

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY

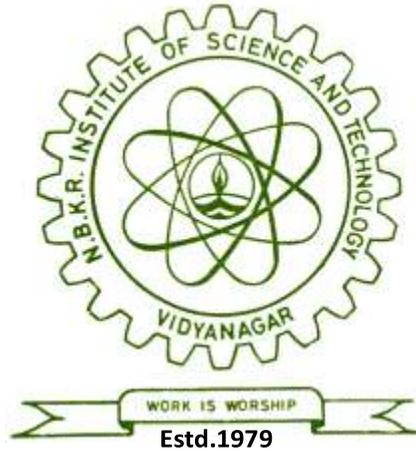
(AUTONOMOUS)

COLLEGE WITH POTENTIAL FOR EXCELLENCE (CPE)

Affiliated to JNTUA, Ananthapuramu

Re-Accredited by NAAC with 'A' Grade

B.Tech. Courses Accredited by NBA under TIER-I



SYLLABUS B.TECH. DEGREE COURSE

I & II B.TECH. CIVIL ENGINEERING

(With effect from the batch admitted in the academic year 2019-2020)

&

B.Tech (Lateral entry scheme)

(for the batches admitted from the academic year 2020-21)

VIDYANAGAR - 524413

SPSR Nellore-Dist., Andhra Pradesh

www.nbkrist.org

VISION AND MISSION OF THE INSTITUTE

Vision

- To emerge as a comprehensive Institute that provides quality technical education and research thereby building up precious human resource for the industry and society.

Mission

- To provide a learner-centered environment that challenges individuals to actively participate in the education process.
- To empower the faculty to excel in teaching while engaging in research, creativity and public service.
- To develop effective skills enabling learners to pick up critical thinking thus crafting them to be professionally fit and ethically strong.
- To reach out industries, schools and public agencies to partner and share human and academic resources.

VISION AND MISSION OF THE CIVIL ENGINEERING DEPARTMENT

Vision

- To promote excellence in civil engineering education, enrich research and provide quality professional service to the society in all areas of civil engineering.

Mission

- To provide a learner-centered environment for students to gain comprehensive knowledge in civil engineering.
- To provide a learning experience that fosters an aptitude for research.
- To provide graduates with contemporary skills and tools required to excel in civil engineering profession or alternate fields. To produce graduates to serve within the constraints of complex needs of the society with high integrity.

PROGRAMME EDUCATIONAL OBJECTIVES OF THE DEPARTMENT

- PEO 1** : Graduates will be proficient in the fundamental knowledge of basic science, engineering science including mathematical and computational skills appropriate for civil engineering.
- PEO 2** : Graduates will be successful practicing engineers in civil engineering and allied fields or alternate careers using their technical knowledge, teamwork, communication skills and leadership qualities.
- PEO 3** : Graduates will be innovative problem solvers within the realistic constraints of economic, environmental, social, political, health, safety and sustainability impacts and serve the society as responsible professionals with integrity.
- PEO 4** : Graduates will engage in lifelong learning within the profession or through higher studies.

PROGRAMME OUTCOMES OF THE DEPARTMENT

The programme outcomes are the skills and knowledge which the graduates have at the time of graduation:

- a. An ability to apply knowledge of mathematics, science and engineering.
- b. An ability to design and conduct experiments, as well as to analyze and interpret data.
- c. An ability to design an engineering system, component or process.
- d. An ability to identify, formulate and solve engineering problems.
- e. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
- f. Knowledge of contemporary issues.
- g. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context.
- h. An understanding of professional and ethical responsibility.
- i. An ability to function on multi-disciplinary teams.
- j. An ability to communicate effectively.
- k. To embark on a career as an entrepreneur or civil engineering project manager/consultant thereby playing a very important role in society.
- l. Recognition of the need to be successful in competitive examinations, and an ability to engage in lifelong learning.

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR

(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2019-2020)

I YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER

S.NO.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation						Max. Total Marks			
							Sessional Test-I			Sessional Test-II				Total Sessional Marks (Max. 40)	Semester End Examination	
			THEORY				Test-I (2 hrs.)	Assignment-I	Max. Marks	Test-II (2 hrs.)	Assignment-II	Max Marks			Durati on In Hours	Max . Marks
1	19SH1101	Functional English	2	0	0	2	34	6	40	34	6	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	19SH1103	Engineering Chemistry	2	1	0	3	34	6	40	34	6	40		3	60	100
3	19SH1104	Engineering Mathematics -I	3	1	0	4	34	6	40	34	6	40		3	60	100
4	19CS1101	Programming for Problem Solving	3	0	0	3	34	6	40	34	6	40		3	60	100
5	19EE1103	Elements Of Electrical And Electronics Engineering	2	1	0	3	34	6	40	34	6	40		3	60	100
PRACTICALS																
1	19SH11P3	Engineering Chemistry Laboratory	0	0	3	1.5	-	-	-	-	-	-	Day-to-day Evaluation and a test (40 marks)	3	60	100
2	19CS11P1	Programming for Problem Solving Laboratory	0	0	3	1.5	-	-	-	-	-	-		3	60	100
3	19ME11P1	Computer Aided Engineering Drawing Laboratory-1	0	0	6	3	-	-	-	-	-	-		3	60	100
TOTAL						21										

19SH1101 - FUNCTIONAL ENGLISH

(Common to all Branches)
(New Regulations w.e.f. 2019-2020)
I B.TECH. - I Semester

Course Category:	Basic Sciences	Credits:	2
Course Type:	Theory	Lecture-Tutorial-Practical:	2-0-0
Pre-requisite:	Basic Level of LSRW Skills	Sessional Evaluation: External Exam Evaluation: Total Marks:	40 60 100

Course Objectives	Students undergoing this course are expected:	
	<ol style="list-style-type: none">1. To develop basic writing skills in English.2. To learn writing paragraphs effectively with unity and coherence3. To achieve specific linguistic and communicative competence.4. To acquire relevant skills and use them effectively in realistic working context.5. To learn writing simple and analytical essays.6. To inculcate the habit of reading.	
Course Outcomes	On successful completion of this course, the students will be able to:	
	CO1	Improve syntactical knowledge and use of phrases and clauses in sentences and encourage their appropriate use in writing.
	CO2	Obtain effective writing skills in practicing different types of formal letters.
	CO3	Attain both public speaking skills and writing skills by practicing drafting of speeches
	CO4	Acquire data interpretation and summarizing skills
	CO5	Acquire effective strategies for good writing and demonstrate the same in summarizing, writing well-organized essays, record and report the useful information.
	CO6	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials.

Course Content	<p style="text-align: center;">UNIT-I</p> <p>Writing: Paragraph Writing: Sentence Structures: use of phrases and clauses in sentences- importance of proper punctuation- The Five Parts: introducing the topic, logical order, creating coherence, unity and summarizing the main idea.</p> <p>Grammar: Parts of Speech: Nouns, Pronouns, Verbs, Adjectives and Adverbs; Nouns: Countable and Uncountable, Singular and Plural; Pronoun-Agreement; Subject-Verb Agreement.</p>
	<p style="text-align: center;">UNIT-II</p> <p>Writing: Letter Writing: Parts of a Letter - Formats of Letters- Types of Letters- Formal letter Writing (enquiry, complaints, seeking permission, seeking internship etc.)</p> <p>Grammar: Use of Articles and Zero Article, Prepositions, basic sentence structures; simple question form - wh-questions; word order in sentences</p>
	<p style="text-align: center;">UNIT-III</p> <p>Writing: Drafting of Public Speech: Ideas / Content Generation, Structure</p> <p>Grammar: Tenses- Active Voice & Passive Voice; Conditional Sentences</p>
	<p style="text-align: center;">UNIT-IV</p> <p>Writing: Information transfer; comprehend, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables.</p> <p>Grammar: Degrees of Comparison; Question Tags, Non-finite Verbs (infinitives, gerunds & participles)</p>
	<p style="text-align: center;">UNIT-V</p> <p>Writing: Essay Writing: Writing structured essays on specific topics- Introducing, analyzing and arguing an issue-creating coherence-Usage of proper punctuation-importance of conclusion</p> <p>Grammar: Direct and Indirect Speech, Modifiers</p>
	<p style="text-align: center;">UNIT-VI</p> <p>Reading: Comprehension: Different Reading Strategies- Skimming-Scanning-Infering, Predicting and Responding to Content - Guessing from context and vocabulary extension.</p> <p>Grammar: Common Errors: Identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, parallelism, subject verb agreement, pronoun agreement etc.)</p> <p>REFERENCE BOOKS: Bailey, Stephen. <i>Academic writing: A handbook for international students</i>. Routledge, 2014. Chase, Becky Tarver. <i>Pathways: Listening, Speaking and Critical Thinking</i>. Heinley ELT; 2nd Edition, 2018. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational. Hewings, Martin. <i>Cambridge Academic English (B2)</i>. CUP, 2012. Murphy, Raymond. <i>English Grammar in Use</i>, 4th ed, CUP</p>

19SH1103 - ENGINEERING CHEMISTRY*(New Regulations w.e.f. 2019-2020)***I B.Tech. – I Semester
(MECH and CIVIL)**

Course Category:	Basic science	Credits	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Pre-requisite:	Fundamental concepts of Chemistry	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100

Course Objectives	<ul style="list-style-type: none"> To familiarize engineering chemistry and its applications To impart the concept of soft and hard waters, softening methods of hard water To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement
Course Outcomes	On successful completion of this course student will be able to:
	CO1 Explain the principles of reverse osmosis and electro dialysis
	CO2 Apply Nernst equation for calculating electrode and cell potentials
	CO3 Differentiate between thermoplastics and thermosetting plastics
	CO4 Explain calorific values, octane number, refining of petroleum and cracking of oils
	CO5 Explain the setting and hardening of cement and concrete phase
	CO6 Explain the synthesis of colloids with examples
Course content	<p style="text-align: center;">UNIT – I</p> <p>WATER TECHNOLOGY: Introduction –Hardness of water, Estimation of hardness of water by EDTA Method - Boiler troubles - scale and sludge, Priming and foaming, caustic embrittlement, Boiler corrosion, Industrial water treatment –Lime-soda, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis.</p> <p style="text-align: center;">UNIT – II</p> <p>ELECTROCHEMISTRY AND CORROSION: Electrodes – concepts, reference electrodes (Calomel electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems.</p> <p>Primary cells – Zinc-air battery, Fuel cells, hydrogen-oxygen– working of the cells.</p> <p>Secondary cells – lead acid and lithium ion batteries- working of the batteries including</p>

cell reactions.

Corrosion: Introduction to corrosion, types of corrosion, theories of corrosion, Factors affecting the corrosion, prevention methods of corrosion- Metallic coatings(electroplating) and Cathodic protection

UNIT-III

POLYMERS: Introduction to polymers, Polymerisation and Types of polymerisation. Plastomers -Thermoplastics and Thermo-setting plastics- Preparation, properties and applications of PVC, Bakelite, Urea-Formaldehyde and Nylons.

Elastomers – Preparation, properties and applications of Buna N, Thiokol and Silicon rubber

UNIT – IV

FUEL TECHNOLOGY: Introduction – Chemical fuels, classification, characteristics of good fuel, calorific value, determination of calorific value (Bomb and Boy's gas calorimeters), numerical problems based on calorific value, Analysis of coal.

Liquid Fuels -Refining of petroleum, knocking and anti-knock agents, Octane and Cetane values.

Gaseous Fuels-Flue gas analysis by Orsat's apparatus.

UNIT – V

ADVANCED ENGINEERING MATERIALS:

Refractories- Classification, Properties, Factors affecting the refractory materials and Applications

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications

Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

UNIT-VI

SURFACE CHEMISTRY AND APPLICATIONS: Introduction to surface chemistry, colloids, synthesis of colloids (any two methods with examples), Properties of colloids, stabilization of colloids, coagulation of colloids, adsorption isotherm, BET equation (no derivation) applications of colloids.

<p style="text-align: center;">Text Books & References</p>	<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013. 2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, Engineering Chemistry 1/e McGraw Hill Education (India) Pvt Ltd, New Delhi 2016 2. Dr. S.S. Dara and Dr S.S Umare, A Text book of Engineering Chemistry, 1st Edition, Chand & Company Ltd., 2000. 3. K Seshamaheswaramma and MridulaChugh, Engineering Chemistry Pearson India Education Services Pvt. Ltd 4. D. J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
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19SH1104 - ENGINEERING MATHEMATICS – I

(New regulations with effect from 2019 -20)

(Common to All Branches)

Course Category:	Basic Sciences	Credits:	4
Course Type:	Theory	Lecture-Tutorial-Practical:	3-1-0
Pre – requisite:	Intermediate Mathematics	Sessional Evaluation:	40
		External Evaluation:	60
		Total Marks:	100
Course Objectives:	To make the student learn about <ol style="list-style-type: none">1. The concepts of Newton’s law of cooling, Law of natural growth and decay.2. Solutions of higher order linear differential equations with RHS of the different types.3. The concepts of first shifting theorem, change of scale property, Laplace transformation of multiplied by t and division by t and transformation of derivatives and integrals.4. The concepts of Inverse Laplace transform and their applications.5. The solution of system of linear equations by matrices.6. Taylor’s and Maclaurin’s series, Maxima and Minima of the functions of two and three variables.		
Course Outcomes:	After completing the course the student will be able to		
	CO1	Attains skills in solving first order differential equations and its applications.	
	CO2	Solve the linear differential equations related to various engineering fields.	
	CO3	Acquire basic knowledge in Laplace transforms and their applications.	
	CO4	Develop analytical skills in solving the ordinary differential equations by using the Laplace transform technique.	
	CO5	Develop the use of matrix algebra techniques that is needed by engineers for practical applications.	
	CO6	Attains skills in analyzing the Taylor’s and Maclaurin’s series and maxima and minima of the functions of two and three variables.	
	UNIT - I		
	First Order Differential Equations: Differential equations of first order and first degree - exact, linear and Bernoulli – Applications to Newton’s law of cooling – Law of natural growth and decay.		

<p>Course Content:</p>	<p style="text-align: center;">UNIT - II</p> <p>Higher Order Differential Equations: Homogeneous linear differential equations of second and higher order with constant coefficients with R.H.S. of the type e^{ax}, $\sin ax$ or $\cos ax$, x^n, $e^{ax} V$ and $x^n v(x)$.</p> <p style="text-align: center;">UNIT - III</p> <p>Laplace Transformation: Laplace transformations of standard functions – Region of convergence – First shifting theorem – Change of scale property – Laplace transformation of multiple by t and division by t – Transformation of derivatives and integrals.</p> <p style="text-align: center;">UNIT - IV</p> <p>Inverse Laplace Transformation: Inverse Laplace transform – Method of partial fractions – Shifting property – Inverse Laplace transform of multiple by s and division by s – Inverse Laplace transform of derivatives and integrals – Convolution theorem – Application to solutions of ordinary differential equations.</p> <p style="text-align: center;">UNIT - V</p> <p>Matrices: Rank of Matrix by Echelon form – System of homogenous and non-homogenous linear equations – Cayley Hamilton theorem (without proof)-Eigen values and Eigen vectors and their properties.</p> <p style="text-align: center;">UNIT - VI</p> <p>Differential Calculus: Taylor's and Maclaurin's series of single variable – Maxima and minima of function of two variables – Lagrangian method of multipliers with three variables only.</p>
<p>Textbooks:</p>	<ol style="list-style-type: none"> 1. Higher Engineering Mathematics – B.S.Grewal, Khanna Publishers, New Delhi. 2. Engineering Mathematics – B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
<p>References:</p>	<ol style="list-style-type: none"> 1. Higher Engineering Mathematics – H.K. Dass, Er. Rajnish Verma, S.Chand Publication, New Delhi. 2. Advanced Engineering Mathematics – N.P. Bali & M. Goyal, Lakshmi Publishers, New Delhi. 3. Advanced Engineering Mathematics – Erwin Kreyszig, Wiley, India

19CS1101 - PROGRAMMING FOR PROBLEM SOLVING
(Common to all branches)

Course Category:	Program Core	Credits:	3
Course Type:	Theory	Lecture – Tutorial – Practical:	3-0-0
Prerequisite:	Knowledge on computer fundamentals and basic mathematics	Sessional Evaluation: Univ. Exam Evaluation: Total Marks:	40 60 100

Course Objectives	<ul style="list-style-type: none"> • To learn the procedure how to develop algorithms, representations and programming development steps • To learn the basic building blocks of C language. • Usage of C constructs (arrays, structures, pointers and file management) to develop various programs • To create better awareness how effectively utilize the concepts of C for application development
Course Outcomes	Upon the successful completion of the course, the students will be able to:
	CO1 Learn the fundamentals of programming development, structure of C and basic data types
	CO2 Find the usage of operators in expression evaluation and construction of I/O Statements.
	CO3 Acquire knowledge on various control structures to develop simple programs
	CO4 Explore the concept of arrays, strings and its effective utilization
	CO5 Understand the concepts of Pointers and Functions for exploring the dynamic memory usage
	CO6 Explore the basics of Structures, Unions, File operations and supporting implementations
Course Content	<p style="text-align: center;"><u>UNIT – I</u></p> <p>INTRODUCTION: Algorithms, Flow charts, Program development steps. FUNDAMENTALS OF C: History, Structure of a C program, Programming rules and execution.Character set, Delimiters, C keywords, Identifiers, Constants, Variables, Rules for defining Variables, Data types, Declaration and Initialization of Variables.</p> <p style="text-align: center;"><u>UNIT – II</u></p> <p>OPERATORS AND EXPRESSIONS: Introduction, Operator Precedence and Associativity, Operator Types INPUT AND OUTPUT IN C: Formatted and Unformatted functions, Commonly used library functions.</p> <p style="text-align: center;"><u>UNIT – III</u></p> <p>DECISION STATEMENTS: Introduction, Types of If statements, switch statement, break, continue, goto. ITERATIVE STATEMENTS: while, do-while and for loops.</p>

	<p style="text-align: center;"><u>UNIT – IV</u></p> <p>ARRAYS: Definitions, Initialization, Characteristics of an array, Array Categories. STRINGS: Declaration and Initialization of strings, String handling functions.</p> <p>STORAGE CLASSES: Automatic, External, Static and Register Variables.</p> <p style="text-align: center;"><u>UNIT – V</u></p> <p>POINTERS: Fundamentals, Declaration and initialization of Pointers, Arithmetic Operations, Pointers and Arrays. FUNCTIONS: Definition, Function Prototypes, Types of functions, Call by Value and Call by Reference, Recursion.</p> <p style="text-align: center;"><u>UNIT – VI</u></p> <p>STRUCTURES: Definition, Declaration and Initialization of Structures. UNIONS: Definition, Declaration and Initialization of Union. FILES: Introduction, File Types, Basic operations on Files, File I/O, Command Line Arguments.</p>
Text Books and References	<p>TEXT BOOK(S):</p> <ol style="list-style-type: none"> 1. Programming with ANSI & TURBO C by Ashok N.Kamthane, Pearson Education 2007 <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. A Book on C by Al Kelley/Ira Pohl, Fourth Edition, Addison-Wesley.1999 2. Let Us C by Yashavant Kanetkar, BPB Publications. 3. Programming in ANSI C by Balaguruswamy 6th Edition, Tata McGraw Hill Education, 2012.
E-Resources	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses 2. https://freevidelectures.com/university/iitm

19EE1103-ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

(Civil Engineering)

Course Category	Professional core	Credits	3
Course Type	Theory	Lecture - Tutorial-Practical	2-1-0
Pre-requisite	1. Basics of Mathematics 2. Basics of Electricity	Sessional Evaluation	40
		External Exam Evaluation	60
		Total Marks	100

Course Objectives	To make the student learn about	
	1. The basic concepts of DC circuits. 2. The basic concepts of AC circuits 3. The operations of AC Generator and Induction motor. 4. Construction and working principle of the transformers. 5. The fundamentals of electrical safety and wiring. 6. The transducers and electric welding	
Course Outcomes	After completing the course the student will be able to	
	CO1	Comprehend the fundamental concepts of DC circuits.
	CO2	Understand the fundamental concepts of AC circuits.
	CO3	Know the operations of AC Generator and Induction motor.
	CO4	Acquire the knowledge about the transformers.
	CO5	Understand the fundamentals of electrical safety and wiring system.
	CO6	Understand about different transducers and methods of welding.
Course Content	<p align="center">UNIT-I</p> <p>Fundamentals of DC Circuits: Introduction to DC circuits, Active and passive elements, Voltage - Current relations for resistor, Inductor and Capacitor, Kirchhoff's laws-simple problems.</p> <p align="center">UNIT-II</p> <p>Fundamentals of AC Circuits: Generation of sinusoidal voltage, Average and RMS values, Form Factor and peak factors for sinusoidal waveforms, Analysis of R, L, C circuits with sinusoidal source, j notation, Concept of Impedance, introduction to three phase system and Comparison between three phase and single phase system.</p> <p align="center">UNIT-III</p> <p>AC Generator: Working principle, Construction and applications of alternators Induction motor: Classification of Induction motors, Working principle, Construction and applications of capacitor start and capacitor start & run motors (descriptive only)</p>	

	<p style="text-align: center;">UNIT-IV</p> <p>Single Phase Transformers: Principle and operation of a transformer, Construction, EMF equation, Losses and efficiency of transformer, Three phase transformer connections (descriptive only)</p> <p style="text-align: center;">UNIT-V</p> <p>Electrical Safety and Wiring: Importance of electrical safety, Introduction to Personal protective equipment (PPE), Types of wiring, Wiring accessories, Staircase and fluorescent lamp connections, Earthing, Pipe and plate earthing, Types of conductors used in wiring.</p> <p style="text-align: center;">UNIT-VI</p> <p>Transducers: Resistance temperature detector (RTD), Thermocouple, Strain gauge, Piezo electric transducer.</p> <p>Electric welding: Introduction, resistance welding and arc welding techniques</p>
Textbooks & Reference Books	<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. “Basic Electrical Engineering”, by Dash.S.S, Subramani.C and Vijayakumar.K First edition, Vijay Nicole Imprints Pvt.Ltd, 2013. 2. “Basic Electrical and Electronics Engineering”, by R.Muthusubramanian and S.Salivahanan, First Edition ,Tata McGraw Hill. 3. “Basic Electrical Engineering”, by Metha.V.K, Rohit Metha, Fifth edition, Chand. S & Co, 2016. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. “Basic Electrical Engineering”, by Kothari .D.P and Nagrath.I.J, Second edition, Tata McGraw - Hill, 2009. 2. “Basic Electrical and Electronics Engineering”, by Bhattacharya.S.K, First Edition, Pearson Education, Reprint 2015. 3. “A Text book on Power System Engineering”, by A. Chakrabarti, M.L. Soni, P.V.Gupta, U.S. Bhatnagar and Dr. A Chakrabarti, DhanpathRai & Company Pvt Ltd, 2009.
E-Resources	<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses. 2. http://iete-elan.ac.in. 3. http://freevideolectures.com/university/iitm.

19SH11P3 - ENGINEERING CHEMISTRY LABORATORY*(New Regulations w.e.f. 2019-2020)***I B.Tech. – I Semester
(MECH and CIVIL)**

Course Category:	Basic science	Credits:	1.5
Course Type:	Practical	Lecture-Tutorial-Practical:	0-0-3
Pre-requisite:	Fundamental concepts of Chemistry	Sessional Evaluation: External Exam Evaluation: Total Marks:	40 60 100

Course Objectives	The main objective is to provide students to learn about experimental techniques in chemistry with knowledge in theoretical aspects so that they can excel in that particular field.		
Course Outcomes	CO1	Determine the cell constant and conductance of solutions	
	CO2	prepare advanced polymer materials	
Course Content	Minimum of 8 experiments to be completed out of the following: <p style="text-align: center;"><u>LIST OF EXPERIMENTS</u></p> <ol style="list-style-type: none"> 1. Determination of total hardness of water by EDTA method 2. Determination of total alkalinity of water 3. Estimation of chlorides using potassium chromate indicator 4. Determination of cell constant and conductance of solutions 5. Conductometric titration of strong acid Vs strong base 6. Conductometric titration of weak acid Vs strong base 7. Determination of pH of unknown solution 8. Potentiometry - determination of redox potentials and emfs 9. Determination of Strength of an acid in Pb-Acid battery 10. Preparation of a polymer 11. Determination of viscosity of oils with Redwood viscometer 12. Adsorption of acetic acid by charcoal 		
Text Books	TEXT BOOKS: <ol style="list-style-type: none"> 1. Vogel's text books of quantitative chemical analysis, Mendham et al, person publications. 2. Chemistry lab manual – KN Jayaveera, Subbareddy & Chandrasekher. 3. Instrumental methods of chemical analysis – Chatwal & Anand Himalaya publications. 		

19CS11P1 - PROGRAMMING FOR PROBLEM SOLVING LABORATORY**(Common to all Branches)**

Course Category:	Program Core	Credits:	1.5
Course Type:	Practical	Lecture-Tutorial-Practical:	0-0-3
Pre-requisite:	Basic mathematical knowledge to solve problems and computer fundamentals	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100

Course Objective(s)	To learn the C programming constructs and its implementation.
Course Outcome(s)	Upon successful completion of the course, the students will be able to Solve problems using C programming concepts
Course Content	<p>Minimum of 8 experiments to be completed out of the following:</p> <p style="text-align: center;"><u>LIST OF EXPERIMENTS</u></p> <ol style="list-style-type: none"> 1. To evaluate expressions. 2. To implement if constructs. 3. To implement Switch statement. 4. To implement all iterative statements. 5. To implement Arrays. 6. To implement operations on Strings without using Library functions. 7. To implement arithmetic operations using pointers. 8. Implement both recursive and non-recursive functions. 9. To implement parameter passing techniques. 10. To implement Structures. 11. To implement basic File operations.
Text Books	<p>TEXT BOOK(S):</p> <ol style="list-style-type: none"> 1. Programming with ANSI & TURBO C by Ashok N.Kamthane, Pearson Education 2007 <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. A Book on C by Al Kelley/Ira Pohl, Fourth Edition, Addison-Wesley.1999 2. Let Us C by Yashavant Kanetkar, BPB Publications. 3. Programming in ANSI C by Balaguruswamy6th Edition, Tata McGraw Hill Education,2012.
E-Resources	https://nptel.ac.in/courses

19ME11P1-COMPUTER AIDED ENGINEERING DRAWING LABORATORY-1**(Common to ME and Civil)**

I B.Tech I Semester

(With effect from 2019-20)

Course Category	Engineering Science	Credits	3
Course type	Practical	Lecture- Tutorial-Practical	0-0-6
Prerequisite	Geometrical Construction	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100
		External Exam Duration:	3 hrs.

Course	Marks	Examination and Evaluation		Scheme of examination
Computer Aided Engineering Drawing	60	Semester end Examination for 3 hours duration in the CAD Laboratory		60 marks are allotted for the drawing examination during semester end.
	40	20	Day-to-Day evaluation during the practice.	Marks are evaluated based on average performance of student in day-to-day exercises and finalized for 20 marks
		20	Drawing examination	Two drawing examinations are conducted for 20 marks. 80% of better one and 20% of the other are added and finalized for 20 marks. Drawing examination-I: Shall be conducted just before I mid-term examinations. Drawing examination-II: Shall be conducted just before II mid-term examinations.
Course Objectives	<p>Students are made to understand / learn</p> <ul style="list-style-type: none"> ❖ To enable the students with various concepts like dimensioning, construction of conic sections, polygons, cycloids and involutes. ❖ To impart and inculcate proper understanding of AutoCAD fundamentals. ❖ To apply the knowledge of AutoCAD for the projections of points, lines and solids. ❖ To know about sections and developments of solids. ❖ To improve the visualization skills with isometric projections. 			
Course Outcomes	At the end of the course, the student will be able to			
	CO1	Understand the conventions and methods of engineering drawings		
	CO2	Sketch the solutions to the problems on projection of points, lines, planes and solids		
	CO3	Demonstrate orthographic and Isometric principles		
CO4	Understand and apply the knowledge of engineering drawing in modern CAD tools.			

<p style="text-align: center;">Course Content</p>	<p>INTRODUCTION TO CAD SOFTWARE: Introduction: Importance of Computer Aided Drawing, software tool environment, drawing size and scale, main menu, tool bar and menus, co-ordinate system, drafting settings. Creation and Editing: Points, Lines, Poly lines, Polygons, Splines, circle, ellipse, text, move, copy, off-set, pan, mirror, rotate, trim, extend, break, chamfer, fillet, curves, block, layers, line representations, dimensioning and hatching.</p> <p>GEOMETRICAL CONSTRUCTIONS, AND CONIC SECTIONS: Importance of Drawing, Drawing Instruments, Sheet layout, BIS Conventions, Types of lines, Lettering, and dimensioning methods. Geometrical Constructions: Regular Polygons. Conic Sections: Introduction, Construction of Ellipse, Parabola and Hyperbola using Eccentricity method and Rectangular/ Oblong methods, Rectangular hyperbola.</p> <p>SPECIAL CURVES: Construction of Cycloidal curves – Cycloid, Epi-cycloid and Hypo- cycloid. Involute – Involute of circle and polygons.</p> <p>PROJECTIONS OF POINTS AND LINES: Projections of Points: Principles of projections, Planes of projection, Points in four quadrants. Projections of Lines: Line inclined to both the principal planes (first angle projection only).</p> <p>PROJECTIONS OF PLANES: Projections of Planes: Plane (triangle, square, rectangle, pentagon, hexagon and circular) inclined to both the principal planes.</p> <p>PROJECTIONS OF SOLIDS: Projections of Solids: Solids such as Prisms, Pyramids, Cylinders and Cones inclined to one plane.</p>
<p>Textbooks</p>	<ol style="list-style-type: none"> 1. Engineering Drawing, N.D. Bhat / Charotar Publishing House,. Gujarat, 53rd edition, 2014. 2. AutoCAD 2013 For Engineers and Designers, Sham Tickoo, Dream tech Press, 2013.
<p>Reference books</p>	<ol style="list-style-type: none"> 1. Engineering Drawing And Graphics + Autocad, Venugopal K, New Age International Pvt. Ltd.New Delhi, 2007. 2. Engineering Graphics with Auto CAD, D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, PHI Learning Private Limited, Revised Edition, August 2010. 3. Engineering Drawing and Graphics Using Autocad, T Jeyapooan, Vikas Publishing House, 3rd Edition, 2010. 4. A Textbook on Engineering Drawing, P. Kannaiah, K. L. Narayana, K. Venkata Reddy, Radiant Publishing House, 2012.

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR
(AUTONOMOUS)
CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
 (With effect from the batch admitted in the academic year 2019-2020)
I YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER

S.NO.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation						Max. Total Marks			
							Sessional Test-I			Sessional Test-II				Total Sessional Marks (Max. 40)	Semester End Examination	
			THEORY	L	T		P	Test-I (2 hrs.)	Assignment-I	Max. Marks	Test-II (2 hrs.)	Assignment-II			Max Marks	Duration In Hours
1	19SH1201	Professional English	2	0	0	2	34	6	40	34	6	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	
2	19SH1202	Engineering Physics	2	1	0	3	34	6	40	34	6	40		3	60	100
3	19SH1204	Engineering Mathematics –II	3	1	0	4	34	6	40	34	6	40		3	60	100
4	19CE1201	Engineering Mechanics	2	1	0	3	34	6	40	34	6	40		3	60	100
5	19CE1202	Building Materials & Construction	3	0	0	3	34	6	40	34	6	40		3	60	100
		PRACTICALS														
1	19SH12P1	English Language Laboratory	0	0	2	1	-	-	-	-	-	-	Day-to-day Evaluation and a test (40 marks)	3	60	100
2	19SH12P2	Engineering Physics Laboratory	0	0	3	1.5	-	-	-	-	-	-		3	60	100
3	19ME12P2	Computer Aided Engineering Drawing Laboratory-II	0	0	3	1.5	-	-	-	-	-	-		3	60	100
4	19ME12P3	Engineering Workshop	0	0	2	1	-	-	-	-	-	-		3	60	100
		TOTAL				20										

19SH1201 - PROFESSIONAL ENGLISH

(Common to all Branches)

(New Regulations w.e.f. 2019-2020)

I B.TECH- II Semester

Course Category:	Basic Sciences	Credits:	2
Course Type:	Theory	Lecture-Tutorial-Practical:	2-0-0
Pre-requisite:	Basic Level of LSRW skills	Sessional Evaluation: External Exam Evaluation: Total Marks:	40 60 100

Course Objectives	Students undergoing this course are expected : <ol style="list-style-type: none">1. To develop their basic professional writing skills in English2. To achieve specific linguistic and verbal competence3. To acquire relevant skills and function efficiently in a realistic professional working environment4. To inculcate the habit of reading & writing5. To learn writing analytical essays.6. To acquire verbal proficiency.	
Course Outcomes	On successful completion of this course, the students will be able to:	
	CO1	Write effective descriptions on scientific/technical topics
	CO2	Draft effective business e-mails.
	CO3	Present perspective of an issue and analyze an argument.
	CO4	Write proposals and project reports for professional contexts
	CO5	Practice different techniques of note making and note taking.
	CO6	Write effective book reviews on technical & non-technical books. Equip themselves with verbal proficiency.

<p>Course Content</p>	<p style="text-align: center;"><u>UNIT –I</u></p> <p>WRITING: Descriptions: Descriptions on scientific/ technical in nature-writing introduction - defining – classifying - describing technical features –the structure of an automobile/gadget/product or the process - instruction or installation manuals.</p> <p>VERBAL: Verbal reasoning- Analogies, Homophones & Homonyms</p> <p style="text-align: center;"><u>UNIT-II</u></p> <p>WRITING: E-mail Communication- Etiquette – Format- Writing Effective Business Email</p> <p>VERBAL:Idioms and Phrases, One-word substitutes</p> <p style="text-align: center;"><u>UNIT-III</u></p> <p>ANALYTICAL WRITING: Presenting perspective of an issue- Compare & Contrast, Cause and Effect, Analyze an argument</p> <p>VERBAL: Affixes-prefix and suffix, root words, derivatives</p> <p style="text-align: center;"><u>UNIT-IV</u></p> <p>TECHNICAL WRITING: Writing Proposals: Significance, Structure, Style and Writing of Project Reports.</p> <p>VERBAL: Synonyms and Antonyms</p> <p style="text-align: center;"><u>UNIT-V</u></p> <p>WRITING: Introduction to different kinds of materials: Technical & Non-technical- Note Taking and Note Making- Identification of important points and precise the content</p> <p>VERBAL: Words often confused</p> <p style="text-align: center;"><u>UNIT-VI</u></p> <p>BOOK REVIEWS:Review of a Technical and Non-Technical - A brief written analysis including summary and appreciation</p> <p>VERBAL: Sentence Completion</p>
	<p>REFERENCES:</p> <ol style="list-style-type: none"> 1. A Textbook of English for Engineers and Technologists (combined edVol. 1&2) Orient Black Swan 2010. 2. Word Power Made Easy by Norman Lewis 3. A Communicative Grammar of English by Geoffrey Leech 4. Effective Technical Communication, M. Ashraf Rizvi, Tata McGraw- Hill, 2011.

19SH1202 - ENGINEERING PHYSICS

I B.Tech. II – Semester

(Common to CIVIL&MECHANICAL Branches)

(New regulation w.e.f. 2019 – 2020)

Course Category:	Basic Science	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Pre-requisite:	Fundamental concepts of Physics	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100

Course Objectives	Students undergoing this course are expected to <ol style="list-style-type: none">1. To acquire knowledge of interference, diffraction and principles of laser applied in Engineering Field.2. Apply principles of Quantum Mechanics to various atomic phenomena.3. Explain and provide the knowledge about semiconductors and their use in electronic devices.4. To gain knowledge about dielectrics & magnetic materials focusing on their applications.5. Analyze various harmonic motions and understand concept of resonance.6. To understand importance and role of optical fibers and nanomaterials in Civil & Mechanical engineering
Course Outcomes	Upon successful completion of the course, the student will be able to:
	CO1 Understand the phenomena of wave optics, principles of lasers and its applications.
	CO2 Able to understand the basic concepts of quantum physics applicable to solids.
	CO3 To know the concepts of electron theory of solids and properties of semiconductor materials by projecting the view of energy bands.
	CO4 Understand the concept of polarization & magnetization and also applications of dielectric & magnetic materials in various disciplines.
	CO5 Understand & analyse different kinds of oscillatory motions.
	CO6 Basic ideas about optical fibers and nanomaterials with their uses in various fields of Science & Technology.

<p>Course Content</p>	<p style="text-align: center;"><u>UNIT-I</u></p> <p>Wave optics and Lasers Wave Optics : Introduction (Interference of light) – Superposition of waves – interference by division of wave front (Young’s double slit experiment) & by division of amplitude (Newton rings) – Fraunhofer diffraction due to single slit, double slit– Diffraction grating and its resolving power, Lasers :Spontaneous& simulated emission - Population inversion - Types of Lasers: Solid state lasers (Ruby), Gas lasers (He–Ne) – Properties of laser beam: monochromacity, coherence, directionality & brightness – Applications of lasers in science, engineering & medicine.</p> <p style="text-align: center;"><u>UNIT-II</u></p> <p>Principles of Quantum mechanics: Black body radiation – Laws of explaining the energy distribution- Planks quantum theory of black body radiation – Stefan-Boltzman, Wein’s displacement & Rayleigh Jean’s law - Photon & its properties. Wave and particle duality – de Broglie hypothesis – Properties of matter waves – de Broglie wave length – Heisenberg uncertainty principle – Schrodinger time independent wave equation – Physical significance of wave function - Particle in a one dimensional potential box.</p> <p style="text-align: center;"><u>UNIT-III</u></p> <p>Electron theory and Semiconductors Electron theory: Free electron theory (classical & quantum : postulates, success& drawbacks) - Fermi–Dirac distribution function & its temperature dependence – Kronig–Penny model (non mathematical treatment) – Concept of band – Classification of solids into conductors , semiconductors & insulators. Semiconductors: Intrinsic & extrinsic semiconductors (qualitative) – Fermi level in extrinsic semiconductors – Conductivity in semiconductors :Drift & diffusion – Einstein relation – Hall effect & its applications.</p> <p style="text-align: center;"><u>UNIT-IV</u></p> <p>Dielectric and Magnetic properties Dielectric Properties: Basic definitions – Electronic, ionic (quantitative)& orientation (qualitative) polarizations – Internal field in solid dielectrics – Clausius- Mossotti relation. Magnetic Materials: Introduction – Basic definitions – Origin of magnetic moment – Classification in to dia, para, ferro, anti ferro&ferri magnetic materials – Hysteresis – Soft & hard magnetic materials - Applications of magnetic materials.</p> <p style="text-align: center;"><u>UNIT-V</u></p> <p>Waves & Oscillations: Review of simple harmonic motion - Free vibrations – Torsional pendulum – Damped harmonic motion: over damped, critically damped and lightly damped oscillations. Forced oscillations & resonance - Sharpness of resonance and Q-factor – Electrical analogy for an oscillator.</p>
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	<p style="text-align: center;"><u>UNIT VI</u></p> <p>Optical fibers and Physics of Nanomaterials Optical fibers: Introduction – Construction and working principle of optical fiber – Acceptance angle – Numerical Aperture – Types of optical fibers – Block diagram of optical fiber communication system – Applications of optical fibers. Physics of Nanomaterials: Introduction – Significance of nanoscale – Types of nanomaterials – Properties of nanomaterials: physical, mechanical, magnetic and optical – Synthesis of nanomaterials: top-down-Ball milling, bottom up – Chemical vapour deposition – Applications of nanomaterials.</p>
<p>Textbooks & Reference Books</p>	<p>TEXTBOOKS: 1. Engineering Physics by Gaur and Gupta, Dhanpatrai Publications 2. Engineering Physics by Palanisamy, Scitech. 3. Engineering Physics by K.Thyagarajan, McGraw Hill.</p> <p>REFERENCE BOOKS: 1. Engineering Physics by Maninaidu, Pearson. 2. Unified Physics Vol. 1 (Mechanics and Waves & Oscillations), Jai Prakashnath& co., Meerut.</p>

19SH1204 - ENGINEERING MATHEMATICS - II

I.B.TECH. II-SEMESTER

(New regulations with effect from 2019-20)

(Common to All Branches)

Course Category:	Basic Sciences	Credits:	4
Course Type:	Theory	Lecture-Tutorial-Practical:	3-1-0
Pre – requisite:	Intermediate Mathematics	Sessional Evaluation:	40
		External Evaluation:	60
		Total Marks:	100
Course Objectives:	To make the student learn about <ol style="list-style-type: none">1. The concepts of double integrals and its applications.2. The basic concepts of triple integrals and its applications, Beta and Gamma functions.3. The gradient, divergence and curl operators, Solenoidal and Irrotational vectors.4. The basic concepts of vector integration and their applications.5. To express a function in Fourier series in an interval.6. The concepts of Fourier transform.		
Course Outcomes:	After completing the course the student will be able to		
	CO1	Apply double integration techniques in evaluating areas bounded by region.	
	CO2	Understand effectively in analyzing the Triple integrals, Beta and Gamma functions	
	CO3	Interpret the physical meaning of different operators such as Gradient, Divergence and Curl.	
	CO4	Apply Green's, Stokes and Divergence theorems in evaluation of double and triple integrals.	
	CO5	Develop analytical skills in solving the problems involving Fourier Series.	
	CO6	Understand effectively Fourier Sine and Cosine integral, Fourier Sine and Cosine transforms.	
	UNIT - I		
	Double Integrals: Double integrals – Change of order of integration – Change to polar coordinates – Area by double integration.		

Course Content:	<p style="text-align: center;">UNIT - II</p> <p>Tripple Integrals and Special functions: Evaluation of triple integrals – Volume by triple integral – Beta and Gamma functions and their properties – Relation between Beta and Gamma functions.</p>
	<p style="text-align: center;">UNIT - III</p> <p>Vector Differentiation: Scalar and vector point functions – Vector differential operator – Gradient, Divergence and Curl – Solenoidal and Irrotational vectors.</p>
	<p style="text-align: center;">UNIT - IV</p> <p>Vector Integration: Line integral-circulation-workdone – Surface integrals -flux – Volume integral – Vector integral theorems - Green’s theorem, Stoke’s theorem and Gauss-divergence theorem (without proof).</p>
	<p style="text-align: center;">UNIT-V</p> <p>Fourier Series: Determination of Fourier coefficients (without proof) – Fourier series – Even and odd functions – Change of intervals.</p>
	<p style="text-align: center;">UNIT-VI</p> <p>Fourier Transforms: Fourier Integral Theorem (Without proof) – Fourier Sine and Cosine integrals — Fourier Transforms – Fourier Sine and Cosine transforms.</p>
Textbooks:	<ol style="list-style-type: none"> 1. Higher Engineering Mathematics - B.S.Grewal, Khanna Publishers, New Delhi. 2. Engineering Mathematics - B.V. Ramana, Tata McGraw-Hill Education Pvt. Ltd, New Delhi.
Reference:	<ol style="list-style-type: none"> 1. Higher Engineering Mathematics - H.K. Dass, Er. Rajnish Verma, S.Chand Publication, New Delhi. 2. Advanced Engineering Mathematics - N.P. Bali & M. Goyal, Lakshmi Publishers, New Delhi. 3. Advanced Engineering Mathematics - Erwin Kreyszig, Wiley, India

19CE1201 - ENGINEERING MECHANICS

(Civil Engineering)

(New Regulations w. e. f. 2019-2020)

I B.TECH – II Semester

Course category:	Engineering Science course	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practical:	2-1-0
Prerequisite:	Engineering Physics, Engineering Mathematics	Sessional Evaluation : End Exam. Evaluation: Total Marks:	40 60 100

Course Objectives	<ol style="list-style-type: none">1. To analyse the system of forces acting in a plane in different conditions.2. To calculate unknown force components under the action of frictional forces.3. To explain the properties of surfaces by calculating centroid, moment of inertia and other related concepts.4. To evaluate motion characteristics of body subjected to given force.5. To analyse the system of forces using D Alembert principle and Work-Energy equations.6. To analyze the components of forces in trusses and learn about mechanical vibrations	
Course Outcomes	CO1	Determine the components of forces in rectangular and non-rectangular coordinates.
	CO2	Determine the support reactions on structures and analyze systems that include frictional forces.
	CO3	Locate the centroid of an area, calculate the second moment and principal second moment of an area
	CO4	Calculate the motion characteristics of a body subjected to a given force system
	CO5	Determine the resultant forces using moment of momentum principle, D Alembert principle and Work-Energy equations.
	CO6	Determine resultant forces in trusses and frequency and amplitude for a given system.
	<p style="text-align: center;">UNIT-I</p> <p>STATICS: Introduction – Units and Dimensions – Law of mechanics – Vectors – Vectorial representation of forces and moments – Vector operations – Coplanar and concurrent forces – Resolution and composition of forces – Equilibrium of a particle – Equivalent systems of forces – Principle of transmissibility – Single equivalent force and Free body diagram – Types of supports and their reactions – Equilibrium of rigid bodies in two dimensions.</p> <p style="text-align: center;">UNIT – II</p> <p>FRICTION : Types of friction – Laws of friction – Limiting friction – Cone of limiting friction - Static and dynamic frictions – Motion of bodies – Wedge, Screw jack and differential jack.</p>	

<p>Course Content</p>	<p style="text-align: center;">UNIT – III</p> <p>CENTROID AND CENTRE OF GRAVITY: Centroids of simple figures – Centroids of composite figures - Centre of gravity of bodies – Area moment of inertia - Parallel axis theorems and perpendicular axis theorems – Moment of inertia of composite figures. MASS MOMENT OF INERTIA: Moment of inertia of simple solids – Moment of inertia of composite masses (Simple problems only)</p> <p style="text-align: center;">UNIT – IV</p> <p>DYNAMICS-1: Displacement – Velocity and acceleration and their relationship – Relative motion – Curvilinear motion – Newton’s law of motion.</p> <p style="text-align: center;">UNIT – V</p> <p>DYNAMICS-2: Basic terms – General principles in dynamics - Types of motion – instantaneous centre of rotation in plane motion (simple problems) - Work energy equation – D Alembert’s Principle and its uses – kinetics of rigid body rotation.</p> <p style="text-align: center;">UNIT – VI</p> <p>ANALYSIS OF PLANE TRUSSES: Assumptions – rigid and non-rigid trusses – Simple truss, analysis by method of joints, method of sections and tension coefficient method. MECHANICAL VIBRATIONS: Basic terminology – Free and forced vibrations – resonance and its effects – degree of freedom – Derivation of frequency and amplitude of free vibrations without damping and single degree of freedom system (simple problems) – Types of pendulum – Use of simple and compound pendulum.</p>
<p>Textbooks & Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Engineering Mechanics by A. K. Tayal. 2. Engineering Mechanics by R.K. Bansal 3. Engineering Mechanics by S. Timoshenko, D.H. Young, J V Rao and Sukumar <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Engineering Mechanics by J .L .Meriam and L. G. Kraige 2. Engineering Mechanics by Irving. H. Shames & G. Krishna Mohana Rao. 3. Engineering Mechanics and statistics by P.B.Beer& E. R. Johnston.

19CE1202-BUILDING MATERIALS AND CONSTRUCTION

(Civil Engineering)

(New Regulations w. e. f. 2019-2020)

I B.TECH – II Semester

Course category:	Engineering Science course	Credits:	3
Course Type:	Theory	Lecture - Tutorial - Practical:	3-0-0
Prerequisite:	None	Sessional Evaluation : End Exam. Evaluation: Total Marks:	40 60 100

Course Objectives	<ol style="list-style-type: none">1. To know the significance of various building materials used in construction industry.2. To explain the materials used in concrete and different types of mortars and their applications.3. To explain various types masonry construction4. To explain various types of building components.5. To explain types of roofs and roof coverings and temporary works used in buildings6. To learn about types of wall finishes and thermal and acoustic insulating materials in buildings.	
Course Outcomes	CO1	Gain an in-depth knowledge on types of building materials used in construction.
	CO2	Gain an in-depth knowledge on components of concrete and mortars.
	CO3	Understand various types of buildings and masonry.
	CO4	Understand various types of building components and their construction practices.
	CO5	Understand the various types of roofs and temporary works in construction.
	CO6	Know various roof coverings and special treatments for thermal and acoustic insulation materials.
Course Content	<p style="text-align: center;">UNIT – I</p> <p>INTRODUCTION TO BUILDING MATERIALS: Stone: Dressing of stones- Artificial stones and applications-Wood: classification of timber- characteristics of good timber- ply wood- types and uses- Modern building materials- Bricks: Manufacturing process- testing of bricks- Ceramic products: Manufacturing process- Glass: Functions of glass in buildings- manufacturing process-special glass- Advantages and disadvantages- Building materials for low cost housing- Utilisation of waste for alternative building materials- Sustainable materials in construction- National Standards</p>	

UNIT- II

CEMENT CONCRETE AND MORTARS:

Constituents of Cement Concrete

Cement: Manufacturing process- types of cement- Portland cement- hydration of cement- tests of cement- National standards

Aggregate: Introduction- Classification of aggregate- Characteristics- National standards

Water: Quality of mixing water

Building Mortars

Introduction- Classification (Cement mortar, lime mortar, lime-cement mortar, special mortar) - Characteristics of good mortar- grouting- guniting.

UNIT- III

MASONRY CONSTRUCTION:

Introduction to Building Components

Types of buildings- Components of buildings- Types and uses of shallow and deep foundations

Stone masonry: Technical terms – Joints – Types – Random (un-coarsed) rubble – Coarsed rubble – Dry rubble masonry – Ashlar masonry – Ashlar fine – chamfered fine – Supervision.

Brick masonry: Technical terms – bonds in brick work- English bond – single & double Flemish bond – Defects – Comparison of Brick masonry and stone masonry.

Cavity walls: Brick cavity walls- position of cavity at foundation, roof and opening levels

UNIT- IV

BUILDING COMPONENTS:

Lintels and arches: Lintels: types- construction- Arches: Technical terms- types (brick arches, rough, axed stone arches, flat and semi circular arches)

Doors: Location- Technical terms – Types – Suitability

Windows: Location – Types – Suitability – Fixtures and fastenings

Stairs and Stair cases: technical terms- Requirements of good stair – classification- elevators and escalators

Floorings

Introduction- Requirements of a good floor- types of floorings: cement concrete (regular and precast)- mosaic- tiled- marble- timber

UNIT- V

ROOFS AND FORM WORK:

Roofs and Roof coverings

Technical terms- classification (pitched roofs and flat roofs)- advantages and disadvantages- Roof coverings: A.C sheets and G.I sheets

	<p>Temporary works Form work: Introduction- Stripping of formwork- timbering in trenches- types of Scaffolding- shoring and underpinning.</p> <p style="text-align: center;">UNIT– VI</p> <p>WALL FINISHES AND SPECIAL TREATMENTS:</p> <p>Wall finishes Plastering: objectives of plastering- requirements of good plaster- types of mortars for plastering- tools using in plastering - types of pointing</p> <p>Thermal Insulation Introduction- thermal properties and selection of the insulating materials- classification of thermal insulating materials - methods of thermal insulation</p> <p>Acoustical Construction Introduction- Characteristics of audible sound- behaviour of sound in enclosure- reflection of sound- Reverberation and absorption- types of acoustic materials</p>
<p>Textbooks & Reference Books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Engineering Materials by S.C Rangwala. 2. Building construction by Dr. B. C. Punmia. 3. A Text Book of Building Construction and Construction Materials 4th Edition by T. D. Ahuja, G. S. Birdie. <p>REFERENCES:</p> <ol style="list-style-type: none"> 1. Building construction by S. C. Rangwala. 2. Building and Construction Materials : Testing and Quality Control 1st Edition by M. L. Gambhir, NehaJamwal. 3. Indian Standard Institution, National Building Code of India, ISI, 1984, New Delhi.

19SH12P1 - ENGLISH LANGUAGE LABORATORY

(Common to CE, ME)

(New Regulations w. e. f. 2019-2020)

I B.TECH- II Semester

Course Category:	Basic Sciences	Credits:	1
Course Type:	Practical	Lecture-Tutorial-Practical:	0-0-2
Pre-requisite:	Basic Level of LSRW skills	Sessional Evaluation: External Exam Evaluation: Total Marks:	40 60 100

Course Objectives	The main objective is to prepare the students to improve their communicative ability in English with emphasis on LSRW skills and enable them to communicate effectively in different socio- cultural and professional contexts.
Course Outcomes	These activities practiced in the laboratory are helpful in comprehending the important language aspects which are useful for the real life situations. These are also helpful in enhancing the language competency and communicative level of students.
Course Content	<p style="text-align: center;"><u>LIST OF ACTIVITIES</u></p> <p>1. Listening Skills</p> <ul style="list-style-type: none">• Listening for Identifying key terms, understanding concepts• Listening for specific information• Listening for global comprehension and summarizing• Listening to short audio texts and answering a series of questions. <p>2. Common Everyday Conversations: (Asking and answering general questions on familiar topics such as home, family, work, studies and interests)</p> <ul style="list-style-type: none">• Expressions in various situations• Making requests and seeking permissions• Interrupting and apologizing• Role plays / Situational dialogues

3. Communication at Work Place:

- Introducing oneself and others
- Ice breaking activity and JAM Session
- Greetings
- Taking leave

4. Group Discussion

- Discussion in pairs/ small groups on specific topics
- Short structured talks
- Debates
- Reporting/ summarizing

5. Presentations:

- Pre-planning
- Non-verbal communication
- Formal oral presentations on topics from academic contexts

6. Giving directions

- Giving directions
- **Asking for directions**
- **Specific instructions**
- Importance of Landmarks

REFERENCES:

1. A Manual for English Language Laboratories: Dr. D. Sudha Rani, Pearson Publications
2. Techniques of Teaching English: A.L. Kohli
3. <https://www.talkenglish.com/>

19SH12P2 - ENGINEERING PHYSICS LABORATORY

I B.Tech. II – Semester
(Common to CIVIL&MECHANICAL Branches)
(New regulation w.e.f. 2019 – 2020)

Course Category:	Basic Science	Credits:	1.5
Course Type:	Practical	Lecture-Tutorial-Practical:	0-0-3
Pre-requisite:	Engineering Physics	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100

Course Objectives	To provide student to learn about some important experimental techniques in physics with knowledge in theoretical aspects so that they can excel in that particular field.
Course Outcomes	<ol style="list-style-type: none">1. These experiments in the laboratory are helpful in understanding important concepts of physics through involvement in the experiments by applying theoretical knowledge.2. It helps to recognize where the ideas of the students agree with those accepted by physics and where they do not.
Course Content	<p>Minimum of 8 experiments to be conducted out of the following :</p> <p style="text-align: center;"><u>LIST OF EXPERIMENTS</u></p> <ol style="list-style-type: none">1. Determination of rigidity modulus of wire material – Torsional pendulum.2. Melde’s experiment – Transverse & longitudinal modes.3. Resonance in LCR circuit.4. Magnetic field along the axis of a coil (Stewart – Gee’s Method).5. Study of characteristics of LED6. Newton rings7. Wedge method8. Diffraction grating - Wavelength of given source.9. Dispersive power of prism material using spectrometer.10. P-N- junction diode characteristics.11. Evaluation of Numerical Aperture of given optical fiber.12. Energy gap of a P-N junction diode material.13. Transistor characteristics.14. Solar cell characteristics.15. Logic gates.

19ME12P2-COMPUTER AIDED ENGINEERING DRAWING LABORATORY-1I

(Common to ME and Civil)

I B.Tech II Semester

(With effect from 2019-20)

Course Category	Engineering Science	Credits	1.5
Course type	Practical	Lecture- Tutorial-Practical	0-0-3
Prerequisite	Geometrical Construction	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100
		External Exam Duration:	3 hrs.

Course	Marks	Examination and Evaluation		Scheme of examination
Computer Aided Engineering Drawing	60	Semester end Examination for 3 hours duration in the CAD Laboratory		60 marks are allotted for the drawing examination during semester end.
	40	20	Day-to-Day evaluation during the practice.	Marks are evaluated based on average performance of student in day-to-day exercises and finalized for 20 marks
		20	Drawing examination	Two drawing examinations are conducted for 20 marks. 80% of better one and 20% of the other are added and finalized for 20 marks. Drawing examination-I: Shall be conducted just before I mid-term examinations. Drawing examination-II: Shall be conducted just before II mid-term examinations.
Course Objectives	Students are made to understand / learn <ul style="list-style-type: none"> ❖ To enable the students with various concepts like dimensioning, construction of conic sections, polygons, cycloids and involutes. ❖ To impart and inculcate proper understanding of AutoCAD fundamentals. ❖ To apply the knowledge of AutoCAD for the projections of points, lines and solids. ❖ To know about sections and developments of solids. ❖ To improve the visualization skills with isometric projections. 			
Course Outcomes	At the end of the course, the student will be able to			
	CO1	Sketch the solutions to the problems on projection of solids and sections of solids		
	CO2	Understand the development of surfaces		
	CO3	Demonstrate orthographic and Isometric principles		
	CO4	Understand and apply the knowledge of engineering drawing in modern CAD tools.		

<p>Course Content</p>	<p>PROJECTIONS OF SOLIDS: Projections of Solids: Solids such as Prisms, Pyramids, Cylinders and Cones inclined to both the principal plane.</p> <p>SECTIONS OF SOLIDS: Sections of Solids: Solids such as Prisms, Pyramids, Cylinders and Cones resting on their bases on HP.</p> <p>DEVELOPMENT OF SURFACES. Development of Surfaces: Lateral surfaces of solids such as Prisms, Pyramids, Cylinders and Cones (cut by a plane inclined to HP).</p> <p>ISOMETRIC VIEWS AND PROJECTIONS: Isometric views of planes and solids. Isometric scale, Isometric Projections of simple objects.</p> <p>ORTHOGRAPHIC PROJECTIONS: Conversion of Pictorial views into Orthographic Views.</p>
<p>Textbooks</p>	<ol style="list-style-type: none"> 1. Engineering Drawing, N.D. Bhat / Charotar Publishing House,. Gujarat, 53rd edition, 2014. 2. AutoCAD 2 0 13 For Engineers and Designers, Sham Tickoo, Dream tech Press, 2013.
<p>Reference Books</p>	<ol style="list-style-type: none"> 1. Engineering Drawing And Graphics + Autocad, Venugopal K, New Age International Pvt. Ltd. New Delhi, 2007. 2. Engineering Graphics with Auto CAD, D.M. Kulkarni, A.P. Rastogi and A.K. Sarkar, PHI Learning Private Limited, Revised Edition, August 2010. 3. Engineering Drawing and Graphics Using Autocad, T Jeyapoovan, Vikas Publishing House, 3rd Edition, 2010. 4. A Textbook on Engineering Drawing, <u>P. Kannaiyah</u>, <u>K. L. Narayana</u>, <u>K. Venkata Reddy</u>, Radiant Publishing House, 2012.

19ME12P3- ENGINEERING WORKSHOP

(Common to ME & CE)

I B.Tech II Semester

(With effect from 2019-20)

Course Category	Engineering Science	Credits	1
Course type	Practical	Lecture- Tutorial-Practical	0+0+ 2
Prerequisite	No Prerequisite	Sessional Evaluation:	40
		External Exam Evaluation:	60
		Total Marks:	100
		External Exam Duration:	3 hrs

Course Objectives	<ol style="list-style-type: none">1. To understand the usage of work shop tools and prepare the models in the trades such as carpentry, fitting, sheet metal & foundry.2. To understand the usage of wiring tools and to execute house wiring connections.3. To understand and demonstrate the usage of tools of welding, black smithy and machine tools.		
Course Outcomes	After completing the course the student will be able to:		
	CO1	Identify, Distinguish and Choose the tools of various trades (carpentry, fitting, sheet metal, foundry, wiring, welding, black smithy and machine tools).	
	CO2	Demonstrate and Describe the usage of tools of various trades (carpentry, fitting, sheet metal, foundry, wiring, welding, black smithy and machine tools).	
	CO3	Documenting the procedure adopted while preparing the model.	
Course Content	<ol style="list-style-type: none">1. Carpentry: Half Lap, Mortise and Tenon and Bridle joint.2. Fitting: Square, V, half round and dovetail fittings3. Tin-Smithy: Tray, cylinder, hopper, cone4. House-wiring: One lamp controlled by one switch, Two lamps (bulbs) controlled by two switches independently, Stair - case connection, Two lamps controlled by one switch in series, Two lamps controlled by on switch in parallel and Water pump connected with single phase starter.5. Foundry: single-piece pattern and Two- piece pattern		
	TRADES FOR DEMONSTRATION: <ol style="list-style-type: none">6. Machine Tools7. Welding8. Black Smithy		
Textbooks	<ol style="list-style-type: none">1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd,20092. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers,20043. Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, Vikas publishers,2007.		

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR
(AUTONOMOUS)

CIVIL ENGINEERING

SCHEME OF INSTRUCTION AND EVALUATION

(With effect from the batch admitted in the academic year 2019-2020)

II YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – I SEMESTER

S.NO.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation										
			L	T	P		Sessional Test-I			Sessional Test-II			Total Sessional Marks (Max. 40)	Semester End Examination		Max. Total Marks	
		THEORY					Test-I (2 hrs.)	Assignment-I	Max. Marks	Test-II (2 hrs.)	Assignment-II	Max Marks		Durati on In Hours	Max Mar ks		
1	19SH2101	Engineering Mathematics - III	3	1	0	4	34	6	40	34	6	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100	
2	19CE2101	Strength of Materials	2	1	0	3	34	6	40	34	6	40		3	60	100	
3	19CE2102	Fluid Mechanics	2	1	0	3	34	6	40	34	6	40		3	60	100	
4	19CE2103	Surveying	2	1	0	3	34	6	40	34	6	40		3	60	100	
5	19CE2104	Computer Aided Civil Engineering Drawing	1	0	3	2.5	34	6	40	34	6	40		3	60	100	
6	19MC2101	Environmental Science	2	0	0	0	34	6	40	34	6	40		3	60	100	
PRACTICALS																	
1	19CE21P1	Strength of Materials Lab	0	0	3	1.5	-	-	-	-	-	-	Day-to-day Evaluation and a test (40 marks)	3	60	100	
2	19CE21P2	Surveying Laboratory	0	0	3	1.5	-	-	-	-	-	-		3	60	100	
TOTAL						18.5											

Note:-Survey camp for a duration of 7 days to be conducted before the last day of instruction for II B.Tech, I – Sem. This shall be evaluated as part of Surveying Laboratory.

ENGINEERING MATHEMATICS –III

Code: 19SH2101

(New regulations with effect from 2019 -20)

(Common to CE, MECH, EEE & ECE)

Course Category	Basic Science	Credits	4
Course Type	Theory	Lecture - Tutorial -Practical	3 - 1 -0
Prerequisite	Intermediate Mathematics	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	To make the student learn about 1. The basic concepts of numerical solutions of simultaneous linear and non-linear algebraic equations. 2. The numerical methods to solve Ordinary Differential Equations by using Taylor's series method, Picard's method, Euler's and Modified Euler's Methods and Runge-Kutta methods of 2 nd and 4 th order. 3. The concepts of Cauchy - Riemann equations, Construction of Analytic function, Line integral, Cauchy's theorem and Cauchy's integral formula. 4. The concepts of Residues. 5. The Properties of Z-Transforms, shifting properties, initial value and final value theorems and the applications of difference equations. 6. Foundation of the probability and statistical methods.	
Course Outcomes	CO1	Have a sound knowledge in analyzing the simultaneous linear and non-linear algebraic equations by various numerical methods.
	CO2	Understand effectively the significance numerical methods to solve Ordinary Differential Equations.
	CO3	Understand effectively the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations and also Cauchy's integral formula.
	CO4	Compute the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues.
	CO5	Attains skills in analyzing the Z-Transforms and their applications.
	CO6	Have a well-founded knowledge of standard distributions (Binomial, Poisson and Normal distributions) which can describe real life phenomena.
	UNIT - I SOLUTION OF SIMULTANEOUS LINEAR AND NON-LINEAR ALGEBRAIC EQUATIONS: Iteration method, Gauss Jordon method, Gauss Elimination with Pivotal condensation method, Triangular Factorization method, Gauss-Seidal method and Newton-Raphson method.	

<p>Course Content</p>	<p style="text-align: center;">UNIT - II</p> <p>NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS: Solution by Taylor’s Series, Picard’s Method of Successive Approximations, Euler’s Methods and Runge-Kutta Method of 2nd order and 4th order.</p> <p style="text-align: center;">UNIT - III</p> <p>COMPLEX ANALYSIS: Analytical functions, Cauchy - Riemann equations, Construction of Analytic function, Complex integration - Line integral, Cauchy’s theorem, Cauchy’s integral formula and Generalized Cauchy’s integral formula.</p> <p style="text-align: center;">UNIT - IV</p> <p>RESIDUES: Taylor’s theorem and Laurent’s theorem (without proof), Singularities, Poles, Residues, Residue theorem and Evaluation of real definite integrals.</p> <p style="text-align: center;">UNIT-V</p> <p>Z-TRANSFORMS: Z-Transform of some standard functions, Properties of Z-Transforms, Shifting Properties, Initial value theorem and final value theorem, Inverse Z-Transform, Convolution theorem, Inversion by partial fractions and Applications to difference equations.</p> <p style="text-align: center;">Unit-VI</p> <p>PROBABILITY AND STATISTICS: Introduction, Random variables, Discrete and Continuous distributions, Binomial distribution, Poisson distribution and Normal distribution.</p>
<p>Textbooks & Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. B. S. Grewal, <i>Higher Engineering Mathematics</i>, Khanna Publishers, New Delhi. 2. B. V. Ramana, <i>Engineering Mathematics</i>, Tata McGraw-Hill Education Pvt. Ltd, New Delhi. 3. Erwin Kreyszig, <i>Advanced Engineering Mathematics</i>, Wiley, India. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. H. K. Dass, Er. Rajnish Verma, <i>Higher Engineering Mathematics</i>, S. Chand Publication, New Delhi. 2. Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham, Dr. M. V. S. S. N. Prasad, <i>Engineering Mathematics –III</i>, S. Chand Publication, New Delhi. 3. Shahnaz Bathul, <i>Special functions and complex variables (Engineering Mathematics-III)</i>, PHI, New Delhi.

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - - Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	2	-	1	1	-	-	-	-	-	-	1
CO2	3	3	1	2	1	-	-	-	-	-	2	1
CO3	3	3	3	1	1	-	-	-	-	-	-	2
CO4	3	3	2	2	1	-	-	-	-	-	-	2
CO5	3	3	2	2	1	-	-	-	-	-	-	2
CO6	3	3	1	1	1	-	-	-	-	-	-	1

19CE2101 - STRENGTH OF MATERIALS

(Civil Engineering)

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture - Tutorial -Practical	2 -1 -0
Pre-requisite	Engineering Mechanics	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none"> 1. To understand the behavior of ductile and brittle materials under uni-axial loading. 2. To apply analytical and graphical method of Mohr's circle for principal stresses and strains and understand theories of failures. 3. To construct shear force and bending moment diagrams of beams under various loads and study the relationships among shear force, bending moment and rate of loading. 4. To apply the concept of theory of simple bending for calculating flexural and shear stresses. 5. To calculate stresses and strains in thin and thick cylinders. 6. To implement the concept of theory of pure torsion for calculating shear stresses and understand the mechanical behavior of spring. 	
Course Outcomes	CO1	Understand the types of material and their behavior under uni-axial loading.
	CO2	Calculate the principal stresses and strains by analytical methods and also by Mohr's circle method.
	CO3	Construct shear force and bending moment diagrams for various types of beams under different types of loading.
	CO4	Understand and analyze the variation of flexural and shear stresses across the cross-section due to shear force and bending moment.
	CO5	Calculate hoop and longitudinal stresses and strains in thin and thick cylinders.
	CO6	Calculate shear stress due to pure torsion and understand the mechanical behavior of spring.
Course Content	<p style="text-align: center;">UNIT – I</p> <p>SIMPLE STRESSES & STRAINS: Properties of materials - Ductile and brittle; Concept of stress; Types of stress; Types of strain - Normal strain, shear strain and volumetric strain; Stress-Strain curves - Ductile (mild steel, HYSD bars), brittle (Concrete); Hooke's law; Poisson's ratio; Volumetric strain-Derivation of expression for volumetric strain of rectangular bar and cylindrical bar subjected to axial loading; Relation between Young's modulus, shear modulus and bulk modulus; Analysis of prismatic bars subjected to axial loading- Uniform cross sections, varying sections and uniform tapering – circular, rectangular bars.</p>	

Compound bars- Analysis of bars of composite sections. Factor of safety – Endurance limit.

Introduction to thermal stresses – Analysis of thermal stresses – Expression for thermal stresses and strains in simple bars.

UNIT – II

PRINCIPAL STRESSES: Introduction to compound stresses; Methods of analysis – Application of analytical methods for the analysis of members subjected to direct stress in one plane, in two mutually perpendicular planes, subjected to simple shear stress alone and direct stresses in two mutually perpendicular planes accompanied by simple shear stress.

INTRODUCTION TO GRAPHICAL METHOD – Mohr’s circle-Application of graphical method for the above cases.

INTRODUCTION TO THEORIES OF FAILURE (No derivations).

UNIT –III

SHEAR FORCE AND BENDING MOMENT IN BEAMS: Concept of shear force and bending moment – Relation between shear force, bending moment and rate of loading at a section of beam; shear force and bending moment diagrams for simply supported and cantilever beams subjected to point loads, uniformly distributed load, uniformly varying loads, couple and their combinations; Concept of point of contra flexure; shear force and bending moment diagrams of an overhanging beam subjected to point loads, uniformly distributed load, uniformly varying loads, couple and their combinations.

UNIT –IV

FLEXURAL AND SHEAR STRESSES IN BEAMS: Concept of theory of simple bending; Assumptions made in simple bending – Derivation of pure bending (simple bending) equation. Introduction to shear stress – Derivation of equation for general shear stress; Shear stress distribution diagrams for rectangular, circular, I-section and T-sections; Bending stresses in unsymmetrical sections – I-section and T- sections;

Shear centre – Introduction - Derivation of expression for shear centre of I-section and Channel section.

UNIT –V

CYLINDERS: Introduction – Types of cylinders - Thin cylinders - Expressions for hoop and longitudinal stresses - Efficiency of joints; Thick cylinders – Introduction - Lamé’s theorems – Assumptions – Derivation of expressions (internal and external pressure); Compound cylinders – Introduction – Distribution of stresses (internal and external pressure).

	<p style="text-align: center;">UNIT – VI</p> <p>TORSION OF CIRCULAR SHAFTS: Theory of pure torsion - Assumptions made in pure torsion equation - Derivation of pure torsion expression for solid and hollow circular shafts; Transmission of power in solid circular shafts.</p> <p>SPRINGS: Introduction –Types of springs – Expression for deflection of close and open coiled helical springs under axial loading; Concept of springs in series and parallel; Carriage/leaf springs - Introduction- Expression for deflection.</p>
Textbooks & Reference books	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. S. Ramamrutham and R. Narayananan “<i>Strength of Materials</i>” Dhanpatrai publishing house, 2018. 2. R. K. Bansal, “<i>A Textbook of Strength of Materials</i>” Laxmi Publications, 6st edition, 2019. 3. Dr. H. J. Shah and S. B. Junnarkar “<i>Mechanics of Structures Vol-I</i>”, Charotor Publishing house, 32nd edition, 2016. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Timoshenko S, “<i>Strength of Materials Part 1 Elementary Theory and Problems</i>”, D. Van Nostrand Company, Incorporated, 3rd Edition, 2002. 2. Vazirani and Ratwani, “<i>Analysis of structures Vol-I</i>” Khanna Publishers, 16th Edition. 3. B. C. Punmia, “<i>SMTS-I, Strength of Materials</i>” Laxmi Publications, 10th Edition, 2019.

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - - Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3	2	2	1	1	-	-	-	-	2	2
CO2	3	3	2	3	1	-	-	-	-	-	1	2
CO3	3	3	2	3	1	-	-	-	-	-	1	3
CO4	3	3	3	3	2	-	-	-	-	-	2	3
CO5	3	3	3	3	1	-	-	-	-	-	2	2
CO6	3	3	3	2	2	-	-	-	-	-	2	2

19CE2102 - FLUID MECHANICS

(Civil Engineering)

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture - Tutorial - Practical	2-1-0
Prerequisite	Engineering Mathematics-II, Engineering Physics.	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none">1. To understand various fluid properties and types of pressure.2. To understand the concepts of pressure acting on submerged and floating bodies.3. To study the concepts of fluid kinematics.4. To understand the basic concepts of fluid dynamics and its applications.5. To understand the factors influencing the efficiency of a pipe network.6. To understand fluid flows in pipes under various flow conditions.	
Course Outcomes	CO1	Determine the fluid properties, and fluid pressure in various conditions using manometers.
	CO2	Evaluate the hydrostatic pressure and buoyant force on plane & curved surfaces in floating and submerged conditions.
	CO3	Determine the velocity and acceleration components of a fluid flow.
	CO4	Apply the concepts of fluid dynamics to fluid flow problems.
	CO5	Compute the losses and efficiency of pipe networks.
	CO6	Analyze and apply the laminar and turbulent flow conditions for flow through pipes.
Course Content	UNIT – I DEFINITIONS & BASIC CONCEPTS: Definition of fluid & solid; fluid properties – density, specific weight, specific gravity, specific volume; viscosity – kinematic and dynamic viscosity, Newton’s law of viscosity, variation of viscosity with temperature; concepts of - compressibility, bulk modulus, surface tension, capillarity, vapour pressure and cavitation. PRESSURE MEASUREMENT: Fluid pressure - fluid pressure at a point; Pascal’s law; pressure variation in a fluid at a rest; types of fluid pressure – absolute, gauge, atmospheric & vacuum pressure; measurement of pressure – manometers, mechanical gauges; simple manometers- piezometer, U-tube manometer, single column manometer, differential manometers – U-tube differential manometer, inverted U-tube differential manometer.	

UNIT – II

FLUID STATICS: Total pressure and centre of pressure on – vertical plane surface, horizontal plane surface, inclined plane surface, curved plane surface; buoyancy, centre of buoyancy, meta-centre, meta-centric height equation, conditions of equilibrium of a floating & submerged bodies.

UNIT – III

FLUID KINEMATICS: Methods of describing fluid motion; types of fluid flow; description of the flow patterns – stream line, stream tube, path line, streak line; basic principles of fluid flow- conservation of energy & momentum; continuity equation in Cartesian coordinates; velocity and acceleration – local & convective acceleration; velocity potential function and stream function, equipotential line, relationship between velocity potential function and stream function.

UNIT – IV

FLUID DYNAMICS: Equations of motion- Euler's equation of motion, Bernoulli's equation – assumptions, applications; impulse momentum equation; forces exerted by a flowing fluid on a pipe bend.

DISCHARGE MEASUREMENT USING ORIFICES, MOUTHPIECE, NOTCHES & WEIRS: Types of orifice and mouthpiece; hydraulic coefficients; classification of notches & weirs; discharge over rectangular and triangular notches.

UNIT – V

ANALYSIS OF PIPE FLOW: Reynolds experiment on pipe flow, loss of energy due to friction – Darcy-Weisbach equation; minor losses; hydraulic gradient line and total energy line; flow through syphon; pipes in series & parallel; equivalent pipe; branched pipes; water hammer in pipes – gradual closure of valve, sudden closure of valve in rigid and elastic pipes, control measures.

UNIT VI

LAMINAR & TURBULENT FLUID FLOW IN PIPES: Flow of incompressible fluid through circular pipe and between two rigid parallel plates – velocity distribution, ratio of maximum to average velocity, drop of pressure, shear stress distributions for given length of pipe. Coefficient of friction in terms of shear stress, shear stress in turbulent flow, Prandtl's mixing length theory.

Textbooks and Reference books	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Dr. P. N. Modi, Dr. S. M. Seth, “<i>Hydraulics and Fluid Mechanics Including Hydraulics Machine</i>” Standard Book House, 21st Edition, 2017. 2. R. K. Bansal, “<i>A Textbook of Fluid Mechanics and Hydraulic Machines</i>” Laxmi Publications, 10th Edition, 2019. 3. A. K. Jain “<i>Fluid Mechanics including Hydraulic Machines</i>” Khanna Publications, 2016. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Frank M White, “<i>Fluid Mechanics in SI Units</i>” White, McGraw Hill Education India Private Limited, 8th Edition, 2017. 2. Yunus A. Cengel, Dr. John M. Cimbala, “<i>Fluid Mechanics: Fundamentals and Applications</i>” McGraw-Hill Education India Private Limited, 4th Edition, 2018. 3. Okiishi, Hubesh, and Rothmayer “<i>Fluid Mechanics</i>” Munson Johnwiley Publications, 7th Edition, 2017.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	2	-	1	1	-	-	-	1	-	2	2
CO2	3	1	-	2	1	-	-	-	1	1	2	2
CO3	3	2	-	3	1	-	-	-	2	-	2	2
CO4	3	2	1	2	1	-	-	-	2	1	2	2
CO5	3	3	3	3	2	-	-	-	-	1	3	2
CO6	3	2	2	2	2	-	-	-	2	-	2	2

19CE2103 –SURVEYING

(Civil Engineering)

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture - Tutorial - Practical	2-1-0
Prerequisite	Engineering Mathematics - II	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none">1. To apply knowledge of mathematics, science and engineering for understanding measurement techniques and basic equipment used in land surveying.2. To understand the operation of automatic level to perform differential and profile leveling, record observations, mathematically reduce and check levelling measurements, interpolation and plotting of contours.3. Understand various methods of angular measurements and perform traverse computations.4. To understand basics of curve setting and various methods of computing areas and volumes.5. To understand the principles and usage of total station and GPS in surveying.6. To apply the knowledge of surveying for setting-out works.		
Course Outcomes	CO1	Apply chain and plane table surveying principles to record observations and make necessary calculations.	
	CO2	Apply various methods of levelling, understand the basic principles of contouring and uses of contour maps.	
	CO3	Calculate azimuths, latitudes and departures, error of closure; adjust latitudes and departures and determine coordinates for a closed traverse using a prismatic compass and theodolite.	
	CO4	Calculate, design and layout horizontal and vertical curves. Calculate areas and volumes from survey data using mathematical principles.	
	CO5	Operate a total station to measure distance, angles, and to calculate differences in elevation. Make GPS measurements and relate them to conventional surveying.	
	CO6	Carryout setting-out for laying pipeline and tunneling.	

Course Content	<p style="text-align: center;">UNIT – I</p> <p>BASICS OF SURVEYING: Definition, principles, purpose of surveying, basic measurements – linear and angular; chain surveying - principle, methods and applications; pacing, ranging, chaining and selection of survey stations and lines; well-conditioned triangle, field book entries, scales-types and uses, plan and map – comparison; cross staff survey; plane table survey - principle, methods and errors.</p> <p style="text-align: center;">UNIT – II</p> <p>LEVELLING – Definition, principles, methods and classification of levelling, recording observations and reduction of levels, calculation of gradient and plotting longitudinal and cross sections.</p> <p>CONTOURING – Contour interval, characteristics, uses; methods of locating contours, interpolation of contours.</p> <p style="text-align: center;">UNIT – III</p> <p>ANGULAR MEASUREMENTS: Compass surveying, bearings, meridians, directions, included angles, local attraction, dip and deflection. Theodolite surveying - measurements of horizontal and vertical angles, deflection angles. Traversing – methods, types, computations and checks for traverse. Tacheometry - principle, methods and determination of tacheometric constants.</p> <p style="text-align: center;">UNIT – IV</p> <p>CURVES: Types of curves, elements, methods of setting out of horizontal and vertical curves (only simple curves for examination).</p> <p>AREAS and VOLUMES: Area calculation- plotting of survey work, methods of area and volume computations, minor instruments.</p> <p style="text-align: center;">UNIT –V</p> <p>MODERN FIELD SURVEY SYSTEMS: Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Distomat, Total Station – Parts of a Total Station – Accessories –Advantages and Applications, Field Procedure for total station survey, Errors in Total Station Survey; Global Positioning Systems-Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations.</p> <p style="text-align: center;">UNIT – VI</p> <p>CONSTRUCTION SURVEYS: Introduction-staking out buildings-pipelines and sewers-highways-culverts. Bridge surveys-determining the length of a bridge-locating centres of piers- surface surveys and tunnel alignment-underground surveys-connection of surface and underground surveys-levelling in tunnels.</p>
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Textbooks and reference books:	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. N. N. Basak, “<i>Surveying and leveling</i>”, McGraw Hill Education (India) Pvt. Ltd, 2nd Edition, 2014. 2. Dr. K.R. Arora “<i>Surveying Vol-I, II and III</i>”, Standard Book House, 17th Edition, 2019. 3. B. C. Punmia, Ashok K Jain and Arun K Jain, “<i>Surveying Vol.I</i>” Laxmi Publications, 2016. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. C. Venkatramaiah, “<i>Text Book of Surveying</i>” Universities Press, revised edition, 2011. 2. T. P. Kanetkar and S. V. Kulkarni, “<i>Surveying and Levelling</i>”, Pune Vidyarthi Griha Prakashan publishers, 2010. 3. A. M. Chandra “<i>Plane Surveying</i>”, New Age International Ltd. Publishers, 3rd Edition, 2018.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	2	1	2	1	1	-	-	1	2	2	1
CO2	3	3	2	2	2	1	-	-	1	2	2	1
CO3	3	3	1	2	1	-	-	-	1	1	1	2
CO4	3	3	2	2	1	1	-	-	1	2	2	2
CO5	3	3	3	2	2	-	1	1	1	2	3	2
CO6	3	3	3	3	2	1	1	1	3	2	3	2

19CE2104 - COMPUTER AIDED CIVIL ENGINEERING DRAWING

(Civil Engineering)

Course Category	Engineering Science	Credits	2.5
Course Type	Theory	Lecture - Tutorial - Practical	1-0-3
Prerequisite	Building Materials and Building Construction	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	1. To understand the basic concepts of building drawing as per NBC standards. 2. To understand the basics of planning of different types of buildings. 3. To prepare plans, sections and elevations of a residential buildings.	
Course Outcomes	CO1	Understand the terms in building drawing, and able to apply the NBC standards in building drawing.
	CO2	Analyze the basic principles of planning for different types of buildings.
	CO3	Prepare detail drawings of residential building and its components.
Course Content	<p style="text-align: center;">PART-A (Theory)</p> <p>INTRODUCTION: Terms used in building drawing as per NBC – Factors affecting in selection of site – Functional requirements of a residential building – Minimum size requirements as per NBC – Standard sizes of door, windows and ventilators.</p> <p>PLANNING: Principles of planning – Factors to be considered in planning – Planning of residential, Office, School and Hospital buildings – Preliminaries of vastu – Municipal bye-law – List of documents to be submitted for building plan approval.</p> <p style="text-align: center;">PART-B (Drawing)</p> <p>Standard conventional signs and symbols used in Civil Engineering Drawing – Bonds in brick masonry – Paneled and flush doors – Glazed windows – Steel roof truss.</p> <p>Preparation of plan, section and elevation of simple residential buildings with flat roof not exceeding two storeys.</p>	

	<p>EVALUATION:</p> <ol style="list-style-type: none"> 1. For End examination (Internal only), two out of three questions to be answered from Part–A (Theory) for 20 marks (i.e. 2x10=20). And one compulsory drawing question to be answered from Part-B (Drawing) for 40 marks (i.e.,1x40=40). 2. For internal evaluation, a weightage of 20 marks out of a total of 40 marks to be given for day-to-day work.
<p>Textbooks and Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Dr. N. Kumara Swamy and A. KameswaraRao “<i>Building Planning and Drawing</i>” Charotar Publishing House Pvt. Ltd, 9th Edition, 2019. 2. Gurucharan Singh and Jagadish Singh, “<i>Building Planning Design and Scheduling</i>” Standard Publishers Distributors, 2015. 3. S. S. Bhavikatti and M. V. Chitawaagi, “<i>Building Planning and Drawing</i>”, IK International Publishing House, 2014. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Shah M. H, S.Y. Patkiand Kale C. M., “<i>Building Drawing with an Integrated Approach to Built Environment</i>” McGraw Hill Education, 6th Edition, 2020. 2. National Building Code of India 2016 (NBC 2016) (Vol.I & Vol.II), Published by the Bureau of Indian Standards (BIS). 3. Model Building Bye-laws -2016 of Govt. of India (GOI) - A.P building rules – 2017.

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	2	-	1	-	-	1	2	1	-	2	3	2
CO2	3	-	1	-	2	2	2	1	2	1	3	2
CO3	3	-	1	-	3	2	2	1	2	1	3	1

19MC2101 - ENVIRONMENTAL SCIENCE

(Common to CE, EEE, ECE, CSE & IT)

(New Regulations with effect from 2020-2021)

Course Category:	Mandatory course	Credits:	-
Course Type:	Theory	Lecture – Tutorial – Practical:	2-0-0
Prerequisite:	Basic idea on environment, Environmental pollution causes, effects and control measures.	Sessional Evaluation:	40
		Semester End Exam.	60
		Evaluation: Total Marks:	100

Objectives	<ol style="list-style-type: none"> To know the importance of Environmental Sciences and understand the various components of environment. To know the value of natural resources and need to protect them. To know the value of biodiversity and its conservation methods. To describe advanced methods to solve problems related to environmental pollution. To understand the social issues and provide plans to minimize the problems. To articulate various environmental acts in order to protect the environment. 	
Course Outcomes	Upon successful completion of the course, the students will able to:	
	CO1	Know the importance of Environmental sciences and understand the various components of environment.
	CO2	Understand the value of natural resources
	CO3	Summarize the function of ecosystem, values of biodiversity and conservation.
	CO4	Identify how the environment is polluted and suggest the mitigation measures.
	CO5	Understand the environmental problems in India and way to minimize the effects.
	CO6	Categorize the environmental protection laws in our country and role of information technology in environment protection.
Course Content	<p align="center">UNIT-I</p> <p>MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL SCIENCES: Introduction, Definition, Scope and Importance of environmental sciences - Various components of environment – Atmosphere, lithosphere, hydrosphere and biosphere – Multidisciplinary nature of environmental sciences.</p> <p align="center">UNIT-II</p> <p>NATURAL RESOURCES: LAND RESOURCES: Importance, Land degradation, Soil erosion and desertification, Effects of modern agriculture (fertilizer and pesticide problems). FOREST RESOURCES: Use and over-exploitation-Mining and Dams-their effects on forest and tribal people.</p>	

WATER RESOURCES: Use and over-utilization of surface and ground water - Floods and droughts.

ENERGY RESOURCES: Renewable and non-renewable energy, need to use of alternate energy sources, Impact of energy use on environment.

UNIT-III

ECOSYSTEM: Definition, types, structure (biotic and abiotic components) and functions of an Ecosystem – Energy flow, Food chain, food web, ecological pyramids and Ecological succession.

BIO-DIVERSITY AND ITS CONSERVATION: Definition - genetic, species and ecosystem diversity- value of biodiversity - hotspots of biodiversity in India - threats to biodiversity – in situ and ex situ conservation of biodiversity.

UNIT-IV

ENVIRONMENTAL POLLUTION: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution and Nuclear hazards.

SOLID WASTE MANAGEMENT: causes, effects and control measures of urban and industrial waste.

DISASTER MANAGEMENT: Floods, earthquake and cyclones.

UNIT-V

SOCIAL ISSUES AND ENVIRONMENT: From unsustainable to sustainable development, urban problems related to energy, water conservation, rainwater harvesting and water shed management.

CASE STUDIES: Silent valley project, Madhura Refinery and TajMahal, Tehri Dam, Kolleru Lake Aquaculture and Fluorosis in Andhra Pradesh.

CLIMATE CHANGE: Global warming, Acid rain and Ozone depletion.

UNIT-VI

HUMAN POPULATION AND ENVIRONMENT: Population growth, variation among nations and population explosion- Role of information technology in environment and human health.

ENVIRONMENTAL ACTS: Water (Prevention and control of pollution) Act-Air (Prevention and control of pollution) Act – Wildlife protection Act and Forest conservation Act.

FIELD WORK: Visit to Local Area having river/Forest/grass land/hill/mountain to document environmental assets.

Text Books and References:	<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. “Environmental science and Engineering” by Anubha Kaushik and C. P. Kaushik, New Age International publishers. 6th Edition, 2018. 2. “Environmental science and Engineering” by N. Arumugam, V. Kumaresan, Saras Publication; 2nd edition, 2014. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. “Introduction to Environmental science” by Y. Anjaneyulu, B. S Publications.2004. 2. Perspectives in Environmental Studies, Anubha Kaushik and C. P. Kaushik, New Age International publishers, 3rd Edition, 2019. 3. “Environmental science” by M. Chandrasekhar, Hi-Tech Publications, 2009.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	2	-	-	-	-	-	2	-	1	-	-	1
CO2	1	-	-	-	-	2	1	1	1	-	-	-
CO3	-	-	-	-	-	2	2	1	-	2	-	-
CO4	1	-	-	-	-	1	-	3	-	-	-	-
CO5	1	1	-	-	-	-	2	1	2	-	1	1
CO6	-	-	-	-	-	-	2	-	2	-	1	3

19CE21P1 - STRENGTH OF MATERIALS LABORATORY

(Civil Engineering)

Course Category	Professional Core	Credits	1.5
Course Type	Laboratory	Lecture - Tutorial - Practical	0 - 0 - 3
Prerequisite	Strength of Materials	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	To understand the characteristics and behavior of various materials used in buildings and infrastructure.	
Course Outcomes	CO1	Determine the strength and elastic modulus of various materials used in buildings and infrastructure.
	CO2	Evaluate the impact strength of mild steel.
	CO3	Compute the rigidity modulus of mild steel.
	CO4	Evaluate the hardness property of steel, copper and brass.
	CO5	Evaluate the stiffness property of the spring.
	CO6	Determine the elastic modulus and flexural rigidity of various types of beam.
Course Content	<u>LIST OF EXPERIMENTS</u>	
	<ol style="list-style-type: none">1. Deflection test on fixed beam2. Deflection test on simply supported beam3. Deflection test on close-coiled helical springs4. Deflection test on over hanging beam5. Tension test on mild steel bar6. a) Rockwell hardness test b) Brinell hardness test7. Tension test on HYSD bar8. Torsion test9. Compression test on wood10. a) Direct shear test on mild steel bar b) Charpy impact test c) Izod impact test	

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3	1	1	1	-	-	2	3	3	2	2
CO2	3	3	1	1	1	-	-	2	3	3	2	2
CO3	3	3	1	1	1	-	-	2	3	3	2	2
CO4	3	3	1	1	1	-	-	2	3	3	2	2
CO5	3	3	1	1	1	-	-	2	3	3	2	2
CO6	3	3	1	1	1	-	-	2	3	3	2	2

19CE21P2 - SURVEYING LABORATORY

(Civil Engineering)

Course Category	Program core	Credits	1.5
Course Type	Laboratory	Lecture - Tutorial - Practical	0 - 0 - 3
Prerequisite	Surveying	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objective	To obtain knowledge of various basic and advanced surveying equipments and their field applications. Understanding the field conditions to plan and the collect the data.	
Course Outcomes	CO1	Apply geometric and trigonometric principles of basic surveying calculations.
	CO2	Be able to measure elevations of points using auto level.
	CO3	Be able to use the theodolite along with chain/tape and also carry out tacheometric surveying.
	CO4	Be able to set out a simple curve.
	CO5	Use the total station instrument in basic engineering works.
	CO6	Understand the use of advanced surveying instruments.
Course Content	<p>EXERCISE -1</p> <p>Demonstration on conventional equipment such as chain, ranging rod, compass, cross staff, Dumpy level etc.</p> <p>EXERCISE -2</p> <p>Determination of elevations of given points using auto level.</p> <p>EXERCISE -3</p> <ul style="list-style-type: none">a) Determination of difference in elevation between two points using auto level.b) Locating a bench mark by fly levelling using auto level. <p>EXERCISE -4</p> <ul style="list-style-type: none">a) Plotting profile of given road section by obtaining longitudinal and cross sections using auto level.b) Plotting a contour map for the given area using auto level.	

	<p>EXERCISE -5 Measurement of horizontal and vertical angles using theodolite</p> <p>EXERCISE -6 Measurement of elevation and gradient between points by using tacheometry.</p> <p>EXERCISE -7 Set out a simple curve by one theodolite method.</p> <p>EXERCISE -8 Introduction and setting up of total station.</p> <p>EXERCISE -9 a) Measurement of distance and direction using total station. b) Measurement of area of given field using total station. c) Measurement of height of an object in REM using total station.</p> <p>EXERCISE -10 Setting out work using total station</p> <p>DEMONSTRATION: Introduction to advanced surveying instruments like hand held G.P.S, optical theodolite and electronic theodolite.</p>
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	1	1	2	2	1	-	1	-	3	2	2
CO2	3	3	2	2	2	1	-	2	2	1	1	1
CO3	3	2	2	3	2	1	-	1	2	2	2	2
CO4	3	3	2	2	2	-	-	1	1	2	2	2
CO5	3	3	2	3	3	1	2	1	2	3	3	3
CO6	2	2	2	2	3	-	1	1	2	1	3	2

N.B.K.R. INSTITUTE OF SCIENCE & TECHNOLOGY :: VIDYANAGAR
(AUTONOMOUS)
CIVIL ENGINEERING
SCHEME OF INSTRUCTION AND EVALUATION
 (With effect from the batch admitted in the academic year 2019-2020)
II YEAR OF FOUR YEAR B.TECH. DEGREE COURSE – II SEMESTER

S.NO.	Course Code	Course Title	Contact Hours/ Week			Credits	Evaluation									Max. Total Marks
							Sessional Test-I			Sessional Test-II			Total Sessional Marks (Max. 40)	Semester End Examination		
							Test-I (2 hrs.)	Assignment-I	Max. Marks	Test-II (2 hrs.)	Assignment-II	Max Marks		Durati on In Hours	Max . Marks	
THEORY	L	T	P													
1	19SH2202	Engg. Economics And Financial Accounting	2	0	0	2	34	6	40	34	6	40	0.8(Better of two sessional tests) + 0.2(Other)	3	60	100
2	19CE2201	Structural Analysis - I	2	1	0	3	34	6	40	34	6	40		3	60	100
3	19CE2202	Design of Reinforced Concrete Structures	2	1	0	3	34	6	40	34	6	40		3	60	100
4	19CE2203	Hydraulics And Hydraulic Machinery	2	1	0	3	34	6	40	34	6	40		3	60	100
5	19CE2204	Engineering Geology	2	0	0	2	34	6	40	34	6	40		3	60	100
6	19MC2201	Engineering Ethics	2	0	0	0	34	6	40	34	6	40		3	60	100
PRACTICALS																
1	19CE22P1	Fluid Mechanics And Hydraulic Machinery Lab	0	0	3	1.5	-	-	-	-	-	-	Day-to-day Evaluation and a test (40 marks)	3	60	100
2	19CE22P2	Engineering Geology Laboratory	0	0	3	1.5	-	-	-	-	-	-		3	60	100
TOTAL						16										

19SH2202 - ENGINEERING ECONOMICS AND FINANCIAL ACCOUNTING**(Common to CE & CSE)**

Course Category	Humanities and Social Sciences	Credits	2
Course Type	Theory	Lecture - Tutorial -Practical	2 - 0 -0
Prerequisite	None	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	Students undergoing this course are expected to understand: <ol style="list-style-type: none"> 1. Causes of economic problems. 2. Behaviour of a Consumer while purchasing and consuming various commodities and services 3. Various production and cost concepts used in managerial decision making process 4. Formation of different types of business organizations in India. 5. Application of the basic accounting concepts 	
Course Outcomes	CO1	Demonstrate an ability to define, analyze and identify the appropriate solution to a business problem using sound economic and accounting principles.
	CO2	Know the role of various cost concepts in managerial decisions and the managerial uses of production function.
	CO3	Understand to take price and output decisions under various market structures.
	CO4	Know in brief formalities to be fulfilled to start a business organization.
	CO5	Analyse the firm's financial position with the techniques of economic aspects as well as financial analysis.
	CO6	Evaluate and select profitable investment proposals
Course Content	<p style="text-align: center;">UNIT – I</p> <p>INTRODUCTION TO ECONOMICS: Definition of Economics and basic concepts of Micro and Macro-economics. The concept of Demand-Law of demand – Elasticity of Demand: Types and measurement-Demand Forecasting-Methods of Demand Forecasting.</p> <p style="text-align: center;">UNIT – II</p> <p>THEORY OF PRODUCTION AND COST: Production function – Cobb – Douglas production function and its properties – Law of variable proportions – Law of Returns to Scale. Cost concepts – Cost- Out put relations in short run</p>	

	<p>long run- Revenue curves – Break-Even Analysis.</p> <p style="text-align: center;">UNIT – III</p> <p>THEORY OF PRICING: Classification of markets – Pricing under perfect Competition – Pricing under Monopoly – Price discrimination – Monopolistic Competition.</p> <p style="text-align: center;">UNIT – IV</p> <p>TYPES OF BUSINESS ORGANIZATIONS: Sole proprietorship, partnership and Joint Stock Company – Shares and debentures.</p> <p>BANKING SYSTEM: Central bank, Commercial banks and their functions. Impact of technology in banking sector.</p> <p style="text-align: center;">UNIT – V</p> <p>FINANCIAL ACCOUNTING: Concepts and principles, Journal and Ledger, Trial Balance, Final Accounts: Trading account, Profit and Loss account and Balance sheet (Simple Final account problems without adjustments).</p> <p style="text-align: center;">UNIT-VI</p> <p>FUNDAMENTAL CONCEPTS OF CAPITAL AND CAPITAL BUDGETING: Factors and Sources of Capital -Meaning, process and Methods Capital budgeting (Payback period, NPV, ARR & IRR- simple problems).</p>
<p>Textbooks & Reference books</p>	<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Varshney & Maheswari: <i>Managerial Economics</i>, S. Chand Publishers. 2. C. B. Gupta, <i>Business Organizations</i>, S. Chand Publishers 3. A. R. Arya Sri, <i>Managerial Economics and Financial Accounting</i>, Tata McGraw Hill publishers. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. S. Sankaran, <i>Economic Analysis</i>, Margham Publications. 2. S. N. Maheswari and S. K. Maheswari, <i>Financial Accounting</i>, Vikas Publishers. 3. S. A. Siddiqui and A. S. Siddiqui, <i>Managerial Economics & Financial Analysis</i>, New age International Space Publications.

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	-	-	-	-	-	-	-	1	-	-	-	2
CO2	-	-	-	-	-	-	-	-	-	-	-	1
CO3	-	-	-	-	-	-	-	1	-	-	-	1
CO4	-	-	-	-	-	-	-	-	-	-	-	1
CO5	-	-	-	-	-	-	-	-	-	-	3	1
CO6	-	-	-	-	-	-	-	-	-	-	3	1

19CE2201 - STRUCTURAL ANALYSIS - I

(Civil Engineering)

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture - Tutorial - Practical	2-1-0
Prerequisite	Engineering Mechanics & Strength of Materials	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none">1. To understand the various methods for calculating slope and deflection of beams.2. To analyze the columns for different end conditions subjected to axial load and moments.3. To analyze the sections for stresses subjected to direct load and moment and understand the concept of cables.4. To be capable of analysing and drawing of shear force and bending moment diagrams of propped cantilever and fixed beams under various loading conditions including effect of sinking of supports.5. To be able to analyze and draw the shear force and bending moment diagrams of continuous beams using Clapeyron's theorem of three moments.6. To understand the concept of energy theorems and be able to calculate the slope and deflection of beams.	
Course Outcomes	CO1	Determine the slope and deflection of determinate beams under various loading conditions.
	CO2	Analyze the columns subjected to different loading conditions.
	CO3	Analyze the sections for stresses subjected to direct load and moment and analysis of cables.
	CO4	Calculate and draw SFD and BMD for propped and fixed beams.
	CO5	Calculate and draw SFD and BMD for continuous beams using Clapeyron's theorem.
	CO6	Understand energy theorems and apply the same to analyze the structures.
IMP: Application of the concepts covered in every unit must be demonstrated using an appropriate software. This should be followed by an exercise.		
Course Content	UNIT – I SLOPE AND DEFLECTION OF STATICALLY DETERMINATE BEAMS: Relationship between curvature, slope and deflection (Differential equation for the elastic line of a beam) – Slope and deflection of cantilevers and simply supported beams by double integration method, Macaulay's	

method, moment area method and conjugate beam method for point loads, uniformly distributed loads and combination of these loads.

UNIT – II

COLUMNS: Introduction – Unsupported and effective lengths of columns – Slenderness ratio – Types of columns – Types of failure of columns – Crippling load. Assumptions made in Euler’s theory – Expressions for Euler’s crippling load of columns for various end conditions; limitations of Euler’s theory; Introduction to expression for Rankine’s theory Eccentrically loaded columns (without initial curvature).

UNIT – III

DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and B.M. – Core of a section – Circular, rectangular (solid and hollow) and triangular.

CABLES: Assumptions, Parabolic and Catenary cables.

UNIT – IV

ANALYSIS OF STATICALLY INDETERMINATE BEAMS:

PROPPED CANTILEVER BEAMS: Analysis of propped cantilevers for point loads uniformly distributed loads and couple – Shear force and bending moment diagrams.

FIXED BEAMS: Analysis of fixed beams for point loads, UDL, uniformly varying load, couple shear force and bending moment diagrams – Effect of sinking of supports.

UNIT – V

ANALYSIS OF CONTINUOUS BEAMS: Introduction – Clapeyron’s theorem of three moments – Analysis of continuous beams with constant moment of inertia with one or both ends fixed – Continuous beam with overhang – Continuous beam with different moment of inertia for different spans – Effect of sinking of supports – Shear force and bending moment diagrams.

UNIT – VI

ENERGY THEOREMS: Strain energy due to axial load, bending moment and shear force – Maxwell’s reciprocal’s, Betti’s theorems – Castigliano’s first theorem and unit load method – Deflection of simple beams and pin -jointed trusses.

Textbooks and Reference books	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. T. S. Thandavamoorthy, <i>Structural Analysis</i>, Oxford University Press, 2011. 2. R. Vaidanathan, Dr. P. Perumal, <i>Structural Analysis</i>, Laxmi Publications, Revised edition, 2019. 3. R. K. Bansal, <i>A Text Book of Strength of Materials</i>, Laxmi Publications, 6th edition, 2019. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. G. S. Pandit, S. P. Gupta, R. Gupta, <i>Theory of Structures</i>, Vol. I, McGraw Hill Publications. 2. C. K. Wang, <i>Intermediate Structural Analysis</i>, McGraw Hill Education, Indian edition, 2017. 3. V. N. Vazirani, M. M. Ratwani, <i>Analysis of Structures Vol. I & II</i>, Khanna Publishers.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3	3	2	2	1	1	-	2	1	2	3
CO2	3	3	3	2	2	1	1	-	2	1	2	3
CO3	3	3	3	2	2	1	1	-	2	1	2	3
CO4	3	3	3	2	2	1	1	-	2	1	2	3
CO5	3	3	3	2	2	1	1	-	2	1	2	3
CO6	3	3	3	2	2	1	1	-	2	1	2	3

19CE2202 - DESIGN OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture – Tutorial –Practical	2-1-0
Prerequisite	Strength of Materials	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none">1. To understand the basic principles of IS: 456-2000 in design of reinforced concrete elements.2. To design the reinforced concrete beams and slabs subjected to flexure, shear, torsion and bond.3. To design the reinforced concrete compression members under axial load and moment.4. To design different types of isolated footings.5. To understand the serviceability conditions of reinforced concrete flexural members.6. To gain in-depth knowledge of staircases and able to design the dog-legged staircase.		
Course Outcomes	CO1	Understand the design principles of reinforced concrete members.	
	CO2	Design singly and doubly reinforced rectangular and flanged beams for flexure, shear, torsion and bond.	
	CO3	Carry out design and detailing of different types of slabs.	
	CO4	Carry out design and detailing of columns for various loading conditions.	
	CO5	Carry out design and detailing of different types of footings under axial load.	
	CO6	Analyze reinforced concrete members for serviceability conditions.	
IMP: At the end of the course work, complete analysis and design of a RC building must be explained using an appropriate software. This should be followed by an exercise.			
Course Content	<p style="text-align: center;">UNIT – I</p> <p>DESIGN PRINCIPLES: Basic design principles – Stress Strain curves of concrete and steel – Characteristic strengths and loads – Partial safety factors – Stress block – Various limit states.</p> <p>DESIGN FOR FLEXURE: Limit state of collapse in flexure – Ultimate flexural strength – Balanced, under and over – Reinforced sections – Design of singly and doubly reinforced rectangular beams – Design of flanged beams.</p> <p style="text-align: center;">UNIT – II</p> <p>DESIGN FOR SHEAR, TORSION AND BOND: Shear – Truss analogy – Design of beams for shear and torsion – Anchorage and development length.</p>		

	<p style="text-align: center;">UNIT – III</p> <p>DESIGN OF SLABS AND BEAMS: Design of one way and two way slabs- Design of continuous beams and slabs.</p> <p style="text-align: center;">UNIT – IV</p> <p>DESIGN OF COMPRESSION MEMBERS: Columns – Reduction factors – Axially loaded, eccentrically loaded columns – Uni-axial moment – Biaxial moment (Biaxial moment for practice only and not for university examination).</p> <p style="text-align: center;">UNIT – V</p> <p>DESIGN OF FOUNDATIONS: Types of footings– Design of isolated (Square, Rectangular and Circular) footings subjected to axial load.</p> <p style="text-align: center;">UNIT – VI</p> <p>DESIGN OF STAIR CASE: Types of staircase – Specifications – Design of doglegged stair case.</p> <p>LIMIT STATES OF SERVICEABILITY: Deflection (short and long term) – Cracking.</p>
<p style="text-align: center;">Textbooks and Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, <i>RCC Designs (Reinforced Concrete structures)</i>, Laxmi Publications, 10th edition, 2019. 2. N. Krishna Raju, R. N. Pranesh, <i>Reinforced Concrete Design: IS: 456-2000 Principles and Practice</i>, New Age International (P) Ltd. Publishers, 1st edition, 2018. 3. Unni Krishna Pillai, Devdas Menon, <i>Reinforced Concrete Design</i>, Tata McGraw-Hill Educational Private Ltd., 3rd edition, 2017. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. S. N. Sinha, <i>Reinforced Concrete Design</i>, Tata McGraw-Hill Educational Private Ltd., 3rd edition, 2017. 2. Dr. Ramchandra, <i>Reinforced Concrete Structures (Limit State Design)</i>, Rajsons Publications Pvt. Ltd, 3rd edition, 2014. 3. S. R. Karve & V. L. Shah, <i>Limit State Theory and Design of Reinforced Concrete</i>, Structures Publications, 8th edition, 2014. 4. Plain and Reinforced Concrete – Code of practice (IS: 456-2000).

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3	3	2	2	-	-	2	-	-	2	3
CO2	3	3	3	3	3	-	1	2	-	-	3	3
CO3	3	3	3	3	3	-	1	2	-	-	3	3
CO4	3	3	3	3	3	-	1	2	-	-	3	3
CO5	3	3	3	3	3	-	1	2	-	-	3	3
CO6	3	3	2	3	2	1	2	2	-	-	2	3

19CE2203 - HYDRAULICS AND HYDRAULIC MACHINERY**(Civil Engineering)**

Course Category	Professional Core	Credits	3
Course Type	Theory	Lecture - Tutorial - Practical	2-1-0
Prerequisite	Engineering Mathematics- I &II, Fluid Mechanics.	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none"> 1. To understand the concepts of dimensional analysis and its importance in modeling. 2. To understand the concepts of boundary layer, drag and lift acting on a body. 3. To understand the basics of open channel flow for sectional design. 4. To examine the hydraulics of open channel flow. 5. To study the forces exerted by a jet on plates and there by understand the performance of the turbines. 6. To understand the working principle and characteristics of centrifugal pump
Course Outcomes	CO1 Apply the concepts of modeling and similitude for a given flow condition.
	CO2 Illustrate the fundamental characteristics of the boundary layer and compute the lift and drag forces.
	CO3 Design the most economic geometric section of open channel.
	CO4 Analyze open channel flow and calculate key properties of hydraulic jump.
	CO5 Compute the forces exerted by a jet of fluid on stationary and moving plates and also determine the efficiency of turbine and draft-tube.
	CO6 Compute the losses in centrifugal pump and examine the importance of characteristic curves, cavitation and lift.
Course Content	<p style="text-align: center;">UNIT – I</p> <p>DIMENSIONAL ANALYSIS, HYDRAULIC SIMILITUDE & MODEL TESTING: Derived quantities; dimensional homogeneity; methods of dimensional analysis – Rayleigh’s method, Buckingham’s Pie-theorem; similitude – types and similarities; types of forces acting in moving fluid; dimensionless number; model laws.</p> <p style="text-align: center;">UNIT – II</p> <p>BOUNDARY LAYER THEORY: Definitions – types of boundary layer; boundary layer theory, types of boundary layer thickness; drag force on a flat plate due to boundary layer; separation of boundary layer- effects and prevention.</p>

	<p style="text-align: center;">UNIT – III</p> <p>OPEN CHANNEL FLOW – I: Types of flow in channel; geometric properties of channel section; velocity distribution in a channel section; uniform flow in channels – Chezy’s formula, Ganguillet-Kutter formula, Bazin’s formula, Manning’s formula; most economical channel section; specific energy & critical depth, critical flow and its computation – rectangular channel section; determination of mean velocity of flow in channel.</p> <p style="text-align: center;">UNIT – IV</p> <p>OPEN CHANNEL FLOW – II: Gradually varied flow: dynamic equation of gradually varied flow; classification of channel bottom slopes and surface profiles; characteristics of surface profiles; hydraulic jump – assumptions, hydraulic jump in rectangular channel, types and application of hydraulic jump.</p> <p style="text-align: center;">UNIT – V</p> <p>IMPACT OF JETS: Forces exerted by a jet on a vertical plate, inclined plate and curved plate - stationary and moving.</p> <p>HYDRAULIC TURBINES: Turbines – classification of turbines; definitions of heads and efficiencies of a turbine; Pelton wheel, Francis turbine, Kaplan turbine – velocity triangles, work done & efficiency; draft tube- classification, functions of draft tube; specific speed – derivation, significance, unit quantities and its uses; performance characteristics curves of hydraulic turbines; selection of turbines.</p> <p style="text-align: center;">UNIT – VI</p> <p>CENTRIFUGAL PUMPS – I: Components of centrifugal pump; work done by impeller of the centrifugal pump; head of the pump – suction head, delivery head, static head; losses and efficiency of centrifugal pump – manometric, mechanical, overall; minimum speed for a centrifugal pump; multistage centrifugal pump – parallel, series; expression for specific speed of a centrifugal pump.</p> <p>CENTRIFUGAL PUMPS – II: Unit quantities; priming of a centrifugal pump; characteristic curves of centrifugal pump; cavitation; maximum suction lift, Net Positive Suction Head (NPSH).</p>
<p>Textbooks and Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Dr. P. N. Modi, Dr. S. M. Seth, <i>Hydraulics and Fluid Mechanics Including Hydraulics Machines</i>, Standard Book House, 21st edition, 2017. 2. R. K. Bansal, <i>A Textbook of Fluid Mechanics and Hydraulic Machines</i>, Laxmi Publications, 10th edition, 2018. 3. K Subramanya, <i>Flow in Open Channels</i>, Tata McGraw-Hill Educational Private Ltd., 5th edition, 2019.

	<p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Madan Mohan Das, <i>Open Channel Flow</i>, PHI Publications, 3rd edition, 2009. 2. Ven Te Chow, <i>Open-Channel Hydraulics</i>, The Blackburn Press, 7th edition, 2009. 3. Terry W Sturm, <i>Open Channel Hydraulics</i>, Tata McGraw-Hill Educational Private Ltd., 2nd edition.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	3	3	3	2	-	-	-	1	-	1	2
CO2	3	2	2	2	1	-	-	-	1	-	2	2
CO3	3	3	3	3	-	-	1	-	1	-	3	2
CO4	3	2	1	2	1	-	-	-	1	-	2	2
CO5	3	3	3	3	2	1	-	-	2	-	2	2
CO6	3	2	3	3	1	2	-	-	2	-	3	2

19CE2204 - ENGINEERING GEOLOGY**(Civil Engineering)**

Course Category	Professional Core	Credits	2
Course Type	Theory	Lecture - Tutorial - Practical	2-0-0
Prerequisite	None	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100
Course Objectives	<ol style="list-style-type: none"> 1. To introduce the basic concepts of geology, mineralogy and petrology in identification of rocks. 2. To describe the basic concepts of geomorphology. 3. To introduce the basic concepts of structural geology and different geological structures. 4. To understand the basic core logging, basic properties of rocks and calculate thickness of rock beds. 5. To know the general geological hazards and its mitigation. 6. To apply the geological concepts for suitable site selection of major civil engineering structures. 		
Course Outcomes	CO1	Recognize the importance of geology in civil engineering and identify various minerals and rocks.	
	CO2	Classify surface geological process and landforms of Earth surface.	
	CO3	Identify various geological structures.	
	CO4	Understand basic properties of rock and its quality.	
	CO5	Summarize the different geological hazards.	
	CO6	Apply the geological concepts for suitable site selection of major civil engineering structures.	
Course Content	<p style="text-align: center;">UNIT - I</p> <p>INTRODUCTION: Branches of geology useful to Civil Engineering – Scope of geological studies in GSI, NIRM. Role of engineering geologist in planning, design and construction of civil engineering structural features.</p> <p>MINERALOGY: Definition, origin and physical properties of minerals and megascopic identification of common rock forming, economic and clay minerals.</p> <p>PETROLOGY: Definition, origin (Rock cycle), textures, structures and classification of igneous, sedimentary and metamorphic rocks; Physical identification of acidic igneous rocks –Granite, Rhyolite; Basic igneous rocks – Gabbro, Dolerite and Basalt; Physical identification of sedimentary rocks – Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone; Physical identification of metamorphic rocks –Gneiss, Schist, Slate, Marble, Quartzite.</p>		

UNIT - II

PHYSICAL GEOLOGY: Factors causing weathering, erosion and denudation. Soil as product of weathering and engineering consideration, its profile and types in India. Geomorphologic (landforms) features of various geological agents as Water fall, Gorges, River meandering, superficial deposits, alluvium, glacial deposits, laterite (engineering aspects), desert landforms, loess, residual deposits of clay with flints, solifluction deposits, mudflows, coastal deposits.

UNIT - III

BASICS OF STRUCTURAL GEOLOGY: Concept of rock deformation and plate tectonics. Geological Structural elements as Dip and Strike. Fold: classification and nomenclature, Criteria for their recognition in the field. Faults: Classification, nomenclature and their recognition in the field. Types of joints, unconformity.

UNIT - IV

PROPERTIES OF ROCKS: Properties of rocks – Density, unit weight, porosity; Strength index measurements of rocks – RMR, RQD and point load. Core logging; Calculation of true thickness and vertical thickness of bed rock.

UNIT - V

GEOLOGICAL HAZARDS: Rock instability and slope movement: Concept of sliding blocks – Different controlling factors – Instability in vertical rock structures and measures to prevent collapse –Types of landslide and their prevention. Ground water: Factors controlling water bearing capacity of rock – Pervious and impervious rocks and lowering of water table. Earthquake: Magnitude and intensity of earthquake. Seismic zones in India. Importance in civil engineering.

UNIT - VI

GEOLOGICAL INVESTIGATION FOR DAMS, RESERVOIRS AND TUNNELS: Required geological consideration for selecting dam (geological profile from catchment area to dam site, topography, slope, drainage system.), reservoir and tunnel site. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features, precautions to be taken to counteract unsuitable conditions for dams, reservoirs and tunnels. Two case studies on failure of dams due to ignorance of geological aspects.

Textbooks and Reference books	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Parbin Singh, <i>Engineering and General Geology</i>, S K Kataria & Sons, 2013. 2. P. C. Varghese, <i>Engineering Geology for Civil Engineers</i>, PHI Learning Private Ltd., 2012. 3. Subinoy Gangopadhyay, <i>Engineering Geology</i>, Oxford University Press, 2013. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. K. M. Bangar, <i>Principles of Engineering Geology</i>, Standard Publishers, 2009. 2. N. W. Gokhale, <i>A Manual of problems in structural geology</i>, CBS Publishers, 2018. 3. Dimitri, P. Krynine, William R. Judd, <i>Principles of Engineering Geology and Geotechnics</i>, CBS Publishers and Distributers Private Ltd. 2018.
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CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	-	2	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	-	-	-	1	-	2	-	-	-
CO3	-	-	-	2	-	-	-	-	-	2	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-
CO5	-	-	-	1	-	-	2	-	-	-	-	-
CO6	-	-	-	2	-	-	-	-	-	-	-	-

19MC2201 – ENGINEERING ETHICS**(Civil Engineering)**

Course Category	Mandatory Course	Credits	-
Course Type	Theory	Lecture - Tutorial - Practical	2 - 0 - 0
Prerequisite	None	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objectives	<ol style="list-style-type: none"> 1. To create awareness on engineering ethics providing basic knowledge about engineering ethics, professional ideals and virtues. 2. To provide basic familiarity about engineers as responsible experimenters, research ethics, Industrial standards. 3. To inculcate knowledge and exposure on safety and risk, risk benefits analysis. 4. To have an idea about the collegiality and loyalty, collective bargaining, confidentiality, occupational crime. 5. To explain concept of intellectual property rights. 6. To have an adequate knowledge about MNC's, business, environment, computer ethics, honesty, moral leadership and sample code of conduct. 	
Course Outcomes	CO1	Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories.
	CO2	Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
	CO3	Solve ethical problems.
	CO4	Aware of responsibilities of an engineer for safety and risk benefit analysis.
	CO5	Aware of professional rights and responsibilities of an engineer.
	CO6	Perform various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.
Course Content	UNIT-I	
	Introduction to professional ethics: Basic concepts – Governing ethics – Thoughts of ethics, ethics and Indian philosophy - Contemporary Indian philosophies, engineering ethics, ethics and law – Space shuttle challenger accident and other recent case studies.	
	UNIT-II	
	Professionalism – Profession, Engineering as a profession, difference between engineering and other professions and codes of ethics.	

	<p>Ethical problems- moral theories, utilitarianism, cost benefit analysis, Duty and right ethics, virtue ethics – Intel Pentium Chip, Runway concrete at the Denver International Airport and other recent case studies.</p> <p style="text-align: center;">UNIT-III</p> <p>Techniques for solving ethical problems – Line drawing method and flow chart method - The Disaster at Bhopal, and other significant national and international case studies.</p> <p style="text-align: center;">UNIT-IV</p> <p>Risk, safety- factors, engineers and safety and accidents- types of accidents – Designing for safety, risk benefit analysis – The crash of valujet flight 592, firestone tires and other recent incidents.</p> <p style="text-align: center;">UNIT-V</p> <p>Rights and responsibilities of engineers – Ethics in research – Computer ethics – Experimentation. Case studies – Goodrich A7-D Brake case, kevin mitnick and computer hacking, etc.</p> <p style="text-align: center;">UNIT-VI</p> <p>Global issues in professional ethics: Introduction – Current scenario – Business ethics and corporate governance – Media ethics – Bio ethics – War ethics – Intellectual property rights.</p>
<p>Textbooks and Reference books</p>	<p>TEXTBOOKS:</p> <ol style="list-style-type: none"> 1. Charles B. Fleddermann, <i>Engineering Ethics</i>, Pearson Education, 4th edition, 2012. 2. M. Govindarajan, S. Natarajan, V. S. Senthilkumar, <i>Engineering Ethics (Includes Human Values)</i>, PHI Publications, 12th edition, 2012. 3. Jayshree Suresh and B.S. Raghavan, <i>Human Values and Professional Ethics</i>, S Chand, 3rd revised edition, 2005. <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. R. S. Naagarazan, <i>A Text Book on Professional Ethics and Human Values</i>, New Age International publishers, 2nd edition, 2017. 2. Mike W. Martin, Roland Schinzinger, <i>Ethics in engineering</i>, McGraw Hill Education, 4th edition, 2005. 3. William Lillie, <i>An Introduction to Ethics</i>, University Paperbacks, 2006.

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	2	-	-	-	-	2	3	3	2	-	2	1
CO2	1	1	-	-	-	3	2	3	2	-	2	1
CO3	-	-	-	-	-	3	2	3	2	-	2	1
CO4	2	-	-	-	-	3	3	3	-	-	2	1
CO5	1	-	-	2	-	3	3	3	2	-	2	2
CO6	-	-	-	-	-	3	3	3	1	-	2	1

19CE22P1 - FLUID MECHANICS & HYDRAULIC MACHINERY LABORATORY**(Civil Engineering)**

Course Category	Professional Core	Credits	1.5
Course Type	Laboratory	Lecture - Tutorial - Practical	0-0-3
Prerequisite	Fluid Mechanics	Sessional Evaluation	40
		Semester End Exam. Evaluation	60
		Total Marks	100

Course Objective(s)	To impart knowledge of evaluating various flow measuring devices and hydraulic machines.	
Course Outcomes	CO1	Calibration of orifice and mouthpiece.
	CO2	Determination of efficiency of notches, venturimeter and orifice meter.
	CO3	Evaluate the major and minor losses in pipe network.
	CO4	Evaluate the performance characteristics of pump.
	CO5	Evaluate the performance characteristics of turbine.
	CO6	Evaluate the Chezy's and Manning's coefficient in open channel flow.
Course Content	<p style="text-align: center;"><u>LIST OF EXPERIMENTS</u></p> <p>I. EXPERIMENTS ON CALIBRATION OF</p> <ol style="list-style-type: none"> a. Orifice b. Mouth piece c. Notch d. Venturimeter e. Orifice meter f. Bend meter g. Friction loss through a pipe h. Gate valve i. Bend loss j. Sudden contraction k. Sudden Expansion l. Open channel <p>II. EXPERIMENTS ON PERFORMANCE CHARACTERISTICS OF</p> <ol style="list-style-type: none"> a. Turbines b. Pumps 	

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	3	2	1	2	2	-	-	-	1	2	1	1
CO2	3	3	2	2	1	-	-	-	1	3	1	2
CO3	3	3	1	1	1	-	-	-	1	2	2	1
CO4	3	2	1	2	2	2	-	-	1	2	2	1
CO5	3	3	2	2	1	2	-	-	1	3	1	2
CO6	3	2	1	2	2	-	-	-	1	2	1	1

19CE22P2 - ENGINEERING GEOLOGY LABORATORY

(Civil Engineering)

Course Category	Professional Core	Credits	1.5
Course Type	Laboratory	Lecture - Tutorial - Practical	0-0-3
Prerequisite	None	Sessional Evaluation	40
		Semester End Exam Evaluation	60
		Total Marks	100

Course Objective(s)	To understand various geological aspects of minerals, rocks and landforms for their application to engineering projects.		
Course Outcomes	CO1	Identify the minerals using basic geologic classification systems.	
	CO2	Identify the rocks using basic geologic classification systems.	
	CO3	Categorize the various landforms of the Earth surface.	
	CO4	Calculate the elements of structural geology and thickness of rock strata.	
	CO5	Study the structural elements of surface and subsurface strata.	
	CO6	Interpret various types of topographical and geological maps.	
Course Content	<u>LIST OF EXPERIMENTS.</u> <ol style="list-style-type: none">1. Study of physical properties of minerals2. Identification of minerals3. Identification of Rocks4. Study of Dipping beds and their thickness5. Study of true dip, apparent dip and strike direction of beds6. Three point problem or Borehole problem7. Study of geological maps of<ol style="list-style-type: none">i. Horizontal bedsii. Dipping bedsiii. Dipping beds with dykeiv. Folded bedsv. Faulted bedsvi. Beds with unconformityvii. Completion of outcrop8. Study of geological models9. Aqua meter- Demonstration		

CO-PO Mapping: 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

	a	b	c	d	e	f	g	h	i	j	k	l
CO1	-	2	-	-	-	-	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	2	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	1	-	-
CO5	-	2	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	2	-	-	-	-	-	-	-	-