COURSE STRUCTURE
AND
DETAILED SYLLABUS
(Choice Based Credit System)

R19

Civil Engineering

For
B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for batches admitted from 2019-2020)

SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

SEETHARAMAPURAM, NARSAPUR-534 280, W.G.DT., A.P.

CIVIL ENGINEERING
COURSE STRUCTURE – UG (CBCS)

SEMESTER-I

S.No.	Course Code	Course Title	L	T	P	C	I	E	TM
1	19MA1T01	Calculus and Linear Algebra	3	1	0	4.0	30	70	100
2	19BS1T02	Engineering Chemistry	3	0	0	3.0	30	70	100
3	19EE1T01	Basic Electrical Engineering	3	0	0	3.0	30	70	100
4	19HS1T01	English	3	0	0	3.0	30	70	100
5	19CS1L02	IT Workshop	0	0	3	1.5	30	70	100
6	19BS1L02	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	19EE1L01	Basic Electrical Engineering Lab	0	0	3	1.5	30	70	100
8	19HS1L01	English Proficiency Lab	0	0	3	1.5	30	70	100
		Total	12	1	12	19	240	560	800

SEMESTER-II

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19MA2T02	Differential Equations and Vector Calculus	3	0	0	3.0	30	70	100
2	19BS2T01	Engineering Physics	3	0	0	3.0	30	70	100
3	19CS2T01	Problem Solving and Programming Using C	3	0	0	3.0	30	70	100
4	19ME2T01	Engineering Graphics	3	0	0	3.0	30	70	100
5	19CE2T01	Applied Mechanics	3	0	0	3.0	30	70	100
6	19ME2L01	Engineering Workshop	0	0	3	1.5	30	70	100
7	19BS2L01	Engineering Physics Lab	0	0	3	1.5	30	70	100
8	19CS2L01	C Programming Lab	0	0	3	1.5	30	70	100
9	19HS2L01	English Communication Skills Lab	0	0	3	1.5	30	70	100
		Total	15	0	12	21	270	630	900

L-LECTURE HOURS, T- TUTORIAL HOURS, P-PRACTICAL HOURS, C-CREDITS,
I- INTERNAL MARKS, E- EXTERNAL MARKS, TM- TOTAL MARKS

SEMESTER-III

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19MA3T05	Probability & Statistics	3	0	0	3	30	70	100
2	19BM3T01	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
3	19CE3T01	Strength of Materials-I	3	0	0	3	30	70	100
4	19CE3T02	Surveying	3	0	0	3	30	70	100
5	19CE3T03	Engineering Geology & Building Materials	3	0	0	3	30	70	100
6	19CE3L01	Surveying Lab	0	0	3	1.5	30	70	100
7	19CE3L02	Engineering Geology Lab	0	0	3	1.5	30	70	100
8	19CE3L03	Computer-aided Civil Engineering Drawing Lab	0	0	3	1.5	30	70	100
9	19GE0M06	Indian Culture & Tradition	2	0	0	0			
		Total	**17**	**0**	**9**	**19.5**	**240**	**560**	**800**

SEMESTER-IV

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19CE4T01	Strength of materials-II	3	0	0	3	30	70	100
2	19CE4T02	Fluid Mechanics & Hydraulic Machines	3	1	0	4	30	70	100
3	19CE4T03	Structural Analysis-I	3	0	0	3	30	70	100
4	19CE4T04	Concrete Technology & Building construction	3	0	0	3	30	70	100
5	19CE4T05	Building Planning & Drawing	3	0	0	3	30	70	100
6	19CE4L01	Strength of Materials Lab	0	0	3	1.5	30	70	100
7	19CE4L02	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5	30	70	100
8	19CE4L03	Concrete Technology Lab	0	0	3	1.5	30	70	100
9	19GE0M02	Constitution of India	2	0	0	0			
		Total	17	0	9	20.5	240	560	800

L-LECTURE HOURS, T- TUTORIAL HOURS, P-PRACTICAL HOURS, C-CREDITS,
I- INTERNAL MARKS, E- EXTERNAL MARKS, TM- TOTAL MARKS

SEMESTER-V

S. No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19CE5T01	Structural Analysis-II	3	1	0	4	30	70	100
2	19CE5T02	Design and Drawing of Reinforced Concrete Structures	3	0	0	3	30	70	100
3	19CE5T03	Water Resources Engineering	3	0	0	3	30	70	100
4	19CE5T04	Geotechnical Engineering	3	0	0	3	30	70	100
5	19CE5T05	Transportation Engineering	3	0	0	3	30	70	100
6		Open Elective-I	3	0	0	3	30	70	100
7	19CE5L01	Geotechnical Engineering Lab-I	0	0	3	1.5	30	70	100
8	19CE5L02	Transportation Engineering Lab	0	0	3	1.5	30	70	100
9	19GE0M01	Environmental Science	2	0	0	0			
		Total	20	1	6	22	240	560	800

SEMESTER-VI

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19CE6T01	Environmental Engineering	3	0	0	3	30	70	100
2	19CE6T02	Remote Sensing & GIS	3	0	0	3	30	70	100
3	19CE6T03	Design and Drawing of Steel Structures	3	1	0	4	30	70	100
4		Elective-I	3	0	0	3	30	70	100
5		Elective-II	3	0	0	3	30	70	100
6		open Elective-II	3	0	0	3	30	70	100
7	19CE6L01	Environmental Engineering Lab	0	0	3	1.5	30	70	100
8	19CE6L02	GIS and STAAD Lab	0	0	3	1.5	30	70	100
9	19GE0M03	PE & IPR	2	0	0	0			
		Total	20	0	6	22	240	560	800

L-LECTURE HOURS, T- TUTORIAL HOURS, P-PRACTICAL HOURS, C-CREDITS,
I- INTERNAL MARKS, E- EXTERNAL MARKS, TM- TOTAL MARKS

SEMESTER-VII

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1	19CE7T01	Estimation, specifications and contracts	3	0	0	3	30	70	100
2		Elective-III	3	0	0	3	30	70	100
3		Elective-IV	3	0	0	3	30	70	100
4		open Elective-III	3	0	0	3	30	70	100
5		open Elective-IV	3	0	0	3	30	70	100
6	19CE7L01	Geotechnical Engineering Lab-II	0	0	4	2	30	70	100
7	19CE7P01	Mini Project	0	0	3	1.5	30	70	100
8	19CE7I01	Internship	0	0	3	1.5	50		50
		Total	15	0	10	20	260	490	750

SEMESTER-VIII

S.No.	Subject Code	Subject Title	L	T	P	C	I	E	TM
1		Elective-V	3	0	0	3	30	70	100
2		Elective-VI	3	0	0	3	30	70	100
3	19CE8P01	Main Project	0	0	20	10	60	140	200
		Total	6	0	20	16	120	280	400

L-LECTURE HOURS, T- TUTORIAL HOURS, P-PRACTICAL HOURS, C-CREDITS,
I- INTERNAL MARKS, E- EXTERNAL MARKS, TM- TOTAL MARKS

LIST OF OPEN ELECTIVES

S. No.	Course Code	Course Title	Offering Dept.
1	19EEXO01	Electrical Safety Management	**EEE**
2	19EEXO02	Non-conventional Energy sources	
3	19EEXO03	Electrical Vehicle	
4	19EEXO04	Electrical Energy Conservation and Auditing	
5	19CEXO01	Disaster Management	**CE**
6	19CEXO02	Environmental Pollution and Control	
7	19CEXO03	Solid Waste Management	
8	19CEXO04	Building Planning and Drawing	
9	19MEXO01	3D Printing	**ME**
10	19MEXO02	Form Machinery	
11	19MEXO03	Bio-Mechanical Engineering	
12	19MEXO04	Waste to Energy Conversion	
13	19CSXO01	Internet of Things and Applications	**CSE**
14	19CSXO02	Foundation to Data Analytics	
15	19CSXO03	Data Engineering	
16	19CSXO04	Machine Learning	
17	19ECXO01	Nanotechnology and Applications	**ECE**
18	19ECXO02	Global Positioning and Navigation Satellite Systems	
19	19ECXO03	Remote Sensing	
20	19ECXO04	Mobile Communication and Applications	
21	19ITXO01	Software Engineering Principles	**IT**
22	19ITXO02	Cloud Computing Principles	
23	19ITXO03	E-Commerce	
24	19ITXO04	Web Technology Principles	
25	19BMXO01	Innovations and Entrepreneurship	**MBA**
26	19BMXO02	Industrial Sociology and Psychology	
27	19BMXO03	Digital Marketing	
28	19BMXO04	Business Environment	
29	19MAXO01	Operation Research	Maths
30	19MAXO02	Optimization Models	
31	19BSXO01	Quantum Computing	S & H
32	19BSXO02	Optoelectronics	

ELECTIVES

Stream	Elective-I			Elective-II		
	S.No	Subject Code	Subject	S.No	Subject Code	Subject
Structural Engineering	1	19CE6E01	Advanced Structural Analysis	1	19CE6E06	Earthquake Engineering
Geotechnical Engineering	2	19CE6E02	Foundation Engineering	2	19CE6E07	Earth Retaining Structures
Transportation Engineering	3	19CE6E03	Pavement Materials	3	19CE6E08	Railway, Airport & Harbour Engineering
Water Resources Engineering	4	19CE6E04	Design of Hydraulic Structures	4	19CE6E09	Open channel flow
Environmental Engineering	5	19CE6E05	Air pollution & Control	5	19CE6E10	Solid & Hazardous waste Management

Stream	Elective-III			Elective-IV		
	S.No	Subject Code	Subject	S.No	Subject Code	Subject
Structural Engineering	1	19CE7E11	Repairs & Rehabilitation of structures	1	19CE7E16	Advanced Structural Design
Geotechnical Engineering	2	19CE7E12	Rock Mechanics	2	19CE7E17	Ground Improvement Techniques
Transportation Engineering	3	19CE7E13	Traffic Engineering	3	19CE7E18	Pavement Analysis & Design
Water Resources Engineering	4	19CE7E14	Watershed management	4	19CE7E19	Hydropower Engineering
Environmental Engineering	5	19CE7E15	Environmental Impact Assessment & Management	5	19CE7E20	Waste water Engineering & Management

Stream	Elective- V			Elective-VI		
	S.No	Subject Code	Subject	S.No	Subject Code	Subject
Structural Engineering	1	19CE8E21	Pre stressed Concrete	1	19CE8E26	Construction Technology & Management
Geotechnical Engineering	2	19CE8E22	Soil Dynamics & Machine Foundations	2	19CE8E27	Geo Synthetics
Transportation Engineering	3	19CE8E23	Urban Transportation & Planning	3	19CE8E28	Road Safety Management
Water Resources Engineering	4	19CE8E24	Ground Water Management	4	19CE8E29	River Engineering
Environmental Engineering	5	19CE8E25	Industrial waste Management	5	19CE8E30	Faecal Sludge and Septage Management

B. TECH 1st SEMESTER	L	T	P	C
	3	1	-	4
19MA1T01: CALCULUS & LINEAR ALGEBRA				

Course Objectives:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, Normal form - solving system of homogeneous and non-homogeneous linear equations- Gauss Elimination, Jacobi and Gauss Seidel methods - Eigen values and Eigen vectors and their properties (without proof).

Learning Outcomes:

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

solve systems of linear equations, determine the rank, Eigen values and eigenvectors(K2).

Unit II: Cayley-Hamilton theorem and Quadratic forms

Cayley-Hamilton theorem (without proof), Finding inverse and power of a matrix by Cayley-Hamilton theorem - Reduction to diagonal form - Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

Learning Outcomes:

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

- reduce to diagonal form and identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (K3)

Unit III: Multivariable calculus

Expansions of functions: Taylor's and Maclaurin's series - Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

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

- Expand the given function as series of Taylor's and Maclaurin's (K3)
- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (K3)
- Acquire the Knowledge in maxima and minima of functions of several variables (K1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (K3)

Unit IV: Multiple Integrals

Double Integrals: change of order of integration, double integrals in polar coordinates, areas enclosed by plane curves.

Triple Integral: Evaluation of triple integrals, change of variables

Learning Outcomes:

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

- evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (K3)
- apply double integration techniques in evaluating areas bounded by a region (K4)

Unit V: Special Functions

Beta and Gamma functions and their properties, relation between beta and gamma functions.

Learning Outcomes:

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

- Conclude the use of special functions in multiple integrals (K3)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 42/e, Khanna Publishers, 2012.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2. B.V. RAMANA, Higher Engineering Mathematics, Tata McGraw Hill, 2007.

Course Outcomes:

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

1. develop the use of matrix algebra techniques that is needed by engineers for practical applications (K3)
2. familiarize with functions of several variables which is useful in optimization (K3)
3. learn important tools of calculus in higher dimensions. Students will become familiar with double integral(K3)
4. familiarize with triple integral and also learn the utilization of special functions

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
19BS1T02: ENGINEERING CHEMISTRY				

COURSE OUTCOMES

At the end of semester, the students will be able to

CO1: Explain the impurities present in raw water, problems associated and how to avoid them (K2)
CO2: Explain the advantages of Polymers in daily life (K2)
CO3: Explain the theory of construction of battery and fuel cells and theories of corrosion and prevention methods. (K2)
CO4: Differentiate conventional and non-conventional energy sources and their advantages and disadvantages. (K2)
CO5: Identify the usage of advanced materials in day to day life (K2)

UNIT I: WATER TECHNOLOGY

Hardness of water-types of hardness-disadvantages of hard water-determination of hardness by EDTA complexometric method. Portable water and its specifications-steps involved in purification of water-chlorination, break point of chlorination. Boiler troubles: Scale and sludge-priming and foaming-boiler corrosion-caustic embrittlement.

Industrial Water Treatment: Softening methods: zeolite process-ion exchange process.
Brackish water treatment (desalination methods): Reverse osmosis - electro dialysis.

Learning Outcomes: At the end of this unit, the students will be able to Explain
The impurities present in raw water, problems associated with them and how to avoid them

UNIT-II: POLYMERS AND COMPOSITE MATERIALS

Polymers-Introduction-Types of polymers-degree of polymerization-functionality-preparation properties and applications of individual polymers-Bakelite-PVC-Poly styrene.

Plastics: Types (thermosetting and thermoplastic)-compounding of plastics-moulding Process (Any Four) - recycling of e-waste.

Rubbers and elastomers: Introduction-natural rubber-vulcanization of rubber-synthetic rubbers-Buna-N, Buna-S.

Composite materials: Fiber reinforced plastics-biodegradable polymers-biomedical polymers-conducting polymers

Learning Outcomes: At the end of this unit, the students will be able to

- **Outline** the properties of polymers and various additives added and different methods of forming plastic materials.
- **Explain** the preparation, properties and applications of some plastic materials.
- **Discuss** natural and synthetic rubbers and their applications.

UNIT III: ELECTRO CHEMICAL CELLS AND CORROSION

Electrochemical Cells

Introduction-single electrode potential-electrochemical cell-electrochemical series and applications. Reference electrodes-standard hydrogen electrode and calomel electrode-construction of glass electrode.

Batteries: Construction, working and cell reaction of primary (dry cell) and Secondary (Pb acid, Ni-Cd, Zinc-Air and Li-ion) battery. Fuel cells (H_2-O_2, Methanol-Air cells).

Corrosion

Defination-theories of corrosion (Chemical and Electrochemical corrosion)-types of corrosion (Galvanic, Differential aeration (waterline and pitting corrosion), stress Corrosion). Factors influencing rate of corrosion-nature of metal-nature of corrosive atmosphere.

Corrosion Prevention methods: Cathodic protection-Sacrificial anodic method-Impressed voltage method. Metallic coatings: Galvanization-Tinning-Electro plating-Electro less plating.

Learning Outcomes: At the end of this unit, the students will be able to

- **Explain** the theory of construction of battery and fuel cells.
- **Categorize** the reasons for corrosion and study some methods of corrosion control.

UNIT IV: CONVENTIONAL AND NONCONVENTIONAL ENERGY RESOURCES

Conventional energy sources

Introduction to fuels-classification and characteristics of fuels-solid, Liquid and gaseous fuels-advantages and disadvantages-calorific value-higher and lower calorific values-construction and working of bomb calorimeter-analysis of coal-proximate and ultimate analysis-numerical problems related to bomb calorimeter, Dulong's formula and coal analysis-petroleum refining-cracking-petrol and diesel knocking-octane number and cetane number-gaseous fuels-Natural gas-CNG-LPG

Non-conventional energy sources

Solar energy: Advantages-disadvantages of solar cells-construction and working of photo voltaic cell-Introduction to hydro power-geo thermal power-tidal and wave power.

Learning Outcomes: At the end of this unit, the students will be able to

- **Differentiate** conventional and non conventional energy sources and their advantages and disadvantages.
- **Explains** energy production by different natural sources

UNIT V: CHEMISTRY OF MATERIALS

Nano materials: Introduction-sol-gel method-characterization by BET, SEM and TEM methods-carbon nanotubes and fullerenes: Types, preparation and applications

Semiconductors:Preparation (Distillation, Zone refining, Czochralski crystal pulling epitaxy, diffusion, ion implantation)-semiconductor devices (P-N junction diode as rectifier, junction transistor)

Cement: Constituents of cement-setting and Hardening of cement, Decay of Cement.

Refractories: Definition of refractory-classification and properties of refractoriness-applications of refractories.

Learning Outcomes: At the end of this unit, the students will be able to

- **Outline** the awareness of materials like nanomaterials and fullerenes and their uses.

- **Explain** the techniques that detect and measure the surface properties of materials.
- **Illustrate** the commonly used industrial materials.

Text Books:

T1. N. Y. S. Murthy, V. Anuradha & K. Ramana Rao, A Text Book of Engineering Chemistry - Maruthi Publications. (2018)

T2. K. Sesha Maheswaramma, Mridula Chugh, A Text Book of Engineering Chemistry - Pearson Publications (2018).

Reference Books:

R1. Jain & Jain, Engineering Chemistry – Dhanpat Rai Publishing Company (2017)

R2. Shashi Chawla, Text Book of Engineering Chemistry - Dhanpat Rai & Co. (P) Limited (2017)

R3. Prasanta Rath, Subhendu Chakroborthy, Chemistry –Cengage publications (2018)

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
19EE1T01: BASIC ELECTRICAL ENGINEERING				

COURSE OUTCOMES: ***After successful completion of this course, students should be able to:***

CO1 : Solve simple DC circuit using KVL, KCL and Network Theorems.

CO2 : Understand the fundamental concepts of single-phase and three phase systems analysis for simple AC circuit.

CO3 : Demonstrate the construction, working principles and operating characteristics of DC machines, transformer and AC rotating machines.

CO4 : Understand the basic Concepts of Electrical installations.

SYLLABUS

UNIT-I : DC CIRCUIT ANALYSIS

Electrical Circuit Elements (R, L and C), Voltage and Current Sources, Ohms Laws, Kirchoff's Laws and Star/Delta Conversion, Network Reduction Techniques-Series-Parallel- Series and Parallel (Only Resistor), Superposition, Thevenin's and Norton's Theorems, Problems in Simple Circuits with DC Excitation.

UNIT-II : AC CIRCUIT ANALYSIS

Representation of Sinusoidal Waveforms, Peak and RMS Values, Phasor Representation, Real Power, Reactive Power, Apparent Power, Power Factor, Analysis of Single Phase AC Circuits Consisting of R, L, C, RL, RC and RLC Combinations (Series and Parallel), Resonance, Three Phase Circuits- Voltage and Current Relations in Star/Delta Connections-Simple Problems.

UNIT-III : DC MACHINES & TRANFORMERS

DC MACHINES: Introduction-Construction Details - Principle of Operation - EMF Equation – Classification Based on Excitation - Torque Equation- Characteristics: OCC of DC Shunt Generator-Load Characteristics of DC Shunt Motor, 3-Point Starter – Speed Control by Armature Voltage, Field Control of DC Motors -Simple Problems.

TRANFORMERS: Introduction-Constructional Details - Principle of Operation - EMF Equation – OC and SC Test – Equivalent Circuit, Voltage Regulation, Losses and Efficiency.

UNIT- IV : AC MACHINES

3-Ø INDUCTION MOTOR: Introduction-Construction Details - Principle of Operation-Generation of Rotating Magnetic Fields, Torque-Slip Characteristic. Losses and Efficiency.

ALTERNATOR: Introduction-Construction Details - Principle of Operation – Definition for Pitch Factor and Distribution Factor-E.M. F Equation - Determination of Voltage Regulation by E.M.F Method.

UNIT-V : ELECTRICAL INSTALLATIONS

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics of Batteries. Elementary Calculations for Energy Consumption, Battery Backup.

TEXT BOOKS:

1. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, 3rd edition 2010, Tata McGraw Hill.
2. P. V. Prasad, S. Sivanagaraju, K. R. Varmah, and Chikku Abraham, Basic Electrical Engineering, Cengage, 2019.

REFERENCE BOOKS:

1. D.C. Kulshreshtha-, Basic Electrical Engineering 2009, Tata McGraw Hill.
2. L.S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011
3. E. Hughes, Electrical and Electronics Technology,10th Edition, Pearson, 2010.
4. Vincent Deltoro, Electrical Engineering Fundamentals, Second Edition, Prentice Hall India, 1989.
5. V K Mehta & Rohit Mehta, S "Principles of Electrical Engineering and Electronics", Chand Publishers,2019 edition.

B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
19HS1T01: ENGLISH				

COURSE OBJECTIVES

1. To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
2. To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
3. To assist students to carry on the tasks and activities through guided instructions and materials.
4. To effectively integrate English language learning with employability skills and training.
5. To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
6. To provide hands-on experience through case –studies, mini –projects, group and individual presentations.

COURSE OUTCOMES

A) Reading Skills

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

B) Writing Skills

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, e-mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

C) Interactive skills

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

D) Grammar in context

- Enable the skills of grammar using in a situation
- Identifying the needs of apt grammar in life related situation
- Promoting discourse with grammar effectively

Syllabus :

S No	Content
UNIT –I	**Vocabulary Building** **1.1** Video Lesson 1.2.1 Word formation Root words Prefixes and Suffixes Synonyms and Antonyms **Parts of Speech** **Note- making, Note-taking**

UNIT -II	**Basic Writing Skills** **2.1** Video Lesson 2.2.1 Basic sentence structure 2.2.2. Clauses and Phrases Punctuations Creating coherence Organizing principles of paragraph documents Techniques for writing precisely **Tenses** **Letter Writing**
UNIT-III	**Identifying Common Errors in Writing** **3.1** Video Lesson Sub + verb agreement Noun pronoun agreement Articles Preposition Redundancies Clichés **Active - Passive Voice** **Reported Speech** **3.4 Resume Writing**
UNIT-IV	**Nature and Style of sensible Writing** **4.1** Video Lesson Describing Classifying Writing Introduction and conclusion **Conditional Sentences** **Degrees of Comparison** **4.4 Email writing**
UNIT-V	**Writing Practice** **5.1** Video Lesson Comprehension Precise writing Essay Writing **Simple Compound and Complex Sentences** **Report Writing**

TEXT BOOK: Board of Editors, Building Effective Communication Skills
By Maruti Publications (2019)

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B. TECH 1st SEMESTER	L	T	P	C
	3	-	-	3
19CS1L02: IT WORKSHOP				

COURSE OUTCOMES:

At the end of the Course, Student will be able to:

1. Identify the components of a personal computer and Install Operating System.
2. Send email messages (with or without attachments)
3. Prepare their own Presentation / Documentation using Office Tools
4. Create Interactive Visual Programs Using Scratch.
5. Develop Static web site Applications

WEEK	TOPIC
1	**KNOWING OF COMPUTER** **Identification of peripherals of a PC, Laptop, and Smart Phones:** Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.
2	**OPERATING SYSTEMS** Functions of OS, Types, **OS simple setting** : Changing system date and time, display properties, to add or remove a window component and changing mouse properties **File and Directory Management** : Creating and renaming of files and directories, **MS-DOS Commands**
3	**INTERNET SERVICES** Web Browser usage and **Advanced settings** like LAN, Proxy, Content, Privacy, Security, Cookies, Extensions/ Plug-in, **Antivirus installation,** Configuring a firewall, blocking pop-ups ,**Email** creation and usage.
4	Practice on **Microsoft-Word**
5	Practice on **Microsoft-PowerPoint**
6	Practice on **Microsoft-Excel**
7	Creating pdf documents.
8	**CLOUD BASED COLLABORATION TOOLS** Store, sync, and share files with ease in the cloud using Google Drive Manage event registrations, create quizzes, and analyze responses using Google Forms
9&10	**STATIC WEB PAGE DESIGNING** Basic HTML Tags,Table Tags,List Tags,Image Tags, Forms

B. TECH 1st SEMESTER	L	T	P	C
	-	-	3	1.5
19BS1L02: ENGINEERING CHEMISTRY LAB				

Outcomes: The experiments introduce volumetric analysis: Acid-Base, complexometric, Redox, Conductometric and potentiometric titrations. Then they are exposed to a few instrumental methods of chemical analysis.

Thus at the end of the lab course, the student is exposed and able to

1. Identify the concentration of given solution by different methods of chemical analysis (**K3**)
2. Analyze the water purity by checking hardness, DO and Acidity. (**K4**)
3. Estimate the Cu^{+2}, Fe^{+3}, Ca^{+2}, Mg^{+2} ions and Ascorbic acid present in given solution. (**K4**)
4. Identify the pour and cloud point of lubricants. **(K3)**
5. Understand the principles of conductometric and potentiometric titrations. (**K_2**)

Syllabus:

1. Estimation of HCl using standard Na_2CO_3 through acid-base titration.
2. Estimate the total hardness of water using standardized EDTA solution through complexometric titration.
3. Estimation of $KMnO_4$ using standard $H_2C_2O_4$ through redox titration method.
4. Estimation of Dissolved Oxygen in given water sample by Wrinkler's Method
5. Determination of ferric (Fe^{+3}) ions using standard KCr_2O_7 solution
6. Determination of copper (II) using standard hypo solution.
7. Estimation of strong acid by using strong base through conductometric titration method.
8. Estimation of strong acid by using strong base through potentiometric titration method.
9. Preparation of polymer (Demo).
10. Determination of Vitamin 'C'.
11. Determination of Pour and Cloud Point of lubricating oils

Reference Books

1. Arthur J. Vogel, A Textbook of Quantitative Analysis.

* * *

B. TECH 1st SEMESTER	L	T	P	C
	-	-	3	1.5
19EE1L01: BASIC ELECTRICAL ENGINEERING LAB				

COURSE OUTCOMES: ***After successful completion of this course, students should be able to:***

CO1 : Handle Various Electric Instruments and Solve DC Circuits Using Network Theorems

CO2 : Determine Resonance Frequency and Perform Voltage, Current and Power Measurement On Three Phase Circuit

CO3 : Determine and Predetermine the Performance of DC Machines

CO4 : Determine and Predetermine the Performance of Transformers and AC Machines

LIST OF EXPERIMENTS

1. Practice on Measuring Instruments – Voltmeter, Ammeter, Millimeter, Oscilloscope.
2. Verification of KCL and KVL.
3. Verification of Thevenin's Theorem.
4. Verification Norton's Theorem.
5. Verification Superposition Theorem.
6. Resonance in R-L-C Circuits.
7. Measurement of Voltage and Current using Three Phase Star/Delta Connections.
8. Measurement of Three-Phase Power in Balanced Circuits.
9. Open Circuit Characteristics of DC Shunt Generator.
10. Load Characteristics of DC Shunt Generator.
11. Speed-Torque Characteristic of DC Motor.
12. Open Circuit and Short Circuit Test on a Single Phase Transformers.
13. Regulation of Alternator Using EMF Method.

Note: Any Ten Experiments will conduct from the above experiments

REFERENCE:

1. Department lab manual.

B. TECH 1st SEMESTER	L	T	P	C
	-	-	3	1.5
19HS1L01: ENGLISH PROFICIENCY LAB				

COURSE OBJECTIVES

- To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
- To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
- To assist students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice English language in order to acquire proficiency in English. 'Enrich your interactive Skills: Part - A' is designed to provide opportunities for engineering students to revise and consolidate the basic skills in listening, speaking, reading and writing in addition to giving ample practice in various communicative functions and Life skills.

PRE REQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus

Unit	TOPIC
1	Vowels, Consonants, Pronunciation, Phonetic transcripts
2	Word stress and syllables
3	Rhythm and Intonation
4	Contrastive Stress –Homographs
5	Word Stress : Weak and Strong forms , Stress in compound words

Text Book:

Board of Editors, "Infotech" by Maruthi Publications (2019)

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B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
19MA2T02: DIFFERENTIAL EQUATIONS & VECTOR CALCULUS				

Course Objectives:

1. To enlighten the learners in the concept of differential equations and vector calculus.
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit I: Ordinary Differential equations of first order and first degree:

Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories

Learning Outcomes:

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

- solve first order differential equations by appropriate method (K3)
- apply to geometrical and real world problems (K3)

Unit II: Linear differential equations of higher order:

Solutions of Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^nV(x) – Method of Variation of parameters. Applications: LCR circuit

Learning Outcomes:

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

- identify the essential characteristics of linear differential equations with constant coefficients (K3)
- solve the linear differential equations with constant coefficients by appropriate method (K3)

Unit –III: Partial Differential Equations of First Order:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

Learning Outcomes:

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

- apply a range of techniques to find solutions of standard PDEs (K3)
- outline the basic properties of standard PDEs (K2)

Unit IV: Vector differentiation

Scalar and vector point functions, vector operator del, del applied to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, physical interpretation of Gradient Div F and Curl F, Del applied twice to point functions Del applied to products of point functions.

Learning Outcomes:

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

- apply del to Scalar and vector point functions (K3)
- illustrate the physical interpretation of Gradient, Divergence and Curl (K3)

Unit V: Vector integration

Integration of Vectors Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Learning Outcomes:

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

- find the work done in moving a particle along the path over a force field (k3)
- evaluate the rate of fluid flow along and across curves (K3)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (K3)

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 42/e, Khanna publishers, 2012.

References:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2013.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

Course Outcomes:

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

1. solve the differential equations related to various engineering fields (K3)
2. identify solution methods for partial differential equations that model physical processes (K3)
3. interpret the physical meaning of scalar and vector point functoins different operators such as del,gradient, curl and divergence (K3)
4. estimate the work done against a field, circulation and flux using vector calculus and familiarize vector integral theorems. (K3)

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
19BS2T01: ENGINEERING PHYSICS				

COURSE OUTCOMES

After completion of course student able to:

1. Describe Basic crystal systems and determination of crystal structures
2. Explain Magnetic and Dielectric Materials properties
3. Describe Concept of Magnetic Induction and Super Conducting properties
4. Explain Pure & Doped Semiconductor materials for better utility
5. Describe Optical fibers and Optical properties of materials and their applications

UNIT –I: CRYSTAL STRUCTURE AND X-RAY DIFFRACTION

CRYSTAL STRUCTURE:
Introduction – Space lattice – Basis – Unit Cell – Lattice parameters – Bravais lattices – Crystal systems – Structures and packing fractions of SC, BCC and FCC.

X-RAY DIFFRACTION:
Directions in crystals- planes in crystals- Miller indices and procedure to find Miller indices- Various planes in crystals- Separation between successive (h k l) planes-Bragg's law-Bragg's Spectrometer.

Learning Outcomes: At the end of this unit, the students will be able to

- **Explain** the seven crystal systems
- **Interpret** the crystal structure based on Bragg's law

UNIT – II: MAGNETIC AND DIELECTRIC PROPERTIES

MAGNETIC PROPERTIES: Introduction-Magnetic permeability – Magnetization – Relation between three magnetic vectors - Origin of magnetic moment – Classification of Magnetic materials- Dia, Para, Ferro, Anti-Ferro and Ferri-magnetism – Hysteresis- soft and Hard Magnetic materials.

DIELECTRIC PROPERTIES: Introduction-Dielectric constant- Relation between three electric vectors-Electronic and ionic polarizations (Quantitative) - orientation polarizations (Qualitative) - Internal fields in solids- Clausius - Mossotti equation.

Learning Outcomes: At the end of this unit, the students will be able to

- **Classify** the magnetic materials into dia, para, ferro, anti ferro and ferri
- **Explain** the importance of hysteresis
- **Explain** the concept of polarization in dielectric materials.
- **Summarize** various types of polarization of dielectrics .
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics.

UNIT-III: ELECTROMAGNETIC WAVES AND SUPERCONDUCTIVITY

ELECTROMAGNETIC WAVES: Introduction-Electric flux –magnetic flux- Gauss law in electrostatics- Gauss law in magnetostatics- Ampere's law - Biot-Savart's law-Magnetic Induction due to current carrying circular loop- Faraday's law - Maxwell's equations.

SUPERCONDUCTIVITY: General and Thermal properties –Meissner effect – Type-I and Type-II superconductors – Flux quantization – BCS Theory of Superconductivity - Josephson effects – Applications of Superconductors.

Learning Outcomes: At the end of this unit, the students will be able to

- **Illustrate** the concept of electro magnetism based on fundamental laws of electro magnetism
- **Explain** Maxwell's equations
- **Summarize** various properties and applications of superconductors

UNIT-IV: PHYSICS OF SEMICONDUCTORS:

Classification of solids based on band theory - Intrinsic semiconductors- density of charge carriers- Equation for conductivity – Extrinsic semiconductors- P-type and N-type- density of charge carriers- Drift and diffusion – Einstein's equation – Hall Effect- Hall coefficient – Applications of Hall effect– direct & indirect band gap semiconductors.

Learning Outcomes: At the end of this unit, the students will be able to

- **Summarize** various types of solids based on band theory.
- **Outline** the properties of n-type and p-type semiconductors.
- **Identify** the type of semiconductor using Hall effect

UNIT-V: LASERS AND OPTICAL FIBERS

LASERS: Introduction– Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion - Three level and four level laser pumping schemes - Ruby laser – Helium-Neon laser- Applications of Laser.

FIBER OPTICS: Introduction to Optical fibers- Critical angle of propagation- Total internal reflection- Acceptance angle and acceptance cone- Numerical aperture- Classification of optical fibers based on refractive index profile-Classification of optical fibers based on modes- Applications of optical fibers.

Learning Outcomes: At the end of this unit, the students will be able to

- **Design** various types of lasers
- **Explain** the principle and propagation of light through Optical fibers
- **Discuss** the application of lasers and Optical fibers

TEXT BOOK:

M. N. Avadhanulu, P.G. Kshirasagar & TVS Arun Murthy, A text book of "Engineering Physics", S Chand publications, 11th Addition 2019.

REFERENCE BOOKS:

1. Shatendra Sharma and Jyotsna Sharma, Engineering Physics, Pearson Education, 2018.
2. Palanisamy, Engineering Physics, Scitech Publishers-2018.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
19CS2T01: PROBLEM SOLVING AND PROGRAMMING USING C				

Course Objectives:

- To impart adequate knowledge on the need of programming languages and problem solving techniques and develop programming skills.
- To enable effective usage of Control Structures and Implement different operations on arrays.
- To demonstrate the use of Strings and Functions.
- To impart the knowledge of pointers and understand the principles of dynamic memory allocation.
- To understand structures and unions and illustrate the file concepts and its operations.
- To impart the Knowledge Searching and Sorting Techniques.

UNIT-I

Introduction to Computer Problem Solving: Programs and Algorithms, Computer Problem Solving Requirements, Phases of Problem Solving, Problem Solving Strategies, Top-Down Approach, Algorithm Designing, Program Verification, Improving Efficiency, Algorithm Analysis and Notations.

UNIT-II

Introduction to C Programming: Introduction, Structure of a C Program, Comments, Keywords, Identifiers, Data Types, Variables, Constants, Input/output Statements, Operators, Type Conversion.

Control Flow, Relational Expressions: Conditional Branching Statements: if, if-else, if-else–if, switch. Basic Loop Structures: while, do-while loops, for loop, nested loops, The Break and Continue Statements, goto statement.

UNIT-III

Arrays: Introduction, Operations on Arrays, Arrays as Function Arguments, Two dimensional Arrays, Multi-dimensional arrays.

Pointers: Concept of a Pointer, Declaring and Initializing Pointer Variables, Pointer Expressions and Address Arithmetic, Null Pointers, Generic Pointers, Pointers as Function Arguments, Pointers and Arrays, Pointer to Pointer, Dynamic Memory Allocation, Dangling Pointer, Command Line Arguments.

UNIT-IV

Functions: Introduction, Function Declaration, Function Definition, Function Call, Categories of Functions, Passing Parameters to Functions, Scope of Variables, Variable Storage Classes, Recursion.

Strings: String Fundamentals, String Processing with and without Library Functions, Pointers and Strings.

UNIT-V

Structures, Unions, Bit Fields: Introduction, Nested Structures, Arrays of Structures, Structures and Functions, Self-Referential Structures, Unions, Enumerated Data Type –enum variables, Using Typedef keyword, Bit Fields.

Files: Introduction to Files, Using Files in C, Reading from Text Files, Writing to Text Files, Random File Access.

Course Outcomes:

At the end of the Course, Student will be able to:

- Illustrate the Fundamental concepts of Computers and basics of computer programming.
- Use Control Structures and Arrays in solving complex problems.
- Develop modular program aspects and Strings fundamentals.

- Demonstrate the ideas of pointers usage.
- Solve real world problems using the concept of Structures, Unions and File operations.

Text Books:

1. R. G. Dromey, How to solve it by Computer, Pearson Education.
2. Reema Thareja, Computer Programming, Oxford University Press.

Reference Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.
2. Ajay Mittal, Programming In C A-Practial Approach, Pearson.
3. Forouzan, Gilberg, C Programming – A Problem Solving Approach, Cengage.
4. Dennis Richie And Brian Kernighan, The C Programming Language, Pearson Education.
5. Ashok Kamthane, Programming In C, Second Edition, Pearson Publication.
6. Yaswanth Kanetkar, Let us C, 16th Edition, BPB Publication.

Web Links:

1. http://www.c4learn.com/
2. http://www.geeksforgeeks.org/c/
3. http://nptel.ac.in/courses/122104019/
4. http://www.learn-c.org/
5. https://www.tutorialspoint.com/cprogramming/

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
19ME2T01: ENGINEERING GRAPHICS				

COURSE OBJECTIVE

Engineering drawing is the principle method of communication for engineers; the objective is to introduce the students, the techniques of constructing the various types of polygons, curves. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

COURSE OUTCOMES: Students will be able to

CO1: Construct polygons, conics, cycloids, involutes. (K3)
CO2: Draw the orthographic projections of points, lines in different positions. (K2)
CO3: Draw the orthographic projections of plane surfaces in different positions.(K2)
CO4: Draw the orthographic projections of solids like prisms, cylinder, pyramids and cone. (K2)
CO5: Convert Isometric views to orthographic views and vice-versa and also visualize 2D & 3D objects
using Auto CAD. (K3)

UNIT I

POLYGONS: Constructing regular polygons by general methods, inscribing and describing polygons on circles. Curves: Parabola, Ellipse and Hyperbola by Eccentricity method, Cycloid, Epi-cycloid and Hypo-cycloid and Involutes.

UNIT II

ORTHOGRAPHIC PROJECTIONS: Reference plane, importance of reference lines, projections of points in various quadrants, projections of lines, line parallel to both the planes, line parallel to one plane and inclined to other plane. Projections of straight lines inclined to both the planes, determination of true lengths, and angle of inclination.

UNIT III

PROJECTIONS OF PLANES: regular planes perpendicular and parallel to one reference plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT IV

PROJECTIONS OF SOLIDS: Prisms, Pyramids, Cone and Cylinder, Simple positions of solids and Axis of the Solid parallel to one plane and inclined to other plane.

UNIT V

ISOMETRIC VIEWS:

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

CAD:

FUNDAMENTALS OF AUTOCAD - FOR POLYGONS, CREATING 2D AND 3D DRAWINGS USING AUTOCAD:

Computer Aided Design, Drawing practice using Auto CAD simple figures like polygons, creating 2D&3D drawings of objects using Auto CAD

Note: In the End Examination there will be no question from CAD.

TEXT BOOKS:

1. N.D. Butt, Engineering Drawing, Chariot Publications 2016

2.K Venugopal & V. Prabhu Raja, Engineering Drawing + AutoCAD, New Age 2010

REFERENCE BOOKS:

1. K.L.Narayana & P. Kannaiah, Engineering Drawing Scitech Publishers 2016.
2. K.C. John, Engineering Graphics for Degree PHI, Publishers 2009.
3. PI Varghese, Engineering Graphics, McGrawHill Publishers 2013.

B. TECH 2nd SEMESTER	L	T	P	C
	3	-	-	3
19CE2T01: APPLIED MECHANICS				

COURSE OUTCOMES

Students will be able to

1. Determine the resultant of the given force systems.
2. Analyze force systems using equations of equilibrium.
3. Determine centroid, center of gravity and moment of inertia of areas and bodies.
4. Describe the principles of various types of friction
5. Distinguish between kinematics and kinetics.

SYLLABUS

UNIT-I

Introduction to Engineering Mechanics- Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction.

UNIT-II

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

UNIT-III

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), center of gravity of composite bodies, Pappus theorems.

UNIT-IV

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT-V

Kinematics: Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion– Fixed Axis Rotation – Rolling Bodies.

Text/Reference Book

1. S. Timoshenko & D.H. Young ,ENGINEERING MECHANICS -, McGraw Hill
2. A.K.TAYAL ENGINEERING MECHANICS – UMESH Publications
3. BASUDEB BHATTACHARYA ENGINEERING MECHANICS -– Oxford University Press.
4. A. NELSON, ENGINEERING MECHANICS -, McGraw Hill Publications
5. Ferdinand L. Singer, ENGINEERING MECHANICS - Ferdinand L. Singer, Harper Collins Publishers
6. S. S. Bhavikatti,, ENGINEERING MECHANICS - New Age Publishers.

B. TECH 2nd SEMESTER	L	T	P	C
	0	0	3	1.5
19ME2L01 - ENGINEERING WORKSHOP				

COURSE OBJECTIVE: To impart hands–on practice on basic Engineering trades and skills.
COURSE OUTCOMES: Students will be able to
CO1: Model and Develop various basic prototypes in Carpentry trade [K3]
CO2: Model and Develop various basic prototypes in Fitting trade [K3]
CO3: Perform Various Forging Operations [K3]
CO4: Perform various House Wiring Techniques. [K3]
CO5: Develop various basic prototypes in the trade of Sheet metal. [K3]
NOTE: At least **Two** Exercises to be done from each trade.
TRADE:
I. CARPENTRY:
1. CROSS LAP JOINT 2. DOVETAIL JOINT 3. MORTISE and TENNON JOINT
II. FITTING:
1. SQUARE FIT 2. V-FIT 3. HALF ROUND FIT
III. FORGING:
1. ROUND ROD TO SQUARE
2. S-HOOK
3. ROUND ROD TO SQUARE HEADED BOLT
IV. HOUSE WIRING:
1. PARALLEL/SERIES CONNECTION OF THREE BULBS
2. STAIRCASE WIRING
3. FLOURESCENT LAMP FITTING
V. SHEET METAL:
1. SQUARE TRAY 2. HOLLOW CYLINDER 3. OPEN SCOOP
MANUAL:
1. Engineering Workshop Practice Lab Manual Prepared by Mechanical Faculty.

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	3	1.5
19BS2L01: ENGINEERING PHYSICS LAB				

COURSE OUTCOMES

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

CO1: Demonstrate the basic knowledge to know the frequency of a vibrator, hall coefficient, (K3)

CO2: Attain knowledge to verify some of the properties of physical optics. (K4)

CO3: Develop skills to plot various characteristic curves and to calculate the physical properties of given materials. (K4)

CO4: Calculate some the properties of semiconducting materials. (K2)

STUDENT HAS TO DO ANY TEN OF THE FOLLOWING

1. Determination of wavelength of Laser using diffraction grating.
2. Determination of Numerical Aperture and Acceptance angle of an Optical Fiber.
3. Determination of the charge carrier density by using Hall Effect.
4. Determination of the Band Gap of a Semiconductor using a p-n junction diode.
5. Study of Characteristic curves (l/V) of a Zener diode to determine its Breakdown voltage.
6. Determination of Temperature coefficient of resistance of a Thermistor by using its Characteristic curve.
7. Study the variation of intensity of magnetic field along the axis of a circular current carrying coil by using Stewart and Gee's experiment.
8. Study of Characteristic curves (l/V) of a P-N diode.
9. Determine Frequency of given electrically driven tuning fork in Transverse and Longitudinal modes by using Melde's apparatus
10. Determine frequency of A.C. supply by using Sonometer.
11. Determination of the Time Constant for a C-R Circuit
12. Determination of the Planck's constant by using Photo-Cell
13. Determination of dielectric constant of a given material

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	3	1.5
19CS2L01: C PROGRAMMING LAB				

Course Objectives:

- To impart knowledge on various Editors, Raptor.
- To make the students understand the concepts of C programming.
- To nurture the students on Control Structures and develop different operations on arrays.
- To make use of String fundamentals and modular programming constructs.
- To implement programs using dynamic memory allocation.
- To explain the concepts of Structure, Unions and files for solving various problems.

List of Experiments:

1. Introduction to Algorithms and Flowcharts

Implement Algorithm Development for Exchange the values of Two numbers.

Given a set of n student's examination marks (in the range 0-100) make a count of the number of students that passed the examination. A Pass is awarded for all of 50 and above.

Given a set of n numbers design an algorithm that adds these numbers and returns the resultant sum. Assume N is greater than or equal to zero.

2. Introduction to C Programming

Exposure to Turbo C, Code Blocks IDE, Dev C++, Falcon C++.

Writing simple programs using printf(), scanf() .

3. Raptor

Introduction to Raptor.

Draw a flow chart to find the Sum of 2 numbers.

Draw a flow chart to find Simple interest.

4. Basic Math

Write a C Program to convert Celsius to Fahrenheit and vice versa.

Write a C Program to find largest of three numbers using ternary operator.

Write a C Program to Calculate area of a Triangle using Heron's formula.

5. Control Flow- I

Write a C Program to Find Whether the Given Year is a Leap Year or not.

Write a C program to find the roots of a Quadratic Equation.

Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using Switch…case.

6. Control Flow- II

Write a C Program to Find Whether the Given Number is Prime number or not.

Write a C Program to Find Whether the Given Number is Armstrong Number or not.

Write a C program to print Floyd Triangle.

7. Control Flow- III

Write a C program to find the sum of individual digits of a positive integer.

Write a C program to check whether given number is palindrome or not.

Write a C program to read two numbers, x and n, and then compute the sum of the geometric progression $1+x+x^2+x^3+\ldots\ldots\ldots\ldots+x^n$.

Practice Programs:

Write a C program to print all natural numbers from 1 to n. - using while loop
Write a C program to print all natural numbers in reverse (from n to 1). - using while loop
Write a C program to print all alphabets from a to z. - using while loop
Write a C program to print all even numbers between 1 to 100. - using while loop
Write a C program to print sum of all even numbers between 1 to n.
Write a C program to print sum of all odd numbers between 1 to n.
Write a C program to print table of any number.
Write a C program to find first and last digit of any number.
Write a C program to count number of digits in any number.
Write a C program to calculate sum of digits of any number.
Write a C program to calculate product of digits of any number.
Write a C program to swap first and last digits of any number.
Write a C program to enter any number and print its reverse.
Write a C program to enter any number and check whether the number is palindrome or not.
Write a C program to find frequency of each digit in a given integer.
Write a C program to enter any number and print it in words.
Write a C program to print all ASCII character with their values.
Write a C program to enter any number and print all factors of the number.
Write a C program to enter any number and calculate its factorial.
Write a C program to find HCF (GCD) of two numbers.
Write a C program to find LCM of two numbers.
Write a C program to check whether a number is Prime number or not.
Write a C program to check whether a number is Armstrong number or not.
Write a C program to check whether a number is Perfect number or not.
Write a C program to check whether a number is Strong number or not.
Write a C program to print Fibonacci series up to n terms.

8. Arrays

Write a C program to search an element in the given array (Linear Search).
Write a C program to perform matrix addition.
Write a C program to perform matrix multiplication.

Practice Programs:

Write a C program to read and print elements of array.
Write a C program to find sum of all array elements. - using recursion.
Write a C program to find maximum and minimum element in an array. - using recursion.
Write a C program to find second largest element in an array.
Write a C program to copy all elements from an array to another array.
Write a C program to insert an element in an array.
Write a C program to delete an element from an array at specified position.
Write a C program to print all unique elements in the array.
Write a C program to print all negative elements in an array.
Write a C program to count total number of even and odd elements in an array.
Write a C program to count total number of negative elements in an array.
Write a C program to count total number of duplicate elements in an array.
Write a C program to delete all duplicate elements from an array.
Write a C program to count frequency of each element in an array.
Write a C program to merge two array to third array.
Write a C program to find reverse of an array.

Write a C program to convert lowercase string to uppercase.

Write a C program to convert uppercase string to lowercase.

Write a C program to toggle case of each character of a string.

Write a C program to find total number of alphabets, digits or special character in a string.

9. Pointers

Write a C Program to Perform Addition, Subtraction, Multiplication and Division of two numbers using Command line arguments.

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.

Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

10. Functions, Array & Pointers

Write a C Program to demonstrate parameter passing in Functions.

Write a C Program to find Fibonacci, Factorial of a number with Recursion and without recursion.

Write a C Program to find the sum of given numbers with arrays and pointers.

Practice Programs:

Program to change the value of constant integer using pointers.

Program to print a string using pointer.

Program to count vowels and consonants in a string using pointer.

Program to read array elements and print with addresses.

11. Strings

Implementation of string manipulation operations with library function:

a) copy
b) concatenate
c) length
d) compare

Implementation of string manipulation operations without library function:

a) copy
b) concatenate
c) length
d) compare

Verify whether the given string is a palindrome or not.

12. Structures

Write a C Program to Store Information of a book Using Structure.

Write a C Program to Add Two Complex Numbers by Passing Structure to a Function.

13. Files

Write a C program to open a file and to print the contents of the file on screen.

Write a C program to copy content of one file to another file.

Write a C program to merge two files and store content in another file.

14. Application

Creating structures to capture the student's details save them in file in proper record format, search and prints the student details requested by the user.

Note: Draw the flowcharts using Raptor from Experiment 3 to Experiment 6.

Course Outcomes:

- Implement basic programs in C and design flowcharts in Raptor.
- Use Conditional and Iterative statements to solve real time scenarios in C.
- Implement the concept of Arrays and Modularity and Strings.
- Apply the Dynamic Memory Allocation functions using pointers.
- Develop programs using structures, and Files.

Reference Books:

1. Yashwanth Kanetkar, Let Us C,16th edition, BPB Publications.
2. Ajay Mittal, Programming in C A-Practial Approach, Pearson Education.
3. Dennis Richie and Brian Kernighan, The C programming Language, Pearson Education.
4. K Venugopal, Problem solving using C, 3rd Edition, TMG Publication.

Web Links:

1. https://www.hackerrank.com/
2. https://www.codechef.com/
3. https://www.topcoder.com/
4. https://code-cracker.github.io/
5. https://raptor.martincarlisle.com/
6. https://nptel.ac.in/courses/106105085/2

B. TECH 2nd SEMESTER	L	T	P	C
	-	-	3	1.5
19HS2L02: ENGLISH COMMUNICATION SKILLS LAB				

COURSE OBJECTIVES

- To improve the language proficiency of technical under graduates in English with emphasis on LSRW Skills.
- To provide learning environment to practice Listening, Speaking, Reading and Writing Skills within and beyond the classroom environment.
- To assist students to carry on the tasks and activities through guided instructions and materials.
- To effectively integrate English language learning with employability skills and training.
- To design the main course material and exercises with authentic materials drawn from everyday use to cater to everyday needs.
- To provide hands-on experience through case-studies, mini-projects, group and individual presentations.

COURSE OUTCOMES:

a) Reading Skills.

- Addressing explicit and implicit meaning of a text.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

b) Writing Skills:

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, E-Mails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

c) Interactive skills:

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

d) Life Skills and Core Skills:

- Examining self-attributes and identifying areas that require improvement self-diagnosis, self-motivation.
- Adopting to a given situation and developing a functional approach to find solutions-adaptability, problem-solving.
- Understanding the importance of helping others-community service, enthusiasm.

COURSE DESCRIPTION

Communicating in a language is also a skill. So a student has to look for an opportunity to practice the language he is learning in order to acquire communication skills. 'Enrich your interactive Skills: Part - B' is designed to provide opportunities for engineering students to revise and consolidate communication skills in different contexts formal and informal. It prepares the student for facing Interviews, participating in group discussions and making presentations.

PRE REQUISITES

The student is expected to have basic knowledge in English language and must be able to write in English. He is also expected to possess fundamental knowledge of general English grammar and vocabulary.

Syllabus

UNIT	TOPIC
1	Oral Activity : JAM, Hypothetical situations, self / peer profile, Common errors in pronunciation, Neutralizing Accent
2	Oral Activity : Telephonic Etiquette, Role plays, Poster presentations and e-mail Writing
3	Oral Activity : Oral Presentation Skills, Public Speaking Data Interpretation
4	Oral Activity : Group Discussion: Do's and Don'ts –Types, Modalities
5	Oral Activity : Interview Skills: Preparatory Techniques, FAQ, Mock Interviews Pronunciation : Connected speech (pausing, tempo, tone, fluency etc.,)

Text Book:

Board of Editors, "Infotech" by Maruthi Publications (2019).

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
19MA3T05: PROBABILITY & STATISTICS				

Course Objectives:

1. To familiarize the students with the foundations of probability and statistical methods
2. To impart probability concepts and statistical methods in various applications of Engineering
3. To introduce the correlation and regression and method of least squares

Unit-1 Probability:

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

Learning Outcomes:

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

- define the terms trial, events, sample space ,probability, and laws of probability (K_1)
- make use of probabilities of events in finite sample space from experiments (K_3)
- apply Baye's theorem to real time problems(K_3)
- explain the notion of random variable, distribution functions and expected value(K_2)

Unit-2 Probability distributions:

Probability distribution-Binomial, Poisson approximation to the binomial distribution and normal distribution –their properties.

Learning Outcomes:

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

- apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (K_3)
- interpret the properties of normal distribution and its applications (K_2)

Unit-3 Sampling distribution and Testing of hypothesis, large sample tests:

Basic terminology in sampling, sample techniques (with and without replacement), sampling distribution of means for large and small samples (with known and unknown variance).
Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors.
Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Learning Outcomes:

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

- Explain the concept of sampling distribution for large and small samples (K_2)
- apply the concept of hypothesis testing for large samples (K_4)

Unit-4 Small sample tests:

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variance (F- test), Chi-square test for goodness of fit and independence of attributes.

Learning Outcomes:

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

- apply the concept of testing of hypothesis for small samples to draw the inferences (K_3)
- estimate the goodness of fit (K_4)

Unit-5 Curve Fitting and Correlation:

Curve Fitting : Method of least squares -Fitting a straight line, Second degree parabola -exponential curve-power curves

Correlation: Simple correlation, correlation coefficient (for ungrouped data), rank correlation. Linear regression, regression lines, regression coefficients.

Learning Outcomes:

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

- Adopt correlation methods and principle of least squares, regression lines (K_4)

Course Outcomes:

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

1. make use of the concepts of probability and their applications (k3)
2. apply discrete and continuous probability distributions(K3)
3. design the components of a classical hypotheses test(K6)
4. infer the statistical inferential metods based on small and large sampling tests(K6)
5. adopt correlation methods and principle of least squares, regression lines (K_4)

Books:

1. Dr. K. Murugesan & P.Gurusamy, Probability and Statistics, Anuradha Publications,2011
2. Dr.B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publications, 2012.

Reference:

1. Ramana B.V., Higher Engineering Mathematics, Tata Mc Graw Hill New Delhi 11th Reprint, 2010
2. Miller & Freund, Probability and statistics for engineers.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
19BM3T01: MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS				

COURSE OBJECTIVES:

1. To acquire knowledge of economics to facilitate the process of economic Decision making
2. To analyze production function and its laws of variable proportions and cost concepts
3. To differentiate and distinguish price and output decisions in different market structures
4. To compare and contrast the difference between private and public sector in their functioning
5. To develop the skills to analyze financial statements.

COURSE OUTCOMES

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

1. Describe the importance of Managerial Economics and its utility in decision making
2. Understand the meaning and usefulness of production function and cost function in analyzing firm's production activity.
3. Comprehend the concept of Market structure, different types of Markets and pricing policies.
4. Identify different forms of business organizations and analyze their merits and demerits.
5. Evaluate the investment proposals through techniques of capital budgeting and Financial performance of the company through Financial Statements.

UNIT–I Managerial Economics &Demand Analysis: Definition – Nature and Scope - Relation with other disciplines - Concept of Demand-Types-Determinants - Law of Demand – Exceptions - Elasticity of Demand - Types and Measurement-Demand forecasting and its Methods.

UNIT–II Production and Cost Analysis: Production function - Law of Variable proportions - Isoquants and Isocosts -Law of returns Economies of Scale - Cost Concepts - Fixed, VariableCosts, ExplicitCosts, Implicit Costs & Opportunity cost - Cost Volume Profit Analysis - Break Even Point (Simple Problems)

UNIT-III Market Structures & Pricing Policies: Perfect Competition, Monopoly, Monopolistic Competition and Oligopoly – Features – Price & Output Determination - Pricing Methods

UNIT-IV Forms of Organizations & Business Cycles: Business Organization- Sole Trader – Partnership - Joint Stock Company - State/Public Enterprises and their forms - Business Cycles: Meaning and Features - Phases of Business Cycle.

UNIT–V Capital Budgeting and Accounting: Concept and sources-Techniques of capital budgeting-Traditional and Modern Methods (Simple problems)

Introduction to accounting: Branches-Systems of Accounting-Single Entry-Double Entry System-Journal-Ledger-Trail Balance-Final Accounts(Simple problems)

TEXTBOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.

2. T.V.Ramana & B. Kuberudu: Managerial Economics and Financial Analysis, Himalaya Publishing House,Mumbai

3. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

REFERENCE BOOKS:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.

2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.

3. Suma Damodaran, Managerial Economics, Oxford University Press.

4. Lipsey & Chrystel, Economics, Oxford University Press.

5. S. A. Siddiqui & A. S. Siddiqui, Managerial Economics & Financial Analysis, New age International Space Publications.

6. Domnick Salvatore: Managerial Economics in a Global Economy, 4th Edition, Thomson. 7. Narayanaswamy: Financial Accounting A Managerial Perspective, PHI.

8. Raghunatha Reddy & Narasimhachary: Managerial Economics& Financial Analysis, Scitech.

9. S.N.Maheswari & S.K. Maheswari, Financial Accounting, Vikas.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
19CE3T01: STRENGTH OF MATERIALS-I				

COURSE OUTCOMES

Course Outcomes:

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
3. The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
4. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure using Lame's equation.

SYLLABUS:

UNIT- I

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

Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT-II

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

UNIT-III

Flexural Stresses: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R, Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear center.

UNIT -IV

Deflection Of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT-V

Thin And Thick Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells

Text /Reference Books:

1. R. K. Rajput, Strength of Materials, 7th Edition, S. Chand & Co, New Delhi, 2018.
2. R. Subramanian , Strength of Materials,3rd Editio, Oxford Publications, 2016.
3. B.C Punmia, Jain and Jain , 2nd Edition, Mechanics of Materials, 2017.
4. R.K Bansal , Strength of Materials, 6th Edition, Lakshmi Publications, 2018.

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
19CE3T02: SURVEYING				

COURSE OUTCOMES

Students are able to

1. describe the principles and classification of surveying, Calculate horizontal and angular measurements.
2. identify to use various surveying instruments for Measure distances and bearings.
3. use different methods of surveying to Measure levels and draw contours .
4. demonstrate the various components of Theodolite. Prepare theodolite traversing including closing error and trigonometric levelling .
5. compute various data required for various methods of surveying for setting out of curves.
6. calculate areas of irregular boundaries, volumes of borrow pits, embankments ,capacity of reservoirs .

SYLLABUS:

UNIT – I

INTRODUCTION: definition - Uses of surveying-overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications- Errors in survey measurements.

UNIT - II

DISTANCES AND DIRECTION: Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements (EDM) -principles of electro optical EDM- errors and corrections to linear measurements-compass survey -Meridians, Azimuths and Bearings, declination, computation of angle. Traversing – Purpose-types of traverse-traverse computation -traverse adjustments -omitted measurements.

UNIT - III

LEVELING AND CONTOURING: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments - method of levelling. Characteristics and Uses of contours-methods of conducting.

UNIT - IV

THEODOLITE: Theodolite, description, principles - uses and adjustments -temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite - Trigonometrical leveling..

TACHEOMETRIC SURVEYING: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT - V

CURVES: Types of curves, design and setting out - simple and compound curves - transition curves. Introduction to geodetic surveying, Total Station and Global positioning system.

COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text /Reference Books:

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain , Surveying (Vol No.1, 2 &3),16th edition, Laxmi Publications (P) ltd, New Delhi, 2015.
2. SatishGopi, R. Sathi Kumar and N. Madhu, Advance Surveying,2nd edition Pearson Publications,2016.
3. C. Venkataramaiah , Text book of Surveying, 2nd edition, University press, India (P) limited,2014.
4. R. Subramanian Surveying and levelling , 2nd edition, Oxford University press,2007.
5. S.K. Duggal, Text book of Surveying (Vol No.1&2), 3rd Edition, Tata McGraw Hill Publishing Co. Ltd. NewDelhi, 2008.
6. Arora, Text book of Surveying, (Vol No. 1&2),15th Edition, Standard Book House, Delhi.
7. A.M. Chandra , Higher Surveying, 2nd Edition, New Age International Pvt ltd, 2008.
8. S.K. Roy, Fundamentals of surveying, 2nd edition - PHI learning (P) Ltd, 2010.
9. Alak de, Plane Surveying, 2nd edition, S. Chand & Company, New Delhi,2014

B. TECH 3rd SEMESTER	L	T	P	C
	3	-	-	3
19CE3T03: ENGINEERING GEOLOGY &BUILDING MATERIALS				

COURSE OUTCOMES

Students are able to

1. demonstrate knowledge of how geological principles can be applied to engineering practice.
2. identify and classify the geological minerals, measure the rock strengths of various rocks.
3. know about geophysical studies and structural geology
4. identify various building materials and select suitable type of building.
5. know about Timber, alternative material used in civil engineering construction.

SYLLABUS

UNIT-I Introduction

Branches of geology useful to civil engineering - Importance of geology from civil engineering point of view - Brief study of case histories of failure of some civil engineering constructions due to geological draw backs- Branches of geology.

Weathering of rocks: Weathering effect over the properties of rocks, importance of weathering with reference to dams, reservoirs and tunnels- River process and their development.

UNIT-II Mineralogy and Petrology

Mineralogy: Definition of mineral, importance of study of minerals, different methods of study of minerals- Study of physical properties of following common rock forming minerals: Feldsper, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Kyanite, Garnet, Talc, Calcite - Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chromite, Galena, Pyrolusite, Graphite, Magnesite and Bauxite.

Petrology: Definition of rock - Geological classification of rocks into igneous, sedimentary and metamorphic rocks - common structures and textures of igneous. Sedimentary & metamorphic rocks and their distinguishing features- Megascopic and microscopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Rock excavation, stone aggregates.

UNIT-III Structural Geology and Geophysical Studies

Structural Geology:

Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities

Geophysical Studies: Importance of Geophysical studies. Principles of Geophysical study by Gravity methods, Magnetic methods, Electrical methods, Seismic methods, radiometric methods and geothermal method.

UNIT-IV building materials-Stones, Bricks, Tiles, Timber

Stones - Building stones, classification of building stones, quarrying procedures, dressing, and tools for dressing of stones.

Bricks -Composition of brick earth, manufacturing of brick & Tests on brick.

Tiles - Types of tiles, manufacturing of tiles.

Timber-Structure, properties, seasoning of timber; Classification of various types of woods used in buildings, defects in timber; Alternative materials for wood, galvanized iron, fibre-reinforced plastics, steel, aluminum

UNIT-V Lime, Cement and Finishing Materials

Lime: Various ingredients of lime - Constituents of lime stone -classification of lime - various methods of manufacture of lime.

Cement: Portland cement- Chemical Composition - Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance.

FINISHINGS: Damp Proofing and water proofing materials and uses - Paints: Constituents of a paint - Types of paints - Painting of new/old wood- Varnish.

Text/Reference Books

1. N.Chennakesavulu ―A Text book of Engineering Geology, Mac-Millan Publishers India Ltd. 2nd Edition, 2013.
2. Parbin Singh ―Engineering Geology and general geology, S. K. Kataria & Sons, 8thEdition, New Delhi, 2013.
3. F.G. Bell, "Fundamental of Engineering Geology" Butterworths Publications, New Delhi, 2016.
4. SK Duggal, "Building Materials", New Age Publications 4th Edition, April, 2014.
5. Sushil Kumar "Building Materials and construction", Standard Publishers, 20thedition, reprint, 2015.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	3	1.5
19CE3L01: SURVEYING LAB				

COURSE OUTCOMES

Students are able to

1. use conventional surveying tools such as chain/tape, compass, plane table,theodolite, level in the field of civil engineering applications such as structural plotting and highway profiling.
2. apply the procedures involved in field work and to work as a surveying team.
3. demonstrate and Plan a survey appropriately with the skill to understand the surroundings.
4. select accurate measurements, field booking, plotting and adjustment of errors can be understood.
5. prepare and Plot traverses / sides of building and determine the location of points present on field on a piece of paper.
6. generalize the field procedures using total station.

SYLLABUS:

LIST OF EXPERIMENTS

1. Survey by chain survey of road profile with offsets in case of road
2. Survey in an area by chain survey (Closed circuit).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse).
5. Plane table survey: finding the area of a given boundary by the method of Radiation & method of intersection.
6. Two Point Problem by the plane table survey.
7. Fly levelling: Height of the instrument method. (differential levelling) and rise and fall method
8. Fly levelling: Longitudinal Section and Cross sections of a given road profile.
9. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method and reiteration method
10. Theodolite Survey: Finding the distance between two inaccessible points.
11. Tacheomatric survey: Heights and distance problems using tachometric principles.
12. Total Station: Introduction to total station and practicing setting up,levelling up and elimination of parallax error.
13. Total Station: Determination of area using total station.
14. Total Station: Traversing

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	3	1.5
19CE3L02: ENGINEERING GEOLOGY LAB				

Course Outcomes

Students are able to

1. learn geology and its types, various features like fault, fissures, weathering etc., minerals, rocks, and rock formations in relation to civil engineering structures.
2. understand various techniques to determine engineering properties of rocks etc.
3. analyze various techniques to analyze and to made possible solutions for various geological engineering problems.

SYLLABUS:

List of Experiments:

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties , Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrolody): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps- Identification of symbols in maps.

Reference Books:

1. M T MautheshaReddy ‘Applied Engineering Geology Practicals’, 2nd Edition., New Age International Publishers
2. Tony Waltham, ‘Foundations of Engineering Geology’, 3rd edition , Spon Press, 2009.

B. TECH 3rd SEMESTER	L	T	P	C
	-	-	3	1.5
19CE3L03 : COMPUTER AIDED ENGINEERING DRAWING				

Course Outcomes:

Students are able to

1. define the concept of CAD software.
2. discuss various building components using CAD software.
3. examine aspects in 3D views of buildings by using software.
4. practice computer aided solid modeling.

SYLLABUS

UNIT – I

PROJECTIONS OF SOLIDS:

Projection of regular solids inclined to both the planes, Auxiliary views and sectional views of Regular solids.

UNIT –II

DEVELOPMENT OF SURFACES OF RIGHT REGULAR SOLIDS- Prisms, cylinders, pyramids, cone and their parts Interpenetration and Intersection of right regular solids.

UNIT –III

ISOMETRIC PROJECTIONS AND ORTHOGRAPHIC PROJECTIONS- Plane figures, simple and compound solids, isometric projections of objects having non-isometric lines and spherical parts.

UNIT-IV

INTRODUCTION TO COMPUTER AIDED DRAFTING - Generation of points, lines, curves, polygons, dimensioning Types of modeling-Object selection commands, edit, zoom, cross, hatching, pattern filling, utility commands in object selection commands,2D and 3D wire frame modeling. view point coordinates and views displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT-V

COMPUTER AIDED SOLID MODELING- Isometric projections, orthographic projections of isometric projections, Building-plan, Section and Elevation.

Text /Reference Books:

1. N.D. Butt, Engineering Drawing,Chariot Publications 2016
2. KVenugopal& V. Prabhu Raja, Engineering Drawing + AutoCAD,4th Edition,New Age 2011
3. K.L.Narayana& P. Kannaiah, Engineering Drawing Scitech Publishers 2016.
4. K.C. John, Engineering Graphics for Degree PHI, Publishers 2009.
5. PI Varghese, Engineering Graphics,McGrawHill Publishers 2013.
6. K.Venkata reddy, Text book of Engineering Drawing with AutoCAD, 4th Edition, B.S.Publications, 2016.

B. TECH 3rd SEMESTER	L	T	P	C
	2	-	-	-
19GE0M05: Essence of Indian Traditional Knowledge				

Course Objectives:

1. The course aims at imparting basic principles of thought process, reasoning and inferencing. Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.

2. Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

3. The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system. Course Outcomes:

4. Ability to understand, connect up and explain basics of Indian Traditional knowledge modern scientific perspective. Course Content

5. Basic Structure of Indian Knowledge System

6. Modern Science and Indian Knowledge System

7. Yoga and Holistic Health care

8.Case Studies.

Suggested Text/Reference Books:

1. V. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai,5th Edition, 2014
2. Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
3. Fritzof Capra, Tao of Physics
4. Fritzof Capra, The wave of Life
5. V N Jha (Eng. Trans,), Tarkasangraha of Annam Bhatta, Inernational Chinmay Foundation, Velliarnad,Amaku,am
6. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkatta
7. GN Jha (Eng. Trans.) Ed. R N Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakasham, Delhi,2016
8. RN Jha, Science of Consciousness Psychotherapy and Yoga Practices, Vidyanidhi Prakasham, Delhi, 2016.
9. P R Sharma (English translation), Shodashang Hridayam.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
19CE4T01: STRENGTH OF MATERIALS-II				

COURSE OUTCOMES:
Upon successful completion of this course,

1. The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
2. The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
3. The student will be able to assess forces in different types of trusses used in construction.

SYLLABUS:

UNIT-I
Principal Stresses and Strains And Theories Of Failures: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.
Theories Of Failures: Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT-II
Torsion Of Circular Shafts And Springs: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.
Springs: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT III:
Columns And Struts: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions-derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.
Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT IV:
Direct and Bending Stresses: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT V:
Analysis Of Pin-Jointed Plane Frames: Determination of Forces in members of plane pin-jointed perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

Text /Reference Books:

1. R. K. Rajput, Strength of Materials, 7th Edition, S. Chand & Co, New Delhi, 2018.
2. R. Subramanian , Strength of Materials,3rd Editio, Oxford Publications, 2016.
3. B.C Punmia, Jain and Jain , 2nd Edition, Mechanics of Materials, 2017.
4. R.K Bansal , Strength of Materials, 6th Edition, Lakshmi Publications, 2018.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
19CE4T02: FLUID MECHANICS & HYDRAULIC MACHINES				

COURSE OUTCOMES

At end of the course student able to

1. Understand and apply concepts of fluid statics, kinematics and dynamics for solving various fluid flow problems.
2. Analyze various losses in pipe flow problems and understand the measurement of flow.
3. Understand the concept of hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes.
4. Explain the working and performance of various types of turbines and pumps and their characteristics.

SYLLABUS:

UNIT-I

FLUID STATICS: Dimensions and units- physical properties of fluids- specific gravity, viscosity and surface tension- vapour pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure –measurement of pressure- Piezometer, U- Tube and Differential manometers.

UNIT-II

FLUID KINEMATICS: Stream line, path line, streak lines and stream tube-Classification of flows-steady & unsteady, uniform, non-uniform, laminar, turbulent, rotational, and irrational flows-Equation of continuity for one dimensional flow.

FLUID DYNAMICS: Surface and body forces -Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its application on force on pipe bend.

UNIT-III

CLOSED CONDUIT FLOW: Reynold's experiment- Darcy Weisbach equation - Minor losses in pipes, pipes in series and pipes in parallel - Total energy line-hydraulic gradient line.

MEASUREMENT OF FLOW: Pilot tube, venture meter, orifice meter.

UNIT-IV

BASICS OF TURBO MACHINERY AND PUMPS

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes, Force exerted by jet of water on series of vanes.

Centrifugal pumps: Classification, working, work done – Manometric head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

UNIT-V

HYDRAULIC TURBINES: Classification of turbines, impulse and reaction turbines, Pelton wheel,Francis turbine and Kaplan turbine-working proportions, work done, efficiencies , hydraulic design –draft tube theory- functions and efficiency.

PERFORMANCE OF HYDRAULIC TURBINES: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

Text /Reference Books:

1. P.N. MODI and S.M.SETH , Hydraulics, fluid mechanics,20th Edition, Standard book house. 2015
2. R.K.Bansal, A text book of Fluid Mechanics and Hydraulic Machines,10th edition Laxmi Publications.2004.
3. D.S. Kumar, Fluid Mechanics and Fluid Power Engineering, 2nd edition Kotaria & Sons. 2010.
4. D. Rama Durgaiah, Fluid Mechanics and Machinery, 2nd edition , New Age International.2007.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
19CE4T03: STRCTURAL ANALYSIS-I				

COURSE OUTCOMES:

Upon successful completion of this course,

1. Analyze Propped Cantilever and fixed beam under different loading conditions.
2. Deduce Continuous Beams under different loading and support conditions by Clapeyron's theorem of three moments.
3. Evaluate the continuous beam using slope deflection method.
4. Apply Energy theorem in strain energy in linear elastic system & castigliano's first theorem.
5. Explain about the moving loads under different loading conditions & influence lines of S.F & B.M under different loading conditions.

SYLLABUS:

UNIT-I

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

FIXED BEAMS: Introduction to statically indeterminate beams with U. D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT-II

CONTINUOUSBEAMS: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT III:

SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT IV:

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT V:

MOVING LOADS AND INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, ingle point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

Text /Reference Books:

1. V.D. Prasad, Structural Analysis, 3rd Edition,Galgotia publications, 2011.
2. T.S. Thandavamoorthy, Analysis of Structures, 1st Edition, Oxford University Press, New Delhi, 2011
3. Gupta, Pandit & Gupta; Theory of Structures, 1st Edition , Tata McGraw Hill, New Delhi, 2017
4. R.S. Khurmi , Theory of Structures, 1st Edition, S. Chand Publishers.2005.
5. R.C. Hibbeler , Structural analysis, 6th edition, Pearson, New Delhi, 2017.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
19CE4T04: CONCRETE TECHNOLOGY & BUILDING CONSTRUCTION				

COURSE OUTCOMES

Students are able to

1. Identify the characteristics of basic ingredients and properties of concrete
2. Distinguish the properties of fresh and hardened concrete
3. Discriminate Concepts Proportioning of concrete mixes by various methods -BIS method of mix design.
4. Justify the significance of special concretes
5. Prepare building components and various finishing's in building construction.
6. Explain about brick and stone masonry in building construction.

SYLLABUS:

UNIT-I

INGREDIENTS OF CONCRETE & ADMIXTURES: - Concrete ingredients- Admixtures-Mineral and chemical admixtures - accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate - Particle shape & texture - Bond, strength & other mechanical properties of aggregates - Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate -Bulking of sand -Deleterious substance in aggregate - Soundness of aggregate – Alkali aggregate reaction - Thermal properties - Sieve analysis - Fineness modulus - Grading curves - Grading of fine & coarse Aggregates -Gap graded and well graded aggregate as per relevant IS code - Maximum aggregate size. Quality of mixing water.

UNIT - II

FRESH AND HARDENED CONCRETE

Fresh concrete: Steps in Manufacture of Concrete-proportion, mixing, placing, compaction, finishing, curing - including various types in each stage. Properties of fresh concrete-Workability - Factors affecting workability - Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability - Segregation &bleeding - Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

Hardened concrete: Water / Cement ratio - Abram's Law –Gel space ratio - Nature of strength of concrete -Maturity concept - Strength in tension & compression - Factors affecting strength – Relation between compression & tensile strength - Curing, Testing of Hardened Concrete: Compression tests – Tension tests - Factors affecting strength -Flexure tests -Splitting tests - Non-destructive testing methods – codal provisions for NDT.

UNIT - III

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

MIX DESIGN: Factors in the choice of mix proportions - Durability of concrete - Quality Control of concrete - Statistical methods - Acceptance criteria - Concepts Proportioning of concrete mixes by various methods -BIS method of mix design.

SPECIAL CONCRETES: Ready mixed concrete -Light weight aggregate concrete – Cellular concrete -No-fines concrete, High density concrete, Fibre reinforced concrete - High performance concrete.

UNIT - IV

BUILDING COMPONENTS: Lintels, arches, vaults, stair cases - types. Different types of floors - Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs - King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT – V

MASONRY: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls.

BUILDING FINISHINGS: Plastering Pointing, white washing and distempering -Form Works and Scaffoldings.

Text /Reference Books:

1. M.S.Shetty , Concrete Technology, S.Chand& Co. , 2004.
2. M.L. Gambhir, Concrete Technology- Tata Mc. Graw Hill Publishers, New Delhi.
3. A.M.Neville, Properties of Concrete, PEARSON - 4th edition.
4. A.R. Santha Kumar , Concrete Technology, Oxford University Press, New Delhi.
5. S.S. Bhavikatti, Building Construction, Vices publications House private ltd.
6. B.C. Punmia , Building Construction, Laxmi Publications (p) ltd.
7. P.C.Verghese, Building construction, PHI Learning (P) Ltd.

B. TECH 4th SEMESTER	L	T	P	C
	3	-	-	3
19CE4T05: BUILDING PLANNING AND DRAWING				

COURSE OUTCOMES

Students are able to

1. distinguish the different income groups in India and their housing requirements
2. apply the concept of climatology for housing layouts and principles of planning
3. plan the individual rooms with reference to functional and furniture requirements.
4. prepare different sign conventions and bonds
5. develop the skills of Drawing Plans, Sections and Elevations of different houses.
6. design and draw various rooms with the given data.

SYLLABUS:

UNIT-I

BUILDING BYELAWS AND REGULATIONS: Introduction - terminology - objectives of building Bye laws - floor area ratio - floor space index - principles under laying building bye laws - classification of buildings - open space requirements - built up area limitations- height of buildings- wall thickness - lightening and ventilation requirements.

UNIT -II

RESIDENTIAL AND PUBLIC BUILDINGS

Residential buildings: Minimum standards for various parts of buildings -requirements of different rooms and their grouping- characteristics of various types residential buildings.

Public buildings: Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT-III

SIGN CONVENTIONS AND BONDS : Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminum alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT- IV

DOORS, WINDOWS, VENTILATORS AND ROOFS: Panelled door, panelled and glassed door, glassed windows, paneled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT-V

PLANNING AND DESIGNING OF BUILDINGS: Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

Text /Reference Books:

1. Y.S. Sane , Planning and Design of buildings,.
2. Gurucharan Singh and Jagadish Singh , Planning, designing and scheduling,
3. M. Chakravarthi., Building planning and drawing,
4. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur.
5. Shah and Kale , Building drawing,

B. TECH 4th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE4L01 : STRENGTH OF MATERIALS LAB				

COURSE OUTCOMES

Students are able to

1. calculate Young Modulus, torsional strength, hardness and tensile strength of given specimens
2. determine the compressive strength of concrete cubes and bricks
3. estimate stiffness of open coiled and closed coiled springs.
4. evaluate the impact strength of the given specimen.
5. examine the bending moment of the given material (Steel / Wood) of Cantilever beam & simply supported beam.

SYLLABUS:

LIST OF EXPERIMENTS

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam - deflection test.

B. TECH 4th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE4L02: FLUID MECHANICS AND HYDRAULIC MACHINES LAB				

COURSE OUTCOMES

Students are able to

1. determine coefficient of discharge of venture meter and orifice meter
2. calculate friction factor and sudden contraction of given pipeline
3. evaluate impact of jet on vanes
4. test the efficiency of centrifugal pump, multi stage centrifugal pump ,reciprocating pump
5. evaluate the efficiency of pelton wheel ,Francis turbine

LIST OF EXPERIMENTS

1. Calibration of Venturi meter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth pieceby variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

B. TECH 4th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE4L03: CONCRETE TECHNOLOGY LAB				

COURSE OUTCOMES

Students are able to

1. describe the consistency and fineness of cement.
2. identify the setting times of cement.
3. estimate the specific gravity and soundness of cement.
4. discover the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
5. experiment the flakiness and elongation index of aggregates.
6. calculate the bulking of sand.

SYLLABUS:

LIST OF EXPERIMENTS:

At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test.
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus.
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration).

B. TECH 4th SEMESTER	L	T	P	C
	2	-	-	-
19GE0M02: CONSTITUTION OF INDIA				

Unit 1

Constitution – Structure and Principles

1.1: Meaning and importance of Constitution

1.2: Making of Indian Constitution – Sources

1.3: Salient features of Indian Constitution

Unit 2

Fundamental Rights and Directive Principles

: Fundamental Rights

: Fundamental Duties

: Directive Principles

Unit 3

Government of the Union

3.1: President of India – Election and Powers

3.2: Prime Minister and Council of Ministers

3.3: Lok Sabha – Composition and Powers

3.4: Rajya Sabha – Composition and Powers

Unit 4

Government of the States

: Governor – Powers

: Chief Minister and Council of Ministers

: Legislative Assembly – Composition and powers

4.4: Legislative Council – Composition and powers

Unit 5

The Judiciary

: Features of judicial system in India

: Supreme Court –Structure and jurisdiction

5.3: High Court – Structure and jurisdiction

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
19CE5T01: STRUCTURAL ANALYSIS-II				

COURSE OUTCOMES

Students are able to

1. Determine support reactions, normal thrust and radial shear for three hinged and two hinged arches.
2. Apply moment distribution method to continuous beams and portal frames.
3. Solve continuous beams and portal frames using kani's method.
4. Use lateral load analysis to building frames.
5. Analyze cable structures and suspension bridges.

SYLLABUS:

UNIT-I

THREE HINGED AND TWO HINGED ARCHES

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear –Rib shortening and – effect of temperature.

UNIT -II

MOMENT DISTRIBUTION METHOD: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycles.

UNIT-III

Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNIT- IV

LATERAL LOAD ANALYSIS USING APPROXIMATE METHODS: Application to building frames. (i) Portal method (ii) Cantilever method.

UNIT-V

CABLE STRUCTURES AND SUSPENSION BRIDGES: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

Text /Reference Books:

1. T.S.Thandavamoorthy, 'Structural Analysis', Oxford universitypress, India,2015.
2. Devdas menon , "Structural analysis" -Narosa Publishing House,2018.
3. R.C. Hibbeler, 'Structural Analysis', Pearson Education, India,2015.
4. B.C.Punmia, Jain & Jain, 'Theory of Structures – II', Laxmi Publications, India, 2015.
5. C.S. Reddy, Structural Analysis', Tata Mc-Graw hill, New Delhi, 2014.

B. TECH 5th SEMESTER	L	T	P	C
	3	1	-	4
19CE5T02: DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES				

COURSE OUTCOMES

Students are able to

1. Work on different types of design philosophies
2. Carryout analysis and design of flexural members and detailing
3. Design structures subjected to shear, bond and torsion, design for serviceability.
4. Design different type of compression members and footings.
5. Design of different types of slabs and detailing.

SYLLABUS:

UNIT -I

Introduction: Working stress method Design codes and handbooks, loading standards - Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design - Basic statistical principles -Characteristic loads - Characteristic strength - Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design - stress - block parameters - limiting moment of Resistance.

UNIT -II

Design for Flexure: Limit state analysis and design of singly reinforced sections-effective depth-Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity Limiting Percentage of Steel-Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange -Behavior- Analysis and Design.

UNIT - III

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

Limit state design for serviceability: Deflection, cracking and code provision.

UNIT - IV

Design of Compression members: Effective length of a column, Design of short and long columns-under axial loads, uni axial bending and biaxial bending - I S Code provisions.

Footings: Different types of footings-Design of isolated and combined footings-rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

UNIT -V

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to teach in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of four questions with internal choice. Weightage for Part – A is 30% and Part- B is 70%.

Text /Reference Books:

1. A. K. Jain, 'Reinforced Concrete (Limit State Design), Nem Chand & Bros, 7th Edition, 2012.
2. N. Subrahmanyian , 'Design of Reinforced concrete Structures', Oxford; Illustrated edition, 2014.
3. S. Unnikrishna Pillai & Devdas Menon , 'Reinforced Concrete Structures', Tata Mc Graw Hill, New Delhi, 2016.
4. Arthus H.Nilson, David Darwin, and Chorles W. Dolar , 'Design of concrete structures', Tata McGraw Hill, 3rd Edition, 2005.
5. Park and Pauley, Reinforced Concrete Structures', John Wiley and Sons, 2015.

IS Codes:

1) IS -456-2000 (Permitted to use in examination hall)
2) IS - 875
3) SP-16

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
19CE5T03: WATER RESOURCES ENGINEERING				

COURSE OUTCOMES

Students are able to

1. Discuss the theories and principles governing the hydrologic processes.
2. Estimate flood magnitude and carry out flood routing.
3. Describe the design of diversion head works.
4. Generalize planning of reservoirs and stability of the dams.
5. Develop irrigation canals and canal network.

SYLLABUS:

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle.

Precipitation: Types and forms, measurement, rain gauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves.

Evaporation and Evapo-transpiration: factors affecting, measurement, reduction.

Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT – II

Runoff: Catchment characteristics, Factors affecting runoff, computation by empirical formulae, tables and curves. Components of hydrograph, Base flow separation, Unit hydrograph , assumptions, limitation, derivation, application, S-hydrograph.

Floods: Causes and effects, frequency analysis by Gumbel's and Log-Pearson type III distribution methods, flood control methods and management. Hydrologic routing, channel and reservoir routing, Muskingum and Pul's methods of routing.

UNIT – III

Irrigation: Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, standards of quality for Irrigation water, principal crops and crop seasons, crop rotation. Design of erodible canals by Kennedy's silt theory and Lacey's regime theory.

Diversion Head works: Types of Diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failure of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT – IV

Reservoir planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis.

Earth dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters.

UNIT – V

Spillways: Types, design principles of Ogee spillways, types of spillway crest gates.

Falls: Types and their location, design principles of straight glacis fall.

Regulators: Head and cross regulators, design principles.

Canal outlets: types, proportionality, sensitivity and flexibility.

Cross Drainage works: Types, selection, design principles of aqueduct.

Text /Reference Books:

1. Subramanya.K., "Engineering Hydrology", Tata McGraw Hill, New Delhi , 2014.
2. Jayarami Reddy.P., "Hydrology", Tata McGraw Hill, New Delhi , 2016.
3. Ragunath.H., "Hydrology", Wiley Eastern Limited, New Delhi, 2015.
4. B.C Punmia & Lal , Irrigation and water power engineering, Laxmi publications pvt. Ltd., New Delhi.,2018.
5. S.K Garg , Irrigation Engineering and hydraulic structures , Khanna publishers,2015
6. PN Modi , Irrigation Water Resources and Water Power Engineering , Standard Book House,2014.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
19CE5T04: GEOTECHNICAL ENGINEERING				

COURSE OUTCOMES:
Students are able to

1. Develop different methods of index properties of the soils and classify the soils.
2. Compute different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
3. Relate stress distribution in soils in day-to-day civil engineering practice.
4. Estimate compressibility of soils
5. Develop stress-strain behavior of different sands.

SYLLABUS:

UNIT - I

Introduction: Soil formation- soil structure and clay mineralogy -Adsorbed water – Mass-volume relationship - Grain size analysis - Sieve and Hydrometer methods -consistency limits and indices.

Index Properties of Soils: Various Types of soil Classifications - Unified soil classification and I.S. Soil classification-Relative density - Mechanism of compaction - factors affecting - effects of compaction on soil properties -compaction control.

UNIT -II

Permeability: Soil water - capillary rise - One dimensioned flow of water through soils - Darcy's law permeability - Factors affecting -laboratory determination of coefficient of permeability -Permeability of layered systems. Total, neutral and effective stresses -quick sand condition - 2-D flow and Laplace's equation - Seepage through soils -Flow nets: Characteristics and Uses.

UNIT - III

Stress Distribution In Soils: Stresses induced by applied loads -Boussinesq's and Westergaard's theories for point loads and areas of different shapes- Newmark's influence chart - 2:1 stress distribution method.

UNIT - IV

Consolidation: Compressibility of soils - e-σ and e-log σ curves - Stress history - Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation - Determination of coefficient of consolidation (C_v) - Over consolidated and normally consolidated clays.

UNIT - V

Shear Strength of Soils: Basic mechanism of shear strength - Mohr -Coulomb Failure theories - Stress-Strain behavior of Sands - Critical Void Ratio - Stress-Strain behavior of clays - Shear Strength determination various drainage conditions.

Text /Reference Books:

1. Gopal Ranjan and A.S.R.Rao , 'Basic and Applied Soil Mechanics', New Age International Publishers., 2015.
2. R.F.Craig, "Soil mechanics", spon press, Talyor & Francis Group, London**,** Seventh edition, 2014.
3. Braja M. Das and Khaled Sobhan, "Principles of Geotechnical Engineering, Cengage Learning-USA, Eight edition, 2015.
4. Holtz and Kovacs, An introduction to Geotechnical Engineering', Prentice Hall, 2014.
5. B.C.Punmia, Ashok Kumar Jain & Arun kumar Jain , 'Soil Mechanics and Foundations', Laxmi Publications, 16th edition, 2018.

B. TECH 5th SEMESTER	L	T	P	C
	3	-	-	3
19CE5T05: TRANSPORTATION ENGINEERING				

Course Outcomes:
Students are able to

1. Plan highway network for a given area.
2. Determine Highway alignment and design highway geometrics.
3. Illustrate Intersections and prepare traffic management plans.
4. Judge suitability of pavement materials
5. Design of flexible and rigid pavements and their maintenance.

SYLLABUS:

UNIT-I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans - First, second, third road development plans, road development vision 2021, Rural Road Development Plan - Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys - Drawings and Reports.

UNIT - II

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

UNIT - III

Traffic Engineering: Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies -spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections - Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals - Webster Method - IRC Method.

UNIT - IV

Highway Materials: Subgrade soil: classification -Group Index - Subgrade soil strength - California Bearing Ratio - Modulus of Subgrade Reaction. Stone aggregates: Desirable properties - Tests for Road Aggregates - Bituminous Materials: Types - Desirable properties - Tests on Bitumen -Bituminous paving mixes: Requirements - Marshall Method of Mix Design.

UNIT – V

Design, construction and maintenance of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors.

Flexible Pavements: Design factors-Flexible Pavement Design Methods-CBR method-IRC method - Burmister method.

Rigid Pavements: Design Considerations - wheel load stresses - Temperature stresses - Frictional stresses - Combination of stresses - Design of slabs - Design of Joints - IRC method.

Highway Construction and Maintenance: Types of Highway Construction - Earthwork; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements and Construction of Cement Concrete Pavements. Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements.

Text /Reference Books:

1. Khanna S.K., Justo C.E.G and Veeraragavan A 'Highway Engineering ', Nem Chand Bros, Roorkee, 10th Edition, 2016.
2. Kadiyali L.R , 'Traffic Engineering and Transportation' Planning, Khanna Publishers, New Delhi, 2015.
3. Srinivasa Kumar R , 'Highway Engineering', Universities Press, Hyderabad, 2019.
4. Papacostas C.S. and PD Prevedouros , 'Transportation Engineering and Planning', Prentice Hall of India Pvt. Ltd; New Delhi, 2010.
5. Kadiyali LR , 'Principles of Highway Engineering' by, Khanna Publishers, New Delhi, 2017.
6. Jotin Khisty C , 'Transportation Engineering - An Introduction',Prentice Hall, Englewood Cliffs, New Jersey, 2015.
7. Paul H. Wright and Karen K Dixon , 'Highway Engineering', Wiley Student Edition, Wiley India (P) Ltd., New Delhi, 2013.
8. Partha Chakroborthy and Animesh Das , 'Principles of Transportation Engineering', PHI Learning Private Limited, Delhi, 2014.
9. Sharma SK , 'Practice and Design of Highway Engineering' , S.Chand & Company Private Limited, New Delhi, 2018.

B. TECH 5th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE5L01: GEOTECHNICAL ENGINEERING LAB-I				

Course Outcomes:

Students are able to

1. Examine index properties of soil and classify them.
2. Discover permeability of soils.
3. Describe differential free swell.
4. Demonstrate permeability of soil.

SYLLABUS:

LIST OF EXPERIMENTS

1. Determination of water content by oven drying method.
2. Determination of specific gravity by Density bottle method & Pycnometer method.
3. Sieve analysis – Mechanical analysis – dry soil.
4. Hydrometer analysis.
5. Determination of Differential free Swell (DFS).
6. Determination of Shrinkage limit.
7. Determination of Liquid limit & Plastic limit.
8. Determination of field unit weight by Core cutter method & sand replacement method.
9. Determination of permeability by Constant head permeameter.
10. Determination of permeability by Variable head permeameter.

At least eight experiments shall be conducted.

LIST OF EQUIPMENT

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic limit.
3. Apparatus for shrinkage limit.
4. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
5. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
6. Hydrometer
7. Permeability apparatus for
   a) Constant head test
   b) Variable head test
8. Hot air ovens (range of temperature 50)

REFERENCE BOOK:

1. IS 2720 –relevant parts.

B. TECH 5th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE5L02: TRANSPORTATION ENGINEERING LAB				

COURSE OUTCOMES:

Students are able to

1. Evaluate the desirable properties of the pavement materials.
2. Perform quality control tests on pavements and pavement materials.
3. Design the job mix formula for Bituminous Mixes.
4. Demonstrate Marshall Stability test

SYLLABUS:

LIST OF EXPERIMENTS

I. ROAD AGGREGATES:

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

II. BITUMINOUS MATERIALS:

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

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume studies at mid blocks.
2. Traffic volume Studies at intersection.
3. Spot speed studies.
4. Parking study.
5. Speed and delay studies

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Stop Watches

Text /Reference Books:

1. S.K. Khanna, C.E.G Justo and A.Veeraraghavan: Highway Material Testing Manual, Neam Chan Brothers New Chand Publications, New Delhi, 2018.
2. IRC Codes of Practice, 2019.
3. Asphalt Institute of America Manuals.
4. Code of Practice of B.I.S.

B. TECH 5th SEMESTER	L	T	P	C
	2	-	-	-
19GE0M01: ENVIRONMENTAL SCIENCE				

UNIT-I: Multidisciplinary nature of Environmental Studies:

Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects;. Role of information technology in environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem; Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT-II: Natural Resources:

Natural resources and associated problems. Forest resources: Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people.

Water resources: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems.

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification; Role of an individual in conservation of natural resources; Equitable use of resources for sustainable lifestyles.

UNIT-III: Biodiversity and its conservation:

Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV Environmental Pollution:

Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his wellbeing.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V Social Issues and the Environment:

Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

Text Books:

1. K. V. S. G. Murali Krishna , Environmental Studies,VGS Publishers, Vijayawada, 2010
2. R. Rajagopalan, Environmental Studies, 2nd Edition, Oxford University Press, 2011
3. P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani, Environmental Studies, 2nd Edition , Pearson Education, Chennai,2015

Reference:

1. Deeshita Dave & P. Udaya Bhaskar Text Book of Environmental Studies, Cengage Learning, 2011
2. Shaashi Chawla, A Textbook of Environmental Studies, TMH, New Delhi,2017
3. Benny Joseph, Environmental Studies, Tata McGraw Hill Co, New Delhi, 2006
4. Anubha Kaushik, C P Kaushik , Perspectives in Environment Studies, New Age International Publishers, 2014

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6T01: ENVIRONMENTAL ENGINEERING				

COURSE OUTCOMES

Students are able to

1. Recognize the importance of protected water supply, water demand and water quality.
2. Acquire knowledge about different treatment methods.
3. Identify a source of water for water supply to a town or city with respect to quality and quantity of water through distribution system.
4. Understand the sources of sewerage, Estimation and design of sewers and its appurtenances.
5. Explore the FSSM technologies in general.

UNIT- I: Introduction and Sources of Water

Introduction: Water demand: Types of demand – factors affecting – fluctuations – fire demand in detail – storage capacity, water quality and testing, drinking water standards.

Sources of Water: Sources of water and comparison between quality and quantity and other considerations, Types of Intake, Infiltration galleries, Jack wells, springs, confined and unconfined aquifers and wells.

UNIT- II: Sedimentation and Filtration& Disinfection

Sedimentation: Sedimentation: Types of sedimentation, principles, uniform settling velocity, design of sedimentation tank, Coagulation- flocculation Definition and principles, Types of coagulants, feeding arrangements. Optimum dosage of coagulant- Jar test.

Filtration& Disinfection: Filtration theory/ Principles, Construction and working of slow and rapid gravity filters, multimedia filters, design of filters, troubles in operation, comparison of filters, Disinfection – Types of disinfection - Theory of chlorination - chlorine demand, Residual chlorine test.

UNIT- III: **Conservancy and Water Carriage System**

Definition of sewage, characteristics of sewage, Decomposition of sewage, cycles of decay examination of sewage – B.O.D, – C.O.D equations. Sewage and storm water estimation – time of concentration – storm water overflows, combined flow, Sewers shapes and materials, Design of Sewer, Sewer appurtenances: Manholes – Inverted siphon – Catch basins – Flushing tanks – Ejectors, pumps and pump houses, house drainage – components requirements, sanitary fittings-traps, one pipe and two pipe systems of plumbing.

UNIT- IV: **Waste Water Effluent Treatment methods and disposal**

Lay out of Waste Water Effluent Treatment plant, Primary treatment: Types and classification of screens, grit chambers, skimming tanks, sedimentation tanks, principles and design of biological treatment: Trickling filters, standard, high rate Trickling filter and Activated sludge process. Ultimate disposal of sewage, sewage farming dilution, Sludge digestion tanks– Sludge disposal by drying – septic tanks, working principles and design, design of oxidation ponds.

UNIT-V Introduction to faecal sludge and septage management

Overview of faecal sludge- the importance of an integrated approach to faecal sludge management -The Global Situation- Designing for faecal sludge management treatment- end use.

Test books:

1. G.S. Birdi"Water supply and sanitary Engineeringy", Dhanpat Rai & Sons Publishers 2010.
2. Dr. B.C.Punmia, Ashok Jain &Arun Kumar Jain, "Water Supply Engineering", Vol. I "Waste water Engineering", Vol. II, Laxmi PublicationsPvt.Ltd, New Delhi 2nd Edition 2016.
3. S.K. Garg, "Water Supply Engineering: Environmental Engineering" Vol.I Khanna Publications,New Delhi 2010.
4. Faecal Sludge and Septage Management-V.Srinivas Chary,G Bala Subramanyam- Dr Y.Malini Reddy, Mayank Gupta, G.V.L.N.Murthy, Dr M.S.V.K.V.Prasad, A.Venkata Krishna-Administrative Staff College of India-Hyderabad-2019

References:

1. "Water and Waste Water Technology" by Steel. 2. Metcalf and Eddy 2004.
2. Mark J. Hammer, Sr. Mark J. Hammer "Water and WastewaterTechnology", 6th Edition, HDR Engineering, Inc. ©, 2008.
3. S.C.Rangwala, revised by K.S.Rangwala&P.S.Rangwala"WaterSupply and Sanitary Engineering" 14th edition, 2014.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6T02: REMOTE SENSING & GIS				

Course outcomes:

Students are able to

1. Describe the basic principles of Remote Sensing and GIS techniques.
2. Identify familiar with ground, air and satellite based sensor platforms.
3. Interpret the aerial photographs and satellite imageries.
4. List and create input spatial data for GIS application.
5. Recognize the application of RS and GIS in Civil engineering.

SYLLABUS

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-Band Interleaved by Pixel, Band Interleaved by Line, Band Sequential, IRS, LANDSAT, SPOT.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image Preprocessing, image enhancement, image classification, supervised classification, unsupervised Classification.

UNIT - III

Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT - IV

Spatial data analysis: Introduction overlay function-vector overlay operations, raster Overlay operations, arithmetic operators, comparison and logical operators, conditional Expressions, overlay using a decision table, network analysis-optimal path finding, network Allocation, network tracing.

UNIT - V

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, Geomorphology, urban applications.

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater Prospects and potential recharge zones, watershed management

Text /Reference Books:

1. Bhatta B , 'Remote sensing and GIS', Oxford University Press,2008.
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi, 2013.
3. Schowenger, R. Remote Sensing Elsevier publishers, 2006
4. George Joseph ,'Fundamentals of Remote Sensing' Universities Press, 2013.
5. Demers, M.N,Wiley 'Fundamentals of Geographic Information Systems' India Pvt. Ltd, 2013.
6. Narayan LRA 'Remote Sensing and its Applications' Universities Press, 2012.

7. Pang Lo and A K W Yeung, 'Concepts and Techniques of Geographical Information System' Chor Prentice Hall (India), 2006.
8. Kand Tsung Chang, 'Introduction to Geographic Information Systems' McGraw Hill Higher Education, 2009.
9. Kumar S, 'Basics of Remote sensing & GIS', Laxmi Publications, New Delhi, 2005.
10. Burrough P A and R.A. McDonnell, 'Principals of Geographical Information Systems', Oxford University Press, 1998.

B. TECH 6th SEMESTER	L	T	P	C
	3	1	-	4
19CE6T03: DESIGN AND DRAWING OF STEEL STRUCTURES				

COURSE OUTCOMES:

Students are able to

1. Understand riveted connections and welded connections, design fillet weld subjected to moment acting in the plane and at right angles to the plane of the joint.
2. Design of tension members and compression members
3. Design of columns along with design of slab base and gusset base.
4. Design of simple beams and compound beams.
5. Design plate girder and gantry girder with connection detailing.

SYLLABUS:

UNIT - I

Connections: Riveted connections - definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses - IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT - II

Tension Members and compression members: General Design of members subjected to direct tension and bending -effective length of columns. Slenderness ratio-permissible stresses. Design of compression members, struts etc.

UNIT - III

Design of Columns: Built up compression members-Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

UNIT -IV

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compoundbeams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT - V

Design of Plate Girder: Design consideration - I S Code recommendations Design of plate girder-Welded - Curtailment of flange plates, stiffeners - splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II - V. The students should prepare the following plates.

Plate 1: Detailing of simple beams.
Plate 2: Detailing of Compound beams including curtailment of flange plates.
Plate 3: Detailing of Column including lacing and battens.
Plate 4: Detailing of Column bases - slab base and gusseted base.
Plate 5: Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of four questions with internal choice. Weightage for Part- A is 30% and Part- B is 70%.

Text /Reference Books:

1. N.Subramanian, 'Steel Structures Design and Practice', Oxford University Press, 2015.
2. Ramachandra 'Design of Steel Structures' Vol - 1, Universities Press, 2014.
3. S.K. Duggal, 'Design of steel structures', Tata Mcgraw Hill, and New Delhi, 2013.
4. S.S. Bhavakatti , Design of Steel Structures', 2018.
5. Sarwar Alam Raz , 'Structural Design in Steel', New Age International Publishers, New Delhi, 2015.
6. P. Dayaratnam , 'Design of Steel Structures' S. Chand Publishers, 2014.
7. M. Raghupathi, 'Design of Steel Structures' Tata Mc. Graw-Hill, 2015.
8. N. Krishna Raju 'Structural Design and Drawing' University Press, 2014.

IS Codes:

1) IS -800 - 2007
2) IS - 875
3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E01: ADVANCED STRUCTURAL ANALYSIS				

ELECTIVE-I

Course Outcomes:

Students are able to

1. Determine unknowns in a structures using flexibility method.
2. Analyze structures using stiffness methods.
3. Explain plane stress & plane strain in theory of elasticity.
4. Solve multiple degrees of freedom of two dimensional problems in rectangular co-ordinates.
5. Discuss dynamic loadings and free vibrations in a structure.

SYLLABUS:

UNIT- I

Flexibility Method:

Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

UNIT- II

Stiffness method:

Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

UNIT- III

Introduction to theory of elasticity: notations for forces and stresses, components of stresses, components of strains, Hooke's law.

Plane stress and plane strain: Definitions, differential equations of equilibrium, boundary conditions, and compatibility equations.

UNIT- IV

Two dimensional problems in rectangular co-ordinates: Airy stress function, solution by polynomials, saint venant principle, solution of bi-harmonic equation using Fourier series.

UNIT – V

Introduction to structural dynamics: Dynamic loadings, formulation of equation of motion-Newton's second law of motion, D'Alembert's principle, solution of undamped single degree of freedom system.

Free Vibrations: Damped single degree of freedom system, Viscous damping, equation of motion, critically damped, over damped and under damped system, logarithmic decrement.

Text /Reference Books:

1. Dr. P. Dayaratnam , Advanced structural analysis, Tata McGraw hill publishing company Limited, 2015.
2. Robert E Sennet , Matrix analysis of structures- Prentice Hall-Englewood cliffs-New Jercy, 2014.
3. Timoshenko and Goodier , Theory of Elasticity by, McGraw Hill Book Company, New Delhi, 2015.
4. Mario Paz , Structural Dynamics, CBS Publishers, New Delhi, 2014.
5. sadhu singh , Theory of Elasticity, Khanna Publishers, 2015.
6. A.K.Chopra , Dynamics of structures, Prentice Hall of India, 2014.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E02: FOUNDATION ENGINEERING				

ELECTIVE-I

COURSE OUTCOMES:

Students are able to

1. Explain the various types of shallow foundations and decide on their location based on soil characteristics.
2. Compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
3. Develop field test data and arrive at the bearing capacity.
4. Examine the principles of bearing capacity of piles and design them accordingly.
5. Interpret load carrying capacity of piles and wells.

SYLLABUS:

UNIT - I

Soil Exploration: Need- Methods of soil exploration-Boring and Sampling methods- Field tests - Penetration Tests - Pressure meter-planning of Programme and preparation of soil investigation report.

UNIT - II

Earth Slopes And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay - types of failures - factor of safety of infinite slopes - stability analysis by Swedish arc method, standard method of slices - Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions. Rankine's & Coulomb's theory of earth pressure - Culmann's graphical method - earth pressures in layered soils.

UNIT-III

Shallow Foundations - Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity - criteria for determination of bearing capacity - factors influencing bearing capacity - analytical methods to determine bearing capacity - Terzaghi's theory - IS Methods.

UNIT-IV

Shallow Foundations - Settlement Criteria: Safe bearing pressure based on N- value - allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT -V

Pile Foundation: Types of piles - Load carrying capacity of piles based on static pile formulae - Dynamic pile formulae- Pile load tests - Load carrying capacity of pile groups in sands and clays.

Well Foundations: Types- Different shapes of well - Components of well- functions- forces acting on well foundations- Design Criteria-Determination of steining thickness and plug - construction and Sinking of wells - Tilt and shift.

Text /Reference Books:

1. Gopal Ranjan & ASR Rao , 'Basic and Applied Soil Mechanics', New Age International Pvt. Ltd, 2004.
2. MUNI BUDHU , "Soil Mechanics and Foundations", Third edition, JOHN WILEY & SONS, INC, 2013.

3. H. G. Poulos & E. H. Davis , “Pile Foundation Analysis and Design” -Rainbow Bridge Book Co., 1980.
4. Michael Tomlinson and John Woodward , "Pile Design and Construction Practice”, 6th Edition, CRC Press-Talyor & Francis Group, 2012.
5. V.N.S.Murthy , ‘Soil Mechanics and Foundation Engineering’,CBS publishers, 2015.
6. Bowles, J.E., , Foundation Analysis and Design, McGraw-Hill Publishing Company, Newyork. , 4th Edition, 1988.
7. Das, B.M., ‘Principles of Foundation Engineering ‘ -Cengage learning, 6th edition (Indian edition), 2011.
8. B.C.Punmia, “Soil Mechanics and Foundations” , 2018.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E03: PAVEMENT MATERIALS				

ELECTIVE-I

COURSE OUTCOMES:

Students are able to

1. Identify and describe various pavement materials.
2. Identify the tests and procedure to evaluate different pavement materials and interpret the results
3. Design bituminous and mixes and analyze their performances.
4. Design pavement quality concrete.
5. List and identify alternative pavement systems and materials.

SYLLABUS:

UNIT - I

Soil materials: As sub-grade, sub-base and base course, Basic engineering properties; resilient modulus, CBR and plate load test.

UNIT - II

Road Aggregates: Aggregate Classification, physical properties and evaluation, Job mix formula.

UNIT - III

Road binders: Bitumen, cutback, emulsion, modified binders and cement. Physical properties of different binders and tests, rheology binders, modified binders

UNIT - IV

Mix design: WBM and WMM mix design, Marshall mix design and Super pave procedure; design of emulsified mixes, fatigue and rutting behaviours of bituminous mixtures; visco elastic analysis of asphalt mixes. Concrete mix design, flexural test, concrete block pavement, Alternate and marginal materials in Rural Roads.

UNIT - V

Soil stabilization - Methods used in soil stabilizations; Evaluation and design of stabilized sub-grade, Use of geo-synthetics.

Text /Reference Books:

1. P. H. Wright John Wiley & Sons, Highway Engineering, 1996.
2. S. K. Khanna and C. E. G. Justo, Highway Material Testing, New Chand & Bros., 1999.
3. E. J. Yoder and M. W. Witczak, Principles of Pavement Design, 2nd Edition, Yang H, 2015.
4. Huang, Pavement Analysis and Design, Pearson Prentice Hall, 2004.
5. A. T. Papagiannaki , and E. A. Masad, Pavement Design and Materials, John Wiley and Sons, New Jersey, USA, 2008.
6. Relevant IRC, ASTM, AASHTO, SHRP and other Codes, Manuals and Specifications
7. D. Croney, and P. Croney, Design and Performance of Road Pavements, McGraw- Hill, 1998.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E04: DESIGN OF HYDRAULIC STRUCTURES				

ELECTIVE-I

Course Outcomes:

Students are able to

1. Design & drawing of Sloping glacis weir
2. Design & drawing of Sloping glacis weir
3. Design & drawing of Surplus weir.
4. Design & drawing of Trapezoidal notch fall.
5. Design & drawing of Canal regulator.

SYLLABUS:

Design and drawing of the following hydraulic structures.

1. Sloping glacis weir.
2. Tank sluice with tower head
3. Surplus weir.
4. Trapezoidal notch fall.
5. Canal regulator.

Final Examination pattern:

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

Text /Reference Books:

1. C.Satyanarayana Murthy , Design of minor irrigation and canal structures by, Wiley eastern Ltd, 2016.
2. S.K.Garg , Irrigation engineering and Hydraulic structures, Stand book house, 2015.
3. B.C. Punmia & Lal, Irrigation and water power engineering by, Laxmi publications pvt. Ltd. New Delhi, 2015.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E05: AIR POLLUTION & CONTROL				

ELECTIVE-I

Course Outcomes:

Students are able to

1. Define the ambient air quality based the analysis of air pollutants.
2. Design principles of particulate and gaseous control measures for an industry.
3. Judge the plume behavior in a prevailing environmental condition.
4. Estimate carbon credits for various day to day activities.
5. Outline the air pollution control methods.

SYLLABUS:

UNIT– I :Air Pollution:

Sampling and analysis of air pollutants, conversion of ppm into μg/m3. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution - Climate Change and its impact - Carbon Trade.

UNIT-II: Thermodynamics and Kinetics of Air-pollution:

Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution- Odor pollution control, Flares.

UNIT – III: Meteorology and Air Pollution:

Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behavior and Air Quality - Wind rose diagrams, Plume Rise Models.

UNIT-IV: Ambient Air Quality Management:

Monitoring of SPM, SO_2; NOx and CO – Stack Monitoring for flue gases - Micro-meteorological monitoring - Weather Station.-Emission Standards- Gaussian Model for Plume Dispersion.

UNIT-V: Air Pollution Control:

Control of particulates - Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments - Settling Chambers, Cyclone separators –Fabric filters- Scrubbers, Electrostatic precipitators.

Text /Reference Books:

1. M.N. Rao and H.V.N. Rao , Air Pollution - Tata McGraw Hill Company, 2015.
2. KVSG Murali Krishna , Air Pollution and Control , Laxmi Publications, New Delhi,2014.
3. R.K. Trivedy and P.K. Goel An Introduction to Air pollution, B.S. Publications, 2017.
4. Wark and Warner - Harper & Row, Air pollution, New York, 2015.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E06: EARTHQUAKE ENGINEERING				

ELECTIVE-II

Course outcomes:

Students are able to

1. Identify different seismic zones of india.
2. explain seismic design concepts
3. calculate earthquake load on a building system
4. Describe modern concepts and base isolation techniques.
5. Develop retrofitting and restoration of buildings subjected to damage due to earthquakes.

SYLLUBUS:

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms– seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames(MRF) – ductility of MRF – Infill wall – Nonstructural elements.

UNIT-III

Calculation of EQ load – 3D modeling of building systems and analysis (theory only) Design and ductile detailing of Beams and columns of frames Concept of strong column weak beams, Design and ductile detailing of shear walls.

UNIT-IV

Cyclic loading behavior of RC, steel and pre- stressed concrete elements - modern concepts- Base isolation – Adaptive systems – case studies.

UNIT-V

Retrofitting and restoration of buildings subjected to damage due to earthquakes- effects of earthquakes – factors related to building damages due to earthquake- methods of seismic retrofitting- restoration of buildings.

Text /Reference Books:

1. Pankaj Agarwal and Manish ShriKhande, Earthquake Resistant Design of Structures, Prentice – Hall of India, 2007, New Delhi, 2015.
2. Bullen K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University Press 1996.
3. Relevant code of practices.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E07: EARTH RETAINING STRUCTURES				

ELECTIVE-II

COURSE OUTCOMES:

Students are able to

1. Differentiate different types of earth pressures.
2. Generalize types of failures of retaining walls.
3. Identify sheet pile structures and location of anchors.
4. Analyze failure modes of Embankments on problematic soils.
5. Design Various Components of a Braced cut.

SYLLABUS:

UNIT-I

Earth pressures – Different types and their coefficients- Classical Theories of Earth pressure – Rankine's and Coulomb's Theories for Active and Passive earth pressure- Computation of Lateral Earth Pressure in Homogeneous and Layered soils- Graphical solutions for Coulomb's Theory in active and passive conditions.

UNIT-II

Retaining walls – different types - Type of Failures of Retaining Walls – Stability requirements – Drainage behind Retaining walls – Provision of Joints – Relief Shells.

UNIT-III

Sheet Pile Structures – Types of Sheet piles – Cantilever sheet piles in sands and clays – Anchored sheet piles – Free earth and Fixed earth support methods – Row's moment reduction method – Location of anchors, Forces in anchors.

UNIT-IV

Soil reinforcement – Reinforced earth - Different components – their functions – Mechanics of reinforced earth – Failure modes-Failure theories – Design of Embakments on problematic soils.

UNIT-V

Braced cuts and Cofferdams: Lateral Pressure in Braced cuts – Design of Various Components of a Braced cut – Stability of Braced cuts – Bottom Heave in cuts. – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects– TVA method and Cummins' methods.

Text /Reference Books:

1. Braja M. Das , Principles of Foundation Engineering, 2015.
2. Bowles, JE , Foundation analysis and design, McGraw Hill, 2015.
3. Terzaghi, K and Rolph, B. peck , Soil Mechanics in Engineering Practice, John Wiley & Co., 2nd Edn., 2016.
4. Prakash, S, Saritha Prakashan, Analysis and Design of Foundations and Retaining Structures, , Mearut, 2016.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E08: RAILWAY, AIRPORT & HARBOUR ENGINEERING				

ELECTIVE-II

Course Outcomes:

Students are able to

1. apply geometrics in a railway track.
2. develop good transportation network
3. prepare airport planning and geometrics
4. describe airfield pavements.
5. plan and maintenance of Docks Harbours.

SYLLABUS:

A.RAILWAY ENGINEERING

UNIT - I

Components of Railway Engineering: Permanent way components -Railway Track Gauge Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast -Rail Fastenings - Creep of Rails- Theories related to creep - Adzing of Sleepers- Sleeper density - Rail joints.

UNIT - II

Geometric Design of Railway Track: Alignment - Engineering Surveys -Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency - Degree of Curve – safe speed on curves – Transition curve Compound curves - Reverse curves - Extra clearance on curves - widening of gauge on curves- vertical curves - cheek rails on curves.

UNIT - III

Turnouts & Controllers: Track layouts - Switches - Design of Tongue Rails - Crossings - Turnouts – Layout of Turnout - Double Turnout - Diamond crossing - Scissors crossing. Signal Objectives - Classification – Fixed signals - Stop signals - Signaling systems Mechanical signaling system - Electrical signaling system – System for Controlling Train Movement - Interlocking - Modern signaling Installations.

B.AIRPORT ENGINEERING

UNIT - IV

Airport Planning & Design: Airport Master plan- Airport site selection-Air craft characteristics-Zoning laws - Airport classification - Runway orientation - Wind rose diagram - Runway length - Taxiway design - Terminal area and Airport layout - Visual aids and Air traffic control.

Runway Design: Various Design factors - Design methods for Flexible pavements- Design methods for Rigid pavements- LCN system of Pavement Design- Airfield Pavement Failures - Maintenance and Rehabilitation of Airfield pavements- Evaluation & Strengthening of Airfield pavements-Airport Drainage- Design of surface and subsurface drainage.

C.DOCKS & HARBOURS

UNIT - V

Planning, Layout, Construction & Maintenance of Docks & Harbours:

Classification of ports - Requirement of a good port -classification of Harbours - Docks - Dry & wet docks - Transition sheds and workhouses - Layouts; Quays - construction of Quaywalls - Wharves - Jetties - Tides - Tidal data and Analysis - Break waters - Dredging - Maintenance of Ports and Harbours - Navigational aids.

Text /Reference Books:

1. Satish Chandra and Agarwal M.M , Railway Engineering., Oxford University Press, New Delhi, 2018.
2. Khanna & Arora , Airport Engineering - Nemchand Bros, New Delhi, 2015.
3. Bindra S.P , Docks and Harbour Engineering - Dhanpathi Rai & Sons, New Delhi, 2014.
4. Saxena & Arora , 'Railway Engineering'- Dhanpat Rai, New Delhi, 2015.
5. Wright P.H. & N.J , 'Transportation Engineering Planning Design'. - John Wiley & Sons, 2015.
6. Virendra Kumar , 'Airport Engineering', Dhanpat Rai Publishers, New Delhi , 2012.
7. Srinivasa Kumar R, 'Transportation Engineering',University Press, Hyderabad, 2019.
8. Subramanian KP , 'Highway, Railway, Airport and Harbour Engineering', Scitech Publications (India) Pvt. Limited, Chennai, 2010.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E09: OPEN CHANNEL FLOW				

ELECTIVE-II

Course Outcomes:

Students are able to

1. Understand basic concepts of surface flows
2. Compute methods and analysis of gradually varied flow
3. Know the characteristics of Rapidly Varied Flow
4. Identify principles and classification of spatially varied flow
5. Estimate flow in channel of non-linear alignment.

SYLLABUS:

UNIT - I

Introduction: Basic concepts of free surface flows, velocity and pressure distribution, Mass, energy and momentum principle for prismatic and non-prismatic channels, Review of Uniform flow: Standard equations, hydraulically efficient channel sections, compound sections Energy-depth relations: Concept of specific energy, specific force, critical flow, critical depth, hydraulic exponents, and channel transitions.

UNIT - II

Gradually Varied Flow (GVF): Equation of gradually varied flow and its limitations, flow classification and surface profiles, Control sections, Computation methods and analysis: Integration of varied flow equation by analytical, graphical and advanced numerical methods, Transitions of subcritical and supercritical flow, flow in curved channels.

UNIT - III

Rapidly Varied Flow (RVF): Characteristics of rapidly varied flow, Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Hydraulic jump in gradually and suddenly expanding channels, submerged hydraulic jump, rolling and sky jump, use of jump as an energy dissipater, Flow measurement: by sharp crested and broad crested weirs, critical depth flumes, sluice gate, Free overfall. Rapidly varied unsteady flow: Equation of motion for unsteady flow, "Celerity" of the gravity wave, deep and shallow water waves, open channel positive and negative surge

UNIT - IV

Spatially Varied Flow (SVF): Basic principles, Differential SVF equations for increasing and decreasing discharge, Classifications and solutions, Numerical methods for profile computation, Flow over side-weir and Bottom-rack.

UNIT - V

Flow in channel of non-linear alignment and non-prismatic channel sections, Design considerations for sub critical and super critical flows, Design of culvert.

Text /Reference Books:

1. Chow, V.T., Open channel Hydraulics, McGraw Hill International, 2010.
2. Henderson, F.M., Open Channel Flow, McGraw Hill International, 2012.
3. Subramanya, K., Flow in Open Channels, Tata McGraw Hill, 2017.
4. Ranga Raju, K.G., Flow through open channels, T.M.H, 2018.
5. M. Hanif Chaudhry, Open Channel Flow, PHI, 2010.
6. French, R.H., Open channel Hydraulics, McGraw Hill International, 2015.
7. Srivastava, Flow through Open Channels, Oxford University Press, 2012.

B. TECH 6th SEMESTER	L	T	P	C
	3	-	-	3
19CE6E10: SOLID & HAZARDOUS WASTE MANAGEMENT				

ELECTIVE-II

Course Outcomes:

Students are able to

1. Acquire knowledge in classification of solid waste and quality assessment methods of sampling.
2. Understand the solid waste collection and transport methods, and other design requirements, operational maintenance.
3. Gain knowledge in waste processing techniques and to engage in reduce and recycle, and reuse methods
4. Identify different techniques for waste disposal
5. A broad understanding about solid waste management techniques.

UNIT-I: Introduction to Municipal Solid Waste

Definition - Sources and Impacts of solid waste on environment, Classification of solid waste-composition and its determinants of Solid waste-factors influencing generation-quantity assessment of solid wastes-methods of sampling and characterization.

UNIT-II: Integrated Solid Waste Management

Collection: Collection of Solid waste, equipments, time and frequency of collection, factors affecting collection, analysis of collection system, collection routes. Transfer and Transport: Need for transfer operation, transfer stations – types – transport means and methods – location of transport stations Transfer stations & design requirements.

UNIT-III: Hazardous Waste Management

A: Introduction to Hazardous Waste

Definition, Identification, Characteristics and Classification, Sources, Collection and Transport.

B: Hazardous waste Treatment

Physical & chemical Treatment: Solidification and Stabilization; Thermal: Incineration, Pyrolysis, Biological: Aerobic, Anaerobic and Biochemical.

UNIT-IV: Waste to Energy options

Introduction- Five Waste to Energy Technologies, Composting, principles of composting, factors affecting composting, vermi composting, Landfill technique, and design and operating procedure of landfill.

UNIT-V: Solid & Hazardous Waste Management Legislations

Solid waste management Hierarchy, waste avoidance /waste prevention, Definition of source Reduction, waste reduction at source using 5R's Technique, Solid and Hazardous waste management rules and regulations.

Test / Reference books:

1. Jimmy Alexander Faria Albanese, M. Pilar Ruiz, "Solid Waste as a Renewable Resource: Methodologies", Apple Academic Press, 1st edition, 2015.
2. Sunil Kumar, "Municipal Solid Waste Management in Developing Countries", CRC Press, 1st edition, 2016.
3. P. Jayarama Reddy, "Municipal Solid Waste Management: Processing - Energy Recovery - Global Examples", CRC Press - BS Publications 1st edition, 2015.
4. Elena Cristina Rada, "Solid Waste Management: Policy and Planning for a Sustainable Society", Apple Academic Press, 1st edition, 2016.
5. Syeda Azeem Unnisa, S. Bhupatthi Rav, "Sustainable Solid Waste Management", Apple Academic Press, 1st edition, 2012.

B. TECH 6th SEMESTER	L	T	P	C
	-	-	3	1.5
19CE6L01: ENVIRONMENTAL ENGINEERING LAB				

COURSE OUTCOMES

Students are able to

1. Estimate some important characteristics of water, wastewater in the laboratory.
2. Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.
3. Estimate Chloride, EC and Salinity and suggest their suitability for Construction/Agriculture.
4. Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments.
5. Demonstration of various instruments used in testing of water and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.

List of Experiments

1. Determination of pH of water and soil
2. Determination of Turbidity of water from different sources
3. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
4. Determination of Alkalinity/Acidity.
5. Determination of Chlorides and Fluoride
6. Determination of Iron and Nitrates
7. Determination of Dissolved Oxygen.
8. Determination of Total Hardness and sulphates
9. Determination of B.O.D
10. Determination of C.O.D
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coli form test.

NOTE: At least 10 of the experiments enlisted are to be conducted.

Text Books:

1. Standard Methods for Analysis of Water and Waste Water –APHA

2. KVSG Murali Krishna , Chemical Analysis of Water and Soil, Reem Publications, NewDelhi, 2010.

References:

1. Relevant IS Codes.

2. Sawyer and Mc.Carty , Chemistry for Environmental Engineering.

B. TECH 6th SEMESTER	L	T	P	C
	0	0	3	1.5
19CE6L02: GIS and STAAD Lab				

Course outcomes:

Students are able to

1. Work comfortably on GIS software
2. Digitize and create thematic map and extract important features
3. Develop digital elevation model
4. Use structural analysis software to analyze and design 2D and 3D frames.
5. Design and analyze retaining wall and simple towers using STAAD software.

SYLLABUS

LIST OF EXPERIMENTS:

GIS:

SOFTWARE:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

EXCERCISES:

1. Geo-referencing & Rectifying the given Map/Toposheet
2. Digitization of Map/Toposheet
3. Creation of thematic maps.
4. Study of features estimation
5. Simple applications of GIS in water Resources Engineering or Transportation Engineering.

STAAD:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design

TEXT BOOK:

1. Concept and Techniques of GIS by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers, 2002.

B. TECH 6th SEMESTER	L	T	P	C
	2	-	-	-
19GE0M03: PE & IPR				

UNIT I: Engineering Ethics: Importance of Engineering Ethics-–Professional and Professionalism – Professional Roles to be played by an Engineer –Professional Ethics.

UNIT II: Engineering as Social Experimentation: Role of engineering in knowledge society-Knowledge acquired – Conscientiousness – Relevant Information –Engineers as Managers, Consultants, and Leaders.

Engineers' Responsibility for Safety and Risk: Role and importance of Safety and risk- Types of Risks – Threshold Levels for Risk– Risk Benefit Analysis.

UNIT III : Engineers' Responsibilities and Rights: Collegiality-Conflict of Interest-solving conflict problems – Ethical egoism-Collective bargaining -Confidentiality-Acceptance of Bribes/Gifts—Occupational Crimes-industrial espionage-Whistle Blowing-types of whistle blowing.

UNIT IV: Intellectual property and Copy Rights: Introduction to Intellectual Property Law - Types Of Intellectual Property -Infringement

Copyrights: Introduction to Copyrights – Principles of Copyright – Rights Afforded by Copyright Law – Copyright Formalities and Registration.

UNIT V: Patents and Trademarks: Introduction to Patent Law –Rights under Patent Law – Patent Requirements – Patent Application Process and Granting of Patent – Double Patenting – Patent Cooperation Treaty.

Trademarks: Introduction to Trade Mark – Trade Mark Registration Process – Trade Mark maintenance – Likelihood of confusion

Books Recommended:

1. M.Govindarajan, S.Natarajan and V.S.SenthilKumar -"Engineering Ethics and Human Values" -PHI Learning Pvt. Ltd-2009.
2. Prof.A.R.Aryasri, DharanikotaSuyodhana- "Professional Ethics and Morals" -Maruthi Publications-2012
3. Deborah E. Bouchoux: "Intellectual Property". Cengage learning , New Delhi-2010
4. PrabhuddhaGanguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi-2002
5. "Professional Ethics and Human Values" by A.Alavudeen, R.KalilRahman and M.Jayakumaran-Laxmi Publications-2012
6. Harris, Pritchard and Rabins "Engineering Ethics" CENGAGE Learning, India Edition, 2009

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7T01: ESTIMATION, SPECIFICATIONS AND CONTRACTS				

COURSE OUTCOMES:

Students are able to

1. Determine the quantities of different components of buildings.
2. Find the cost of various building components.
3. Determine the quantities of earthwork and prepare bar bending schedule.
4. Finalize the contract, specifications and value of structures.
5. Prepare detailed estimation of buildings.

SYLLABUS:

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT – II

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-III

Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

UNIT – IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings-Standard specifications for different items of building construction.

UNIT-V

Detailed Estimation of Buildings using individual wall method and centre line method.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of SIX questions from Unit 1 to Unit 4, out of which THREE are to be answered (60% weight-age) & ONE mandatory question (40% weight-age) from Units 5 is to be answered.

Text /Reference Books:

1. B.N. Dutta , 'Estimating and Costing', UBS publishers, 2000.
2. B. S. Patil 'Civil Engineering Contracts and Estimates', Universities Press (India) Pvt. Ltd., Hyd, 2010.
3. Rajiv Gupta , 'Construction Planning and Technology', CBS Publishers & Distributors Pvt. Ltd. New Delhi, 2014.
4. G.S. Birdie , 'Estimating and Costing, 2015.
5. 'Standard Schedule of rates and standard data book' by public works department.
6. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
7. M. Chakraborthi , 'Estimation, Costing and Specifications', Laxmi publications, 2018.
8. National Building Code.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E11: REPAIRS & REHABILITATION OF STRUCTURES				

ELECTIVE-III

COURSE OUTCOMES:
Students are able to
1. Identify the Materials for repair and rehabilitation.
2. Know the Strengthening and stabilization Techniques.
3. Acquire knowledge about Bonded installation techniques.
4. Discuss different types of concrete.
5. Develop high performance concrete.

SYLLABUS:

UNIT-I
Materials for repair and rehabilitation -Admixtures- types of admixtures-purposes of using admixtures-chemical composition- Natural admixtures- Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Non destructive evaluation: Importance- Concrete behavior under corrosion, disintegrated mechanisms-moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT-II
Strengthening and stabilization- Techniques- design considerations-Beam shear capacity strengthening-Shear Transfer strengthening-stress reduction techniques- Column strengthening-flexural strengthening-Connection stabilization and strengthening, Crack stabilization.

UNIT-III
Bonded installation techniques- Externally bonded FRP- Wet layup sheet, bolted plate, near surface mounted FRP, fundamental debonding mechanisms-intermediate crack debonding CDC debonding-plate end debonding- strengthening of floor of structures.

UNIT-IV
Fibre reinforced concrete- Properties of constituent materials- Mix proportions, mixing and casting methods-Mechanical properties of fiber reinforced concrete- applications of fibre reinforced concretes-Light weight concrete- properties of light weight concrete- No fines concrete- design of light weight concrete- Flyash concrete-Introduction- classification of flyash- properties and reaction mechanism of flyash- Properties of flyash concrete in fresh state and hardened state- Durability of flyash concretes.

UNIT-V
High performance concretes- Introduction- Development of high performance concretes Materials of high performance concretes. Properties of high performance concretes- Self Consolidating concrete-properties qualifications.

Text /Reference Books:
1. A.M Neville & J J Brooks , Concrete technology, Pearson Publishers, 2nd Edition, 2015.
2. Rafat Siddique , Special Structural concrete, 2000.
3. Peter H Emmons , Concrete repair and maintenance illustrated., 2015.
4. M S Shetty & A.K Jain, Concrete technology, S. Chand publication, 2018.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E12: ROCK MECHANICS				

ELECTIVE-III

COURSE OUTCOMES:

Students are able to

1. Describe the importance of in the field of mining
2. Identify the physical and mechanical properties of rocks.
3. Ability to calculate the stress and strain in rocks and rockmass.
4. Ability to understand the time dependent behaviour by rheological models.
5. Determine elastic constants of rocks.

SYLLABUS:

UNIT-I

INTRODUCTION: Definition, Importance, History of Rock Mechanics,Distribution of rocks – Archean Rocks, Cuddapah Rocks, Vindhyan Rocks,Palaeozoick Rocks, Mesozoic rocks, Gondwana Rocks, Deccan Traps,Steriographic presentation of Geological data – Representation and plottingline and plane.

UNIT-II

LABORATORY TESTS ON ROCKS: Tests for Physical Properties,Compressive strength, Tensile strength, Direct shear, Triaxial Shear, SlakeDurability, Schmidt Rebound Hardness, Sound Velocity, Swelling Pressure& Free Swell, Void Index

UNIT-III

STRENGTH, MODULUS AND STRESS STRAIN BEHAVIOUR OF ROCKS: Factors influencing rock behaviour, Strength criteria for Isotropic IntactRocks, Modulus of Isotropic Intact Rocks, Compressive strength andmodulus from SPT, Stress Strain models – Elastic model, Elasto plasticmodel, Visco elastic model.

UNIT-IV

ENGINEERING CLASSIFICATION OF ROCK AND ROCK MASS

RQD, RMR system, Terzaghi's rock load classification, Deere Miller, CMRSand RSR System. Classification based on strength and modulus, Clasificationbased on strength and failure strain, rock discontinuity qualitativedescription, friction in rocks – Amonton's law of friction.

UNIT-V

FIELD TESTS ON ROCKS AND ROCK MASS: Geophysical methodsSeismc Refraction method, Electrical Resistivity method, Deformability tests– Plate Jack Test, Goodman Jack Test, Field shear test - Field PermeabilityTest – Open end Test, Packers Test.

Text /Reference Books:

1. Jeremic, K.L. Jeremic, Rotterdam, Balkema , Strata Mechanics in Coal Mining, 1985.
2. Jager & Cook, Methuen andco , Fundamentals of Rock Mechanics. London, 1969.
3. CsabaAsszonyi , Continuum Theory of rock Mechanics, Transtech Publications, 1979.
4. R.D. Lama, V.S.Vutukuri, , Hand Book on Mechanical Properties of rocks Vol. I to IV, Transtech Publications, 1978.
5. Charles Jaeger , Mechanics and Engineering, Cambridge University Press, 1979.
6. Brady and Brown , Rock Mechanics for Underground Mining, Kluwer Academic Publlishers, 2nd edition, 1993.
7. M.L. Jeremic , Ground Mechanics in Hard rock Mining, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 2015.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E13: TRAFFIC ENGINEERING				

ELECTIVE-III

COURSE OUTCOMES:

Students are able to

1. Understand the human factors and vehicular factors in traffic engineering design.
2. Conduct different types of traffic surveys and analysis of collected data using statistical concepts.
3. Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis.
4. Understand the basic knowledge of Intelligent Transportation System.

SYLLABUS:

UNIT-I

Traffic Planning and Characteristics:

Road Characteristics-Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals of Traffic Flow, Urban Traffic problems in India, Integrated planning of town, country, regional and all urban infrastructures, Sustainable approach- land use & transport and modal integration.

UNIT-II

Traffic Surveys:

Traffic Surveys- Speed, journey time and delay surveys, Vehicles Volume Survey including non-motorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical applications in traffic studies and traffic forecasting, Level of service- Concept, applications and significance.

UNIT-III

Traffic Design and Visual Aids:

Intersection Design- channelization, Rotary intersection design, Signal design, Coordination of signals, Grade separation, Traffic signs including VMS and road markings, Significant roles of traffic control personnel, Networking pedestrian facilities & cycle tracks

UNIT-IV

Traffic Safety and Environment:

Road accidents, Causes, effect, prevention, and cost, Street lighting, Traffic and environment hazards, Air and Noise Pollution, causes, abatement measures, Promotion and integration of public transportation, Promotion of non-motorized transport.

UNIT-V

Traffic Management:

Area Traffic Management System, Traffic System Management (TSM) with IRC standards, Traffic Regulatory Measures, Travel Demand Management (TDM), Direct and indirect methods, Congestion and parking pricing, All segregation methods- Coordination among different agencies, Intelligent Transport System for traffic management, enforcement and education.

Text /Reference Books:

1. Kadiyali.L.R. “Traffic Engineering and Transport Planning ”, Khanna Publishers, Delhi, 2013.
2. S K Khanna and CEG Justo and A Veeraragavan, “Highway Engineering”, Nem Chand and Bros., 2018.
3. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management, 2015.

4. Salter. R.I and Hounsell N.B, “Highway Traffic Analysis and design”, Macmillan Press Ltd.1996.
5. Fred L. Mannering, Scott S. Washburn and Walter P. Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi, 2011
6. Garber and Hoel, “Principles of Traffic and Highway Engineering”, CENGAGE Learning, New Delhi, 2010
7. SP:43-1994, IRC Specification, “Guidelines on Low-cost Traffic Management Techniques” for Urban Areas, 1994
8. John E Tyworth, “Traffic Management Planning, Operations and control”, Addison Wesly Publishing Company, 1996
9. Hobbs.F.D. “Traffic Planning and Engineering”, University of Brimingham, Peragamon Press Ltd, 2005

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E14: WATERSHED MANAGEMENT				

ELECTIVE-III

Course Outcomes:

Students are able to

1. Calculate watershed parameters and analyze watershed characteristics to take appropriate management action.
2. Quantify soil erosion and design control measures.
3. Apply land grading techniques for proper land management.
4. Suggest suitable harvesting techniques for better watershed management.
5. Apply appropriate models for watershed management.

SYLLUBUS:

UNIT-I: Introduction:

Concept of watershed development, objectives of watershed development, need for watershed development, Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics.

UNIT-II: Principles of Erosion:

Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation. Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams, rock-fill dams, brushwood dam, Gabion.

UNIT-III: Water Harvesting:

Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-IV: Land Management:

Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

UNIT-V: Watershed Modeling:

Data of watershed for modeling, application and comparison of watershed models, model calibration and validation, advances of watershed models. Integrated and multidisciplinary approach for watershed management.

Text/ References books:

1. Das MM and M.D Saikia , 'Watershed Management', PHI Learning Pvt. Ltd, 2013.
2. Murthy.VVN , 'Land and Water Management', Kalyani Publications, 2007.
3. Murthy J V S , 'Watershed Management', New Age International Publishers, 2006.
4. Wurbs R A and James R A 'Water Resource Engineering', Prentice Hall Publishers, 2002.
5. Black P E , 'Watershed Hydrology', Prentice Hall, 1996.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E15: ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT				

ELECTIVE-III

Course Outcomes:

Students are able to

1. Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
2. Selection of an appropriate EIA methodology
3. Evaluation of impacts on environment
4. Evaluation of risk assessment
5. Understand the latest acts and guidelines of MoEF & CC

SYLLUBUS:

UNIT-I: Basic concepts of EIA:

Elements of EIA-factors affecting EIA-Initial environmental Examination- life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities- application of remote sensing and GIS for EIA.

UNIT-II: EIA Methodologies:

Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods.

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

UNIT-III Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT-IV: Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

UNIT-V EIA: MoEF &CC Acts, Notifications and Guidelines:

Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports. Case studies and preparation of EIA statement for various Industries.

Text/References Books:

1. Canter Larry W , Environmental Impact Assessment, McGraw-Hill education Edi, 1996.
2. Y. Anjaneyulu , Environmental Impact Assessment Methodologies, B. S. Publication, Sultan Bazar, Hyderabad, 2018.
3. J. Glynn and Gary W. Hein Ke , Environmental Science and Engineering,– Prentice Hall Publishers, 2015.
4. Suresh K. Dhaneja , Environmental Science and Engineering, S. K. Katania& Sons Publication., New Delhi, 2014.
5. H. S. Bhatia , Environmental Pollution and Control, Galgotia Publication (P) Ltd, Delhi, 2016.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E16: ADVANCED STRUCTURAL DESIGN				

ELECTIVE-IV

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

1. Design Retaining walls and detailing
2. Design Circular and Rectangular water tanks.
3. Design flat slabs, Raft and Pile foundations.
4. Design Concrete Bridges.
5. Design Chimneys, Bunkers & Silos.

SYLLABUS:

UNIT-I

Design and Detailing of cantilever type of Retaining walls – Stability Check. Principles of Counter fort Retaining walls and shelf type retaining walls.

UNIT-II

Design of Circular and Rectangular Water tanks at Ground level and elevated with staging.

UNIT-III

Design of Flat slabs- Design of Raft and pile foundations.

UNIT-IV

Design of Concrete Bridges – IRC loading Design of Stab bridge, T-beam girder bridge. Introduction to Steel bridges.

UNIT-V

Design of RCC Chimneys Bunkers & Silos.

Text/References Books:

1. Varghese, Advanced Reinforced Concrete Structures, Pranties Hall of India Pvt. Ltd., 2015.
2. S Ponnuswamy , Bridge Engineering, Mc Graw Hill Co, 2013.
3. S.A. Pillai and D. Menon , Reinforced Concrete Design, Tata Mc. Ghrawhill Publishing Company, 2007.
4. Krishna Raju., Advanced Reinforced Concrete Structures, 2000.
5. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain , Reinforced Concrete Structures Vol. 2, Laxmi, Publications Pvt. Ltd., New Delhi, 2018.
6. D. John Son Victor, Essentials of Bridge Engineering, Oxford and IBM Publication Co., Pvt. Ltd, 2015.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E17: GROUND IMPROVEMENT TECHNIQUES				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. Differentiate various methods of ground improvement and their suitability to different field situations.
2. Design a reinforced earth embankment and check its stability.
3. Review various functions of Geosynthetics and their applications in Civil Engineering practice.
4. Conclude the concepts and applications of grouting.
5. Develop method for geo membranes.

SYLLABUS:

UNIT- I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth - in situ densification of cohesive soils – pre loading - vertical drains – sand drains and geo drains - stone columns.

UNIT -II

Dewatering - sumps and interceptor ditches - single and multi stage well points – vacuum well points - horizontal wells - criteria for choice of filler material around drains – electro osmosis.

UNIT- III

Stabilization of soils - methods of soil stabilization - mechanical - cement - lime - bitumen and polymer stabilization - use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV

Reinforce earth - principles - components of reinforced earth – design principles of reinforced earth walls - stability checks - soil nailing.

UNIT- V

Geo synthetics – geo textiles - types - functions, properties and applications - geogrids, geo membranes and gabions - properties and applications.

Grouting - objectives of grouting - grouts and their applications - methods of grouting – stage of grouting - hydraulic fracturing in soils and rocks - post grout tests.

Text/References Books:

1. Purushotham Raj ‘Ground Improvement Techniques’, Laxmi Publications, New Delhi, 2018.
2. Nihar Ranjan Patro , ‘Ground Improvement Techniques’ , Vikas Publishing House (P) Limited, New Delhi, 2015.
3. G.L.Siva Kumar Babu , ‘An introduction to Soil Reinforcement and Geosynthetics’, Universities Press, 2000.
4. Shukla. S. K , “Handbook of Geosynthetic Engineering”. ICE Publishing, London, UK, 2012.
5. MP Moseley , ‘Ground Improvement’ , Blackie Academic and Professional, USA, 2013.
6. RM Koerner , ‘Designing with Geosynethetics’, Prentice Hall, 2002.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E18: PAVEMENT ANALYSIS & DESIGN				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. Design flexible and rigid pavements using various methods
2. Design shoulders, overlays and drainage.
3. Develop several designs of pavement structures
4. Analyze traffic and geotechnical data from real-life projects
5. Gain experience in calculating pavement response using state-of-the-art mechanistic software

SYLLABUS:

UNIT-I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT-II

Stresses In Pavements: Vehicle-Pavement Interaction: Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements;

Stress in Flexible Pavements: Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts;

Stresses in Rigid Pavements: Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars, Introduction to DAMA, KENLAYER & KENSLABS Programs.

UNIT-III

Material Characterization & Mix Design Concepts: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates - Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of nthetics; Marshall's and Hveem's Methods of Bituminous Concrete Mix Design, Field Implications of Stability and Flow Values, Introduction to Super Pave Mix Design, IRC Cement Concrete Mix Design.

UNIT-IV

Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, Road Note No 29 & IRC Methods, Design of Runways & Taxiways, Design of Low Volume Rural Roads.

Design of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Pre stressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads.

UNIT-V

Design of Shoulders, Overlays & Drainage: Shoulder Design Considerations, Traffic Prediction, Parking, Regular & Encroaching Traffic, Thickness Design Specifications for Flexible & Rigid Shoulders;

Types & Design of Overlays: AI's Principal Component Analysis & IRC Methods of Overlay Design, Importance of Profile Correction Course; Pavement Drainage Concepts, Drainage Related Failures, Inflow- Outflow Concepts, Condition of Continuity, Surface and Sub Surface Drainage Design Specifications.

Text/References Books:

1. Yang H. Huang , 'Pavement Analysis and Design', Pearson Education, Second Edition.. 2003.
2. Srinivasa Kumar R , 'Principles of Pavement Design', 'Pavement Design' by, Universities Press, Hyderabad, 2019.
3. Nai C. Yang , 'Design of Functional Pavements', McGraw Hill Publications, 2005.
4. AF Stock , 'Concrete Pavements', Elsevier, Applied Science Publishers, 2009.
5. Micheal Sargious , 'Pavement and Surfacings for Highway & Airports', Applied Science Publishers Limited, 2016.
6. G. Martineek, Chapmen & Hall Inc.'Dynamics of Pavement Structures', 2012.
7. Patha Chakroborty and Animesh Das , 'Principles of Transportation Engineering', PHI Learning Private Limited, Delhi, 2010.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E19: HYDROPOWER ENGINEERING				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. Know sources and forms of energy
2. Understand hydropower plant and its components.
3. Identify Flow of water through penstock.
4. Design simple surge tank.
5. Have a knowledge on Hydraulic turbines and types and classification.

SYLLABUS:

UNIT-I

Introduction: Sources and forms of energy, types of power plants, elements of hydropower scheme, hydropower development in India. Power house structures-substructure and superstructure Layout and dimensions, deign considerations.

UNIT-II

Hydropower plants classification: Surface and underground power stations, Low medium-high head plants-layout and components, pumped storage plants, tidal power plants, microtydal units. Load and power studies: load curve, load factor, load duration curve, firm capacity, reservoir capacity, capacity factor

UNIT-III

Penstocks and power canals: Classification of penstocks, Design of Penstocks, economic diameter, bends, anchor blocks, surges in canals design criteria of power canals. Intake structures: Location function and types of intakes, energy losses at intake trash rock, design of intakes

UNIT-IV

Water hammer and surge tanks: Rigid and elastic water column theories, water hammer pressure. Behavior of surge tanks, types of surge tanks, hydraulic design, design of simple surge tank-stability

UNIT-V

Hydraulic turbines and types and classification, constructional features, hydraulic analysis, selection, characteristic curves, governing of turbine, drafts tubes-types, hydraulic principles, and design. Gates and valves- types. Design of air vent

Text/References Books:

1. Creagar, W.P. and Justin, J.D., Hydroelectric hand book:, John Wiley & Sons, New York, 2013.
2. Zipparro, V. J. and Hasen H Davis , Handbook of applied hydraulics, Mc-Graw Hill, Inc., New York, 2002.
3. R.S.Varshiray , Hydropower structures, Nem Chand and Bros. Roorkee, 2015.
4. M.M.Desmukh , Water Power Engineering, Dhanpat rai and Sons, 2018.
5. M.M. Dnadeker and K.L.Sharma , Water Power Engineering:, Vikas Publishing house, 2012.

B. TECH 7th SEMESTER	L	T	P	C
	3	-	-	3
19CE7E20: WASTE WATER ENGINEERING & MANAGEMENT				

ELECTIVE-IV

Course Outcomes:

Students are able to

1. Estimate sewage generation and design sewer system including sewage pumping stations.
2. Understand on the characteristics and composition of sewage, self-purification of streams.
3. Perform basic design of the unit operations and processes that are used in sewage treatment.
4. Acquire the standard methods for disposal of sewage.
5. Gain knowledge on sludge treatment and disposal.

SYLLUBUS:

UNIT-I: PLANNING AND DESIGN OF SEWERAGE SYSTEM

Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation – Sewer materials – Hydraulics of flow in sanitary sewers – Sewer design – Storm drainage-Storm runoff estimation – sewer appurtenances – corrosion in sewers – prevention and control – sewage pumping-drainage in buildings-plumbing systems for drainage - Rain Water ting.

UNIT-II: PRIMARY TREATMENT OF SEWAGE

Unit Operations and Processes – Selection of treatment processes –- Onsite sanitation - Septic tank-Grey water harvesting – Primary treatment – Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks –Construction, Operation and Maintenance aspects.

UNIT-III: SECONDARY TREATMENT OF SEWAGE

Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Extended aeration systems -Trickling filters– Sequencing Batch Reactor(SBR) – Membrane Bioreactor - UASB – Waste Stabilization Ponds – - Other treatment methods -Reclamation and Reuse of sewage - Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

UNIT-IV: DISPOSAL OF SEWAGE

Standards for Disposal - Methods – dilution – Mass balance principle - Self purification of river- Oxygen sag curve – deoxygenation and reaeration - Streeter–Phelps model - Land disposal –Sewage farming – sodium hazards - Soil dispersion system.

UNIT-V: SLUDGE TREATMENT AND DISPOSAL

Sludge characterization – Thickening - Design of gravity thickener- Sludge digestion – Standard rate and High rate digester design- Biogas recovery – Sludge Conditioning and Dewatering – Sludge drying beds-ultimate residue disposal.

Text/ Referencesbooks:

1. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers,New Delhi, 2015.
2. Duggal K.N., "Elements of Environmental Engineering" S.Chand and Co. Ltd., New Delhi, 2014.
3. Punmia, B.C., Jain, A.K., and Jain.A.K.., Environmental Engineering, Vol.II, Laxmi Publications, 2010.
4. Manual on Sewerage and Sewage Treatment Systems Part A,B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
5. Metcalf and Eddy- Wastewater Engineering–Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2010.
6. Syed R. Qasim "Wastewater Treatment Plants", CRC Press, Washington D.C.,20104. Gray N.F, "Water Technology", Elsevier India Pvt. Ltd., New Delhi, 2006.

B. TECH 7th SEMESTER	L	T	P	C
	-	-	4	2
19CE7L01: Geotechnical Engineering Lab-II				

Course Outcomes:
Students are able to

1. Determine Compaction characteristics of soil.
2. Determine Consolidation characteristics of soils.
3. Determine the shear strength characteristics of soils.
4. Determine the relative density of sand.

SYLLABUS:

LIST OF EXPERIMENTS

1. Determination of OMC, MOD- Standard proctor compaction test.
2. Determination of OMC, MOD- Modified proctor compaction test.
3. Determination of Relative Density of Sand
4. CBR test.
5. Determination of C and φ by direct shear test.
6. Determination of C and φ -Unconfined compression test.
7. Determination of Shear strength by Vane shear test.
8. Triaxial shear test.
9. Consolidation test
10. Determination of p_H value of Soil

At least eight experiments shall be conducted.

LIST OF EQUIPMENT:

1. Apparatus for I.S light and heavy compaction tests.
2. Shaking table, funnel for sand raining technique.
3. Apparatus for CBR test
4. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity 5.
5. One dimensional consolidation test apparatus with all accessories.
6. Box shear test apparatus
7. Tri-axial cell with provision for accommodating 38 mm diameter specimens.
8. Laboratory vane Shear apparatus
9. Hot air ovens (range of temperature 50)

REFERENCE BOOK:

1. IS 2720 –relevant parts.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E21: PRESTRESSED CONCRETE				

ELECTIVE-V

COURSE OUTCOMES:

Students are able to

1. Discriminate the different methods of pre stressing.
2. Generalize &Equip student with different systems and devices used in prestressing.
3. Estimate the effective pre stress including the short and long term losses.
4. Analyze and design of pre stressed concrete beams under flexure
5. Develop and Familiarize students with the analysis and design of prestressed concrete members under shear and torsion.

SYLLABUS:

UNIT – I

Introduction-Historic development -Basic concepts of Prestressing- Advantages –limitations and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section-pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-II

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses-Total losses allowed for design.

UNIT-III

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing- Prediction of short term and long term deflections.

UNIT-IV

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-V

Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

Text /Reference Books:

1. N. Krishna Raju, 'Prestressed Concrete',6th Edition, Tata McGraw hill, 2018.
2. S. Ramamrutham 'Prestressed Concrete' 5th Edition, Dhanpat Rai Publishing Company, 2013.
3. P. Dayaratnam 'Prestressed Concrete', 5th Edition, Medtech Publishers, 2017.
4. T. Y. Lin & Burns 'Prestressed Concrete'3rd , Wiley India Private Limited, 2010

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E22: SOIL DYNAMICS & MACHINE FOUNDATIONS				

ELECTIVE-V

Course Outcomes:

Students are able to

1. Define theory of vibrations to find the behavior of soil under dynamic loading.
2. Design machine foundations under different loads and soil conditions.
3. Describe the liquefaction phenomena.
4. Perform various laboratory and filed tests to determine the dynamic soil prosperities and its interpretation.
5. Design vibration isolators under any vibratory machines.
6. Develop methods of liquefaction of soils, CSR, CRR

SYLLABUS:

UNIT-I

Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping - Constant force and rotating mass type excitation -Types of damping-Equivalent stiffness of springs in series and parallel. - Resonance and its effect - magnification-logarithmic decrement -Transmissibility.

UNIT-II

Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system - Barkan and IS methods- Pressure bulb concept-Reisner Theory - Limitations of Reisner theory - Sung's solutions-- Pauw's Analogy - Heigh's Theory.

UNIT-III

Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.- Block vibration test - Determination of Damping factor.

UNIT-IV

Types of machine foundations - general requirements design - criteria for machine foundations, permissible amplitudes and bearing pressure Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

UNIT-V

Design data, design criteria, IS code provisions for the design foundations of Impact type of machines. Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators-Types and their characterizes Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads.

Text /Reference Books:

1. Richart Hall and Woods , Vibrations of Soils and Foundations, 2010.
2. B M Das, 'Fundamentals of Soil Dynamics', 2012.
3. NSV KameswaraRao , 'Vibration Analysis and Foundation Dynamics, Wheeler Publishing, NewDelhi, 2015.
4. Prakash andPuri , 'Foundations of Machines- Analysis and Design', 2015.
5. P J Moore , 'Analysis and design of Foundations for Vibrations', 2000.
6. D D Barkar. 'Dynamics of bases and Foundations', 2008.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E23: URBAN TRANSPORTATION & PLANNING				

ELECTIVE-V

Course Outcomes:

Students are able to

1. Estimate travel demand for an urban area.
2. Design the transportation network for a city.
3. Identify the corridor and plan for providing good transportation facilities.
4. Evaluate various alternative transportation proposals.
5. Evaluate traffic assignment in a town and develop Corridor identification.

SYLLABUS:

UNIT -I

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand –Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT -II

Data Collection And Inventories: Collection of data – Organization of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment –Vehicle Owner Ship.

UNIT -III

Trip Generation & Distribution: UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

UNIT -IV

Mode Choice Analysis: Mode Choice behavior, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNIT -V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, mCapacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

Text /Reference Books:

1. Hutchinson, B.G , 'Introduction to Urban System Planning', McGraw Hill, 2000.

2. Khisty C.J.,'Transportation Engineering - An Introduction', Prentice Hall, 2012.
3. Papacostas , 'Fundamentals of Transportation Planning', Tata McGraw Hill, 2010.
4. Mayer M and Miller E , 'Urban Transportation Planning: A decision oriented Approach', Mc Graw Hill, 2000.
5. Bruton M.J , 'Introduction to Transportation Planning', Hutchinson of London, 2013.
6. Dicky, J.W., 'Metropolitan Transportation Planning', Tata McGraw Hill, 2015.
7. Kadiyali.L.R , 'Traffic Engineering and Transportation Planning', Khanna Publishers, New Delhi, 2017.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E24: GROUND WATER MANAGEMENT				

ELECTIVE-V

Course Outcomes:

Students are able to

1. Estimate aquifer parameters and well hydraulics.
2. Design wells and understand the construction practices.
3. Determine the process of artificial recharge for increasing groundwater potential.
4. Interpret geophysical exploration data for scientific source finding of aquifers.
5. Apply appropriate measures for groundwater management

SYLLUBUS:

UNIT–I: Introduction

Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics: Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT-II: Well Design

Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

Well Construction and Development

Water wells, drilling methods-rotary drilling, percussion drilling, well construction installation of well screens-pull-back method, open- hole, bail- down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT-III: Artificial Recharge:

Concepts of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge. Saline Water Intrusion Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT–IV: Geophysics: Surface methods of exploration of groundwater - Electrical resistivity and Seismic refraction methods, Sub-surface methods - Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNIT–V: Groundwater Modeling and Management:

Basic principles of groundwater modeling- Analog models viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use case studies.

Text/References books:

1. Raghunath H M , 'Groundwater', New Age International Publishers, 2005.
2. Todd D.K., 'Groundwater Hydrology', Wiley India Pvt Ltd., 2014.
3. Todd D K and L W Mays , 'Groundwater Hydrology, CBS Publications, 2005.
4. Karanth K R , 'Groundwater Assessment and Management', Tata McGraw Hill Publishing Co., 1987.
5. Bouwer H, 'Groundwater Hydrology', McGraw Hill Book Company, 1978.
6. Willis R and W.W.G. Yeh , 'Groundwater Systems Planning and Management', Prentice Hall Inc., 1986.
7. Walton W C 'Groundwater Resources Evaluation', Mc Graw Hill Book Company, 1978

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E25: INDUSTRIAL WASTE MANAGEMENT				

ELECTIVE-V

Course Outcomes:

Students are able to

1. Explain the manufacturing process of various industries and treatment methods for industrial wastewater
2. Develop the need of common effluent treatment plant for the industrial area in their vicinity.
3. Describe industrial wastewater disposal management
4. Collect treatment methods of liquid waste from Steel plants, Fertilizers, Textiles
5. Identify treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers

SYLLABUS:

UNIT - I

Industrial water Quantity and Quality requirements: Boiler and cooling waters-Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.

UNIT - II

Miscellaneous Treatment: Use of Municipal wastewater in Industries - Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Color and Odor.

UNIT - III

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates -Industrial wastewater sampling and preservation of samples for analysis Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction -Neutralization - Equalization and proportioning- recycling, reuse
and resources recovery.

UNIT - IV

Industrial wastewater disposal management: discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.

UNIT - V

Process and Treatment of specific Industries: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

Text/References books:

1. M.N. Rao and A.K. Dutta , Wastewater Treatment, Oxford & IBH, New Delhi, 2012.
2. A.D. Patwardhan , Industrial Wastewater treatment, PHI Learning, Delhi, 2011.
3. Soli. JArceivala, Shyam R Asolekar , Wastewater Treatment for Pollution Control and Reuse, by, Mc-Graw Hill, New Delhi; 3rdEdition, 2014.
4. KVSG Murali Krishna., Industrial Wastewater Treatment, 2011.
5. W. Wesley Eckenfelder , Industrial Water Pollution Control, Mc-GrawHill, Third Edition, 2017.
6. Metcalf and Eddy Inc., , Wastewater Engineering , Tata McGrawhill Co., New Delhi, 2000.
7. G.L.Karia & R.A. Christian , Wastewater Treatment- Concepts and Design Approach, Prentice Hall of India, 2018.
8. Reynolds. Richard , Unit Operations and Processes in Environmental Engineering, Cengage Learning, 2015.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E26: CONSTRUCTION TECHNOLOGY & MANAGEMENT				

ELECTIVE-VI

Course Outcomes:

Students are able to

1. Prepare appreciate the importance of construction planning.
2. Design functioning of various earth moving equipment.
3. Develop the methods of production of aggregate products and concreting.
4. Report knowledge towards project management and construction techniques.
5. Describe about concreting equipment.

SYLLABUS:

UNIT- I

Construction project management and its relevance - qualities of a project manager – project planning - coordination - scheduling - monitoring - bar charts - milestone charts.

UNIT -II

Project evaluation and review technique - critical path method-cost analysis - updating - crashing for optimum cost -crashing for optimum resources - allocation of resources.

UNIT- III

Construction equipment - economical considerations - earthwork equipment - Trucks and handling equipment - rear dump trucks - capacities of trucks. and handling equipment - calculation of truck production – compaction equipment - types of compaction rollers.

UNIT -IV

Hoisting and earthwork equipment - hoists - cranes - tractors - bulldozers - graders – scrapers draglines clam shell buckets.

UNIT -V

Concreting equipment – crushers - jaw crushers - gyratory crushers - impact crushers- selection of crushing equipment - screening of aggregate- concrete mixers- mixing, consolidating and finishing.
Construction methods-earthwork-piling- placing of concrete - form work - fabrication and erection-quality control and safety engineering.

Text/References books:

1. Peurifoy and Schexnayder, Shapira , ‘Construction Planning, Equipment and Methods’, Tata Mcgrawhill, 2012.
2. Kumar Neeraj Jha , ‘Construction Project Management Theory and Practice’, Pearson., 2011.
3. Subir K. Sarkar and Subhajit Saraswati ‘Construction Technology’, Oxford Universitypress, 2012.
4. Peter Fewings, Taylor and Francis, ‘Construction Project Management-An Integrated Approach’, 2010.
5. Trefor Williams , ‘Construciton Management Emerging Trends and Technologies’, Cengage learning, 2012.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E27: GEO SYNTHETICS				

ELECTIVE-VI

Course Outcomes:

Students are able to

1. Identify the type of geosynthetics and their relevance in geotechnical field.
2. Understand the mechanism of formation of different geo-synthetics.
3. Analyze and compute different properties of geosynthetics
4. Apply the knowledge for designing the structures using Geosynthetic materials.

SYLLABUS:

UNIT- I

An Overview of Geo synthetic in Geotechnical Engineering: Historical development Types of geo synthetics, geo textiles, geo grids, geo nets, geo membranes, geo composites, Recent use in India.

UNIT- II

Manufacturing : Materials and Process: Raw materials : polyamide , polyester , polyethylene , polypropylene , poly vinyl chloride, Different type of geosynthetics based on manufacturing woven, monofilament , multifilament , slit filament , non-woven Different bonding process : Mechanically bonded, Chemically bonded ,Thermally bonded.

UNIT- III

Properties of Geosynthetics : Physical Properties: Mass per unit area , Thickness , Specific gravity Hydraulic properties: Apparent open size, Permittivity, Transmissivity Mechanical Properties: Uniaxial Tensile Strength , Burst and Puncture Strength , Soil Geosynthetic friction tests Durability : Abrasion resistance ,Ultraviolet resistance.

UNIT- IV

Functions of Geo synthetics: Reinforcement, Separation Filtration, Drainage Barrier Functions Confinement.

UNIT-V

Applications of Geosynthetics: Use of geosynthetics in roads, Use of reinforced soil in Retaining walls Improvement of bearing capacity, Geosynthetics in environmental control and land fills, Ground Improvement by geo drains, Use of Geo synthetics in lining of canals

Text/References books:

1. G.VenkatappaRao and G.V.S SuryanarayanaRaju , Engineering with Geosynthetics– Tata McGraw Hill, New Delhi, 1990.
2. Robert M. Koerner –, Construction and Geotechnical Methods in Foundation Engineering, McGraw Hill, New York, 1985.
3. Robert M. Koerner , Designing with Geosynthetics, Prentice Hall, New Jersey, UAS,1989.
4. Sanjay Kumar Shukla, Jian-Hua Yin , Fundamentals of Geosynthetic Engineering, CRC Press, 2000.
5. Sanjay Kumar Shukla, Thomas Telford, Handbook on Geosynthetics and their applications,2002.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E28: ROAD SAFETY MANAGEMENT				

ELECTIVE-VI

Course Outcomes:

Students are able to

1. Understand fundamentals of Traffic Engg.
2. Investigate & determine the collective factors & remedies of accident involved.
3. Design & planning various road geometrics.
4. Know the Role of Urban infrastructure design in safety.
5. Manage the traffic system from road safety point of view.

SYLLABUS:

UNIT- I

Fundamentals of Traffic Engineering: Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Traffic Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons.

UNIT- II

Accident Investigations and Risk Management: Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction

UNIT- III

Road Safety in Planning And Geometric Design: Vehicle And Human Characteristics, Road Design and Road Equipments, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care

UNIT- IV

Role of Urban infrastructure design in safety: Geometric Design of Roads; Design of Horizontal and Vertical Elements, Junctions, At Grade and Grade Separated Intersections, Road Safety in Urban Transport, Sustainable Modes and their Safety.

UNIT- V

Traffic Management Systems: for Safety, Road Safety Audits and Tools for Safety Management Systems, Road Safety Audit Process, Approach to Safety, Road Safety Improvement Strategies, ITS and Safety.

Text/References books:

1. L.R. Kadiyali , Traffic Engineering and Transportation Planning, Khanna Publishers, 2015.
2. C.S. Papacostas , Fundamentals of Transportation Engineering, Prentice Hall India, 2014.
3. C.Jotinkhisty, B. Kent Lall, Transportation Engineering – An Introduction, 2015.
4. Richardo G Sigua , Fundamentals of Traffic Engineering, 2014.
5. Rune Elvik, Alena Hoye, Truls Vaa , Handbook of Road Safety measures, second Edition, 2010.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E29: RIVER ENGINEERING				

ELECTIVE-VI

Course Outcomes:

Students are able to

1. Classify rivers and their schemes
2. Know the characteristics of river channel pattern
3. Identify Mechanics of Alluvial Rivers
4. Analyze and design natural channels
5. Familiarize River Training and Protection Works.

SYLLABUS:

UNIT- I

Introduction: classification of Rivers, Mechanics of alluvial rivers including channel and flood plain features, Sediment transport and budgets, River morphology and various classification schemes.

UNIT- II

Behaviour of Rivers: Introduction, River Channel patterns, Straight river channels, causes, characteristics and shapes of meanders and control, cutoff, Braided Rivers, Bed forms, Instability of rivers, Hydraulic geometry, Delta formation and control.

UNIT- III

Mechanics of Alluvial Rivers, Rivers and restoration structures, Socio-cultural influences and ethics of stream restoration.

UNIT- IV

Bio-engineering Techniques, Classification review, Natural Channel Design Analysis, Time Series, Analysis of flow, Sediment and channel geometry data.

UNIT- V

River Training and Protection Works: Introduction, Classification of River Training, Types of training works, Protection for Bridges with reduced waterway, Design of Guide Band, embankment and spurs/dampners and other river/ flood protection works.

Text/References books:

1. River Behaviour Management and Training (Vol. I & II), CBI&P, New Delhi, 2012.
2. B. C. Punmia and Pande B. B. Lal , Irrigation & Water Power Engineering, 2015.
3. Margeret Peterson , River Engineering, 2012.
4. PH Jameen , Principles of River Engineering(the non tidel alluvial), 2000.

B. TECH 8th SEMESTER	L	T	P	C
	3	-	-	3
19CE8E30: FAECAL SLUDGE AND SEPTAGE MANAGEMENT				

ELECTIVE-VI

Course Outcomes:

Students are able to

1. Understand the importance of an integrated approach for faecal sludge management.
2. Know the existing FS treatment technologies, their advantages, constraints and field of application.
3. List the social, procedural, technical aspects related to the collection and transport of faecal sludge from onsite sanitation technologies.
4. Design selected technologies and know the operation, maintenance and monitoring necessary to achieve desired treatment goals.
5. Indicate how regulations, contracts, stakeholders' roles and a proper institutional framework are essential for an effective faecal sludge management.

SYLLUBUS:

UNIT-1: Introduction to faecal sludge management

Overview of faecal sludge- the importance of an integrated approach to faecal sludge management -The Global Situation- Designing for faecal sludge management treatment- end use.

UNIT-II: Technological fundaments of FSM

Faecal Sludge Quantification- Characterization, Operational factors- Treatment Objectives- Sampling procedures.

UNIT-III: Collection and transport of faecal sludge

Duties and responsibilities of collection personals- mechanical collection- Transport of faecal sludge- Manual, Motorised transport- transfer station -Delivering to the treatment plant.

UNIT-IV: Faecal sludge treatment technologies

Overview of treatment technologies- Anaerobic digestion- Settling and Thickening Tanks- Drying beds - Co-treatment of Faecal Sludge – End use of treatment product.

UNIT-V: Management in faecal sludge

Operation, Maintenance and Monitoring of Faecal Sludge Treatment Plant - Institutional Frameworks for Faecal Sludge Management - Financial Transfers and Responsibility in Faecal Sludge Management Chains

Text/References Books:

1. Linda Strande, Mariska Ronteltap & Damir Brdjanovic , Faecal Sludge Management- IWA Publishing- London-UK-2014.
2. V.Srinivas Chary, G Bala Subramanyam- Dr Y.Malini Reddy, Mayank Gupta, G.V.L.N.Murthy, Dr M.S.V.K.V.Prasad, A.Venkata Krishna, Faecal Sludge and Septage Management- - Administrative Staff College of India-Hyderabad-2019.
3. Linda Strande, Mariska Ronteltap, Damir Brdjanovic , Faecal Sludge Management – Systems Approach for Implementation and Operation- - IWA Publishing-Volume:13- July 2014
4. Kevin Tayler , Faecal Sludge and Septage Treatment- Practical Action Publishing Warwickshire-2018

B. TECH 5th/6th/7th SEMESTER	L	T	P	C
	3	-	-	3
19CEXO01: DISASTER MANAGEMENT				

OPEN ELECTIVE

Course Outcomes:

Students are able to

1. identify the tools of integrating disaster management principles in disaster mitigation process.
2. discuss about different approaches needed to manage pre and post- disaster activities**.**
3. prepare the process of risk management and develop a basic understanding method for the role of public in risk management.
4. administer the role of technology in Disaster management.
5. conclude the planning strategies for education and community preparedness programmes.

UNIT-I : Natural Hazards and Disaster management:

Introduction of DM – Inter disciplinary nature of the subject- Disaster Management cycle- Five priorities for action. Case study methods of the following: floods, draughts -Earthquakes- global warming, cyclones & Tsunamis- Post Tsunami hazards along the Indian coast - landslides.

UNIT-II: **Man Made Disaster and their management along with case study methods of the following**: Fire hazards - transport hazard dynamics -Solid waste management- post disaster – Bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III: **Risk and Vulnerability**:

Building codes and land use planning - social vulnerability - environmental vulnerability - Macroeconomic management and sustainable development, climate change risk rendition - financial management of disaster - related losses.

UNIT-IV: **Role of Technology in Disaster managements**:

Disaster management for infra structures, taxonomy of infrastructure - treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes -flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT-V: **Education and Community Preparedness**

Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

Textbooks:

1. Rajib shah & R. Krishnamurthy, 'Disaster Management - Global Challenges and Local Solutions' Universities press-2009.
2. Tushar Bhattacharya, 'Disaster Science & Management', Tata McGraw Hill Education Pvt. Ltd., New Delhi.-2012
3. Jagbir Singh , 'Disaster Management - Future Challenges and Opportunities' , I K International Publishing House Pvt. Ltd-2017

References:

1. H K Gupta , **'**Disaster Management', Universities press-2003
2. Prof. R.B. Singh , "Disaster Management and Mitigation", World Focus 2016

B. TECH 5th/6th/7th SEMESTER	L	T	P	C
	3	-	-	3
19CEXO02: ENVIRONMENTAL POLLUTION & CONTROL				

OPEN ELECTIVE

Course Outcomes:

Students are able to

1. Identify the air pollutant causes and control devices
2. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
3. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
4. know the causes for noise pollution and ISO14000 standards
5. Treatment and management of hazardous waste

SYLLUBUS

UNIT – I : Air Pollution

Air pollution causes-control methods–particulate control devices – methods of controlling Gaseous Emissions – Air quality standards.

UNIT –II: Industrial wastewater Management

Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

UNIT – III : Solid Waste Management

Solid waste characteristics–basics of on-site handling and collection–separation and processing – Incineration- Composting-Solid waste disposal methods – fundamentals of land filling.

UNIT – IV: Noise Pollution

Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000

UNIT – V: Hazardous Waste

Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

Text/References books:

1. Ruth F. Weiner and Robin Matthews , ‘Environmental Engineering‘, 4th Edition Elesevier, 2003.
2. J.G. Henry and G.W. Heinke,‘Environmental Science and Engineering‘– Pearson Education,2002
3. Mackenzie L Davis & David A Cornwell, “Environmental Engineering ‘,McGraw Hill Publishing,2002.
4. K. Sasi Kumar, S.A. Gopi Krishna ,”Solid Waste Management”,PHI New Delhi,2014
5. D. Srinivasan, “Environmental Engineering”, PHI Learning Private Limited, New Delhi, 2011.
6. Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus,”Environmental Engineering”, Mc-Graw-Hill Book Company, New Delhi, 1985.

B. TECH 5th/6th/7th SEMESTER	L	T	P	C
	3	-	-	3
19CEXO03: SOLID WASTE MANAGEMENT				

OPEN ELECTIVE

Course Outcomes:

Students are able to

1. Understand classification of solid waste generated
2. know the collection systems of solid waste of a town
3. analyze the importance of transfer and transport of solid waste
4. apply the knowledge in processing of solid waste
5. design treatment of municipal solid waste and landfill

SYLLUBUS:

UNIT- I

Introduction to Solid Waste Management:

Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization – Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT- II

Collection of Solid Waste:

Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

UNIT- III

Transfer and Transport:

Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

UNIT- IV

Processing and Treatment:

Processing of solid waste – Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT- V

Disposal of Solid Waste:

Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

Text/ Reference books:

1. George Techobanoglous, Frank Kreith ,Integrated Solid Waste Management- McGraw Hill Publication, 1993.
2. R.Saravanan, R.Dinesh Kumar, A.Suriya , Muncipal solid waste management , Lakshmi publications- 2015.
3. Vesilind, P.A., Worrell, W., Reinhart, D.,“Solid Waste Engineering”, Cenage learning, New Delhi, 2004.
4. Charles A. Wentz, “Hazardous Waste Management”,; McGraw Hill Publication, 1995.

B. TECH 5th/6th/7th SEMESTER	L	T	P	C
	3	-	-	3
19CEXO04: BUILDING PLANNING AND DRAWING				

OPEN ELECTIVE

COURSE OUTCOMES

Students are able to

1. Understand the building bye-laws, plan various buildings as per the building by-laws.
2. Plan the individual rooms with reference to functional and furniture requirements.
3. prepare different sign conventions and bonds
4. Learn the skills of drawing building elements like doors and windows.
5. Develop the skills of Drawing Plans, Sections and Elevations of different buildings.

SYLLABUS:

UNIT-I

BUILDING BYELAWS AND REGULATIONS: Introduction - terminology - objectives of building Bye laws - floor area ratio - floor space index - principles under laying building bye laws - classification of buildings - open space requirements - built up area limitations- height of buildings- wall thickness - lightening and ventilation requirements.

UNIT -II

RESIDENTIAL AND PUBLIC BUILDINGS

Residential buildings: Minimum standards for various parts of buildings -requirements of different rooms and their grouping- characteristics of various types residential buildings.

Public buildings: Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT-III

SIGN CONVENTIONS AND BONDS : Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminum alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT- IV

DOORS, WINDOWS, VENTILATORS AND ROOFS: Panelled door, panelled and glassed door, glassed windows, paneled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs. King Post truss, Queen Post truss Sloped and flat roof buildings: drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT-V

PLANNING AND DESIGNING OF BUILDINGS: Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

Text /Reference Books:

1. Y.S. Sane., Planning and Design of buildings, 2010.
2. Gurucharan Singh and Jagadish Singh , Planning, designing and scheduling, 2015.
3. M. Chakravarthi., Building planning and drawing, 2015.
4. ‘A’ Series & ‘B’ Series of JNTU Engineering College, Anantapur.
5. Shah and Kale , Building drawing, 2013.