL	Pearson	2013
4.	Wayne Tomasi	Electronic Communication Systems	Pearson Education	2004

Web URL(s):

1. https://nptel.ac.in/courses
2. www.electronics-tutorials.ws/dccircuits/dcp_6.html
3. https://www.mrt.ac.lk/web/sites/default/files/elect/files/EE201_network_theorems_Nov07.pdf

U19MET01	Engineering Graphics	L	T	P	C
	(Common to MCT, MECH, CIVIL)	2	0	4	4

Pre-Requisites : None

Objectives:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.
- To expose them to existing national standards related to technical drawings.

Course Outcomes:
At the end of this course students will demonstrate the ability to

CO1 : Perform free hand sketching of basic geometrical constructions and multiple views of objects.

CO2 : do orthographic projection of lines and plane surfaces

CO3 : draw projections and solids and development of surfaces

CO4 : Prepare isometric and perspective sections of simple solids.

CO5 : Demonstrate computer aided drafting.

Unit I Projection of Points, Lines and Plane Surfaces 9

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Unit II Projection of Solids 9

Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method.

Unit III Projection of Sectioned Solids and Development of Surfaces 9

Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones.

Unit IV Free Hand Sketching 9

Visualization concepts and Free Hand sketching: Visualization principles –Representation of Three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects.

Unit V Isometric and Perspective Projections 9

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and conversion of orthographic views to isometric. Introduction to perspective projection of simple solids- Prisms, pyramids and cylinders.

Total Periods: 45

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Venugopal K. and Prabhu Raja V	Engineering Graphics	New Age International (P) Limited	2008
2.	Natrajan K.V.,	A text book of Engineering Graphics	Dhanalakshmi Publishers Chennai	2009

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bhatt N.D. and Panchal V.M	Engineering Drawing	Charotar Publishing House 50th Edition	2010
2.	Gopalakrishna K.R.,	"Engineering Drawing" (Vol. I&II combined)	Subhas Stores Bangalore	2007
3.	Luzzader, Warren.J and Duff,John M	Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production	Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi.	2005

U19EEP01	ENGINEERING PRACTICES LABORATORY	L	T	P	C
	(Common to All Branches)	0	0	4	2

Pre-Requisites : None

Objectives:

To make the students to

- To know about the usage of appropriate tools and equipment's used in plumbing and carpentry
- To acquaint metal joining process
- To understand working methodologies in lathe and sheet metal.
- To impart knowledge in electrical wiring concepts for house hold and calculations of power and energy.
- To familiarize with various electronic components and equipments.
- To learn the basic skills of soldering electronic components and wires

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Use proper tools for plumbing and carpentry.

CO2 : Join metals using arc welding.

CO3 : Create models in sheet metal and perform basic machining operations in lathe.

CO4 : Carry out basic home electrical works and measure electrical quantities.

CO5 : Possess the knowledge on various electronics components and equipments.

CO6 : Elaborate on soldering practices.

List of Exercise:

MECHANICAL AND CIVIL EENGINEERING PRACTICES

1. Study of plumbing and carpentry components of residential and industrial building
2. Hands-on-exercise: Wood work, joints by sawing, planning and cutting
3. Preparation of butt joints, lap joints and T- joints by metal arc welding
4. Study of Lathe, centrifugal pump and air conditioner
5. Hands-on-exercise: Simple Turning, Taper Turning and Drilling Practice
6. Sheet Metal Works: Model making – Trays and funnels

ELECTRICAL AND ELECTRONICS ENGINEERING PRACTICES

1. Residential house wiring and staircase wiring.
2. Measurement of power and energy
3. Measurement of earth resistance
4. Study of different types of electronic components resistors, capacitors, inductors, function generator and DC power supply.
5. Study of CRO and measurement of AC signal parameter (peak-peak, rms period, frequency).
6. Soldering practice using general purpose PCB

Total Periods: 30

U19EGE02	COMMUNICATIVE ENGLISH	L	T	P	C
	(Common to all Branches)	2	0	2	3

Pre-Requisites : None

Objectives:

To make the students to

- know the importance of listening skill for effective communication
- practice conversation and public speaking in English
- prepare for competitive examinations
- comprehend the format of business communication
- gain knowledge on communication abilities and language skills

Course Outcomes:
At the end of this course students will demonstrate the ability to

CO1 : communicate effectively

CO2 : do public speaking

CO3 : take up competitive examinations

CO4 : communicate officially

CO5 : master the language

Unit I INTRODUCTION TO COMMUNICATIVE ENGLISH 6

Listening: Listening to longer texts and filling up the table. Speaking: Describing a product. Reading: Reading Biography/ Autobiography of Scientists/ eminent personalities and answering the questions. Writing: simple, Compound and Complex sentences, One word Substitutes, Essay Writing.

Unit II ENGLISH FOR COMPETITIVE EXAMS 6

Listening: listening to personal information. Speaking: Sharing personal information (likes and dislikes), Reading: Reading scientific blogs- projects related to engineering. Writing; Sample questions from International English Language Testing System (IELTS), Test of English as foreign language (TOEFL) & Civil Service (Language related)

Unit III FORMAL COMMUNICATION 6

Listening: Listening to formal conversation, Speaking: Role- play. Reading: Cloze Reading. Writing: Preposition, Phrasal Verbs, Singular or Plural Words, Degrees of Comparison, Job Application- Cover letter and Resume, Writing Circulars

Unit IV VERBAL AND NON- VERBAL COMMUNICATION 6

Listening; Listening to Mock Group Discussion and evaluating. Speaking: Making Presentation on the given topic Reading; Interpreting pictures and graphs- pie chart, flow chart, bar diagram and line graph. Writing: Infinitives and Gerunds, Regular and Irregular Verbs, Indefinite and Definite Articles

Unit V LANGUAGE SKILLS 6

Listening to Interviews. Speaking: Discussing company information/ describing the given data, trends and sales, Problem Solving techniques, Reading: Reading essays on global warming and other prevailing social issues. Writing: Contractions, Conjunctions or 'Joining Words, Subject -Verb Agreement, Proposal writing, Poster making

Total Periods: 30

List of Experiments:

1. Listening to longer texts and filling up the table.
2. Speaking: Describing a product.
3. Listening to personal information.
4. Speaking: Sharing personal information (likes and dislikes)
5. Listening to formal conversation
6. Speaking: Role- play.
7. Listening to Mock Group Discussion and evaluating.
8. Speaking: Making Presentation on the given topic
9. Listening to Interviews.
10. Speaking: Discussing company information/ describing the given data, trends and sales, Problem Solving techniques

Total Periods: 30

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dhanavel.S.N	English and Communication Skills	Orient Long Swan	2013
2.	Lakshmana Perumal.N	Communicative English	Sri Krishna	2018

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Mccarthy	Cambridge Grammar of English	Cambridge University press	2010
2.	Rayadu,C.S	Communication	Himalaya Publishing House	2007
3.	Murphy, R. and Smalzer, W. R	Grammar in use	Cambridge University Press	2000

Web URL(s):

1. https://www.google.com/search?client=ubuntu&channel=fs&q=ted+talk&ie=utf-8&oe=utf-8

U19MAT02	ENGINEERING MATHEMATICS - II	L	T	P	C
	(Common to All Branches)	3	1	0	4

Pre-Requisites : Concepts of Differentiation and Integration

Objectives:

- Understand the concepts of gradient, divergence and curl through vector differentiation.
- Distinguish line integral, double integral, triple integral using vector integration.
- Interpret the solution of second order differential equation.
- Exemplify the concept of Laplace transforms that converts time domain to frequency domain.
- Represent the concept of inverse Laplace transform for engineering problems.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Compute gradient, curl and divergence using vector differentiation.

CO2 : Evaluate line integral, double integral and volume integral using vector integration.

CO3 : Analyze and model the real time problems using differential equations.

CO4 : Apply the knowledge of Laplace transforms for periodic functions.

CO5 : Analyze and model the differential equations using Laplace transform.

Unit I VECTOR DIFFERENTIATION 9+3

Vector of scalar fields, directional derivative, gradient of a scalar field, surfaces, scalar potential, divergence and curl-Line integrals and independent of path, conservative vector fields-work done by a force.

Unit II VECTOR INTEGRATION 9+3

Double integrals, surface integral-flux, Green's theorem, triple integral- Gauss divergence theorem-Stoke's theorem

Unit III LINEAR DIFFERENTIAL EQUATION OF SECOND ORDER 9+3

Linear equations of second order with constant and variable coefficients (Euler, Cauchy's and Legendre's), Method of variation of parameter-Applications:electric circuit.

Unit IV LAPLACE TRANSFORM 9+3

Laplace transform: Linearity, shifting, transform of derivatives and integrals, Periodic function.

Unit V INVERSE LAPLACE TRANSFORM 9+3

Inverse linear transform: Convolution theorem (Statement only), partial fraction, unit step and impulse function, Initial and Final value theorem, (Statements) Applications: differential equations.

Total Periods 45+15=60

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B.S.Grewal	Higher Engineering Mathematics	Khanna Publishers,43rd Edition Delhi	2015
2.	E.Kreyszig	Advanced Engineering Mathematics	John Wiley and Sons (Asia) Ltd, Tenth Edition. Singapore	2015

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Glyn James	Advanced Modern Engineering Mathematics	Wiley India	2014
2.	Samantha Pal, Subodha .C.Bhunia	Engineering Mathematics	Oxford University	2015
3.	C.Ray.Wylie, Loui's C.Barrett	Advanced Engineering Mathematics, 6th edition	McGrawhill, 6th edition, New Delhi	2014

U19PYE02	APPLIED PHYSICS	L	T	P	C
	(Common to CIVIL, MECH and MCT)	3	0	2	4

Pre-Requisites : None

Objectives:

To make the students to

- know about the elastic properties of materials.
- understand the different aspects of sound and production of ultrasaonic.
- comprehensive knowledge about diodes and identify its terminals.
- learn to apply the lever rule to determine the percentage of Phase present in ferrous alloys .
- understand the concept of ceramics, composites, metallic glasses and shape memory alloys.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : apply the elastic properties of materials in engineering design.

CO2 : analyze the aspect of sound in audio and noise control industries.

CO3 : explain the types of semiconductors and its applications in electronic devices.

CO4 : apply the principle of iron carbon diagram to determine the phases in ferrous alloy materials in steel industries.

CO5 : select appropriate materials for latest automotive and aerospace industries.

Unit I Properties of Matter **9**

Elasticity – Stress-strain relationship - factors affecting elastic modulus and tensile strength – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - Mechanical properties of Engineering materials - Tensile strength, Hardness, Fatigue.

Unit II Acoustics and Ultrasonics **9**

Classification of sound- decibel- Weber–Fechner law – Sabine's formula (No derivation) - Absorption Coefficient and its determination –factors affecting acoustics of buildings (Optimum reverberation time, loudness, focusing, echo, echelon effect, resonance and noise) and their remedies.
Ultrasonics – Principle- - Production of ultrasonic's by Magnetostriction and piezoelectric methods-Non Destructive testing – pulse echo system through transmission and reflection modes.

Unit III Semi Conducting Materials **9**

Elemental and compound semiconductors - intrinsic semiconductors: carrier concentration – electrical conductivity band gap. Extrinsic semiconductors: carrier concentration - variation of Fermi level. Hall effect: theory and experimental determination -applications of Hall effect, Light emitting diode, Photo diode.

Unit IV Phase Diagrams and Ferrous Alloys **9**

Solid solutions – Hume Rothery's rules – the phase rule – single component system – one component system of iron – binary phase diagrams – isomorphous systems – the tie-line rule – the lever rule – isomorphous system – eutectic phase diagram – free energy composition curve for binary systems – microstructural change during cooling. The iron – carbon equilibrium diagram phases, invariant reactions – eutectoid steel, hypo and hypereutectoid steels.

Unit V Advanced Materials **9**

Ceramics – types and applications – Composites – classification, role of matrix and reinforcement, processing of fiber reinforced plastics - Metallic glasses: types , glass forming ability of alloys, melt spinning process, applications -shape memory alloys: phases, shape memory effect, pseudoelastic effect, NiTi alloy, applications .

Total Periods: 45

List of Experiments:

1. (a) Determination of Wavelength, and particle size using Laser.
   (b) Determination of acceptance angle in an optical fiber.
2. Determination of Young's modulus by uniform bending method.
3. Determination of thickness of a thin wire by Air wedge method.
4. Determination of thermal conductivity of a bad conductor–Lee's Disc method.
5. Determination of wavelength of mercury spectrum– spectrometer grating.
6. Determination of band gap of a semiconductor.

Total Periods: 30

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Brijlal, N.Subrahmanayam	Properties of Matter	S.Chand & Company Ltd., New Delhi.	2001
2.	William D. Callister,Jr	Materials Science and Engineering, 9th edition	John Wiley and sons,Inc,	2014

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rajendran.V	Engineering Physics	Tata McGraw Hill Education private limited, New Delhi.	2012
2.	Lawrence E.Kinsler, Austin R.Frey, Alan B.Coppens, James V.Sanders	Fundamentals of Acoustics, Fourth edition	Jonwiley and sons inc.UK.	2010
3.	Dr.G.Senthil Kumar	Materials science, Revised edition	VRB Publications, Chennai.	2018

U19MET03	Engineering Mechanics	L	T	P	C
	(Common to Mechanical, Mechatronics and Civil)	3	0	1	4

Pre – Requisites : None

Objectives:

- To apply the laws of Mechanics to solve basic problems in day to day life.
- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.
- To develop the ability to understand the properties of surfaces and solids
- To apply the laws of friction to solve the simple life problems
- To develop the ability, in the engineering student, to understand the laws of motion and dynamic forces.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 **:** Analyze the effect of forces, its magnitudes and direction

CO2 **:** Analyze the rigid body in equilibrium

CO3 **:** Evaluate the properties of surfaces and solids

CO4 **:** Determine the frictional resistance and the effects by the laws of friction

CO5 **:** Calculate dynamic forces exerted on rigid body

Unit I Statics of Particles **12**

Introduction to Mechanics – Fundamental Principles – Laws of Mechanics, Lame's theorem, Parallelogram and triangular Law of forces, Coplanar forces – Resolution of forces –Equilibrium of particle in space.

Unit II Statics of Rigid Bodies **12**

Free body diagram – Types of supports and their reactions – Moments and Couples – Moment of a force about a point and about an axis – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions.

Unit III Properties of Sections **12**

Centroid - Rectangular, circular, triangular areas – T section, I section, Angle section, – Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section, – Parallel axis theorem and perpendicular axis theorem –Principal moments of inertia of plane areas – Product of inertia and Mass moment of inertia of Cylinder, Cone and combination.

Unit IV Dynamics of Particles and Friction **12**

Displacements, Velocity and acceleration, their relationship – relative motion – Curvilinear motion - Projectiles– Newton's law of motion – Work Energy Equation of particles – Impulse and Momentum – Impact of elastic bodies- Impact - direct and central impact – coefficient of restitution.

Friction - Characteristics and Laws of Dry friction - Problems involving dry and ladder friction.

Unit V Dynamics of Rigid Bodies **12**

General plane motion –Velocity and Acceleration- Absolute and Relative motion method - Equilibrium of rigid bodies in plane motion- D'Alembert's Principle- Work Energy Principle-Principle of impulse momentum for rigid bodies in plane motion.

Total Periods: 45

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Vela Murali	Engineering Mechanics	Oxford University Press	2010
2.	Ferdinand P. Beer, E.Russell Johnston	Vector Mechanics for Engineers: Statics and Dynamics (9^{th} Edition)	Tata McGraw-Hill International Edition	2010

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	J. L. Meriam and L. G. Kraige	Engineering Mechanics: Statics and Dynamics (6^{th} Edition)	Wiley Publishers	2006
2.	Rajasekaran S and Sankarasubramanian G	Engineering Mechanics Statics and Dynamics", 3^{rd} Edition	Vikas Publishing House Pvt. Ltd.	2005
3.	Kumar, K.L.,	Engineering Mechanics, 3^{rd} Revised Edition	Tata McGraw-Hill Publishing company, New Delhi.	2008

U19CSE01	Problem Solving and Python Programming	L	T	P	C
	(Common to Mech, MCT and Civil)	3	0	2	4

Pre – Requisites : None

Objectives:

- To know the basics of algorithmic problem solving
- To read and write simple Python programs.
- To develop Python programs with conditionals and loops.
- To define Python functions and call them.
- To use Python data structures – lists, tuples, dictionaries.
- To do input/output with files in Python

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 **:** Develop algorithmic solutions to simple computational problems

CO2 **:** Read, write, execute by hand simple Python programs

CO3 **:** Structure simple Python programs for solving problems.

CO4 **:** Decompose a Python program into functions.

CO5 **:** Represent compound data using Python lists, tuples, and dictionaries.

Unit I Problem Solving Techniques **9**

General problem Solving concepts-: Algorithm, Pseudo-code and Flowchart Problem Solving with Sequential Logic Structure - Problem Solving with Decisions - Problem Solving with Loops. Case Study: Raptor and Scratch Tools.

Unit II Basics of Python Programming **8**

Features of Python, History of Python, The Future of Python, Literal Constants, Variables and Identifiers, Data Types, Input Operation, Comments, Reserved Words, Indentation, Operators and Expressions, Expressions in Python, Operations on Strings, Other Data Types, Type Conversion, String-String functions and methods.

Unit III Decision Control Statements **9**

Introduction to Decision Control, Selection/Conditional Branching Statements, Basic Loop Structures/ Iterative Statements, Nested Loops, The break Statement, The continue Statement ,The pass Statement, The else Statement used with Loops. Case Study: Simple Calculator, Generating a Calendar.

Unit IV Lists, Tuples, Dictionaries **10**

Sequence, Lists- Access Values in Lists, Updating Values in Lists, Nested Lists, Cloning Lists, Basic List Operations, List Methods , Looping in Lists , Tuple- Creating Tuple , Accessing Values in a Tuple , Basic Tuple Operations , Tuple Assignment ,Sets, dictionaries- Creating a Dictionary, Accessing Values, Adding and Modifying an Item in a Dictionary, Modifying an Entry, Deleting Items, Sorting Items in a Dictionary, Looping over a Dictionary, Nested Dictionaries.

Unit V Functions, Modules and Packages **9**

Introduction, Function Definition, Function Call, Variable Scope and Lifetime, The return statement, Recursive Functions, Modules, Packages in Python, Standard Library modules. Case Study: Tower of Hanoi, Shuffling a Deck of Cards

Total Periods: 45

List of Experiments:

1. Draw Flowchart using Raptor Tool
   a. Simple Flow Chart
   b. Decision Making
   c. Looping[Pre test & Post test]
2. Create Animation / Gaming /Application using Scratch Tool
3. Programs on Operators and expressions.
4. Program using Decision Making Statement
5. Programs using Looping Statements
6. Programs on List (Searching, Sorting)
7. Programs on Tuple
8. Program on Dictionaries
9. Programs using Strings Operations
10. Program using Functions
11. Programs using Modules and Packages

Total Periods: 30

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M. Sprankle	Problem Solving and Programming Concepts	Pearson Education	2011
2.	Reema Thareja	Python Programming using problem solving	Oxford University	2017

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Allen B.Downey	Think Python	O'Reilly Media	2012
2.	Mark Lutz.	Learning Python	O'Reilly Media	2013
3.	Alex	Python in a Nutshell	O'Reilly Media	2006

Web URL(s):

https://docs.python.org/3/tutorial/

https://www.tutorialspoint.com/python/

https://nptel.ac.in/courses/106106182/

https://scipy-lectures.org/intro/language/python_language.html

U19MEP01	COMPUTER AIDED DRAFTING AND MODELING LABORATORY	L	T	P	C
	(Common to Mech, MCT and Civil)	0	0	4	2

Pre – Requisites : If any

Objectives:

- To draw simple figures with title block using CAD software commands.
- To sketch curves like parabola, spiral and involute of square & circle and draw the orthographic projection of simple solids.
- To prepare orthographic projection of simple machine parts and draw a plan of residential building.
- To develop skill in sketching simple steel truss and sectional views of simple solids.
- To develop skill to use software to create 2D and 3D models.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 **:** Sketch simple figures with title block using CAD software commands.

CO2 **:** Sketch curves like parabola, spiral and involute of square & circle and draw the orthographic projection of simple solids.

CO3 **:** Prepare orthographic projection of simple machine parts and draw a plan of residential building.

CO4 **:** Sketch simple steel truss and sectional views of simple solids.

CO5 **:** Prepare 2D multi view drawing from 3D model.

List of Experiments:

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
6. Drawing front view, top view and side view of objects from the given pictorial views (eg. V- block, Base of a mixie, Simple stool, Objects with hole and curves).
7. Drawing isometric projection of simple objects.
8. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.
9. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
10. Drawing of a simple steel truss.

Total Periods: 30

U19MAT04	Transforms and Boundary Value Problems	L	T	P	C
	(Common to CIVIL,ECE,EEE,MECH,MCT)	3	1	0	4

PreRequisites : Types of integration and differentiation

Objectives:

To make the students to

- Interpret the effective mathematical tools to solve several physical problems by applying the solutions of partial differential equations.
- Demonstrate the methodologies involved in solving many applications in engineering apart from its use in solving boundary value problems
- Exemplify the concepts of Fourier transform.
- Improve the ability in solving applications of partial differential equations.
- Understand the concepts of Z transform techniques for discrete time systems and to solve the difference equations.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Determine types of partial differential equations and to solve it.

CO2 : Explore the geometrical applications of Fourier series.

CO3 : Apply the knowledge of Fourier transform to compute the solution.

CO4 : Explore the basic concepts and solve partial differential equations for application in their field of engineering.

CO5 : Be exposed to the concepts to solve Z transform for application in the field of engineering.

Unit I PARTIAL DIFFERENTIAL EQUATION 12(9+3)

Formation of Partial Differential equation by elimination arbitrary constants and arbitrary functions, Solution of standard types of first order equations, Lagrange's equation, linear partial Differential equation of second and higher order with constant coefficients.

Unit II FOURIER SERIES 12(9+3)

Dirichlet's conditions, General Fourier series, Half Range Sine and Cosine series, Parseval's identity, Harmonic Analysis.

Unit III FOURIER TRANSFORM 12(9+3)

The infinite Fourier transform, sine and cosine transform, properties, inversion theorem, Parseval's identity and convolution theorem (statement only)

Unit IV BOUNDARY VALUE PROBLEMS 12(9+3)

Classification of Second order linear partial differential equations, solutions of one-dimensional wave equation, one-dimensional heat equation, steady state solution of two dimensional heat equation, Fourier series solution in cartesian coordinates

Unit V Z – TRANSFORMS 12(9+3)

Definition and properties, Elementary Problems, convolution theorem (statement only), Inverse Z transforms (partial fraction method and residue method), Application of Z – Transforms in solving difference equations.

Total Periods 60(45+15)

Text/Reference Books:

1. B.S.Grewal (2001). Higher Engineering Mathematics. 42th Edition. Khanna Publishers,Delhi.
2. Srimanta Pal & Subhodh C.Bhunia,"Engineering Mathematics",9th edition ,John Wiley & Sons,2012
3. Bali.N. P and Manish Goyal, "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications Pvt Ltd, 2007.
4. E.Kreyszig (2001). Advanced Engineering Mathematics. Tenth Edition. John Wiley and Sons (Asia) Ltd, Singapore.
5. Dennis.G..Zill & Michael .R.Cullen,"Advanced Engineering Mathematics,2nd edition, CBS publishers,2012.

U19CET01	Engineering Geology	L	T	P	C
		3	0	0	3

Pre-Requisites : None

Objectives:

- At the end of this course the students will be able to understand the importance of geological knowledge such as earth, earthquake and volcanism.
- To apply geological knowledge in projects such as dams, tunnels, bridges, roads, airport and harbor as well as to choose types of foundation
- To imparts knowledge about the methods used to explore the sub surface for natural resources.
- To understand the Engineering significance of the rocks.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Understand about geological formations of the Earth.

CO2 : Identify the properties and uses of minerals.

CO3 : Understand the Engineering properties of rocks.

CO4 : Apply fundamental knowledge in structural geology like fault, fold and Joints.

CO5 : Know the importance of the study of geology for Civil Engineers with regard to founding Structures like dams, bridges, buildings, etc.

Unit I GENERAL GEOLOGY 9

Interrelationship between Geology and civil engineering – Branches and scope of geology – Earth-surface features and internal structure – Weathering, wind, rivers and their Engineering significance – Volcano – Landforms, Plate tectonics – Earth quakes – Seismic zones in India.

Unit II MINERALOGY 9

Elementary knowledge on symmetry elements of important Crystallographic systems, Physical properties of minerals- Study of the following rock forming minerals – Quartz family, Felspar family, Augite, Hornblende, Biotite , Muscovite, Calcite, Garnet. Ore minerals – Haematite, Magnetite, Bauxite, Graphite, Magnetite – Clay minerals – Properties and Engineering significance.

Unit III PETROLOGY 9

Formation and classification of rocks – Igneous, Sedimentary and metamorphic rocks, their texture and structures, properties of granite, pegmatite, dolerite, and basalt, sandstone , limestone, shale, Quartzite, Marble, Slate, Gneiss and schist and Engineering Properties of Rocks.

Unit IV STRUCTURAL GEOLOGY AND GEOLOGIC HAZARDS 9

Attitude of beds Dip and Strike – Outcrops – types and classifications of folds, faults, joints, unconformities- Classification of natural hazards – Geologic hazards – Earthquakes – Landslides – Volcanism and Tsunami.

Unit V APPLICATION OF GEOLOGICAL INVESTIGATIONS 9

Remote sensing for civil engineering applications; Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels, and Road cuttings – Coastal protection structures. Investigation of Landslides, causes and mitigation

Total Periods 45

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Parbin Singh	Engineering and General Geology	Katson Publication House	2015
2.	Bangar.K.M	Principles of Engineering Geology	Standard Publishers& Distributors, 1705-B,Naisarak, Delhi,	2010
3.	S.M.Mathur	Elements of Geology	PHI learning private limited New Delhi.	2010
4.	S.Ramamrutham and R.Narayanan,	Engineering Geology	Dhanpat Rai Publishing House, Delhi,	2014

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Kesavulu	Text book of Engineering Geology	Macmillan Publishers India Ltd	2009
2.	P.C.Varghese	Engineering Geology for Civil Engineers	PHI Private Ltd., New Delhi	2012
3.	A.B.Roy	Fundamentals of Geology	Narosa Publication	2010

Web URL(s):

1. https://nptel.ac.in/courses/105/105/105105106/#

		L	T	P	C
U19CEE01	**Mechanics of Deformable Bodies - I**	**3**	**0**	**2**	**4**

Pre-Requisites : Engineering Mechanics

Objectives:

- To learn the fundamental concept of stresses and strains in engineering components as a result of different loading conditions.
- To know the concept of shear force and bending moment and draw the diagrams.
- To gain knowledge on shear force and bending stress distribution in different beams under various loads.
- To understand the deformation of shaft under torsion and deflection of closed helical springs.
- To impart knowledge on finding shear stresses and analysis of plane truss.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Evaluate the simple stresses and strains for one dimensional element subjected to axial loads.

CO2 : Examine the shear force, bending moment in various beams.

CO3 : Examine the shear stress of various beams under different loading conditions

CO4 : Examine the stresses induced in shaft and closed coil helical springs subjected to torsion.

CO5 : Evaluate the 2D stresses and forces in plane truss.

Unit I STRESS AND STRAIN 9

Stress and Strain at a point – Tension, Compression, Shear Stresses – Hooke's law –Relationship among Elastic constants – Stress Strain Diagram for Mild Steel, TOR Steel, Concrete – Ultimate Stress – Yield Stress – Factor of Safety - Thermal Stresses – Thin Cylinders - Strain Energy due to Axial Force – Resilience – Stresses due to Impact and Suddenly Applied Load - Compound Bars.

Unit II SHEAR FORCE AND BENDING MOMENT DIAGRAMS 9

Types of beams-Supports and Loads, Shear force and Bending Moment Diagrams in beams, Cantilever, simply supported and overhanging beams - with concentrated loads, uniformly distributed and uniformly varying loads - Point of contra flexure.

Unit III LOADS AND STRESSES IN BEAMS 9

Theory of Simple 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 - Flitched Beams – Combined Direct and Bending Stresses – Strain Energy due to Flexure, Transverse Shear – Shear Stress Distribution.

Unit IV TORSION 9

Torsion of Circular and Hollow Shafts –Elastic Theory of Torsion - Stresses and Deflection in Circular Solid and Hollow Shafts – Stepped Composite Shafts - Combined Bending Moment and Torsion on Shafts – Strain Energy due to Torsion – Modulus of Rupture - Power Transmitted to a Shaft – Shafts and springs in Series and Parallel - Closed and Open Coiled helical Springs – Leaf Springs.

Unit V COMPLEX STRESSES 9

2D State of Stress -2D Normal and Shear Stresses on any plane – 2D Strain – Principal Stresses and Principal Planes – Principal Strains and Direction - Graphical Method. Analysis of Plane Trusses – Method of Joints – Method of Sections.

Total Periods 45

LIST OF EXPERIMENTS:

1. Find the hardness of the material using Rockwell and Brinell hardness tester.
2. Experimental study of an axial bar under tension to obtain the stress strain curve and the strength.
3. Determine the Young-modulus and stiffness of a metal beam through load deflection curve.
4. Experimentally calculate the compressive strength of the materials.
5. Experimental analysis of a bar under torsion to obtain stiffness and angle of twist.
6. Experimentally calculate the strain energy of a material subjected to impact loading.

Practical hours: 30, Total hours: 45+30 = 75

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bansal, R K	Strength of Materials	Laxmi Publications (P) Ltd., New Delhi	2016
2.	Hibbler R C	Mechanics of Materials	Pearson	2016

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	S.S.Rattan	Strength of Materials	Tata McGraw Hill, Delhi	2012
2.	F. P. Beer and R. Johnston	Mechanics of Materials	Tata McGraw Hill Publishing Company Pvt Ltd., New Delhi,	2016
3.	Egor P. Popov	Engineering Mechanics of Solids	Prentice Hall of India Learning Pvt. Ltd, New Delhi,	2015

Web URL(s):

1. https://nptel.ac.in/courses/105/105/105105108/
2. https://swayam.gov.in/noc19_ce18/

		L	T	P	C
U19CET03	**Fluid Mechanics**	**3**	**1**	**0**	**4**

Pre-Requisites : None

Objectives:

- To understand the basic properties of the fluid.
- To identify the various types of fundamentals of fluid like Statics, Kinematics, Dynamics.
- To analyze and appreciate the complexities involved in solving the fluid flow problems.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.

CO2 : Understand and solve the problems related to equation of motion.

CO3 : Gain knowledge about dimensional and model analysis.

CO4 : Learn types of flow and losses of flow in pipes.

CO5 : Understand the terms of Boundary layer separation.

Unit I FLUID PROPERTIES AND FLUID STATICS 11+3

Fluid – definition, distinction between solid and fluid - Units and dimensions - Properties of fluids - density, specific weight, specific volume, specific gravity, viscosity, compressibility, vapour pressure, capillarity and surface tension - Fluid statics: concept of fluid static pressure, absolute and gauge pressures – pressure measurements by manometers-forces on planes – centre of pressure – buoyancy and floatation.

Unit II FLUID KINEMATICS AND DYNAMICS 9+3

Fluid Kinematics – Classification and types of flow - velocity field and acceleration - continuity equation - stream line-streak line-path line- stream function - velocity potential function - flow net. Fluid dynamics - equations of motion -Euler's equation along a streamline - Bernoulli's equation – applications - venturi meter, orifice meter and Pitot tube.

Unit III DIMENSIONAL ANALYSIS AND MODEL STUDIES 7+3

Fundamental dimensions - dimensional homogeneity - Rayleigh’s method and Buckingham Pitheorem - dimensionless parameters - similitudes and model studies - distorted models.

Unit IV FLOW THROUGH PIPES 9+3

Reynold’s experiment - laminar flow through circular pipe (Hagen poiseulle's) - hydraulic and energy gradient – flow through pipes - Darcy - Weisbach's equation - pipe roughness -friction factor- Moody's diagram- major and minor losses of flow in pipes - pipes in series and in parallel.

Unit V BOUNDARY LAYER 9+3

Boundary layer – definition- boundary layer on a flat plate – laminar and turbulent boundary layer - displacement, energy and momentum thickness – Momentum integral equation-Boundary layer separation and control – drag on flat plate.

Total Periods 60

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Modi P.N and Seth	Hydraulics and FluidMechanics including Hydraulic machines	Standard Book House New Delhi	2009
2.	Jain.A.K	Fluid Mechanics" (Including Hydraulic Machines)	Khanna Publishers, Twelfth edition	2016
3.	Subramanya.K	Fluid Mechanics and Hydraulic Machines	Tata McGraw Hill Education Private Limited, New Delhi.	2010
4.	Rajput.R.K	Fluid Mechanics	S.Chand and Co, New Delhi	2008

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bansal.R.K	Fluid Mechanics and Hydraulic Machines	Laxmi Publications Pvt. Ltd., New Delhi,	2013
2.	White.F.M	Fluid Mechanics	Tata McGraw Hill, 5th Edition, New Delhi,	2017
3.	Mohd Kaleem Khan	Fluid Mechanics and Machinery	Oxford University Press, New Delhi, 2015	2015

Web URL(s):

1. **https://nptel.ac.in/courses/105/101/105101082/**

		L	T	P	C
U19CEE02	**Engineering Surveying**	**3**	**0**	**2**	**4**

Pre-Requisites : None

Objectives:

- To understand basic principle and concepts of different surveying methods.
- To study the different surveying equipment's in the field of civil engineering.
- To illustrate the concepts of Control Surveying.
- To introduce the basics concept of Total station surveying.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : The use of various surveying instruments and mapping.

CO2 : Measuring Horizontal angle and vertical angle using different instruments.

CO3 : Methods of Leveling and setting Levels with different instruments.

CO4 : Concepts of astronomical surveying and methods to determine azimuth.

CO5 : Concept and principle of modern surveying.

Unit I FUNDAMENTALS OF CONVENTIONAL SURVEYING AND LEVELLING 9

Classifications and basic principles of surveying –Equipment and accessories for ranging and chaining – Compass – Types of Compass – Bearing – Types – True Bearing – Magnetic Bearing – Levelling– Principles of Levelling – Bench Marks – Temporary and Permanent Adjustments– Methods of Levelling– Reduction – Sources of errors in Levelling – Curvature and refraction correction.

Unit II THEODOLITE AND TACHEOMETRIC SURVEYING 9

Horizontal and vertical angle measurements –Temporary and permanent adjustments – Heights and distances – Tacheometer – Stadia Constants – Analytic Lens –Tangential and Stadia Tacheometry surveying – Contour – Contouring – Characteristics of contours – Methods of contouring –Uses of contour plan and map.

Unit III CONTROL SURVEYING 9

Horizontal and vertical control – Methods – triangulation – baseline – satellite stations – reduction to centre – traversing – Errors Sources – precautions and corrections – classification of errors – true and most probable values – weighed observations – normal equation – correlates– level nets– adjustment of simple triangulation networks.

Unit IV CURVES AND ADVANCED TOPICS IN SURVEYING 9

Simple curves - elements - Setting out of curves - Hydrographic Surveying: Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - River surveys - Measurement of current and discharge- astronomical Surveying- determination of Azimuth by altitude and hour angle methods- Celestial coordinate systems.

Unit V MODERN SURVEYING 9

Total Station: Advantages, working principle, Errors and Good practices in using Total Station –GPS: System components – Signal structure – receiver components – Planning and data acquisition – Data processing - Errors in GPS – Applications.

Total Periods 45

LIST OF EXPERIMENTS:

1. Chain Traversing.
2. Compass surveying.
3. Plane Table Surveying – Radiation, intersection, Traverse, Resection Leveling.
4. Setting out of curves.
5. Total station Surveying.

Practical hours: 30, Total hours: 45+30 = 75

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Punmia.B.C., Ashok K.Jain and Arun K Jain	Surveying Vol. I & II	Lakshmi Publications Pvt Ltd, New Delhi	2016
2.	Bannister and S. Raymond	Surveying	7th Edition, Longman	2004
3.	James M. Anderson and Edward M. Mikhail	Surveying, Theory and Practice	7th Edition, McGraw Hill	2001
4.	Laurila, S.H	Electronic Surveying in Practice	John Wiley and Sons Inc	1993

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Alfred Leick	GPS satellite surveying	John Wiley & Sons Inc., 3rd Edition	2004
2.	Roy S.K	Fundamentals of Surveying	2nd Edition, Prentice Hall of India	2004
3.	Arora K.R	Surveying Vol I & II	Standard Book house, 10th Edition	2008

Web URL(s):

1. **https://nptel.ac.in/courses/105/104/105104101/**

		L	T	P	C
U19CEP01	**Computer Aided Civil Engineering Drawing**	**0**	**0**	**4**	**2**

Pre-Requisites : Engineering Graphics

Objectives:

- To make the students learn the various elements of Residential / Institutional / Workshop buildings
- To impart fundamental knowledge on AutoCAD and to make the students draw the Structures, the plan, elevation and sectional view of a building.
- To familiarize the students with Indian Standards on drawing practices and standard components.
- To draw the detailed drawing of given components.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Understand the various basic commands used for drafting and know the types of coordinate systems.

CO2 : To understand the principles of planning for various types of buildings by incorporating building bye laws.

CO3 : Prepare the plan by computer aided drawing ; arrange the components ofbuilding to satisfy the functional and orientation aspect.

CO4 : Sketch the detailed drawings of plan, elevation and section of a single storey residentialbuilding and list the schedule of joineries.

CO5 : Prepare the plan, elevation and section of residential, public and industrial buildings.

Unit I INTRODUCTION 6

Introduction – Uses of drafting in Auto CADD, Archicad and Sketch up software's – Commands – Limits – Functionkeys – File management – Drawing commands

Unit II PLANNING 9

Basic principles of building planning – Scope of building planning – Arrangement of rooms, their position and purposes –object of drawing in building project

Unit III DRAFTING AND DETAILING 15

Plan of a single storeyed residential building - Drawing of a plan of residential building (Two bed rooms, kitchen, hall,etc.) – Electrical and plumbing layout of residential building & demo

Unit IV BUILDING DRAWING – I 15

Detailed working drawings of building components (doors and windows) - Roof Trusses - Staircases – Toilets –Foundation details of a building

Unit V BUILDING DRAWING – II 15

Elevation and cross section of a single storeyed residential building - Developing sections and elevations for a) Multi storeyed building b) Industrial building – Field applications.

Total Periods 60

Text/Reference Books:

S.No	Authir(s)	Title of the Book	Publisher	Year of Publication
1.	Bhavikatti S S andChitawa M V	Building Planning	IK International Publishing House	2014
2.	Mark W Huth	Understanding Construction Drawings	Cengage Learning	2013

U19MAT07	NUMERICAL METHODS	L	T	P	C
	(Common to CIVIL & EEE)	3	1	0	4

Pre-Requisites : Concepts of integration and differentiation

Objectives:

- To provide the necessary basic concepts and procedures for solving numerically, different kinds of problems occurring in engineering and technology.
- The roots of nonlinear equations, solutions of large system and problem of matrix can be obtained numerically where analytical methods fail to give solution
- When huge amounts of experimental data are involved, the methods discussed on interpolation will be useful in constructing approximate polynomial to represent the data and to find the intermediate values.
- The numerical differentiation and integration find application when the function in the analytical form is too complicated or the huge amounts of data are given such as series of measurements, observations or some other empirical information.
- Since many physical laws are couched in terms of rate of change of one /two or more independent variables, most of the engineering problems are characterized in the form of either nonlinear ordinary differential equations or partial differential equations. The methods introduced in the solution of ordinary differential equations and partial differential equations will be useful in attempting any engineering problems.

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Analyze numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.
2. Solve geometrical applications using interpolation techniques.
3. Apply the numerical techniques to solve the differentiation and integration.
4. Analyze and solve ordinary differential equations for application in their field of engineering.
5. Explain how to find the solution of boundary value problems in ordinary and partial differential equations.

Unit I NUMERICAL SOLUTION OF LINEAR EQUATIONS 9+3

Solution of algebraic and transcendental equations– Newton Raphson method - Solution of linear system of equations - Gauss elimination method – Pivoting - Gauss Jordan method – Iterative methods of Gauss Jacobi and Gauss Seidel - Matrix Inversion by Gauss Jordan method.

Unit II INTERPOLATION 9+3

Interpolation with equal intervals – Newton's forward and backward difference formulae, Interpolation with unequal intervals –Divided differences- Lagrange's interpolation.

Unit III NUMERICAL DIFFERENTIATION AND INTEGRATION 9+3

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 – Romberg's method – Evaluation of double integrals by Trapezoidal and Simpson's rules.

Unit IV NUMERICAL SOLUTION OF ODE GIVEN INITIAL VALUES 9+3

Ordinary differential equations: Initial value problems, Taylor series, Fourth order Runge - Kutta methods, Predictor Corrector methods, Milne's and Adams Bashforth Method.

Unit V SOLUTION OF BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9+3

Solution of two point boundary value problems in linear differential equations using finite difference method, One dimensional heat flow, Bender Schmidt recurrence relation, Crank Nicholson method, Liebmann procedure for Laplace and Poisson equations.

Total Periods45+15

Text/Reference Books:

1. Grewal. B.S., and Grewal. J.S.,"Numerical methods in Engineering and Science", Khanna Publishers, 9th Edition, New Delhi, 2007.
2. Gerald. C. F., and Wheatley. P. O., "Applied Numerical Analysis", Pearson Education, Asia, 6th Edition, New Delhi, 2006.
3. Sankara Rao. K., "Numerical methods for Scientists and Engineers", Prentice Hall of India Private, 3rd Edition, New Delhi,2007
4. P.Kandasamy, K.Thilagavathy and K.Gunavathy(2005). Numerical Methods. S.Chand & Co. Ltd, Delhi.
5. Richard L.Burden ,J.Douglas Faires and Annette Burden "Numerical Analysis", Cengage Learning, 10th edition, 2015.

U19CET02	Construction Materials and Technology	L	T	P	C
		3	0	0	3

Pre-Requisites : Applied Chemistry

Objectives:

1. To learn the applications and testing procedures of materials used for construction.
2. To study the construction practices of different types of structural elements.
3. To understand the various types of doors, windows, plastering and paintings.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Choose the appropriate type of foundations for building construction.

CO2 **:** Acquire knowledge on different masonry and plastering works.

CO3 : Select the suitable type of floors, roofs, stairs and dampness preventing methods for practical applications.

CO4 : Apply knowledge for selection of doors, windows paints and materials for buildings.

CO5 : Understand the different construction practices existing in construction field.

Unit I SUB STRUCTURE CONSTRUCTION 8

Functions of foundation – Types of shallow and deep foundations – Piling techniques – Techniques of Box jacking – Pipe Jacking–Caissons and cofferdam – cable anchoring and grouting

Unit II MASONRY AND PLASTERING 9

Stones – Types – Characteristics–Stone masonry – Classification – Supervision of stone masonry.
Bricks – Composition – types – BIS tests– Brick masonry – Classification – Supervision of brick masonry – **Concrete blocks** – Plastering – Materials and Methods of plastering – Types of plastering – Defects in plastering.

Unit III FLOORING AND ROOFING 10

Cement –**Sand** – River sand, M sand and Eco sand
Coarse aggregate –Concrete – Floors – Requirements of good floor – Floor finishing materials – Classifications– Terrazzo flooring – Marble flooring – Cement concrete flooring – Tiled flooring – Damp Proof Course – Anti-termite treatment. Roofs– **Roofing materials** – Requirements –Types– Pitched roof –Flat roof – Flat and Ribbed slab. Stairs – Classifications of stairs – Ramps and Escalators.

Unit IV DOORS, WINDOWS AND PAINTING 10

Timber–Defects – Seasoning – Preservation – Laminated wood products – Properties – Types – **Fibre board** – Particle boards –Hard boards – **Aluminum products** – **UPVC** – **Glass** – Types – Properties – Applications. **Doors and Windows**–Types – Fixtures and Fastening – Ventilators. Painting **–Paints** –Classification of paints– Painting on new and old surfaces of steel, timber and masonry wall – Defects in painting. .

Unit V CONSTRUCTION PRACTICES 8

Centering and shuttering– Form work– Scaffolding –Structural steel and High Tensile Steel Properties – Types – Market forms of steel–Fabrication and erection of steel trusses – Frames– Launching girders.

Total Periods 45

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain	Building construction	Laxmi Publications Pvt. Ltd	2016
2.	Bindra.S.P and Arora.S.P	Building construction	DhanpatRai Publication Pvt. Ltd	2012

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1	Varghese P.C	Building Construction	Prentice Hall of India	2019
2	Maden Mehta	Building Construction	Pearson Education Publishers	2016
3	Rangwala	Building construction	Charotar Publishing House Pvt. Ltd	2016
4	Edward Allen, Joseph Iano,	Fundamentals of Building Construction: Materials and Methods	Wiley Publishers	2014

Web URL(s):

1. https://nptel.ac.in/courses/105/102/105102088/#
2. https://nptel.ac.in/courses/105/106/105106200/

		L	T	P	C
U19CET04	**Mechanics of Deformable Bodies - II**	**3**	**0**	**0**	**3**

Pre-Requisites : Engineering Mechanics, Mechanics of Deformable Bodies - I

Objectives:

- To study the different methods of finding deflection of beam
- To analyse the Indeterminate beams and beam subject to unsymmetrical bending
- To understand the theory of elastic failures
- To analyze the column with different end conditions and stress in thick cylinders

Course Outcomes:

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

CO1 : To impart knowledge on behaviour of structural elements subjected to transverse load

CO2 : To analyse indeterminate beams for external loading's and support settlements.

CO3 : To learn about the load carrying capacity of columns.

CO4 : To understand the concept of unsymmetrical bending.

CO5 : To learn about the stresses in thick cylinder and study various theories of failure.

Unit I DEFLECTION OF BEAMS 9

Deflection Curve – Differential Equation – Determination of slope and deflection - Double Integration Method – Macaulay‘s Method – Area Moment Method – Conjugate Beam Method.

Unit II INDETERMINATE BEAMS 9

Concept of Analysis – Propped Cantilever Beams – Fixed Beams and Continuous Beams – Theorem of Three Moments – Analysis of Continuous Beam – Shear Force and Bending Moment Diagrams.

Unit III COLUMNS 9

Members Subjected to Axial Load – eccentric load – Slenderness Ratio – End Conditions – Buckling Load for Columns- Euler’s Theory – Assumptions and Limitations – Rankine- Gordon Formula – Empirical Formula – Straight Line Formula – Columns Subjected to Eccentric Loading.

Unit IV UNSYMMETRICAL BENDING 9

Stresses due to Unsymmetrical Bending of Beams for Symmetrical Sections – Shear Centre - Definition – Shear Centre for Sections Symmetrical about One Axis – Moment of Inertia – Product of Inertia – Principal Area and Principal Moment of Inertia – Deflection of Beams due to Unsymmetrical Bending.

Unit V THICK CYLINDERS AND ELASTIC FAILURE 9

Lame’s Equation – Hoop Stress and Radial Stress Distribution – Compound Cylinders – Wire Wound Cylinders – Shrink Fit. Theories of Elastic Failure – Factor of Safety – Graphical Representation of Theories for Two-Dimensional Stress System.

Total Periods 45

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Rajput R K	Strength of Materials	S. Chand & Co.	2016
2.	Sadhu Singh	Strength of Materials	Khanna publishers	2016

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Bansal R K	Strength of Materials	Laxmi Publications (P) Ltd.	2018
2.	Ramamrutham S Narayanan R	Strength of Materials	Dhanpat Rai Publications	2017
3.	Hibbeler R C	Mechanics of Materials	Pearson Education	2013

Web URL(s):

1. https://nptel.ac.in/courses/105/104/105104160/

U19CEE03	Hydraulic Engineering	L	T	P	C
		3	0	2	4

Pre-Requisites : Fluid Mechanics

Objectives:

- To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines.
- The student should be able to relate the theory and practice of problems in hydraulic engineering.

Course Outcomes:

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

CO1 : The knowledge of fluid mechanics in addressing problems in open channels.

CO2 : To identify a effective section for flow in different cross sections.

CO3 : To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.

CO4 : The principles, working and application of turbines.

CO5 : The principles, working and application of pumps.

Unit I OPEN CHANNEL FLOW 9

Uniform flow - Types of Flow - Properties of open channel - Velocity distribution in open channel - Steady uniform flow: Chezy equation, Manning equation - Best hydraulic sections for uniform flow – Wide open channel - Specific energy and specific force – Critical flow.

Unit II GRADUALLY & RAPIDLY VARIED FLOW 9

Dynamic equations of gradually varied flows – Types of flow profiles - Classifications: Computation by Direct step method and Standard step method – Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation – Celerity – Rapidly varied unsteady flows (positive and negative surges).

Unit III MOMENTUM PRINCIPLE 9

Impact of jet on flat plate –Curved plates – Stationary and moving plates -Impulse momentum Principle – force exerted by a jet on normal, inclined and curved surfaces for stationary and moving vanes - Angular momentum principle - Inlet and outlet flow diagrams.

Unit IV TURBINES 9

Classification of Turbines –Working principle of Pelton wheel turbine– Working principle of Francis turbine – Working principle of Kaplan turbine –Types of efficiency - Specific speed – Characteristic Curves of Turbines- Draft tube and cavitation.

Unit V PUMPS 9

Classification of Pumps - Centrifugal pumps – Submersible pump - Work done - Minimum speed to start the pump - NPSH - Multistage pumps – Characteristics curve - Reciprocating pumps - Negative slip - Indicator diagrams and its variations – Air vessels - Savings in work done.

Total Periods 45

LIST OF EXPERIMENTS:

1. Calibration of Rotameter
2. Calibration of Venturimeter
3. Calibration of Orificemeter
4. Bernoulli's Experiment
5. Determination of friction factor in pipes
6. Determination of minor losses
7. Characteristics of Centrifugal pumps
8. Characteristics of Submersible pump
9. Characteristics of Reciprocating pump
10. Characteristics of Pelton wheel turbine
11. Characteristics of Francis turbine
12. Characteristics of Kaplan turbine

Practical hours: 30, Total hours: 45+30 = 75

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Subramanya.K	Flow in open channels	Tata McGraw Hill, New Delhi	2015
2.	Modi P.N and Seth.S.M	Hydraulics and Fluid Mechanics including Hydraulic Machines	Standard Book House New Delhi	2015
3.	Chandramouli P.N	Applied Hydraulic Engineering	Yes Dee Publishing Pvt. Ltd	2017

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	R.K.Rajput	Fluid Mechanics and Hydraulic Machines	S.Chand and Company, New Delhi	2015
2.	Rajesh Srivastava	Flow through open channels	Oxford University Press, New Delhi	2008
3.	Jain.A.K	Fluid Mechanics (Including Hydraulic Machines)	Khanna Publishers, Twelfth Edition	2016
4.	Subramanya.K	Fluid Mechanics and Hydraulic Machines	Tata McGraw Hill Education Private Limited, New Delhi	2015

Web URL(s):

1. **https://nptel.ac.in/courses/105/105/105105203/**

U19CEE04	Geo-Technical Engineering – I	L	T	P	C
		3	0	2	4

PreRequisites : Engineering Mechanics & Fluid Mechanics

Objectives:

- To understand the index and engineering properties of soil by using phase system.
- To gain knowledge on methods of soil classification, flow of water through soils and concept of effective stress.
- To understand the principles of consolidation and shear strength.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Classify the soil based on index properties and understand the compaction process

CO2 : Concept of effective and neutral stresses and the permeability of soils

CO3 : Evaluate the stress distribution due to external loads and consolidation settlement of clayey soils

CO4 : Compute the shear strength parameters of soils under different drainage conditions

CO5 : Analyze the stability of slopes and provide slope protection methods

Unit I BASIC TERMINOLOGY AND INTERRELATIONS 9

Origin and general types of soils - Phase system- Fundamental relationships by volume and weight – Index properties of soils – Sieve analysis – Sedimentation analysis – Atterberg limits - Identification and Classification of soils. Soil compaction - factors affecting compaction – field compaction methods and monitoring.

Unit II SOIL WATER AND WATER FLOW 9

Soil water - Capillary phenomena - Concept of effective stress, pore pressure and total stress - Permeability – Darcy's law and coefficient of permeability - Determination of coefficient of permeability in the laboratory - Seepage flow - Head, gradient, pressure - steady state flow - flow net.

Unit III STRESS DISTRIBUTION AND CONSOLIDATION 9

Vertical stress distribution in soil - Boussinesq equation - New mark's influence chart - Pressure bulb. Consolidation - Terzaghi's one dimensional consolidation theory – Determination of coefficient of consolidation – Square root of time fitting method – Logarithm of time fitting method.

Unit IV SHEAR STRENGTH 9

Shear strength of soils - Mohr - Coulomb failure criterion - Shear strength tests – Direct shear, Unconfined compression, Triaxial compression and vane shear tests - Different drainage conditions - Shear properties of cohesionless and cohesive soils.

Unit V STABILITY OF SLOPES 9

Types - Infinite slopes – Finite slopes – Stability analysis of infinite and finite slope – Factor of safety used in stability analysis of slopes – Fellenius method - Friction circle method – Use of stability number - slope protection measures.

Total Periods 45

LIST OF EXPERIMENTS:

1. Specific gravity of soil grains.
2. Grain size distribution - Sieve analysis & Sedimentation analysis
3. Atterberg limits test
4. Determination of moisture - Density relationship using standard Proctor test.
5. Permeability determination (constant head and falling head methods)
6. Field density test (Core cutter and sand replacement methods)
7. Direct shear test in cohesionless soil
8. Unconfined compression test in cohesive soil
9. Relative density of sands
10. Tri-axial compression test in cohesionless soil (Demonstration only)

Practical hours: 30, Total hours: 45+30 = 75

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Murthy, V.N.S.	Soil Mechanics and Foundation Engineering	CBS Publishers Distribution Ltd., New Delhi.	2007
2.	Arora K.R.	Soil Mechanics and Foundation Engineering	Standard Publishers and Distributors, New Delhi	2002

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Punmia, B.C.	Soil Mechanics and Foundations	Laxmi Publications Pvt. Ltd., New Delhi,	2005
2.	Purushothama Raj. P	Soil Mechanics and Foundation Engineering	Pearson Education	2013
3.	Das, B.M.	Principles of Geotechnical Engineering	Thompson Brooks / Coles Learning Singapore, 5th Edition	2002

Web URL(s):
https://nptel.ac.in/courses/105/101/105101201/

U19MTT01	Environmental Science	L	T	P	C
		2	0	0	0

Pre-Requisites : Applied Chemistry

Objectives:

- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

Course Outcomes:

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

CO1 : To study the nature and facts about environment.

CO2 : To finding and implementing scientific, technological, economic and political solutions to environmental problems.

CO3 : To study the interrelationship between living organism and environment.

CO4 : To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.

CO5 : To study the dynamic processes and understand the features of the earth's interior and surface.

Unit I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 5

Definition - scope of environment - concept of an ecosystem - structure and function of an ecosystem - producers, consumers and decomposers - ecological succession processes - Introduction, types, characteristic features, structure and function of the various ecosystems. Introduction to biodiversity- definition: genetic, species and ecosystem diversity - threats to biodiversity - endangered and endemic species of India - conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Unit II NATURAL RESOURCES 7

Forest resources: Use and over - exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people -Water resources: Use and overutilization of surface and ground water - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies - Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Unit III ENVIRONMENTAL POLLUTION 7

Definition – Sources, causes, effects and control measures of Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters - physical, chemical and biological; absorption of heavy metals- Air pollution - Chemical and photochemical reactions in the atmosphere - Control of particulate and gaseous emission, Control of SOX, NOX, CO and HC- Soil pollution - causes, effects and control measures- Marine pollution- Noise pollution- Thermal pollution-Nuclear hazards-role of an individual in prevention of pollution.

Unit IV SOCIAL ISSUES AND THE ENVIRONMENTAL LEGISLATION 6

From unsustainable to sustainable development - urban problems related to energy - water conservation, rain water harvesting, water shed management - resettlement and rehabilitation of people; its problems and concerns- role of non-governmental organization- environmental ethics: Issues and possible solutions. Environment protection act - Air act - Water act - Wildlife protection act - Forest conservation act -The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Eco mark). Disaster management: floods, earthquake, cyclone and landslides.

Unit V ENVIRONMENT IMPACT ASSESSMENT 5

Environmental impact analysis (EIA) - Environmental Impact Statement (EIS) - Legal and Regulatory aspects in India – Types and limitations of EIA - Terms of Reference in EIA- Issues in EIA - national – cross sectoral - social and cultural - Case studies of EIA of developmental projects.

Total Periods 30

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Benny Joseph	Environmental Science and Engineering	Tata McGraw Hill, New Delhi	2006
2.	Gilbert M.Masters	Introduction to Environmental Engineering and Science	2nd edition, Pearson Education	2004

Reference Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Cunningham W.P.Cooper., T.H. Gorhani	Environmental Encyclopedia	Jaico Publishing House, Mumbai	2001
2.	Dharmendra S. Sengar	Environmental law	Prentice hall of India PVT LTD, New Delhi,	2007
3.	Rajagopalan R	Environmental Studies - From Crisis to Cure	Oxford University Press	2005
4.	Petts. J	Handbook of Environmental Impact Assessment Vol. I and II	Blackwell Science	2009

Web URL(s):

1. https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ge22/

U19CEP02	Survey Camp	L	T	P	C
		0	0	6	3

Pre-Requisites: Engineering Surveying

Objectives:

The objective of the survey camp is to enable the students to get practical training in the field work. Groups of notmore than six members in a group will carry out each exercise in survey camp. The camp must involve work on a large area of not less than 40 acres outside the campus. The camp record shall include all original field observations, calculations and plots.

Course Outcomes:
Apart from above students may be given survey exercises in other area also based on site condition to give goodexposure on survey.

(During III Semester Summer Vacation) (2 Weeks)

Two weeks Survey Camp will be conducted during summer vacation in the following activities:

1. Triangulation
2. Trilateration and
3. Rectangulation
4. Contouring

(i) Radial tachometric contouring - Radial Line at Every 45 degree and Length not less than 60 meter on each Radial Line.
(ii) L.S & C.S - Road and canal alignment for a Length of not less than 1 Kilo meter at least L.S at Every 30 m and C.S at every 90 m.

5. Use of GPS to determine latitude and longitude and locate the survey camp location.
6. Traverse - Using Total station

U19CET05	Design of R C Elements (IS 456 -2000 & SP 16 codes are permitted)	L	T	P	C
		3	1	0	4

Pre-Requisites : Mechanics of Deformable Bodies II

Objectives:

- To know the design philosophies of singly and doubly reinforced sections.
- To know the design of slabs and staircase.
- To understand the limit state design of flexural members.
- To know the behavior of RC beams in shear and torsion.
- To get the concepts of limit state design of columns and practice the design using AutoCAD.

Course Outcomes:
At the end of this course, students will demonstrate the ability to

CO1 : Illustrate the design principles of working stress method for beam

CO2 : Design a type of slab and the staircase

CO3 : Design of beam for various sections subjected to flexure as per the limit state method.

CO4 : Design of beam for shear and determine the beam for deflection and crack.

CO5 : Design of column subjected to axial, uniaxial and biaxial moment.

Unit I WORKING STRESS METHOD 9+3

Aims of design - Method of design - Working stress method - Assumptions - Stress strain behavior of steel and concrete - Stress block parameters - Design of singly and doubly reinforced rectangular sections by working stress method.

Unit II LIMIT STATE DESIGN OF SLAB AND STAIRCASE 9+3

Limit state method - Principles - Partial safety factor - Design of RC rectangular one- and two-way slabs subjected to uniformly distributed load by limit state method -Introduction to flat slab - Types of stairs - Design of stairs spanning horizontally - Design of doglegged stair.

Unit III LIMIT STATE DESIGN OF BEAMS FOR FLEXURE 9+3

Stress block parameters-Neutral Axis-Balanced-Under Reinforced-Over Reinforced Sections - Design of singly reinforced rectangular section - Design of doubly reinforced rectangular section - Design of flanged (T & L) beams.

Unit IV LIMIT STATE DESIGN OF BEAMS FOR SHEAR 9+3

Shear forces in beam - Types of shear resistance - Design of vertical stirrups - Design of Bent-up bars- Development length - Design of beams for flexure, shear and torsion (Combined effect) Parameters considered in limit state of serviceability - Check for deflection and crack width.

Unit V LIMIT STATE DESIGN OF COLUMNS 9+3

Types of columns - Provisions of IS-456 code for the design of columns - Design of short columns subjected to axial load, uniaxial and biaxial bending moment. Design of long column subjected to axial load.

Total Periods 60 (45+15)

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B. C. Punmia, A. K. Jain	Limit State Design of Reinforced Concrete	Laxmi Publications	2017
2.	S. Unnikrishna Pillai and Devedas Menon	Reinforced Concrete Design	McGraw Hill Education	2017
3.	P. C. Varghese	Limit State Design of Reinforced Concrete	PHI Learning Private Limited	2008

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	N. Krishna Raju	Advanced Reinforced Concrete Design	CBS	2016
2.	S. N. Sinha	Reinforced Concrete Design	McGraw Hill Education (India) Private Limited	2014
3.	Subramanian N	Design of Reinforced Concrete Structures	Oxford University Press	2014

Web URL(s):

1. https://nptel.ac.in/courses//105/105/105105105/

U19CET06	Structural Analysis I	L	T	P	C
		3	1	0	4

Pre-Requisites : Engineering Mechanics and Mechanics of Deformable Bodies I

Objectives:

- To impart the deflection in continuous beam, plane frame and truss.
- To understand the concepts of slope deflection method.
- To understand the concepts of moment distribution method.
- To give the knowledge about arches.
- To give the knowledge about influence line concept for beam.

Course Outcomes:
At the end of this course, students will demonstrate the ability to

CO1 : Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method

CO2 : Analyse the continuous beams and rigid frames by slope defection method.

CO3 : Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.

CO4 : Analyse three and two hinged arches.

CO5 : Analyse the determinate and indeterminate beams with moving loads.

Unit I STRAIN ENERGY METHOD 9

Determination of Static and Kinematic Indeterminacies – Analysis of continuous beams, plane frames and indeterminate plane trusses by strain energy method (up to two degree of redundancy).

Unit II SLOPE DEFLECTION METHOD 9

Derivation of slope deflection equations - Application to Continuous beams and rigid frames (with and without sway) - Effect of Support displacements.

Unit III MOMENT DISTRIBUTION METHOD 9

Absolute and relative stiffness and carry over factors - Analysis of continuous beams - Plane rigid jointed frames with and without sway - Effect of settlement of supports - Nayler's simplification.

Unit IV ARCHES 9

Arches as structural forms - Examples of arch structures - Types of arches - Analysis of three hinged, two hinged and fixed arches having parabolic and circular shapes - Settlement and temperature effects.

Unit V MOVING LOADS AND INFLUENCE LINES 9

Influence Lines: Introduction - Construction of ILD for shear force and bending moment at a section - determination of load positions for maximum shear force and bending moments for simply supported and overhanging beams with several point loads and UDL and determination of their values - Sketching of absolute maximum BMD.

Total Periods 60(45+15)

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dr.Punmia B.C, Er.Ashok K Jain, Dr. Arun K Jain	Theory of Structures	Laxmi publications	2017
2.	Vaidyanathan.R, Perumal.P	Structural Analysis I	Laxmi Publications	2016
3.	Reddy C.S	Basic Structural Analysis	Tata McGraw Hill Publishing Co	2015

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	Ramamurtham. S	Theory of structures	Dhanpat Rai & Sons	2018
2.	Thandavamoorthy.T. S	Structural Analysis	Oxford Publishers	2011
3.	Negi L.S and Jangid R.S	Structural Analysis	Tata McGraw - Hill Publishing Company	2003

Web URL(s):

https://nptel.ac.in/courses/105/105/ 105105109/

U19CET07	Geo-Technical Engineering – II (IS Code 6403-1981 & 2911-1979 codes are permitted)	L	T	P	C
		3	1	0	4

Pre-Requisites : Geo-Technical Engineering – I

Objectives:

- To impart fundamental knowledge on investigation of the site and selection of suitable foundation.
- To evaluate the bearing capacity and settlement of foundations.
- To impart knowledge on the design concepts of different types of foundations.
- To calculate the load carrying capacity of pile and pile groups and to design pile foundation.
- To improve the knowledge of earth pressure.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Conduct site investigation and prepare the report for selection of foundation

CO2 : Compute the bearing capacity and settlement of soil

CO3 : Evaluate the size of shallow foundations

CO4 : Estimate the load carrying capacity of piles and settlement of pile groups

CO5 : Analyse the lateral earth pressure on retaining wall

Unit I SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and objectives-Methods of exploration- Depth and spacing of bore holes - Sampling of soil – Methods of sampling -Penetration tests (SPT, SCPT and DCPT)-Bore log report – Types &Selection of foundation - Requirements of good foundation – Factors governing location and depth of foundation.

Unit II BEARING CAPACITY AND SETTLEMENT 9

Bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - Bearing Capacity from insitu tests (SPT, SCPT and Plate load) - Settlement - Components of settlement - Determination of settlement of foundations on granular and clay deposits.

Unit III FOOTINGS AND RAFT 9

Types of footings – Contact pressure distribution: Isolated footing – Combined footings – Types and Proportioning – Mat foundation – Design of mat foundation.

Unit IV PILE FOUNDATION 9

Types of piles and their function - Factors influencing the selection of pile - Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley"s) - Interpretation with in situ tests (SPT, SCPT and Pile load test) - Negative skin friction - Group capacity by different methods (Feld's rule and block failure criterion) - Settlement of pile groups.

Unit V EARTH PRESSURE 9

Active and passive earth pressure - Rankine's theory - Coloumb's wedge theory - Earth pressure on retaining walls including the effect of surcharge for c and c-phi soil under dry and saturated conditions.

Total Periods 60(45+15)

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Punmia, B.C.	Soil Mechanics and Foundations, 16th Edition	Laxmi Publications Pvt. Ltd., New Delhi,	2017
2.	Murthy, V.N.S.	Soil Mechanics and Foundation Engineering	CBS Publishers Distribution Ltd., New Delhi.	2014
3.	Arora K.R.	Soil Mechanics and Foundation Engineering, 7th Edition, 2017 (Reprint).	Standard Publishers and Distributors, New Delhi	2017

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	Purushothama Raj. P	Soil Mechanics and Foundation Engineering	Pearson Education	2013
2.	Das, B.M.	Principles of Geotechnical Engineering	Thompson Brooks / Coles Learning Singapore, 8th Edition	2014
3.	B.N.D.Narasinga Rao	Soil Mechanics and Foundation Engineering	Wiley India Pvt. Ltd., New Delhi	2015
4.	IS Code 1892 (1979)	Code of Practice for subsurface Investigation for Foundations.	Bureau of Indian Standards, New Delhi.	1979
5.	IS Code 6403 : 1981	Bearing capacity of shallow foundation	Bureau of Indian Standards, New Delhi	(Reaffirmed 1997)
6.	IS Code 8009 (Part 1):1976	Shallow foundations subjected to symmetrical static vertical loads	Bureau of Indian Standards, New Delhi	(Reaffirmed 1998)
7.	IS Code 2911 (Part 1): 1979	Concrete Piles	Bureau of Indian Standards, New Delhi.	(Reaffirmed 1997)
8.	IS Code 14458 (Part 2) : 1998	Retaining Wall for Hill Area – Guidelines, Design of Retaining/Breast Walls	Bureau of Indian Standards, New Delhi	1998

Web URL(s):

https://nptel.ac.in/courses/105/105/105105176/

U19MTT02	Indian Constitution	L	T	P	C
		2	0	0	0

Pre-Requisites : Nil

Objective:

Students will be able to

- Understand the historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, central and state relation, the local Administration and about the functions of Election commission.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Understand the emergence and evolution of Indian Constitution.

CO2 : Acquire knowledge about the structure and composition of Indian Constitution

CO3 : Understand and analyze federalism in the Indian context

CO4 : Analyse Panchayat Raj institutions as a medium of decentralization

CO5 : Acquire knowledge about the Indian election commission

Unit I **THE CONSTITUTION - INTRODUCTION** **6**

The History of the Making of the Indian Constitution -Preamble and the Basic Structure, and its interpretation -Fundamental Rights and Duties and their interpretation -State Policy Principles

Unit II **UNION GOVERNMENT** **6**

Structure of the Indian Union -President – Role and Power-Prime Minister and Council of Ministers -Lok Sabha and Rajya Sabha

Unit III **STATE GOVERNMENT** **6**

Governor – Role and Power -Chief Minister and Council of Ministers -State Secretariat

Unit IV **LOCAL ADMINISTRATION** **6**

District Administration -Municipal Corporation -Zila Panchayat

Unit V **ELECTION COMMISSION** **6**

Role and Functioning -Chief Election Commissioner -State Election Commission

Total Periods: 30

Text Books:

S.No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	DD Basu	Introduction to the Constitution of India	Lexis Nexis	2018
2.	Rajeev Bhargava	Ethics and Politics of the Indian Constitution	Oxford University Press, New Delhi	2009
3.	Dr.B.L. Fadia	The Constitution of India	Sahitya Bhawan	2017

Web URL(s):

1. https://www.constitution.org/cons/india/const.html
2. http://www.legislative.gov.in/constitution-of-india
3. https://www.sci.gov.in/constitution
4. https://www.toppr.com/guides/civics/the-indian-constitution/the-constitution-of-india/
5. https://nptel.ac.in/courses/129/106/129106002/

		L	T	P	C
U19CEP03	**Water & Waste Water Engineering Laboratory**	**0**	**0**	**4**	**2**

Pre-Requisites **:** Water supply engineering & Waste Water Engineering

Objectives:

- To understand the sampling procedures of water and waste water samples
- To impart knowledge on preparation of reagents, testing various water and waste water quality parameters.
- To conduct laboratory tests on characterization of water/wastewater samples.

Course Outcomes:
At the end of this course, students will demonstrate the ability to

CO1 : Test the physical properties of water and waste water.

CO2 : Test the chemical properties of water and waste water

CO3 : Test the biological properties of water and waste water.

CO4 : To analyze water and wastewater volumetrically and using certain equipments.

CO5 : Understand sampling and preservation methods of water and wastewater.

LIST OF EXPERIMENTS

1. Sampling and preservation methods for water and wastewater (Demonstration only).
2. Determination of pH and Electrical conductivity
3. Determination of Turbidity
4. Determination of Total Hardness
5. Determination of Alkalinity
6. Determination of Acidity.
7. Determination of Chlorides
8. Determination of Sulphates
9. Determination of Iron and Fluoride
10. Determination of Optimum Coagulant dosage
11. Determination of Residual chlorine and Available chlorine in bleaching powder.
12. Determination of suspended, settleable, volatile and fixed solids
13. Determination of Dissolved Oxygen for the given sample.
14. Determination of TOC for the given sample.
15. Determination of Total Nitrogen for given sample.

Total Periods 60

Reference:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	APHA and AWWA	Standards Methods for the Examination of Water and Wastewater	17th Edition, WPCF, USA	1989
2.	Government of India	Manual on Water Supply and Treatment	CPHEEO, Ministry of Urban Development, New Delhi	2003

Web URL(s):

1. https://nptel.ac.in/courses/105/104/105104102/

U19CET08	Structural Analysis II	L	T	P	C
		3	1	0	4

Pre-Requisites : Structural Analysis I

Objectives:

- To learn the method of drawing influence lines in various applications like beams.
- To understand the concepts of analysis of cables and suspension bridges.
- To impart knowledge on matrix stiffness method.
- To impart knowledge on matrix flexibility method.
- To learn Plastic analysis of beams and rigid frames.

Course Outcomes:
At the end of this course, students will demonstrate the ability to

CO1 : Analyse the indeterminate beams with rolling loads.

CO2 : Solve the problems on cables and suspension bridges.

CO3 : Analyse beams, frames and trusses by flexibility methods.

CO4 : Analyse beams, frames and trusses by Stiffness methods.

CO5 : Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

Unit I 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), and fixed beams.

Unit II 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 - Max Bending Moment due to moving single concentrated load and UDL - Influence lines for Bending Moment and Shear Force - Analysis of suspension bridges with two hinged stiffening girders.

Unit III MATRIX FLEXIBILITY METHOD 9+3

Introduction - Computation of flexibility matrices - Analysis of continuous beams, indeterminate frames and trusses with maximum two degrees of static indeterminacy.

Unit IV MATRIX STIFFNESS METHOD 9+3

Introduction - equilibrium and compatibility - Analysis of continuous beams, indeterminate frames and trusses with maximum two degrees of kinematic indeterminacy.

Unit V 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 frames.

Total Periods 60 (45+15)

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Vaidyanathan.R, Perumal.P	Structural Analysis II	Laxmi Publications	2017
2.	Vazrani.V.N and Ratwani,M.M,	Analysis of Structures	Khanna Publishers	2015
3.	Bhavikatti,S.S	Structural Analysis, Vol.1 & 2	Vikas Publishing House Pvt. Ltd	2014

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	Manickaselvam.V.K	Elementary Matrix Analysis of Structures	Khanna Publishers	1998
2.	Negi, L.S. and Jangid, R.S	Structural Analysis	Tata McGraw-Hill Publications	2003
3.	Reddy C.S	Basic Structural Analysis	Tata McGraw-Hill Publications	2011

Web URL(s):

https://nptel.ac.in/courses/105/105/105105180/

U19CET09	Structural Design - Steel	L	T	P	C
		3	1	0	4

Pre-Requisites : Nil

Objectives:

- To introduce the students to limit state design of structural steel members subjected to compressive, tensile and bending loads, including connections.
- Design of structural systems such as roof trusses, gantry girders as per provisions of current code (IS 800 - 2007) of practice.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : To design the tension and compression steel elements and their connections.

CO2 : To understand the behavior and design of tension members.

CO3 : To understand the behavior and design of beams.

CO4 : To understand the behavior and design of compression members.

CO5 : To familiarize and design the components of industrial buildings.

Unit I SIMPLE STEEL CONNECTIONS 9+3

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

Unit II ECCENTRIC CONNECTIONS AND TENSION MEMBER 9+3

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

Unit III COMPRESSION MEMBERS 9+3

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

Unit IV BEAMS 9+3

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

Unit V ROOF TRUSSES AND INDUSTRIAL BUILDINGS 9+3

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

Total Periods 60

Text Books:

S. No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Duggal.S. K	Limit State Design of Steel Structures	McGraw Hill Education India (P) Ltd, New Delhi	2014
2.	Subramanian.N	Design of Steel Structures	Oxford University Press, New Delhi	2016
3.	Kanthimathinathan S	Limit State Design of Steel Structures as per IS 800:2007	I.K. International Publishing House Pvt Ltd, New Delhi	2014

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain	Design of Steel Structures, Vol. I & II	Laxmi Publications (P) Ltd	2014
2.	Gambhir M. L	Fundamentals of Structural Steel Design	McGraw Hill Publications Pvt. Ltd	2013
3.	Ramachandra	Design of Steel Structures, Vol. I & II	Standard publishers Distributors, New Delhi	2012
4.	IS: 800 – 2007	General Construction in Steel" — Code of Practice.		
5.	SP 6(I) – 1964	"Handbook for Structural Engineers		
6.	IS 875- 2015	Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures - Part 3: Wind Loads		

Web URL(s):

https://nptel.ac.in/courses/105/105/105105162/

U19CEP04	**Design and Drawing (RCC & Steel)**	L	T	P	C
		0	0	2	1

Pre-Requisites : Design of R C Elements & Structural Design - Steel

Objectives:

- To acquire hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.
- To enhance the capability of the students to draw the plan, elevation and sectional view of various RCC structural elements using AutoCAD software.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : At the end of the course the student acquires hands on experience in design

CO2 : Preparation of structural drawings for concrete/steel structures normally encountered in Civil Engineering practice.

CO3 : To impart a thorough knowledge on the computer aided analysis and design of RCC structural components using manual and software.

LIST OF EXPERIMENTS

1. Design and detailing of Cantilever retaining wall
2. Design and detailing of Counterfort retaining wall
3. Design and drafting of circular and rectangular RCC water tanks
4. Design and detailing of Reinforced Concrete T Beam Bridge Deck bridges for IRC loading
5. Design and detailing of Gantry Girder
6. Design and detailing of Plate Girder Bridge
7. Design and detailing of Roof Trusses

Total Periods 60

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Krishnaraju	Structural Design and Drawing	Universities Press	2010
2.	S.K.Duggal	Limit state design of steel structures	McGraw hill education (India) private limited, New Delhi	2013
3.	Subramanian	Design of steel structures	Oxford higher education	2014

		L	T	P	C
U19CEP05	**Concrete and Highway Engineering Laboratory**	**0**	**0**	**4**	**2**

Pre-Requisites **:** Concrete Technology & Transportation Engineering

Objectives:

- To impart basic knowledge on the preliminary tests of the concrete ingredients.
- To provide knowledge on the tests to be conducted on fresh and hardened concrete
- To learn the principles and procedures of testing Concrete and Highway materials and to get hands on experience by conducting the tests and evolving inferences.

Course Outcomes:
At the end of this course, students will demonstrate the ability to

CO1 : Determine the prescribed limits of ingredients as per IS standards for concrete making.

CO2 : Demonstrate the workability property of freshly made concrete.

CO3 : Compute the strength property of hardened concrete

CO4 : Conduct quality control tests on bitumen.

CO5 : Gain knowledge about Bitumen mix design.

LIST OF EXPERIMENTS

1. Test on specific gravity of coarse aggregates.
2. Test on water absorption capacity of coarse aggregates.
3. Test on Gradation of Aggregate.
4. Aggregate Crushing value test.
5. Aggregate Impact value test.
6. Aggregate Abrasion Value test.
7. Flakiness and Elongation Index Test.
8. Mix proportion of concrete: Mix design as per BIS method.
9. Determination of workability of fresh concrete by compaction factor method.
10. Determination of workability of fresh concrete mix by conducting slump test.
11. Determination of workability of concrete mix by the use of Flow table.
12. Determination of workability of concrete by conducting the Vee-Bee consistency test.
13. Determination of compressive strength - cube and cylinder.
14. Determination of flexural strength of concrete beam.
15. Modulus of elastics for the hardened concrete.
16. Penetration test on Bitumen.
17. Softening Point test on Bitumen.
18. Ductility test on Bitumen.
19. Determination of Binder Content.
20. Marshal Method of Mix Design.

Total Periods 60

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	M.S.Shetty	Concrete Technology	S.Chand and Co., Ltd., NewDelhi	2003
2.	P.D.Kulkarni	Text book of Concrete Technology	New Age International (P) Ltd.	2007
3.	S. K. Khanna, C.E.G. Justo, A.Veeraragavan	Highway Materials and Pavement Testing,	Nem Chand and Bros., Roorkee, Revised Fifth Edition	2009
4.	IS: 10262:2009	Concrete Mix Proportioning – Guidelines	Bureau of Indian Standards	2009

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	IS 4031 (Part 1) – 1996	Indian Standard Method for determination of fineness by dry sieving	Bureau of Indian Standards	1996
2.	IS 2386 (Part 1 to Part 6) – 1963	Indian Standard methods for test for aggregate for concrete	Bureau of Indian Standards	1963
3.	IS 1201–1978 to IS 1220– 1978	Methods for testing tar and bituminous materials	Bureau of Indian Standards	1978

Web URL(s):

1. https://nptel.ac.in/courses/105/106/105106176/
2. https://nptel.ac.in/courses/105/101/105101087/

		L	T	P	C
U19CET10	**Estimation and Quantity Surveying**	**3**	**0**	**0**	**3**

Pre-Requisites **:** 1.Construction Materials and Technology.
2 .Computer Aided Civil Engineering Drawing

Objectives:

- To provide the student with the ability to estimate the quantities of item of works involved in buildings,
- Water supply and sanitary works, road works and irrigation works, and also to equip the student with the ability to do rate analysis,
- Valuation of properties and preparation of reports for estimation of various items.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Compute quantities of various items for load bearing and framed structures

CO2 : Calculate the quantities of various items for other structures

CO3 : Analyses the rates for various items of works

CO4 : Carry out valuation of plots and buildings

CO5 : Prepare tenders, contract documents and reports as per norms

Unit I ESTIMATION OF BUILDINGS 10

Types of estimates - Units of measurements - Methods of estimates - Load bearing and framed structures - Calculation of quantities of various items for residential and Industrial building with flat roof - Bar bending schedule - Various types of arches - Calculation of brick work in arches.

Unit II ESTIMATE OF OTHER STRUCTURES AND SPECIFICATION 10

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – estimate of bituminous and cement concrete roads –retaining walls – culverts- Specifications – Detailed and general specifications – Constructions – Types of specifications.

Unit III RATE ANALYSIS AND COSTING 8

Rate for material and labour - Rate analysis for stone masonry, brick masonry, concreting, plastering and tiles laying - PWD Schedule of rates.

Unit IV VALUATION 8

Basics of valuation - Capitalized value - Factors affecting the value of plot and building - Depreciation - Valuation of residential building - Escalation - Calculation of standard rent –Mortgage-Lease.-GST Rate for Construction and Building Materials.

Unit V TENDERS AND REPORT PERPARATION 9

Tenders -Tamilnadu Tender Transparency Act - e-tender - Preparation of Tender Notice and Document - Contracts - Types of contracts - Drafting of contract documents-Arbitration and legal requirements.- Principles for report preparation – Report on estimate of residential building - Culvert - Roads - Water supply and sanitary installations.

Total Periods 45

Text Books:

S.No	Author(s)	Title of the Book	Publisher	Year of Publication
1.	B.N Dutta	Estimating and Costing in Civil Engineering	UBS Publishers & Distributors (P) Ltd,	2020
2.	Kohli, D.D and Kohli, R.C	A Text Book of Estimating and Costing (Civil)	S.Chand & Company Ltd.,	2018

Reference Books:

S.No	Author (s)	Title of the Book	Publisher	Year of Publication
1.	Gurcharan Singh and Jagdish Singh	A Text Book of Estimating, Costing and Valuation	Standard Publishers Distributors, Delhi,	2018
2.	K.S.Rangawala and K.K. Rangawala	Elements of Estimating and Costing	Charotar Publishing House, India,	2020
3.	B.S.Patil,	Civil Engineering Contracts and Estimates	University Press,	2020
4	D.N. Banerjee	Principles and Practices of Valuation'	V Edition, Eastern Law House	2020

Web URL(s):

1. https://www.youtube.com/watch?v=D04uxZpgp6M.

U19MGT02	TOTAL QUALITY MANAGEMENT	L	T	P	C
		3	0	0	3

Pre-Requisites : NIL

Objectives:

- To make the students understand the basic concepts of TQM and appreciate its importance in today's business environment.
- To enable them to acquire required diagnostic skills and use various quality tools.
- To familiarize the students about the Quality Management System.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Able to understand the dimensions of quality.

CO2 : Capable of applying TQM concepts for improving the quality of products and services.

CO3 : Assess the process approach in TQM .

CO4 : Use tools and techniques of TQM for continuous improvement in quality.

CO5 : Implement Quality Management System.

Unit I INTRODUCTION 9

Introduction and basic concepts - Definition of quality - Dimensions of quality - Evolution of TQM - TQM frame work – Barriers to TQM

Unit II TQM IMPLEMENTATION 9

Leadership for TQM - Deming's quality principle - TQM implementation - PDSA cycle - Quality Circles - Quality Council - Supplier Partnership.

Unit III PROCESS APPROACH TO TQM 9

Process approach - Juran's Trilogy - Taguchi's loss function – Kaizen - Quality by design - 5S - ESI (Early Supplier Involvement) 5M.

Unit IV TOOLS AND TECHNIQUES 9

7 Old quality control tools - Bench marking - Total productive maintenance - Failure mode and effect Analysis – POKAYOKE - Six Sigma.

Unit V QUALITY MANAGEMENT SYSTEMS 9

Management systems for TQM - ISO 9000 & 14000 Quality management systems - Auditing and certification Process - Korean and American QMS Quality Awards.

Total Periods(L) 45

Text books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Dale H. Besterfieldetal	Total Quality Management	Pearson Education	2013
2.	Subburaj Ramasamy	Total Quality Management	Tata McGraw Hill	2008

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	J.R. Evans and W.M. Lindsay	The management and control of quality	Cengage Learning	2012
2.	Barrie G Date, Ton Van Der Wiet and Jos Van Iwaarden	Management Quality	Wiley Publications	2012
3.	Greg Brue	Six Sigma for Managers	Tata McGraw Hill Publishing Co. Ltd	2002

U19CEJ01	Project Work Phase I	L	T	P	C
		0	0	4	2

Pre-Requisites **:** All Civil Engineering Subjects

Objectives:

- The objective of this course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection 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.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Identify Civil Engineering Analytical Problems based on present scenario.

CO2 : Understand the IS Codes & Develop the general arrangement drawings.

CO3 : Do detailed Analysis/Modeling, produce detailed design & drawings.

CO4 : Produce a bill of quantities and calculate approximate project cost.

CO5 : Prepare the final detailed project Phase I report.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 20 marks

(Decided by conducting 3 reviews by the guide appointed by the Institution)

2. Evaluation of Project Report : 30 marks **60**

(Evaluated by the external examiner appointed the University).

Every student belonging to the same group gets the same mark

3. Viva voce examination : 50 marks

(Evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weight age).

Total Periods 60

U19MGT01	PRINCIPLES OF MANAGEMENT AND ETHICS	L	T	P	C
		3	0	0	3

Pre-Requisites : NIL

Objectives:

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyze and understand the environment of the organization.
- To enable the students to create an awareness on Engineering Ethics and Human Values to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1 : Describe the basic of management and its types, skills, management roles, types of business organization and current trends in business.

CO2 : Explain the nature and purpose of planning, objectives of planning and decision process. Compare the different organization structures, human resource management and training and development

CO3 : Estimate the individual and group behavior, motivation, job satisfaction types and theories of leadership, Apply the knowledge using the various system and process of controlling, budgetary and non-budgetary control techniques.

CO4 : Understanding basic purpose of profession, professional ethics and various moral and social issues.

CO5 : Acquiring knowledge of various roles of Engineer In applying ethical principles at various professional levels

Unit I INTRODUCTION TO MANAGEMENT 6

Definition and functions of Management – types of managers – managerial roles and skills – Evolution of Management – Scientific, human relations, system and contingency approaches.

Unit II PLANNING AND ORGANISING 10

Nature and purpose of planning – planning process – types of planning – Planning Tools and Techniques – MBO – Decision making steps and process – organizing process – organization structure – Departmentation – Human Resource Management – HR Planning, Recruitment, selection, Training and Development.

Unit III DIRECTING AND CONTROLLING 10

Motivation – motivation theories – motivational techniques – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication System – budgetary and non-budgetary control techniques – use of computers and IT in Management control – direct and preventive control.

Unit IV HUMAN VALUES 10

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.

Unit V 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.

Total Periods(L) 45

Text Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stephen P. Robbins & Mary Coulter	Management	Prentice Hall (India)Pvt. Ltd.	2018
2.	Mike W. Martin and Roland Schinzinger .	Ethics in Engineering	Tata McGraw Hill	2017

Reference Books:

S. No.	Author(s)	Title of the Book	Publisher	Year of Publication
1.	Stephen A. Robbins & David A. Decenzo & Mary Coulter	Fundamentals of Management	Pearson Education	2011
2.	Harold Koontz & Heinz Weihrich	Essentials of Management	Tata McGraw Hill	2012
3.	Laura P. Hartman and Joe Desjardins	Business Ethics: Decision Making for Personal Integrity and Social Responsibility"	Mc Graw Hill education, India Pvt. Ltd	2013
4	Charles B. Fleddermann	Engineering Ethics	Pearson Prentice Hall	2011

U19CEJ02	Project Work Phase II	L	T	P	C
		0	0	16	8

Pre-Requisites **:** All Civil Engineering Subjects

Objectives:

- To enable the student to take up investigative study in the broad field of Civil Engineering, either fully Theoretical/Practical or involving both Theoretical and Practical work.
- To develop the ability to review the literatures.
- To illustrate their expertise in a chosen area.

Course Outcomes:

At the end of this course, students will demonstrate the ability to

CO1 : Identify Specific Civil Engineering area and work for the real life needs.

CO2 : Familiarize with the Standard Codes for specific Civil Engineering works.

CO3 : Apply latest techniques to analyze, Modeling & Simulation work

CO4 : Give practical solutions to Civil Engineering Problems.

CO5 : Prepare the final detailed report.

COURSE CONTENT:

It will be assigned by the Department for maximum of four students in a group, under the guidance of a Supervisor. During this period the students shall receive directions from the Supervisor for the progress of the Project Work.

The students shall give periodical presentations of the progress made in the Project Work. Each student shall finally produce a comprehensive report. This final report shall be typewritten form as specified in the guidelines.

The Project Work shall be carried out in any of the Civil Engineering areas such as Construction Engineering, Structural Engineering, Environmental Engineering, Water Resources Engineering, Transportation Engineering, Geo Technical Engineering and Remote sensing. **180**

The Project Work includes:

∗ Review and finalization of the Approach to the Problem

∗ Preparing an Action Plan for conducting the investigation, including team work

∗ Detailed Analysis/ Modelling /Simulation/Design/Problem Solving/Experiment as needed

∗ Final development of product/process, testing, results, conclusions and future directions

∗ Preparing a paper for Conference presentation/Publication in Journals, if possible

∗ Preparing a Dissertation in the standard format for being evaluated by the Supervisor

∗ **Final Seminar Presentation before a Departmental Committee**

Total Periods 180