R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(Autonomous)
Department of Civil Engineering
Course Structure

I YEAR – I SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20HS0830	Algebra and Calculus	3	-	-	3
2	20HS0848	Engineering Physics	3	-	-	3
3	20ME0351	Basic Electrical and Mechanical Engineering	3	-	-	3
4	20CS0501	C Programming and Data Structures	3	-	-	3
5	20CE0101	Engineering Materials	3	-	-	3
6	20HS0850	Engineering Physics Lab	-	-	3	1.5
7	20ME0352	Basic Electrical and Mechanical Engineering Lab	-	-	3	1.5
8	20CS0502	C Programming and Data Structures Lab	-	-	3	1.5
Contact periods / week			15	-	9	**19.5**
			Total/Week **24**			

I YEAR – II SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20HS0831	Differential Equations and Complex Analysis	3	-	-	3
2	20HS0804	Engineering Chemistry	3	-	-	3
3	20HS0810	Communicative English	3	-	-	3
4	20ME0301	Engineering Graphics	1	-	4	3
5	20CE0102	Engineering Mechanics	3	-	-	3
6	20HS0805	Engineering Chemistry Lab	-	-	3	1.5
7	20HS0811	Communicative English Lab	-	-	3	1.5
8	20ME0302	Workshop Practice Lab	-	-	3	1.5
Mandatory Course						
9	20HS0816	Indian Constitution	2	-	-	0
Contact periods / week			15	-	13	**19.5**
			Total/Week **28**			

R20 **B.Tech – CE**

II YEAR – I SEMESTER

SNo.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20HS0812	Managerial Economics and Financial Analysis	3	-	-	3
2	20CE0103	Strength of Materials	3	-	-	3
3	20CE0104	Surveying & Geomatics	3	-	-	3
4	20CE0105	Building Technology	3	-	-	3
5	20CE0109	Fluid Mechanics	3	-	-	3
6	20CE0106	Strength of Materials Lab	-	-	3	1.5
7	20CE0107	Surveying Lab	-	-	3	1.5
8	20CE0108	Construction Materials Lab	-	-	3	1.5
Skill Oriented Course						
9	20CE0110	Geographic Information Systems	1	-	2	2
Mandatory Course						
10	20HS0858	Human Values and Professional Ethics	2	-	-	0
Contact Periods / Week			18	-	11	**21.5**
			Total/Week 29			

II YEAR – II SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20HS0833	Numerical Methods, Probability & Statistics	3	-	-	3
2	20CE0111	Hydraulic Engineering	3	-	-	3
3	20CE0113	Engineering Geology	3	-	-	3
4	20CE0114	Geotechnical Engineering	3	-	-	3
5	20CE0115	Structural Analysis	3	-	-	3
6	20CE0112	Fluid Mechanics & Hydraulic Machinery Lab	-	-	3	1.5
7	20CE0116	Engineering Geology Lab	-	-	3	1.5
8	20CE0117	Geotechnical Engineering lab	-	-	3	1.5
Skill Oriented Course						
9	20CE0118	Computer Aided Drawing	1	-	2	2
Internship 2 Months (Mandatory) during Summer Vacation						
Contact Periods / Week			16		11	**21.5**
			Total/Week **27**			

R20

B.Tech – CE

III YEAR – I SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20CE0119	Structural Design	3	-	-	3
2	20CE0120	Transportation Engineering	3	-	-	3
3	20CE0121	Estimating, Costing and Valuation	3	-	-	3
Professional Elective Course (PEC) – I						
4	20CE0136	Foundation Engineering	3	-	-	3
	20CE0137	Water Technology				
	20CE0138	Remote Sensing & GIS				
5	**Open Elective Course (OEC)– I**		3	-	-	3
	20EE0227	Generation of Energy through Waste				
	20ME0361	Fundamentals of Mechanical Engineering				
	20EC0450	Introduction to Communication Systems				
	20CS0546	Relational Database Management System				
	20HS0813	Management Science				
6	20CE0122	Computer Aided Design Lab	-	-	3	1.5
7	20CE0123	Transportation Engineering Lab	-	-	3	1.5
Skill Advanced Course / Soft Skill Course						
8	20CE0124	Total Station	1	-	2	2
Mandatory Course						
9	20HS0817	Essence of Indian Traditional Knowledge	2	-	-	0
10	20CE0132	**Summer Internship 2 Months after second year (To be evaluated during V semester)**	-	-	-	1.5
Contact Periods / Week			18	-	8	**21.5**
			Total/Week **26**			

R20

B.Tech – CE

III YEAR – II SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20CE0125	Environmental Engineering	3	-	-	3
2	20CE0126	Hydrology and Water Resources Engineering	3	-	-	3
3	20CE0127	Construction Project Management	3	-	-	3
4	**Professional Elective Course (PEC) – II**		3	-	-	3
	20CE0139	Concrete Technology				
	20CE0140	Airport Planning and Design				
	20CE0141	Advanced Structural Design				
5	**Open Elective Course (OEC) – II**		3	-	-	3
	20EE0235	Industrial Instrumentation				
	20ME0362	Mechanical Measurements & Control Systems				
	20EC0451	Elements of Embedded Systems				
	20CS0547	Java Programming				
	20HS0814	Intellectual Property Rights				
6	20CE0128	Environmental Engineering Lab	-	-	3	1.5
7	20CE0129	Construction Project Management Lab	-	-	3	1.5
8	20CE0130	Civil Engineering Lab (Virtual Lab)	-	-	3	1.5
Skill Advanced Course / Soft Skill Course						
9	20HS0859	English for Corporate Communication Skills lab	1	-	2	2
Mandatory Course						
10	20HS0801	Environmental Science	2	-	-	0
Industrial/Research Internship (Mandatory) 2 Months during summer vacation						
Contact Periods / Week			18	-	11	**21.5**
			Total/Week **29**			

R20

B.Tech – CE

IV YEAR – I SEMESTER

S.No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	**Professional Elective Course (PEC) – III**		3	-	-	3
	20CE0142	FEM in Civil Engineering				
	20CE0143	Solid Waste Management for Smart Cities				
	20CE0144	Ground Improvement Techniques				
2	**Professional Elective Course (PEC) – IV**		3	-	-	3
	20CE0145	Maintenance & Rehabilitation of Structures				
	20CE0146	Environmental Impact Assessment and Management				
	20CE0147	Fundamentals of Urban Planning				
3	**Professional Elective Course (PEC) – V**		3	-	-	3
	20CE0148	Elements of Road Traffic Safety				
	20CE0149	Prestressed Concrete				
	20CE0150	Design & Drawing of Irrigation Structures				
4	**Open Elective Course(OEC) – III**		3	-	-	3
	20EE0237	Electrical Energy Conservation and Auditing				
	20ME0322	Power Plant Engineering				
	20EC0452	Introduction to IOT				
	20CS0511	Python Programming				
	20HS0861	Business Ethics				
5	**Open Elective Course (OEC) - IV**		3	-	-	3
	20EE0239	Neural Networks and Fuzzy Logic				
	20ME0337	Mechatronics & Robotics				
	20EC0453	MATLAB Programming				
	20CS0548	Software Development and Testing				
	20HS0862	Strategic Management				
6	20HS0815	Entrepreneurship Development	3	-	-	3
Skill Advanced Course / Soft Skill Course						
7	20CE0131	ETABS	1	-	2	2
8	20CE0133	Industrial/Research Internship(2 Months)	-	-	-	3
Contact Periods / Week			19	-	2	**23**
			Total/Week **21**			

IV YEAR – II SEMESTER

S No.	COURSE CODE	SUBJECT	L	T	P/ Drg	C
1	20CE0134	Project Work	-	-	-	8
2	20CE0135	Internship in Industry	-	-	-	4
Contact Periods / Week			-	-	-	**12**

Note: L – Lecture hours, T – Tutorial, P – Practical, Drg. – Drawing, C – Credits

Total Credits: 160

Year	I Year		II Year		III Year		IV Year		Total
Semester	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	I Sem	II Sem	
Credits	19.5	19.5	21.5	21.5	21.5	21.5	23	12	160

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B. Tech. – I Sem

L	T	P	C
3	-	-	3

(20HS0830)ALGEBRA AND CALCULUS
(Common to All branches)

COURSE OBJECTIVES

The objectives of this course

1. *To illuminate the students in the concepts of calculus and linear algebra.*
2. *To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.*
3. *To estimate and check answers to mathematical problems in order to determine reasonableness, identify alternatives, and select optimal results.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Develop the use of matrix algebra techniques that is needed by engineers for practical applications.*
2. *Utilize mean value theorems to real life problems.*
3. *Familiarize with functions of several variables which is useful in optimization.*
4. *Learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems.*
5. *Interpret the physical meaning of different operators such as gradient, curl and divergence.*
6. *Apply Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, or Divergence Theorem to evaluate integrals.*

UNIT I

Matrices: Rank of a matrix by echelon form, solutions of system of homogeneous and non-homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem

UNIT II

Mean value theorems: Rolle's theorem-Lagrange's Mean value theorem-Taylor's and Maclaurin's theorems (without proof)

Partial Differentiation: Chain rule, Total derivatives, Jacobians, functional dependence, Maxima and Minima of functions of two variables, method of Lagrange multipliers with three variables only

UNIT III

Integral Calculus: Evaluation of definite and improper integrals (single variable), Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Evaluation of Triple integrals (Cartesian)

UNIT IV

Vector differentiation: Scalar and vector point functions, vector operator del, del applies to scalar point functions- Gradient, del applied to vector point functions-Divergence and Curl, vector identities

UNITV

Vector integration: Line integral-circulation-work done, surface and volume integrals.

Integral theorems: Green's theorem in the plane (without proof), Stoke's theorem (without proof), Divergence theorem (without proof) and applications of these theorems

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, 44thEdition, Khanna Publishers, 2017
2. Ramana B V, *Higher Engineering Mathematics*, McGraw Hill Education, 2010

REFERENCES

1. Rukmangadachari. E &Keshava Reddy E, *Engineering Mathematics*, Volume-I,II&III, Pearson Publishers, 2010.
2. SatyanarayanaBh, Pradeep Kumar T.V &Srinivasulu D, *Linear Algebra and Vector Calculus*, Studera Press, New Delhi, 2017, ISBN: 978-81-930333-8-8.
3. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics,* Volume-I,II&III, 12thEdition, S.Chand publication, 2014.

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20HS0848) ENGINEERING PHYSICS

COURSE OBJECTIVES

The objectives of this course

1. *To identify the importance of optical phenomenon i.e. interference and diffraction related to its engineering applications.*
2. *To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes and crystal structure determination by X-rays.*
3. *To familiarize the basic concepts of acoustics and ultrasonics with their Engineering applications.*
4. *To recognize the various basic terms related to Mechanics of Solids.*
5. *To understand the fundamental concepts of Superconductivity and Nano Science & Technology.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Analyze the differences between interference and diffraction with applications.*
2. *Apply the Bragg's Law for crystal structure for the determination by X-rays.*
3. *Explain applications of acoustics and ultrasonics in various engineering fields.*
4. *Explain the importance of various mechanical properties of solids.*
5. *Explain the basic properties and applications of superconductors in various fields.*
6. *Illustrate methods for synthesis and characterization of nanomaterials and apply basic principles of nanomaterials in various engineering applications.*

Unit – I: WAVE OPTICS

Interference - Principle of Superposition-Interference of light- Conditions for sustained Interference - Interference in thin films (reflected light)-Newton's Rings-Determination of Wavelength of light- Engineering Applications of interference.

Diffraction – Introduction- Fraunhofer Diffraction-Single Slit – Double Slit -Diffraction Grating – Grating Spectrum -Determination of Wavelength of Light - Engineering Applications of diffraction

Unit – II:CRYSTALLOGRAPHY& X-RAY DIFFRACTION

Crystallography*:* Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice –Crystal systems – Packing fractions of SC, BCC and FCC

X-Ray Diffraction - Directions and planes in crystals – Miller indices – Inter planar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder Method

Unit – III: ACOUSTICS AND ULTRASONICS

Acoustics: Intensity – Loudness, Absorption coefficient and its determination –Reverberation – Reverberation time (qualitative treatment) – Factors affecting acoustics of buildings and their remedies.

Ultrasonics*:* Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

Unit – IV: MECHANICS OF SOLIDS

Elasticity and isotropic materials- Stress, Strain and Hooke's Law- Types of Stresses- Types of strains: longitudinal strain, volume strain and shearing strain- Internal energy due to strain – Behaviour of wire under the load- Elastic constants of Isotropic solids- Young's modulus, Rigidity modulus and Bulk modulus, Poisson's ratio of materials - Beams- Classification- Types of support -problems.

Unit – V: SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction – Meissner effect - Properties of superconductors Type I and type II superconductors- ac and dc Josephson effects -BCS theory (qualitative) – Applications of superconductors.

Physics of Nanomaterials: Introduction, Nanoscience and Nanotechnology – Surface area to volume ratio and Quantum confinement- Classifications of Nanomaterials – Properties of nanomaterials: Mechanical, Magnetic, Optical - Synthesis of nanomaterials- Top Down Process- Ball Milling; Bottom Up Process: Sol-Gel method–Applications of nanomaterials.

TEXT BOOKS

1. M.N.Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy" *A Text book of Engineering Physics*",S.Chand Publications, 11th Edition,2019
2. K. Thyagarajan , "*Engineering Physics*" , McGraw Hill Education Private Ltd, New Delhi.

REFERENCES

1. MK Harbola ," *Engineering Mechanics*" , , Cengage Learning Publications ,2nd ed.2012.
2. JL Meriam, LG.Kraige and JN.Bolton, "*Engineering Mechanics – Dynamics*", Wiley Publications, 7th ed.2018
3. SH Crandall, NC Dahl & TJ Lardner, "*An Introduction to the Mechanics of Solids*", Tata McGraw Hill Education. 3rd ed.2017 (with SI Units).
4. M K Varma, "*Introduction to Mechanics*", Taylor & Francis Group, 4th Ed,-2019.
5. D.K. Bhattacharya and A. Bhaskaran, "*Engineering Physics*"- OxfordPublications, 2015.

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B. Tech. – I Sem

L	T	P	C
3	-	-	3

(20ME0351) BASIC ELECTRICAL &MECHANICAL ENGINEERING

COURSE OBJECTIVES

The Objective of this course is to

1. *Know about Basics of Electrical Engineering*
2. *State the principles of DC motors and its classifications*
3. *Impart the aspects of the various manufacturing processes*
4. *Understand the basic fundamentals of mechanical engineering*
5. *Study the basics of Automobiles, Energy conversion devices, R&AC*

COURSE OUTCOMES (COs)

On successful completion of this course, the students will be able to

1. *State various laws in Electrical Engineering and explain the operation of networks*
2. *Recognize the importance of different network theorems and explicate its applications in two port networks.*
3. *Interpret the principle operation of DC motors and derive an EMF equation for the transformers.*
4. *Classify various casting and metal joining processes in the manufacturing processes*
5. *Distinguish the types of machines in the manufacturing and elucidate the machining operations*
6. *Categorize the automobile engines and refrigeration & Air-conditioning systems*

PART A

UNIT – I

Introduction To Electrical Engineering: Ohm‘s Law, Basic Circuit Components, Kirchhoff‘s Laws, Types of Sources, Resistive Networks, Inductive Networks, Capacitive Networks, Series Parallel Circuits, Star Delta and Delta Star Transformation. Principle of AC Voltages, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor

UNIT – II

Network Theorems & Two Port Networks: Network Theorems- Thevenin‘s, Norton‘s, Maximum Power Transfer, Reciprocity and Superposition Theorems for DC Excitations.

Two Port Networks: Two Port Network Parameters – Impedance, Admittance, Transmission and Hybrid Parameters and Their Relations.

UNIT – III

DC Motors and Transformers

DC Motors: Principle of Operation of DC Motors, Types of DC Motors, Torque Equation, Losses and Efficiency Calculation in DC Motor. - Applications.

Transformers: Principles of Operation, EMF equation, Losses and Efficiency, Regulation of

Transformer.

PART B

UNIT – IV

Casting& Metal Joining Processes:

Types of casting processes - Permanent mould casting - Centrifugal casting - Investment casting

Metal joining processes – Principle of soldering, brazing and adhesive bonding - Position of welding, Classification of welding - Arc welding - Gas welding - Applications.

UNIT – V

Machine Tools: Introduction – Lathe, Shaping, Slotting, Planning, Drilling, Boring and Milling machines Principle of working. CNC Machining, classification and fundamentals of operation & Introduction to programming.

UNIT –VI

Basics Of Automobile Engineering: Layout of automobiles – Components of four wheeler automobile, rear wheel drive, front wheel drive, Classifications of Automobiles.

Refrigeration & Air Conditioning: Introduction to Refrigeration & Air conditioning – Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems –Types of Air conditioning systems.

TEXT BOOKS

1. M.S.Naidu and S. Kamakshiah, *Basic Electrical Engineering*, TMH Publishers, 2007.
2. D.P.Kothari& I.J. Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI, 2008.
3. R. K. Jain and S. C. Gupta, *Production Technology*, Khanna Publishers, 16th Edition, 2001.
4. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010

REFERENCES

1. T.Thyagarajan, *Fundamentals of Electrical Electronics Engineering*, SCITECH Publications, 5th Edition-2007.
2. D.P. Kothari &I.J.Nagrath, *Theory and Problems of Basic Electrical Engineering*, PHI.
3. Kirpal Singh, *Automobile Engineering*, Standard Publishers, 1st Edition-2012.
4. Roy J. Dossat, *Principles of Refrigeration*, 4th Edition, Pearson Education Asia, 2009.

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B.Tech. – I Sem.

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3	-	-	3

(20CS0501) C PROGRAMMING AND DATA STRUCTURES
(Common to CE & CSE)

COURSE OBJECTIVES
The objectives of this course
1. *Teach the syntax and semantics of a C Programming language*
2. *Demonstrate the use of Control structures of C Programming language*
3. *Illustrate the methodology for solving Computational problems*
4. *Explain the approach to algorithm analysis*
5. *Introduce different data structures for solving the problems*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. *Recognize the programming elements of C Programming language*
2. *Select the control structure for solving the problem*
3. *Apply modular approach for solving the problem*
4. *Solve mathematical problems using C Programming language*
5. *Develop the applications using stacks and queues*
6. *Construct the linked lists for various applications and perform sorting techniques*

UNIT- I
Introduction to C Language: C Language Elements, Variable Declarations and Data Types, General Form of a C Program, Input and Output Statements, Operators, Expressions, Precedence and Associativity, Type Conversions.
Statements: Decision Statements,Loop Control Statements, break, continue, goto statement.

UNIT- II
Arrays: Declaring and Referencing Arrays, Array Subscripts, Multidimensional Arrays
Functions: Library Functions, Communications among Functions, Using Array Elements as Function Arguments, Scope, Storage Classes,Type Qualifiers, Recursion, Preprocessor Commands
Strings: String Basics, String Library Functions

UNIT- III
Pointers: Pointer Declaration, Pointers and Arrays, Array of Pointers, Pointers to Pointers, Void Pointers, Memory Allocation Functions, Pointer to Functions, Pointers and Strings.
Structure and Union: Declaration and Initialization of Structures, Structure within Structure, Array of Structures, Pointer to Structure, Structure and Functions, typedef, Bit Fields, Enumerated Data Type, Union, Union of Structures.

UNIT- IV

Data Structures: Overview of Data Structure, Types of data structures, Stacks: Introduction-Definition-Representation of Stack-Operations on Stacks- Applicationsof Stacks. Queues: Introduction, Definition- Representations of Queues- Various Queue Structures- Applications of Queues.

Linked List: Single linked list, Circular linked list, Double linked list, Circular Double linked list, Applications of linked lists

UNIT- V

Searching & Sorting: Linear Search, Binary Search, Exchange Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort.

TEXT BOOKS

1. J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, *Programming in C and Data Structures*, Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*, Third Edition, Cengage Learning.

REFERENCES

1. Stephen G. Kochan, *Programming in C*, III Edition, Pearson Education
2. J.A. Jones & K. Harrow, *C Programming with problem solving*, Dreamtech Press
3. Dr.N.B.Venkateswarlu, Dr. E.V.Prasad, S. Chand, *C and Data Structures*, a snapshot oriented treatise with live engineering examples
4. E.Balaguruswamy,*C and Data Structures*,Tata McGraw Hill
5. A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein,*Data Structures using C*,Pearson Education / PHI, Eighth Edition

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B.Tech – I Sem.

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3	-	-	3

(20CE0101) ENGINEERING MATERIALS

COURSE OBJECTIVES

The objectives of this course

1. *Introduction to Engineering Materials*
2. *Develop the knowledge of material science and behaviour of various building materials used in the construction*
3. *Identifying the construction materials required for the assigned work*
4. *Provide procedural knowledge of the simple testing methods of cement and concrete*

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Classify stones and describe process of stone quarrying*
2. *Classify bricks and titles, describe manufacturing process of bricks and titles and can estimate the quality of bricks and titles*
3. *Explain properties of cement and its product and can conduct tests on cement, mortar and concrete*
4. *Explain characteristics of good, describe seasoning of wood, estimate quality of wood and can conduct tests on wood*
5. *Describe the properties, tests and applications of various metallic, non-metallic and synthetic materials used for construction*
6. *Discuss properties, tests related to bitumen and road aggregates*

UNIT – I

Stones: Classification of Rocks-Quarrying of stones: tools, methods of quarrying, Precautions-Uses of Stones-Characteristics of Stones

Bricks: Classification of Bricks-Characteristics of good bricks-Ingredients of good brick earth-Harmful substances in brick earth-Manufacturing of bricks-Defects in bricks

Tiles: Characteristics of good tile-Manufacturing methods-Types of tiles

UNIT – II

Cement: Properties of cement-Composition of ordinary cement-Manufacturing of ordinary cement-Field tests on cement –Laboratory tests on cement-Storage of cement

Mortar: Classification of mortar-characteristics of good mortar-Functions of ingredients-Preparation of cement mortar-Selection of mortar

Concrete: Classification of concrete-Production-Water-Cement Ratio-Strength of concrete - Workability-Factors affecting workability-Measurement of workability

UNIT – III

Wood: Classification of trees-Various types of woods used in buildings-Properties of wood-Wood Products

Timber: Classification of timber-Structure of timber-Seasoning of timber-Characteristics-Defects-Diseases and decay of timber

Paint: Composition of oil paint-Preparation of paint-Defects-Distemper-Whitewash-Colour wash-Varnish

UNIT – IV

Metallic products: Introduction-Iron –Pig iron –Cast iron-Wrought iron-Steel-Rolled steel sections, reinforcing steel bar-Tensile Testing of Steel Sections(IS: 1608)

Non-metallic products: Introduction to Aluminium-Copper

Smart Materials: Piezo electric materials, Electro-rheostatic and magneto rheostatic fluid

UNIT – V

Bitumen: Bitumen and asphaltic materials - Tests & testing of bitumen & bituminous mixes

Aggregates: Classification of Aggregate, M-Sand, Tests & testing of sand- Mechanical Properties of Coarse Aggregate

TEXTBOOKS

1. S.K. Duggal, *Building Materials*, New Age International Publishers, Fourth RevisedEdition,2008
2. Rangwala, *Engineering Materials*, Charotar Publishing House Pvt.Ltd, 42nd Edition

REFERENCES

1.Arora&Bindra, *Building Materials and Construction*, Dhanpat Roy Publications
2. Er.R.K. Rajput, *Engineering Materials,* S.Chand Publisher
3**.** B.C. Punmia, *Building Construction,* Laxmi Publications, 11th Edition

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

I B.Tech – I Sem.

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-	-	3	1.5

(20HS0850) ENGINEERING PHYSICS LAB

COURSE OBJECTIVES

1. *To explore the application of Interference and Diffraction by doing concerned experiments.*
2. *Elucidate the concepts of Physics through involvement in the experiment by applying theoretical knowledge.*
3. *To understand the concept of Rigidity modulus, energy gap and B-H curve.*
4. *Develop an ability to apply the knowledge of physics experiments in the later studies.*
5. *Recognize the significance of Laser by studying its characteristics and its application in finding the particle size.*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Operate various optical instruments.*
2. *Estimate wavelength of laser and particles size using laser.*
3. *Plot the intensity of the magnetic field of induction along the axis of circular coil carrying current with distance.*
4. *Evaluate the acceptance angle of an optical fiber and numerical aperture.*
5. *Determine energy loss by B-H curve.*
6. *Evaluate rigidity modulus of a given wire.*

Suggested list of experiments from the following: (Perform any TEN experiments from the following)

1. Determination of wavelengths of various colors of Mercury vapor lamp using Diffraction Grating – Normal Incidence method.
2. Determination of Dispersive power of prism
3. Rigidity Modulus – Torsional Pendulum
4. Determination of thickness of thin object by wedge method.
5. Determination of radius of curvature of Plano convex lens – Newton's Rings.
6. Determination of wavelength of a given laser source by using diffraction grating.
7. Determination of particle size (Lycopodium particles deposited on glass plates) using Laser source.
8. Determination of energy gap of a semi-conductor using p – n junction diode.
9. B- H curve.

10.Magnetic field along the axis of current carrying coil – Stewart & Gee's Method.
11. Determination of frequency of tuning fork - Melde's Apparatus.
12. Determination of Spring constant – Coupled Oscillator.
13. Determination of di electric constant of dielectric material using charging and discharging of capacitor.
14. Determination of Numerical Aperture of an Optical fiber.
15. Measurement of resistance with varying temperature –Thermistor.

REFERENCES

1. S. Balasubramanian, M.N. Srinivasan "*A Text book of Practical Physics*", S.Chand Publishers,2017
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

R20 **B.Tech – CE**

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I B.Tech – I Sem.

L	T	P	C
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(20ME0352)BASIC ELECTRICAL & MECHANICAL ENGINEERING LAB

COURSE OBJECTIVES

Objective of this course is to

1. *Impart Basic knowledge on Electrical Equipment's*
2. *Familiarize student with Pattern making, Casting & Moulding*
3. *Enable student to know about Lap & Butt joint*
4. *Make the student learn about Drilling & Tapping operation*
5. *Enable the student to learn about Shaping, Slotting ,Cylindrical & Surface Grinding operation*

COURSE OUTCOMES (COs)

Students undergoing this course can

1. *List few Basics in Electrical Engineering*
2. *Explain steps in Pattern making, Casting & Moulding*
3. *Produce a Lap & Butt joint using Arc Welding*
4. *Carryout Drilling & Tapping operation on a given workpiece*
5. *Describe Cylindrical & Surface Grinding operation*
6. *Understand about Shaping & Slotting Operation*

LIST OF EXPERIMENTS

PART – A

BASIC ELECTRICAL ENGINEERING LAB

1. Verification of Superposition Theorem
2. Verification of Thevenin's Theorem
3. Determination of Open circuit and Short circuit parameters
4. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator)
5. Brake Test on DC Shunt Motor. Determination of Performance Characteristics
6. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors)

PART – B

BASIC MECHANICAL ENGINEERING LAB

1. Experiment on Pattern Design & Making, Casting & Moulding
2. Experiment on Arc Welding: Lap & Butt Joint
3. Demonstration on general purpose machines: Milling machine, Shaper, Planning machine, slotting machine, Cylindrical Grinder, Surface grinder and Tool & cutter grinder
4. Experiment on Drilling& Tapping.
5. Experiment on Lathe.
6. Experiment on Shaping & Slotting.

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(20CS0502) C PROGRAMMINGAND DATA STRUCTURES LAB
(Common to CE& CSE)

COURSE OBJECTIVES
The objectives of this course:
1. *Explain basic constructs of C language*
2. *Explain problem solving techniques*
3. *Develop applications in C using strings, pointers, functions, structures*
4. *Explain the different operations that can be performed on data structures*
5. *Introduce the different search and sorting algorithms*

COURSE OUTCOMES (COs)
On Successful completion of this course, the student will be able to
1. *Read, understand and trace the execution of programs written in C language*
2. *Develop C programs for simple applications making use of basic constructs, arrays and strings*
3. *Develop C programs involving functions, recursion, pointers, and structures*
4. *Select the data structure appropriate for solving the problem*
5. *Illustrate the working of stack and queue*
6. *Implement searching and sorting algorithms*

LIST OF EXPERIMENTS
1. Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*,/,% and use Switch Statement)
2. a) Write a C program to find the sum of individual digits of a positive integer.

b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

3. a) Write a C program to calculate the following Sum:

   Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!

b) Write a C program to find the roots of a quadratic equation.

4. a) Write a C program to determine if the given string is a palindrome or not

b) Write a C program to determine whether the given number is Armstrong number or not.

5. a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

6. a) Write a C program to find both the larges and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:

i) Addition of Two Matrices

ii) Multiplication of Two Matrices

7. Write C programs that use both recursive and non-recursive functions

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

iii) To solve Towers of Hanoi problem.

8. Write a C program to swap(exchange) values of two integer variables using pointers

9. Write a C program that uses functions to perform the following operations:

a) To insert a sub-string in to given main string from a given position.

b) To delete n Characters from a given position in a given string.

10. a) Write a C program to check whether the entered string is palindrome or not.

b) Write a C program to read student roll no, name and marks in six subjects for n number of students and give class of each student.

11.Write a C program that implement stack (its operations) using Arrays

12.Write a C program that implement queue (its operations) using Arrays

13.Write a C program that uses functions to perform the following operations on singly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal

14.Write a C program that uses functions to perform the following operations on doublylinked list:

i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

15.a) Write a C program to perform Linear Search on the elements of a given array.

b) Write a C program to perform Binary Search on the elements of a given array.

16.a) Write a C program to sort the elements using Bubble sort.

b) Write a C program to sort the elements using Insertion sort.

TEXT BOOKS

1. J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, *Programming in C and Data Structures*,Pearson Education.
2. B.A.Forouzan and R.F. Gilberg, *C Programming & Data Structures*, Third Edition, Cengage Learning.

REFERENCS

1. P. Padmanabham, *C programming and Data Structures*, Third Edition, BS Publications
2. E Balaguruswamy, *C and Data Structures*, TMH publications.

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I B. Tech. – II Sem

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(20HS0831)DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS
(Common to CE, EEE, ME & ECE)

COURSE OBJECTIVES

The objectives of this course:

1. *To enlighten the learners in the concept of differential equations and multivariable calculus.*
2. *To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.*
3. *Provide a setting that prepares students to read and learn mathematics on their own.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. Classify the differential equations with respect to their order and linearity.
2. Solve the differential equations related to various engineering fields.
3. Identify solution methods for partial differential equations that model physical processes.
4. Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions.
5. Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.
6. Recognize and apply the Cauchy's integral formula and the generalized Cauchy's integral formula (relationship between the derivative and the contour integral of a function).

UNIT-I

First and Higher Order Ordinary Differential Equations: Exact, linear and Bernoulli's equations - Second and higher order linear differential equations with constant coefficients with R.H.S term of the types e^{ax} , *sinax, cosax,* polynomials in*x* ,e^{ax} *V(x).*

UNIT-II

Equations Reducible to Linear Differential Equations: Method of variation of parameters - Cauchy's and Legendre's linear equations- simultaneous linear equations with constant coefficients - Applications to L-C-R Circuit problems.

UNIT-III

Partial Differential Equations:

Formation of P.D.E by elimination of arbitrary constants and arbitrary functions-Method of Separation of variables-Solutions of one dimensional Wave equation, Heat equation and two dimensional Laplace's equation under initial and boundary conditions.

UNIT-IV

Complex Variable – Differentiation:

Differentiation, analytic functions, Cauchy-Riemann equations in Cartesian and polar co-ordinates (without proof), harmonic functions, conjugate harmonic functions, Milne Thompson's method-Conformal mappings, Transformation by e^z, ln z, z^2, sin z and cos z-Mobius transformations and their properties.

UNIT-V

Complex Variable – Integration:

Line integral, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof)- Taylor's series, zeros of analytic functions, singularities, Laurent's series- Residues, Cauchy Residue theorem (without proofs), Evaluation of definite integral involving sine and cosine.

TEXT BOOKS

1. Grewal B. S, *Higher Engineering Mathematics*, 44/e, Khanna Publishers,2017
2. Ramana B. V, *Higher Engineering Mathematics*, McGraw Hill Education, 2010

REFERENCES

1. Rukmangadachari E &Keshava Reddy E, *Engineering Mathematics, Volume-I, II & III,* Pearson Publishers, 2010
2. Iyengar T.K.V, *Engineering Mathematics Volume-I, II & III*, S.Chand publication, 12thEdition, 2014
3. GargNishu Gupta R.L, *Engineering Mathematics Volumes-I & II,* Pearson Education, 2014

R20 **B.Tech – CE**

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I B.Tech – II Sem.

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(20HS0804)ENGINEERING CHEMISTRY

COURSE OBJECTIVES

1.To familiarize engineering chemistry and its applications.
2. To train the students on the principles and applications of electrochemistry.
3. To understand the physical and mechanical properties of polymers helps in selecting suitable materials for different purpose.
4.To understand about the materials which are used in major industries like steel and metallurgical manufacturing industries
5.Be exposed to the importance of nano and engineering materials used in their daily life and Industry

COURSE OUTCOMES (COs)

At the end of the course student will be able to:
1.Explain the principles of reverse osmosis and electro dialysis
2.Apply Nernst equation for calculating electrode and cell potentials.
3.Differentiate between thermoplastics and thermosetting plastics.
4.Explain the setting and hardening of cement and concrete phase.
5.Explain the synthesis of colloids with examples.
6. Acquire spotlight to the nano materials and basic engineering materials usedin academics, industry and daily life.

UNIT-I

Water Technology: Introduction, Soft Water and Hardness of water, Estimation of hardness by EDTA Method - Determination of dissolved oxygen by Winkler's method . Boiler troubles - priming, foaming, scale and sludge, boiler corrosion Municipal Water Treatment,. Specifications for drinking water - Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards. Softening of water by Zeolite and Ion-exchange Processes; Desalination of Brackish water by Reverse osmosis (RO) and Electrodialysis

UNIT-II

Electrochemistry and Applications: Introduction to Electrochemical cell, Nernst equation, Cell potential calculations. Primary cells - Zn-Air Battery. Secondary cells – Lead acid Battery and Lithium Ion cell (Rechargeable) - working of the batteries including cell reactions. Fuel cells: Hydrogen-Oxygen, Methanol-Oxygen Fuel cell– basic principle, working and application of the cells

Corrosion: Introduction to corrosion, Types of corrosion - Chemical corrosion, Electrochemical corrosion and Differential aeration cell corrosion. Factors affecting the

corrosion. Cathodic protection and Anodic protection, Electroplating (Nickel and Copper) and Electro less plating

UNIT-III

Polymers and Fuel Chemistry: Introduction to Polymers, Functionality of Monomers, Nomenclature of Polymers, Types of Polymerization, Mechanism of Addition Polymerization. Thermoplastics and Thermosetting plastics - Preparation, Properties and Applications of PVC and Bakelite. Elastomers: Preparation, Properties and Applications of Buna-S, Buna-N and Thikol Rubber.

Fuels: Types of Fuels, Calorific value, Analysis of Coal. Liquid fuels: Refining of Petroleum, fractional distillation, Fuels for IC-Engines, Knocking and Anti-knocking agents, Octane and Cetane number, Alternative Fuels- Propane, Ethanol and Bio - Fuels.

UNIT-IV

Basic Engineering Materials: Composites: Constituents, Classification- Particle, Fibre and Structural reinforced composites - properties and Engineering applications of Composites. Refractories: Classification, Properties of Refractories.

Lubricants: Classification, Mechanism, Properties of Lubricating Oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, pour point and its Applications. Building Materials - Manufacture of Portland cement, Constituents, Phases and reactivity of clinkers, Setting and Hardening of Cement.

UNIT-V

Surface Chemistry and Applications: Introduction to Surface Chemistry, Colloids, Micelle formation, Characteristics of Colloids, Synthesis of Colloids – Condensation Method, Dispersion Method. Stabilization of Colloids - Solid-Gas Interface, Solid-Liquid Interface, Adsorption Isotherm, BET equation (no derivation), Applications of Colloids

Nano Chemistry: Introduction, Chemical and Electrochemical methods of preparation of Nano-Metals and Metal oxides, Nanomaterials characterization of surface by physicochemical methods: SEM, TEM, X-ray diffraction. Fullerenes and carbon nanotubes, applications of Nanomaterials.

TEXT BOOKS

1. Jain and Jain, Engineering Chemistry, 16 Ed., Dhanpat Rai Publishers, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10 Ed., Oxford University Press, 2010

REFERENCES

1. GVSubba Reddy, KNJayaveera and C. Ramachandraiah, *Engineering Chemistry*, McGraw Hill Higher Education,New Delhi, 2019.
2. K SeshaMaheswaramma and MridulaChugh, *Engineering Chemistry*, Pearson India Education Services Pvt. Ltd, 1 Ed.,2016.
3. Dr. S.S. Dara and Dr S.S Umare, *A Text book of Engineering Chemistry*, Chand & Company Ltd.,1 Ed., 2000
4. D. J. Shaw, *Introduction to Colloids and Surface Chemistry*, Butterworth-Heineman, 4 Ed., 2013

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I B.Tech - II Sem.

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(20HS0810) COMMUNICATIVEENGLISH
(Common to CE & CSE)

COURSE OBJECTIVES

The objectives of this course

1. *Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers*
2. *Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials*
3. *Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations*
4. *Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information*
5. *Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *To understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information*
2. *To ask and answer general questions on familiar topics and introduce oneself/others*
3. *To employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information*
4. *To recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs*
5. *To form sentences using proper grammatical structures and correct word forms*
6. *To use effective sentence structure for their professional activities*

UNIT – I

Part 1

Listening: Identifying the topic, the context and specific pieces of information by listening toshort audio texts. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Writing:** Beginnings and endings of paragraphs - introducing the topic; Letter writing. **Grammar and Vocabulary:** Parts of speech,Function words, Content words; Tenses**. Soft Skills:** Attitude is Everything; Positive attitudePositive thinking- thought provoking ideas – creative thinking.

Part 2

Half a Rupee Worth by R K Narayan from Engage with English

UNIT – II

Part 1

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts **Speaking:** Discussion in pairs/ small groups on specific topics followed by short structured talks **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together **Writing:** Mechanics of writing –punctuations.**Grammar and Vocabulary:** Voice; Cohesive devices; Articles.Types of sentences – Simple, Complex, and Compound

Soft skills: The factors of human mind set; self-confidence- self-belief, self-learning – self motivation.

Part 2

The Thakur's Well byPremchand from Paths to Skills in English

UNIT – III

Part 1

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing Report Writing. **Grammar and Vocabulary: S**ubject-verb agreement; If- clauses; Direct and Indirect speech.wh- questions

Soft skills: Emotional intelligence; Work efficiency- peace of mind- Broad nature in ideas- having patience in multiple ways.

Part 2

I am not that Woman by KishwarNaheed

UNIT – IV

Part 1

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** conversational English in academic contexts (formal and informal).**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of synonyms and antonyms.

Soft skills: Time management; the priority of the task – the task you take- Urgent and importance- not urgent, important- not important, urgent- Not important, not urgent.

Part 2

*What is my name?*By Sathyavathifrom Paths to Skills in English

UNIT – V

Part 1

Listening: Identifying key terms **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement).

Soft skills: Goal setting; Immediate goal – Short goal- midterm goal – Life goal.

Part 2

The Power of Prayer by A P J Abdul Kalamfrom Paths to Skills in English

TEXT BOOK

1.PushpaRelia .P & Sanjay Mihhra .K *EnglishAll Round: Communication Skills for Undergraduation Learners*Vol. I, OrientBlackSwan Publishers, First Edition, 2019

2. Prof.Sundaravalli.G et al.*Paths to Skills in English*, Orient Blackswan,Publishers, First Edition2015

REFERENCES

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014

2.Chase, Becky Tarver.*Pathways: Listening, Speaking and Critical Thinking.* HeinleyELT;2nd Edition, 2018

3.Hewings, Martin. *Cambridge Academic English (B2)*.CUP, 2012

4. Eric H. Glendinning et al Study Reading: A Course in Reading Skills for Academic Purposes,Cambridge University Press; 2nd editions, 14 October 2004

5. Pattabiram, B.V, *Soft Skills*, Sonmez Publication, 2nd Edition, 2011

6. VirendranathYandamuri, *Soft Skills for Engineer*, Yaswin Publication, 2nd Edition, 2009

R20 **B.Tech – CE**

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I B.Tech - II Sem.

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(20ME0301) ENGINEERING GRAPHICS

(Common to all branches)

COURSE OBJECTIVES

The students are able to

1. *Draw simple curves like ellipse, cycloid and Involutes.*
2. *Describe the Orthographic projections of points, lines and planes.*
3. *Construct the projection of solids like cylinders, cones, prisms and pyramids.*
4. *Sketch the development of the surfaces for practical cut sections of cylinders, cones, prisms and pyramids.*
5. *Depict the isometric and Orthographic Projections of simple objects.*

COURSE OUTCOMES (COs)

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

1. *Interpret the engineering drawing fundamentals to draw the curves like ellipse, cycloid and Involutes.*
2. *Know the projection of points and implement the same in the construction of projection of lines and planes.*
3. *Recognize the basic solids like cylinders, cones, prisms and pyramids and sketch the projections of them.*
4. *Explain the sectional views of Right regular Solids and Apply visualization skills in developing new products.*
5. *Understand the basic principles of isometric and Orthographic Projections.*
6. *Construct the isometric and orthographic projections of simple objects.*

UNIT – I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections – Eccentricity method, Rectangle Method, Parallelogram Method, Cycloids- Epi& Hypo-Cycloids and Involutes.

UNIT – II

Projections of Points: Principles of Orthographic Projections-Conventions - Projections of Points.

Projections of straight lines: Inclined to both the planes (Trapezoidal Method & Rotating line method) - simple problems only, Traces

UNIT – III

Introduction to plane surfaces: Surface Inclined to one plane- Surface inclined to both reference planes

Projections of Solids: Introduction– Projections of right regular solids-Prisms, Pyramids in different positions (Inclined to one plane only).

UNIT – IV

Section of solids - Sectional Views of Right regular Solids - Prisms, Pyramids

Development of surfaces - Development of surfaces of Right Regular Solids - Prisms, Pyramids

UNIT – V

Orthographic Projections - Principles of Orthographic projection, Conversion of objects from 3D to 2D

Isometric Projections - Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids, Conversion of 2D to 3D.

TEXTBOOKS

1. K. L. Narayana, P.Kannaiah,*A Text Book of Engineering Drawing*, SciTech Publishers, 23rd Reprint Edition, 2010.
2. N. D. Bhatt, *Engineering Drawing*, Charotar Publishers, 49th Edition, 2008.

REFERENCES

1. K. Venugopal, *A Text Book of Engineering Drawing and Graphics,* New Age Publishing, 5thEdition, 2008.
2. Warren J. Luzadder& Jon M, *Fundamentals of Engineering Drawing*, Peach Pit Press, 11th Edition, 1992.
3. Dhananjay A Jolhe, *Engineering Drawing with An introduction to AutoCAD,* McGraw Hill Education; 1st Edition, 2017.

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I B.Tech – II Sem.

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(20CE0102) ENGINEERING MECHANICS

COURSEOBJECTIVES

The objectives of this course

1. *Can understand difference between rigid and deformable bodies and their applications in engineering*
2. *Can understand different force systems and apply conditions of equilibrium to solve problems related to rigid bodies*
3. *Can determine centre of gravity and moment of inertia for various geometric sections*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain basic principles of statics and can apply them for various force systems*
2. *Describe the equilibrium conditions and analyze various types of frames*
3. *Identify the concept of friction, its types, direction and application*
4. *Describetheprinciplesassociatedwithcentroid,centreofgravity,momentofinertiaandapplythesepr inciplesforvarious two dimensions geo metric sections*
5. *Explainfundamentalprinciplesofdeformablebodiesandcomputevarioustypesofstress,strainand elastic constants*
6. *Analyze thin and thick cylinders subjected internal and external forces for stress*

UNIT – I

Statics of Particles: System of Forces – Laws of mechanics – Resolution and Composition of Forces– Equilibrium of forces – System of concurrent coplanar forces in plane –Lami's theorem

Statics of Rigid Bodies: Moment of a force – Varignon's theorem –Coplanar non-concurrent forces – Types of Beams and Supports – Support Reactions

UNIT-II

Analysis of Simple frames: Types of frames –Analysis of Perfect Frames-Method of joints–Method of sections

Friction: Types of friction– Laws of Friction– Cone of Limiting Friction– Static &Dynamic Friction–Ladder Friction

UNIT-III

Centroid & Centre of Gravity: Centre of Gravity – Centre of Gravity of a Flat Plate – Centroid – Difference Between Centre of Gravity and Centroid – Axis of Symmetry – Determination of Centroid from First Principle – Centroid of Composite Sections

Area Moment of Inertia: Definition – Parallel axis and Perpendicular theorems – Polar Moment of Inertia – Radius of gyration – Moment of inertia of basic shapes, Composite Section and simple solids.

UNIT – IV

Simple Stresses and Strains: Elasticity and plasticity –Types of stresses and strains– Hooke's law– Factor of safety- Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses

CompoundStresses: Two-dimensionalsystem-Stressatapointonaplane-Principalstressesandprincipal planes –Mohr's circle of stress

UNIT – V

ThinCylinders: Thincylindricalshells,Longitudinalandcircumferentialstresses;Hoop,Longitudinaland volumetric strains; Changes in dimensions of thin cylinders

ThickCylinders: Lame'stheory,Distributionofhoopandradialstressesacrossthickness,Designof thick cylinders, Compound cylinders, Difference of radii for shrinkage

TEXT BOOKS

1. BhavikattiSS,*ATextbookofEngineeringMechanics*(AsperthelatestSyllabusJNTU,Anantpur),New Age International, 3rdEdition,2016
2. Dr.R.K. Bansal, *A Textbook of Strength of materials*, Laxmi Publications,6thEdition, 2018

REFERENCES

1. D.S. Kumar, *Engineering Mechanics*, S.K.KATARIA&SONS,3rd Edition
2. K.VijayaKumarReddy,J.SureshKumar,*Singer'sEngineeringMechanics:StaticsandDynamics*,B.S. Publications, 3rdEdition, 2011
3. JLMeriam,LGKraige,*EngineeringMechanics:Dynamics*,WileyIndiaPvt.Ltd,6thEdition, 2010.
4. Barry J. Goodno& James M. Gere, *Mechanics of Materials*, Cengage Learning India Pvt. Ltd, 9th edition, 2019.

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I B.Tech – II Sem.

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(20HS0805)ENGINEERING CHEMISTRY LAB

COURSE OBJECTIVES

1. *Learn to estimate the chemical impurities present in water such as hardness, alkalinity, chlorine, etc.*
2. *Understand and experience the formation of inorganic complex and analytical technique for trace metal determination.*
3. *Be trained to use the instruments to practically understand the concepts of electrochemistry.*
4. *Bridge theoretical concepts and their practical engineering applications, thus highlighting the role of chemistry in engineering.*
5. *Learn and understand the practical implementation of fundamental concepts*

COURSE OUTCOMES (COs)

On successful completion of this course, student will be able to

1. *Develop and perform analytical chemistry techniques to address the water related problems (for e.g., hardness, alkalinity present in water) technically.*
2. *Prepare advanced polymer materials*
3. *Estimate the Iron in cement*
4. *Handle electro-analytical instruments like digital conductivity meter and potentiometer to perform neutralization, precipitation and redox titrations respectively.*
5. *Think innovatively and improve the creative skills that are essential for solving engineering problems*
6. *At the end of the course the students learn the alkalinity, acidity and viscosity of the any solutions*

LIST OF EXPERIMENTS

1. Conductometric Titration of Strong acid vs Strong base
2. Conductometric Titration of Weak acid vs. Strong base
3. Determination of Hardness of a Groundwater sample
4. pH metric titration of Strong acid vs. Strong base
5. Potentiometry - Determination of Redox potentials and emfs
6. Determination of Strength of an Acid in Pb-Acid battery
7. Preparation of a Polymer
8. Determination of viscosity of an oil by Redwood viscometer
9. Determination of percentage of Iron in Cement sample by Colorimetry
10. Determination of acidity of water sample.
11. Determination of Alkalinity of water sample

12.Determination of Percentage Moisture content in a Coal sample

TEXT BOOKS

1. J. Mendham et al, *Vogel's Text book of Quantitative Chemical Analysis,* Pearson Education, Sixth Edition, 2002
2. G.V. Subba Reddy, Chandra Sekhar and Jayaveera, *Chemistry Practical – Lab Manual,* McGraw Hill Higher Education, 2015.

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I B.Tech. – II Sem.

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(20HS0811) COMMUNICATIVEENGLISHLAB
(Common to CE & CSE)

COURSE OBJECTIVES

The objectives of this course

1. *Students will be exposed to a variety of self-instructional, learner friendly modes of language learning.*
2. *Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.*
3. *Students will learn better pronunciation through stress, intonation and rhythm.*
4. *Students will be trained to use language effectively to face interviews, group discussions, and public speaking*
5. *Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
2. *Apply communication skills through various language learning activities.*
3. *Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.*
4. *Evaluate and exhibit acceptable etiquette essential in social and professional Settings.*
5. *Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.*
6. *Use effective communicative approaches by preparing job application, report and other kinds of writing correspondences.*

LIST OF EXPERIMENTS

1. 1**. PHONETICS**

Definition - Articulation - Phonetic Chart - Pure Vowels and Diphthongs

1. 2. **MINIMAL PAIRS**

Definition - Minimal Pairs 1 -Minimal Pairs 2

2. 1.**CLUSTERS AND MARKERS**

Consonant Clusters - Initial Consonant Cluster -Final Consonant Clusters -Past Tense Markers -Plural Markers

2. 2. **ICE BREAKING ACTIVITY**

Ice Breakers Overview - Ice Breakers Activity - Why Ice Breaker

3.1.**SYLLABLE**

Syllable Overview -Syllable Types.

3.2. **STRESS**

Syllable Stress - Stress Pattern -Stress and Rhythm - Word Stress - Sentence Stress.

4**. Accent & Intonation**

Intonation overview- Intonation making lists – Intonation questions – Intonation – yes or no questions – notes

5. **JAM**

Jam tips - Sample topics.

6. **Listening skills**

Listening skills - Effective listening - Listening importance - Barriers to listening

7.1.ROLE PLAY 1

Greetings - Giving compliments - Making requests – Hobbies - Asking permission – Thanking.

7.2.ROLE PLAY 2

Comparing and contrasting - Agreeing and dis agreeing - Expressing opinions - Likes and dislikes - Formal and informal – Suggestions - Polite requests - Meeting people.

7.3.ROLE PLAY 3

Phone calls – Directions

8. **Description**

Describing a person- Adjectives to describe – Giving direction – Asking giving direction describing a product – Describing products – Personal narrative – narrative writing Notes.

9. **Book review**

Introduction – Book review over view- Book review tips – Book review notes

10. **Information Transfer**

Information writings –Text to Diagram- Diagram to Text

Minimum requirements for Communicative English Lab

1. Computer Assisted Language Learning (CALL) Lab: The Computer Assisted Language Lab for 60 Students with 60 systems one Master Console, LAN facility and English Language Software for self-study by learners.
2. Communicative English Labwith movable chairs and audio visual aids with a P. A. system, Projector, a Digital stereo audio & video system and Camcorder etc.

System Requirement (Hardware component)

Computer network, LAN with minimum 60 multimedia systems with the following:

Specifications

i) a) Intel(R) core (TM) i3
   b) Speed 3.10 GHZ
   c) RAM – 4 GB
   d) Hard Disk – 320 GB

ii) Headphones with High quality

Software

Walden Info Tech Software

REFERENCES

1. T.Balasubramanian, *A Textbook of English Phonetics for Indian Students*,(Mcmillian) second edition, 2012
2. DhamijaSethi,*A Course in Phonetics and spoken English*, Prentice-hall of India Pvt. Ltd, 2000
3. Krishna Mohan & NP Singh, *Speaking English Effectively*, (Mcmillian) second edition,2011
4. E.Sureshkumar,P.Sreehari, *A Hand Book of English Laboratories*, Foundation books, 2011
5. M.AshrafRizvi, Director, Jaipuria Institute of Management, Lucknow, *Effective Technical Communication*, McGraw Hill Education; Second edition,27 July 2017

R20 **B.Tech – CE**

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I B.Tech – II Sem.

L	T	P	C
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(20ME0302) WORKSHOP PRACTICE LAB

COURSE OBJECTIVES

To make the student

1. Familiarize with the different types of wood and carpentry joints
2. Develop Tapered Tray and Conical funnel using sheet metal
3. Acquire practical knowledge on Fitting and Electrical Wiring
4. Learn about various peripherals of a computer
5. Know about installation of MS Windows & Linux
6. Gain knowledge on Productivity tools & Networking

COURSE OUTCOMES (COs)

Upon Completion of the course the students will be able to

1. *Describe the different types of wood and carpentry joints*
2. *Produce Tapered Tray and Conical funnel using sheet metal*
3. *Understands about Fitting and Electrical Wiring*
4. *Identify various peripherals of a computer*
5. *Explain the procedure to install MS Windows & Linux*
6. *Understand about Productivity tools & Networking*

PART A

LIST OF EXPERIMENTS

CARPENTRY: Familiarity with different types of woods and tools used in wood working and make following joints

1. T-Bridle joint
2. Corner Dovetail joint

SHEET METAL WORKING: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal jobs using GI sheets.

1. Tapered tray
2. Conical funnel

FITTING: Familiarity with different types of tools used in fitting and do the following fitting exercises

1. Step Fitting
2. V-Fit

ELECTRICAL WIRING: Familiarity with different types of basic electrical circuits and makes the following connections

1. Parallel and series
2. Two way switch
3. Go down lighting
4. Tube light
5. Three phase motor
6. Soldering of wires

PART B

Task 1:

Identification of the peripherals of a computer: To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices

Task 2:

A practice on disassembling the components of a PC and assembling them

Task 3:

1. Basic DOS commands, Installation of MS windows.
2. Basic Linux Commands, Installation of Linux.

Task 4:

Hardware Troubleshooting (Demonstration): Identification of a problem and fixing the solution (improper assembly or defective peripherals). Software Troubleshooting (Demonstration): Identification of a problem and fixing the PC for any software issues

Productivity tools

Task 5:

1. **MS Word Orientation:** Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting ,Drop Cap , Applying Text effects, Using Character Spacing, using templates, Borders and Colours, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving

2. **Presentations:** Creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper linking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered

3**. Spread sheet:** Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spread sheet application considered

Task 6:

Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc. should be done by the student. The entire process has to be documented

TEXT BOOKS

1. V Ramesh Babu, *Engineering Workshop Practice for JNTU*, VRB Publishers Pvt.Ltd.,2009
2. Peter Norton, *Introduction to Computers*, McGraw Hill, 7th Edition, 2017
3. Joan Lambert, Joyce Cox, *MOS study guide for word, Excel, Power point & amp; Outlook Exams*, PHI. 1st Edition, 2011

REFERENCES

1. P. Kannaiah& K.L. Narayana, *Workshop Manual*, SciTech Publishers,2010
2. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education.2009
3. Rusen, *Networking your Computers and Devices*, PHI, 2009
4. Bigelows, *Trouble Shooting, Maintaining & amp; Repairing PCs*, TMH, 2010

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L	T	P	C
2	-	-	-

(20HS0816) INDIAN CONSTITUTION

COURSE OBJECTIVES

The objectives of this course

1. *To know the premises informing the twin themes of liberty and freedom from a civil rightsperspective*
2. *To address the growth of Indian opinion regarding modern Indian intellectuals constitutional role*
3. *To address entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indiannationalism*
4. *To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution*
5. *To acquire knowledge for various competitive examinations*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Explain the key concepts of political economy*
2. *Analyze the significant developments in the political ideologies*
3. *Describe the salient features of the constitution of India interpret, integrate and critically*
4. *Analyze the political economy of Indian international relations and gain knowledge in Judiciary system*
5. *Apply their knowledge and skills acquired to write various competitive examinations*
6. *Analyze the constitutional rights in relating to practical life*

UNIT-I

Constitution: Definition, Introduction, Meaning of the term,- Indian Constitution: Sources and Features

UNIT-II

Historical Perspective of Indian Constitution: The Government Act of 1919and1935 - A Dual Form of Government – The Constitutional Reforms of Simon commission –Formation of Drafting Committee – The Role of Constitution Assembly. Salient features and characteristics of the Constitution of India: Structure of the Indian Union: Federalism, Centre- State relationship

UNIT-III

Scheme of the Fundamental Rights: Concept of Fundamental Rights in India, Justifiability of Fundamental Rights - Reach of Fundamental Rights -The scheme of the Fundamental Duties and its Legal Status: Fundamental Duties in India – Article 51A - Introduction to

Fundamental Duties in India – Importance of Fundamental Duties. The Directive Principles of State Policy - Its importance and implementation - The Potential of Directive Principles of State Policy for the Judicial Enforcement of Socio-Economic Rights

UNIT-IV

Parliamentary Form of Government in India: Origin, growth and development of the parliamentary system in India – Chief Characteristics of Indian Parliament – Constitutional Powers and Functions of Indian Parliamentary system. The President of India: Qualifications of President - Election of President, Tuner of President - Status, Powers and Functions of President. The Historical Perspectives of the Constitutional Amendments in India: Types of Amendments & Constitutional Amendment Process in India - Indian Polity-Judiciary System: Introduction to Indian Judiciary System - Independent Indian Judiciary - Indian Judiciary Structure - Powers and Functions of Indian Judiciary

UNIT-V

Local Self-Government: Constitutional Scheme in India - District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayatiraj: Introduction, PRI: Zila Pachayat, Elected officials and their roles, CEO Zila Pachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

Election Commission: Role and Functions of Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women

TEXT BOOKS

1. Government of India Ministry of Law and Justice (Legislative Department), *The Constitution of India, 1950 (Bare Act) Government Publication, 2015*
2. Dr.S.N.Busi, Dr.B.R.Ambedkar, *Framing of Indian Constitution, Government Publication*, 1st Edition,2015

REFERENCES

1. Jain M. P., *Indian Constitution Law*, Lexis Nexis, 7th Edition., 2014
2. Basu D.D, *Introduction to the Constitution of India*, Lexis Nexis, 2015
3. Bakshi. P.M. Constitution of India, Universal Law Publishing., 15th Edition, 2018

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II B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20HS0812) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES

1. *To familiarize the students with the concepts of microeconomics and make them understand the concept of demand and supply analysis in business applications*
2. *To understand the pricing and output decisions under different market structures*
3. *To understand the basic financial statements and techniques of financial statement analysis*

COURSE OUTCOMES (COs)

After the completion of the course student would be able to:

1. *Understand the nature of managerial economics and the role of it in business firms*
2. *Identify the determinants of demand and apply cost analysis under different market conditions*
3. *Integrate the concepts of price and output decisions of business firms*
4. *Appreciate the importance of market structures and implement appropriate price and output decisions*
5. *Assess the financial statements of a firm and the financial performance of the firm through the financial statements*
6. *Measure operating, investing and financial performance of a firm*

UNIT-I

Introduction To Managerial Economics - Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand - Demand forecasting- factors governing demand Forecasting-methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

UNIT-II

Theory Of Production and Cost Analysis -Production Function – Short-run and long- run production - Isoquants and Isocosts, MRTS, least cost Combination of inputs - Cobb-Douglas production function - laws of returns - Internal and External Economies of scale .

Cost Analysis: Cost concepts - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT-III

Introduction to Markets and New Economic Environment - Market structures: Types of Markets - Perfect and Imperfect Competition - Features, Oligopoly -Monopolistic

competition. Price-Output determination - Pricing Methods and Strategies - New Economic Environment- Economic systems – Economic Liberalization – Privatization and Globalization

UNIT-IV

Capital and Capital Budgeting - Concept of Capital - Over and under capitalization – Remedial measures - Sources of Short term and Long term capital - Estimating Working Capital requirement – Capital budgeting – Features of Capital Budgeting proposals – Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

UNIT-V

Introduction to Financial Accounting and Analysis - Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

TEXT BOOKS

1. Aryasri, *Managerial Economics and Financial Analysis,* TMH, 4th edition, 2009
2. Varshney&Maheswari, *Managerial Economics,* Sultan Chand, 2009

REFERENCES

1. Premchand Babu, Madan Mohan, *Financial Accounting and Analysis*, Himalaya, 2009
2. S.A. Siddiqui and A.S. Siddiqui, *Managerial Economics and Financial Analysis*, New Age International, 2009
3. Pearson Joseph G. Nellis and David Parker, *Principles of Business Economics,* 2nd edition, New Delhi
4. Domnick Salvatore, *Managerial Economics in a Global Economy*, Cengage, 2009
5. H.L.Ahuja, *Managerial Economics*, S.Chand, 3rd edition, 2009

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II B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20CE0103) STRENGTH OF MATERIALS

COURSE OBJECTIVES

1. *To learn how to find shear force and bending moment and construction of SFD & BMD*
2. *To understand about the concept of simple bending and shear stress distribution.*
3. *To study about circular shafts subjected to torsion and springs*
4. *To learn about deflections of beams by using different methods.*
5. *To learn about columns their application.*

COURSE OUTCOMES (COs)

On the completion of course, the students will be able to

1. *Draw the shear forces & bending moment diagrams for beams subjected to different conditions of loading.*
2. *Derive the bending stresses and shear stresses for different beam sections.*
3. *Derive torsional equation for members subjected to torsion, power transmitted by them.*
4. *Determine the deflection of beams by using double integration method, Macaulay's method and Moment-Area method.*
5. *Derive expression for Euler's crippling load for long columns under different end conditions.*
6. *Determine the combined effect of direct and bending stress in beams, dams, chimneys and retaining walls.*

UNIT – I

Shear Force and Bending Moments: Types of supports and beams – Concept of Shear force and bending moment – Shear force and bending moment diagrams for cantilever, simply supported and over hanging beams with point loads, uniformly distributed load, uniformly varying loads and couples – Point of contra flexure – Relationship between bending moment, shear force and loading

UNIT – II

Bending Stresses in Beams: Introduction – Assumptions – Theory of Simple Bending – Derivation of bending equation: M/I = f/y = E/R – Section Modulus – Section Modulus for Various Shapes of Beam Sections.

Shear Stresses in Beams: Derivation – Shear stress distribution in rectangular, triangular, circular, I and T sections.

UNIT – III

Torsion on Circular Shafts: Introduction – Derivation of Shear stress produced in a Circular Shaft subjected to Torsion – Maximum Torque transmitted by a Circular Solid Shaft and

Hollow Shaft – Power transmitted by Shafts – Shaft in Series and Parallel – Polar Section Modulus – Torsional Rigidity – End thrust – Combined bending and torsion

Springs: Closed and open coiled helical springs under axial loads and axial twist – Carriage spring

UNIT – IV

Deflections of Beams: Differential Equation of Elastic Curve – Calculation of Slope & Deflection for cantilever and simply supported beams subjected to point loads, UDL using Double Integration method, Macaulay's method and Moment Area method

UNIT – V

Columns: Types of columns – Effective length – Slenderness ratio – Axially loaded columns – Crippling load – Assumption – Euler's column theory for various end conditions – Limitations in Euler's theory – Rankine-Gordon formula.

Direct and Bending Stresses: Effect of combined bending and direct stress – Resultant of symmetrical & unsymmetrical columns to eccentric loading – Kernel of section for rectangular, circular and hollow sections – Determination of stresses in the case of chimneys, retaining walls and dams – Conditions for stability.

TEXT BOOKS

1. R.K.Bansal, *A Text Book of Strength of Materials,* Laxmi Publications (P) Ltd., New Delhi, 6th Edition
2. S.S. Bhavikatti, *Strength of Materials,*Vikas Publishing House Pvt Ltd, 4th edition

REFERENCES

1. Ferdinand Beer, E. Russell Johnston and others, *Mechanics of Materials,* The McGraw hill Publications, 7th edition, 2014
2. R.C Hibbeler, *Mechanics of Materials,* Prentice Hall Publications, 8th Edition, 2011
3. R.Subramanian, *Strength of Materials,* Oxford HED Publications, 3rd Edition
4. R.K.Rajput, Strength of Materials, S.Chand & Co Ltd, New Delhi, 6th Edition
5. S. Ramamrutham, R. Narayanan, *Strength of Materials,* Dhanpat Rai Publishing Company, 2020

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II B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20CE0104) SURVEYING & GEOMATICS

COURSE OBJECTIVES

The objectives of this course

1. *To train the students on the basic principles of surveying for the measurement of distances and areas*
2. *To measure the bearing of a line with prismatic compass and horizontal angles between the lines and vertical angles of elevated or depressed objects by transit theodolite*
3. *To apply for horizontal and vertical distance computation by tacheometry survey and EDM instrument*
4. *To set out the different types of curves in the field*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Classify and explain the surveying and its principles*
2. *Use the principles of Chain and Compass survey to construct traverse and correct the error of chain and tape while measuring distances*
3. *Prepare LS & CS profiles and counter map using levelling instrument*
4. *To measure horizontal and vertical angles using theodolite and tacheometric surveying and their by compute the horizontal and vertical distances*
5. To c*alculate, design and set various types of horizontal curves*
6. *To describe the working principles of EDM and total station*

UNIT – I

Principles of Surveying: Surveying–Definition-Primary divisions – Classification - Principles of surveying - Scales used for Maps and Plans - Duties of a Surveyor - Errors: Accuracy and Precision - Sources and types of errors

Chain & Compass Surveying: Chain and its accessories- Corrections for tape- Obstacles in Chaining - Compass Surveying - Units of angle measurement - Meridians, Azimuths, Bearings - Magnetic declination and dip - Prismatic and Surveyor compass – Temporary adjustment - Local attraction and corrections to angles and bearing of lines

UNIT – II

Levelling: Basic definitions - Methods of leveling - Leveling instruments: Dumpy level- Leveling staff - Temporary adjustments of dumpy level - Level Field Book – Booking and reduced levels – Methods – Simple leveling - Compound leveling - Check leveling- Reciprocal leveling - Profile leveling - Cross sectioning - Curvature and Refraction - Difficulties in leveling - Errors in leveling

Contouring: General - Contour Interval - Characteristics of contours - Methods of locating contours - Direct and indirect methods - Interpolation of contours - Contour Gradient - Uses of contour maps

UNIT – III

Theodolite: Basic definitions - Fundamental lines and desired relations – Types of Theodolite- Temporary adjustments - Measurement of a horizontal angle - Repetition and Reiteration methods - Measurement of Vertical angle - Sources of errors in Theodolite survey – Single and Double plane method

Tacheometric Surveying: Instrument- Different systems of Tacheometric measurement - Determination of constants K and C – Inclined sight with staff vertical - Inclined sight with staff normal to the line of sight - Movable hair method – Tangential method

UNIT – IV

Curves: Simple curves – Definitions and notations - Designation of a curve - Elements of simple curves - Methods of setting out simple curves - Rankine's method-Two theodolite method- Compound curves – Elements of compound curve - Reverse curve – Elements of Reverse curve - Relationship between various elements

UNIT – V

Electronic Distance Measurements: Introduction – Basic concepts of Electromagnetic waves - Basic definitions - Phase of the Wave, Units, and Types of waves - Measurement of transit time - Computing the distance from the phase differences - Modulation - EDM instruments - Electronic Theodolite

Total Station: Models, Fundamental measurements, Recording, Traversing, and Data retrieval - Global Positioning System

TEXTBOOKS

1. Punmia B.C, *Surveying Vol-I & II*, Laxmi Publications, New Delhi,15th Edition, 2016
2.Arora K. R, *Surveying Vol-I*, Rajsons Publications Pvt. Ltd,10th Edition, 2008

REFERENCES

1.Kanetkar.T.P. & S.V. Kulkarni, *Surveying and Levelling, Part I & II*, Puna Vidyarthi Girha, Prakashan, 23rd Edition, 2006
2.R. Subramanian, *Fundamentals of Surveying and Levelling*, Oxford University Press, India,1st Edition, 2014
3.Basak N.N, *Surveying and Leveling*, Tata McGraw Hill Publishing Company Ltd, 2nd Edition, 2014

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II B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20CE0105) BUILDING TECHNOLOGY

COURSE OBJECTIVES

1. *To explore construction practices to adopted for sub structure*
2. To learn construction of various building component for superstructure
3. To explain various building services in practice

COURSE OUTCOMES (COs)

After completion of the course the Students will be able to

1. *Discuss requirements of foundations, causes of foundation failure and can classify foundations*
2. *Describe how to construct different types of brick and stone masonry and to lay plastering and pointing*
3. *Classify different types of lintels, arches, staircases, doors and windows*
4. *Execute laying different types of floors and roofs*
5. *Discuss the various construction practices of ventilation, air-conditioning, fire protection and acoustics for a building*
6. *Implement different security installation and mechanical conveyors in a building*

UNIT – I

Foundations: Essential requirements of a good foundation - Shallow foundations – Spread, Combined, Strap and Mat footings – Causes of foundation failure

Masonry: Definition of terms used in masonry – Classification of Stone Masonry – Bonds in brick work– Defects in brick masonry – Comparison of brick and stone masonry.

UNIT – II

Floors: Materials used- Types of floors-Composite flooring – Timber flooring.

Lintels & Arches: Classification of Lintels–Classification of Arches.

Plastering and Pointing: Types of Mortars for Plastering – Methods of Plastering – Defects in Plastering – Pointing.

UNIT – III

Staircases: Technical terms; Types of stair-cases, Design considerations.

Doors and Windows: Location of Doors and Windows-Types of Doors–Types of Windows

Roofs: Requirement of good roof – Pitched roof, flat and curved roofs – RCC roofs.

UNIT – IV

Ventilation& Air-Conditioning: Necessity & factors affecting ventilation– Functional requirements – Natural and mechanical ventilation - Purposes of Air-conditioning - Filters for Air-conditioning

Fire Protection: Causes & effects – Fire load – Fire resistant properties of common building materials - General rules for fire resistant building

Acoustics of Buildings: Technical terms - Factors to be considered in Acoustics of building; - Noise and its effects – Acceptable noise levels

UNIT – V

Mechanical Conveyors: Planning lift installations - Electric lifts - Roping systems - Lift doors - Machine room and equipment - Safety features - Installation details - Dimensions - Paternoster lifts - Estimating the number of lifts required – Fire fighting lifts - Escalators - Travelators - Stair lifts.

Security Installations: Intruder alarms - Micro-switch and magnetic reed - Radio sensor, pressure mat and taut wiring - Acoustic, vibration and inertia detectors - Ultrasonic and microwave detectors - Active infra-red detector - Passive infra-red detector - Lightning protection systems.

TEXTBOOKS

1. Dr. B.C, Punmia, Ashok Kumar Jain, Arun Kumar Jain,*Building Construction*, Laxmi Publications (P) Ltd., New Delhi, Tenth Edition, 2012.
2. Fred Hall, Roger Greeno, *Building Services*, Butterworth-Heinemann is an imprint of Elsevier Ltd, Burlington,MA 01803.

REFERENCES

1. Rangwala, *Building Construction*, Charotar Publishing House Pvt Ltd, 41st Edition, 2014
2. N.L.Arora and B.L. Gupta, *Building Construction*, Satyaprakshan publications, New Delhi, 2014
3. Peter.H.Emmons, *Concrete Repair and Maintenance Illustrated*, Galgotia Publications Pvt.Ltd., 2001
4. SandeepMantri, *Practical Building Construction and its Management*,Satya Publisher, New Delhi

R20 **B.Tech – CE**

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II B.Tech – I Sem.

L	T	P	C
3	-	-	3

(20CE0109) FLUID MECHANICS

COURSE OBJECTIVES

The objectives of this course is

1. *To understand the basic concepts of Fluid properties and fluid statics*
2. *To understand the applications of fluid kinematics and dynamics*
3. *To understand the behaviour of pipe flow and losses in pipe flow*
4. *To understand the concepts of flow measurements and boundary layerflows*

COURSE OUTCOMES (COs)

On completion of the course, the students will be able to

1. *State Newton's Law of Viscosity, discuss and calculate fluid properties*
2. *Define Pascal's Law and apply it for measuring pressure devices*
3. *Classify various fluid flows and derive continuity equation*
4. *Deriving Euler's, Bernoulli's, Impulse Momentum Equation and applying them for fluid flow problems*
5. *Derive Darcy Weisbach equation and apply it pipe flow problems*
6. *Describe Laminar and Turbulent flow characteristics*

UNIT-I

Fluid Properties: Dimensions and units - Definition of a fluid – Types of fluids – Ideal fluids, Real fluids -Physical properties of fluids- Density, Specific weight, Specific volume, Specific gravity, Compressibility, viscosity- Newton's Law of Viscosity, Surface tension capillarity and , Vapour pressure

Fluid Statics: Pascal's law – Pressure variation in a static fluid – Atmospheric, gauge and absolute pressures – Measurement of pressure – Piezometer, U–tube and inverted U–tube manometers and Bourdon's pressure gauge -buoyant force - hydrostatic forces on plane and curved surfaces -center of pressure

UNIT-II

Fluid Kinematics: Types of flow – Streamline – Streak line – Path line – Stream tube – Control volume – Continuity equation in one and three dimensional forms – Stream function and velocity potential function – Flow net – Acceleration of a fluid particle – Local and convective accelerations – Tangential and normal accelerations

UNIT-III

Fluid Dynamics: Euler's equation of motion along a streamline – Bernoulli's energy equation – Energy correction factor – Impulse momentum equation – Momentum correction factor – Force on a bend – Energy gradient line – Hydraulic gradient line – Analysis of free liquid jets – Forced vortex and free vortex

Flow Measurement: Velocity measurement by Pitot tube and Pitot static tube – Discharge measurement by Venturimeter and orifice meter - Orifices and mouthpieces – Flow over rectangular, triangular, trapezoidal and stepped notches - Broad crested weirs

UNIT-IV

Analysis of Pipe Flow: Loss of head through pipes - Darcy Weisbach equation - minor losses in pipe flow – Pipes in Series – Pipes in Parallel - Equivalent Pipes – Siphon - Analysis of Pipe Networks ; Hardy Cross Method

UNIT-V

Laminar Flow: Dimensionless numbers -Reynolds Experiment - Laminar Flow Through: Circular Pipes – Hagen Poiseuille equation - – Laminar flow through parallel plates.

Turbulent Flow: Definition - Causes of Turbulence - Velocity Distribution in Turbulent Flow in Pipes- Resistance of Smooth and Rough Pipes

TEXT BOOKS

1. Dr. P.N. Modi & Dr. S.M. Seth, *Hydraulics and Fluid Mechanics Including Hydraulics Machines (A-4-Size)*,Standard BookHouse ,21th Edition,2018
2. *Er.R.K.Rajput , A Textbook of Fluid Mechanics and Hydraulic Machines*, S.Chand Publications,3rd Rev. Edition 2006

REFERENCES

1. Dr. R. K. Bansal , *A Textbook of Fluid Mechanics and Hydraulic Machines*, Laxmi Publications,9th Edition, 2005
2. K.Subramanya, *Fluid Mechanics and Machinery (Problems and Solutions)*,Tata McGraw Hill Education, 2005
3. E. Benjamin Wylie, K.W. Bedford ,*Fluid Mechanics*, Victor Streeter, Tata McGraw Hill Education, 9th Edition, 2017
4. C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, *Fluid Mechanics and Machinery*, Oxford UniversityPress, 1st Edition, 2010
5. Rama Durgaiah D., *Fluid Mechanics and Machinery*, New Age International,1st Edition,2002

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II B.Tech – I Sem.

L	T	P	C
-	-	3	1.5

(20CE0106) STRENGTH OF MATERIALS LAB

COURSE OBJECTIVES

The objectives of this course

1. *Able to conduct test on engineering materials*
2. *To determine the elastic properties such as compression, tension, torsion and modulus of elasticity*

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Conduct tension test on mild steel bar and plot stress strain curve*
2. *Conduct compression test on wood, brick and concrete and can calculate their compression test*
3. *Conduct impact test on metal specimens*
4. *Find hardness of different materials*
5. *Determine modulus of elasticity of given material of beam by studying deflection for different loads*
6. *Determine tensile and torsional strength of mild steel bars and find stiffness of a helical spring*

LIST OF EXPERIMENTS

1. Bending test on simple support beam by using central load and eccentric load
2. Water absorption and Compression test on brick
3. Compression test on wood
4. Compression test on concrete
5. Shear test on wood
6. Impact test on metal specimen (Izod and Charpy)
7. Compression test on helical spring
8. Tension test on mild steel bar
9. Torsion test on mild steel bar
10. Continuous beam – deflection test
11. Hardness test on metals (Rockwell and Brinell Hardness Number Tests)
12. Verification of Maxwell's Reciprocal theorem on beams

Any ten experiments may be conducted

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II B.Tech – I Sem.

L	T	P	C
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(20CE0107) SURVEYING LABORATORY

COURSE OBJECTIVES

The objectives of this course is

1. *To train the students in plotting of land by chain, tape and plane table survey*
2. *To train the students in determining the distance between two inaccessible points by prismatic compass and plane table and theodolite methods*
3. *To train the students in plotting of maps by conducting leveling survey, tacheometric methods and total station*

COURSE OUTCOMES (COs)

On completion of the course, the students will be able to

1. *Calculate the area of given polygon by chain and plane table surveying*
2. *Determine the elevation of various points using leveling instruments*
3. *Compute the angles, distance and height by compass, theodolite, tacheometry and total station*
4. *Setting out the curve by theodolite and tacheometry*
5. *Describe the concept of foundation marking*
6. *Use total station for carrying basic operations*

LIST OF EXPERIMENTS

1. Determination of area of polygon by chain and cross staff survey.
2. Measurement of bearings of sides of traverse with prismatic compass and computation ofcorrect included angle.
3. Determination of area of polygon by Plane table surveying- Radiation method
4. Measurement of distance between two inaccessible points by Plane table surveying – Intersection method
5. Determination of elevation of various points with dumpy level by collimation method (FlyLeveling)
6. Determination of elevation of various points with level by rise & fall method (CheckLeveling)
7. Measurement of horizontal angles by method of repetition and reiteration.
8. Trigonometric leveling – Measurement of heights and distances (Single plane method)
9. Heights and distance measurement using Principles of tacheometric surveying
10. Setting out a simple curve by Rankine's method
11. Setting out works for a single bedroom residential buildings (Foundation marking)
12. Determination of area using digital Planimeter

Any ten experiments may be conducted

REFERENCES

1. Roy S.K., *Fundamentals ofSurveying,*Prentice Hall of India,2nd Edition, 2004
2. Arora K.R., *Surveying,Vol I & II*, Standard Book house, 10th Edition, 2008

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II B.Tech – I Sem.

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(20CE0108) CONSTRUCTION MATERIALS LAB

COURSE OBJECTIVES

This course enables the students to

1. *Know the concept and procedure of different type of test conducted on cement, aggregate and finished concrete*
2. *Test the basic properties of fresh and hardened concrete*
3. *Students can design the mix, make the specimens and test the same for their respective strengths*

COURSE OUTCOMES (COs)

After the completion of this course, students will be able to

1. *Outline the importance of testing of cement and conduct various tests on cement*
2. *Assessthe different properties of aggregate*
3. *Summarize the concept of workability and testing of concrete*
4. *Determine the specific gravity and water absorption on fine aggregate.*
5. *Conduct tests on hardened concrete and describe the its properties*
6. *Perform non-destructive test on concrete*

LIST OF EXPERIMENTS

1. Specific gravity and fineness of cement
2. Soundness of cement
3. Normal consistency of cement
4. Initial and final setting of cement
5. Compression strength of cement
6. Specific gravity and water absorption of coarse aggregate
7. Specific gravity and water absorption of fine aggregate
8. Bulking of sand
9. Fineness modulus of coarse aggregate by sieve analysis
10. Fineness modulus of fine aggregate by sieve analysis
11. Compression strength of concrete
12. Workability of concrete by slump cone test
13. Workability of concrete by compaction factor
14. Workability of concrete by Vee Bee Consistometer
15. Non-destructive testing of concrete

Any ten experiments may be conducted

TEXT BOOKS

1. M.L. Gambhir, *Concrete Manual*, Dhanpat Rai& co., Fourth edition
2. Gambhir, *Building Construction and Materials (Lab Manual)*, TMH publishers

REFERENCES

1. IS 10262-2007
2. IS 456-2000
3. ACI 211.1-91

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II B.Tech – I Sem.

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(20CE0110) GEOGRAPHIC INFORMATION SYSTEMS

COURSE OBJECTIVES

Objective of this course is to introduce concepts of GIS through QGIS open source software

COURSE OUTCOMES (COs)

After the completion of the course student should be able to

1. *Describe fundamental concepts related to GIS*
2. *Work with vector data*
3. *Work with raster data*
4. *Perform data digitalization and process*
5. *Work with attributes, external files*
6. *Prepare map*

LIST OF EXPERIMENTS

1. Understanding coordinate systems, raster and vector data
2. Preparing QGIS environment
3. Working with vector data
4. Applying styles
5. Working with raster data
6. Data digitalization and processing
7. Working with attributes
8. External files and spatial interpolation
9. Maps and visualization

Software Used: QGIS

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II B.Tech – I Sem.

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(20HS0858) HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE OBJECTIVES

The Objective of the course is to

1. *Create awareness on Human Values.*
2. *Impart knowledge on an Engineering Ethics*
3. *Instill morality, accountability in an engineering experimentation*
4. *Create awareness on an assessment of safety, risk and rights*
5. *Develop knowledge on global issues*
6. *Create an awareness on Human Values and Engineering Ethics, Engineers social responsibility in an experimentation, appreciate the rights of others and ethics in global issues.*

COURSE OUTCOMES (COs)

Online completion of the course the student will be able to

1. *Identify and analyze human values in their relevant field*
2. *Assess their own engineering ethics and have the social consciousness*
3. *Get knowledge on codes of ethics and on an utilitarian thinking*
4. *Identify safety, risks and an ethical concern in research and intellectual contexts*
5. *know necessity of computer and an environmental ethics, give a picture on weapons development*
6. *Upon completion of the course, the student should be able to apply the ethics in society, discuss an ethical issues related to engineering and realize the responsibilities and rights in the society*

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UNIT I

Human Values - Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality – Necessity of Yoga and meditation for professional excellence and stress management.

UNIT II

Engineering Ethics - Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories

UNIT III

Engineering As Social Experimentation- Engineering as Experimentation-Engineering Projects Vs. Standard Experiments, Engineers as responsible Experimenters– Conscientiousness- Comprehensive Perspective - Moral Autonomy - Accountability, Industrial Standards, Codes of Ethics – A Balanced Outlook on Law.

UNIT IV

Safety, Responsibilities And Rights- Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk, Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

UNIT V

Global Issues-Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership –Code of Conduct – Corporate Social Responsibility

TEXTBOOKS

1. R S Nagarajan, *Professional Ethics and Human Values,* New Age International (P) Limited Publishers,3rd Edition,2006
2. M.Govindarajan, S.Natarajan and V.S.SenthilKumar, *Engineering Ethics includes Human Values*, PHI Learning Pvt. Ltd, 2nd Edition,2009

REFERENCES

1. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, *Engineering Ethics – Concepts and Cases,* Cengage Learning, 2nd Edition, 2009
2. John R Boatright, *Ethics and the Conduct of Business*, Pearson Education, New Delhi, 1st Edition,2003
3. Edmund G Seebauer and Robert L Barry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press, Oxford, 4th Edition,2001
4. PSR Murthy, *Indian Culture, Values and Professional Ethics*, BS Publication, 2nd Edition, 2013

R20 **B.Tech – CE**

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II B.Tech – II Sem.

L	T	P	C
3	-	-	3

(20HS0833) NUMERICAL METHODS, PROBABILITY & STATISTICS

COURSE OBJECTIVES

The objectives of this course is to

1. *To introduce the tools of differentiation and integration of functions of numerical methods that is used in various techniques dealing engineering problems.*
2. *To develop the essential tool of Probability & Statistics in a comprehensive manner.*
3. *To develop the skill pertinent to the practice of the mathematical concepts including the Student abilities to formulate and modelling the problems, to think creatively and to synthesize information.*

COURSE OUTCOMES (COs)

On successful completion of the course, the students will be able to

1. *To develop the mathematical skills of the students in the areas of numerical methods.*
2. *Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.*
3. *Work out numerical differentiation and integration whenever and wherever routine methods are not applicable.*
4. *A good understanding of the laws of probability axioms and rules.*
5. *Understanding of moments of discrete and continuous random variables as well as be familiar with common named discrete and continuous random variables.*
6. *Calculate and interpret the correlation and Regression between two variables.*

UNIT I

Solution of algebraic and transcendental equations: Solution of polynomial and transcendental equations: Bisection method, Newton-Raphson method and Regula-Falsi method.

Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae.

UNIT- II

Numerical solution of Ordinary differential equations: Taylor's series(first and second order), Euler's method, Modified Euler's method and Runge-Kutta method of fourth order for solving first order differential equations.

Numerical integration: Trapezoidal rule, Simpson's 1/3rd and 3/8 rules.

UNIT III

Basic Statistics: Measures of Central tendency, Moments, skewness and Kurtosis

Basic Probability: Probability spaces, Addition theorem, conditional probability, independence, Multiplication theorem, Baye's theorem

UNIT IV

Random variables: Discrete and Continuous random variables- distribution functions, densities and their properties. Expectation of Discrete and Continuous Random Variables

UNIT V

Probability Distributions and Correlation: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions- Correlation and regression – Rank correlation

TEXT BOOKS

1. Grewal B S, *Higher Engineering Mathematics*, Khanna Publishers, 44th edition, 2017
2. Iyengar T.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Probability & Statistics*, S.Chand publications, 2018

REFERENCES

1. Rukmangadachari. E &Keshava Reddy E, *Engineering Mathematics,* Volume-III, Pearson Publishers, 2010
2. Ramana B. V, *Higher Engineering Mathematics*, McGraw Hill Education, 2010
3. IyengarT.K.V, Krishna Gandhi B, Ranganatham S & Prasad M.V.S.S.N, *Engineering Mathematics-III,* S.Chand Publication, 2014
4. Gupta S.P, *Statistical Methods*, S.Chand Publications, 2011

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II B.Tech – II Sem.

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3	-	-	3

(20CE0111) HYDRAULIC ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To relate the theory and practice of problems in hydraulic engineering*
2. *To learn the behaviour of types of flows, types of channels*
3. *To learn the different hydraulic models*
4. *To learn the basics of turbo machinery, hydraulic turbines and performance of turbines*

COURSE OUTCOMES (COs)

On completion of the course, the students will able to

1. *Discuss uniform and non-uniform open channel flows and Design economic channel section*
2. *Explain gradually varied flow and rapid varied flow*
3. *Analyze impact of jets on vanes and develop velocity triangle*
4. *Classify turbines and study the principal of various turbines*
5. *Study the principals of different pumps*
6. *Classify methods of dimensional analysis and Apply Buckingham Pi theorem*

UNIT-I

Uniform Flow: Classification of flows -Differences between pipe flow and open channel flow -Flow analysis: The Chezy's equation, Empirical formulae for the Chezy's constant - Hydraulically economical sections

Non-Uniform Flow: Concept of specific energy -Specific energy curves-Critical flow – Critical depth- Computation of critical depth – Critical, sub critical and super critical flows - Channel transitions - Specific force - Specific force curve

UNIT-II

Gradually Varied Flow: Dynamic equation for GVF in wide rectangular channel - Classification of channel bottom slopes - Back water curves and Draw down curves - Surface profiles - various types of water surface profiles - Characteristics of surface profiles Computation of surface profiles by step method

Rapidly Varied Flow: Hydraulic jump - Elements and characteristics of hydraulic jump - Hydraulic jump in rectangular channels Height and length of the jump -Types of hydraulic jump Applications of hydraulic jump

UNIT III

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes - jet striking centrally and at tip - Velocity triangles at inlet and outlet - Expressions for work done and efficiency- Angular momentum principle

UNIT-IV

Pumps: Centrifugal Pumps - Component parts and working of a centrifugal pump - Work done by the impeller-heads, losses and efficiencies, minimum starting speed, priming - Specific speed, Multistage centrifugal pumps - Troubles and remedies

Dimensional Analysis and Similitude: Dimensional homogeneity - Methods of dimensional analysis- Rayleigh's method - Buckingham - Pi theorem - Similitude - Types of similarities - Modellaws

UNIT-V

Hydraulic Turbines-I: Layout of Hydro-electric power plant - Head and efficiencies of hydraulic turbines-Classification of turbines - Pelton wheel –Francis turbine-Working,Working proportions, Velocity triangles, work done and efficiency ,hydraulic design

Hydraulic Turbines-II: Kaplan turbine: main components and working - Working proportions - Draft tube: theory and efficiency - Specific speed – NPSH - Cavitation: causes, effects

TEXT BOOKS

1. Dr. P.N. Modi & Dr. S.M. Seth,*Hydraulics and Fluid Mechanics including Hydraulics Machines (A-4-Size),*Standard BookHouse,21th Edition,2018
2. *Er.R.K.Rajput, A Textbook of Fluid Mechanics and Hydraulic Machines,* S.Chand Publications,3rd Rev. Edition,2006

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1. Dr. R. K. Bansal, *A Textbook of Fluid Mechanics and Hydraulic Machines,* Laxmi Publications,9th Edition,2005
2. K.Subramanya, *Fluid Mechanics and Machinery(Problems and Solution),*Tata McGraw Hill Education,2005
3. E. Benjamin Wylie, K.W. Bedford,*Fluid Mechanics*, Victor Streeter, Tata McGraw Hill Education, 9th Edition,2017
4. C.S.P. Ojha, P.N. Chandamouli & R. Berndtsson, *Fluid Mechanics and Machinery,* Oxford UniversityPress, 1st Edition,2010
5. Rama Durgaiah D, *Fluid Mechanics and Machinery,* New Age International,1st Edition,2002

R20 **B.Tech – CE**

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II B.Tech – II Sem.

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3	-	-	3

(20CE0113) ENGINEERING GEOLOGY

COURSE OBJECTIVES

The objectives of the course is

1. *To study and identify different types of rocks and minerals and their properties*
2. *To know the importance of geology in civil engineering applications*
3. *To analyze the geological hazards and their effects for the safe development of civil works*

COURSE OUTCOMES (COs)

Aftercompleting the course, the students are able to

1. *Explain the importance of role of geology in civil engineering*
2. *Describe the concept of Weathering and its importance in civil constructions*
3. *Identify and classify Minerals, Rocks based on their properties*
4. *Analyze the Geological structures and their impact on civil engineering structure*
5. *Describe the principals of geophysical methods and their applications*
6. *Recognize the significance of earth quakes, landslide and ground water in the constructions of dams, reservoirs, tunnels and buildings*

UNIT – I

Introduction: Importance of Geology from Civil Engineering point of view – Failures of some Civil Engineering constructions due to geological drawbacks – Case Histories – Importance of Physical geology

Weathering: Types of Weathering – Factors Affecting Weathering – Its effects over the properties of rocks – Importance of Weathering with reference to dams, reservoirs, tunnels and bridges

UNIT – II

Mineralogy: Different methods of study of minerals – Advantages of study of Minerals by Physical properties – Study of physical properties of common rock forming minerals like, Quartz, Feldspar, Garnet, Mica, Olivine, Hornblende, Augite, Calcite, Talc, Kyanite, Bauxite and Clay Minerals

UNIT – III

Petrology: Origin and Formation of Rocks – Classification of Rocks – Structure and Textures of Rocks – Study of Rocks like Granite, Gabbro, Dolerite, Basalt, Breccia, Conglomerate, Sand Stone, Shale, Limestone, Laterite, Quartzite, Schist, Gneiss, Marble, Slate

UNIT – IV

Structural Geology: Elements of Structural Geology like Strike, Dip, Outcrop - Study of Folds, Joints, Faults, Unconformities and their importance in Civil Engineering Works

Geophysical Studies: Importance of Geophysical studies – Principles of geophysical study by Gravity methods, Magnetic Methods, Electrical methods, Seismic Methods, Radiometric methods and geothermal methods

UNIT – V

Groundwater, Tunnels and Landslides: Types of groundwater – Geological controls of Groundwater movement – Groundwater exploration. Earth Quakes - Causes and Effects of Earth Quakes - Seismic Waves, Richter scale, Precautions to be taken for Building Construction in Seismic Areas – Landslides - Their Causes and Effect - Measures to be taken to Prevent Their Occurrence

Dams, Reservoirs, Tunnels: Geology of Dams - Geological Considerations in the Selection of a Dam Site – Reservoirs – Tunnels - Purposes of Tunnelling - Effects of Tunnelling on the Ground - Role of Geological Considerations in Tunnelling - Over Break and Lining in Tunnels

TEXT BOOKS

1. N. Chenna Kesavulu, *Engineering Geology,* Mc-Millan India Ltd, Second Edition, 2014
2. Parbin Singh, *Engineering and General Geology,* Kataria, S.K.& Sons

REFERENCES

1. Subinoy Gangopadhyay, Engineering Geology, Oxford University Press
2. J.C.Harvey, Geology for Geotechnical Engineers, Cambridge University Press, 1982
3. K.V.G.K. Gokhale, Principals of Engineering Geology, B.S Publications

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II B.Tech – II Sem.

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(20CE0114) GEOTECHNICAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To explain how three phase system is used in soil and how are soil properties estimated using three phase system, carry out soil classification*
2. *To explain role of water in soil behaviour and how soil stresses, permeability and quantity of seepage including flow net are estimated*
3. *Ability to apply the principle of shear strength and settlement analysis for foundation system*
4. *To explain Earth slopes and its stability Analysis*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Describe volumetric ratios, weight/mass relationships, index properties of soils, establish interrelationships and classify soils*
2. *Discuss Soil permeability, effective stress principal and seepage though soils*
3. *Classify compaction and consolidation and predict consolidation settlements*
4. *Determine vertical stress due to various loads and comprehend shear strength of soil*
5. *Can use various methods to analyze stability of finite and infinite earth slopes*
6. *Describe various means to conduct soil exploration and can interpret soil exploration report*

UNIT – I

Introduction: Soil formation - Structure of soils –Volumetric ratios – Phase diagram of Soils –Mass-Volume relationships -Weight-Volume relationships– Interrelationships – Relative Density - Index properties - Sieve analysis - Consistency limits -Indian Standard Classification System – Clay Mineralogy

Permeability: Soil Permeability – Darcy's law -Constant Head Permeability Test-Falling Head Permeability Test-Factors affecting Permeability -Permeability of Layered soils

Effective Stress: Principle of Effective Stress–Quick Sand condition – Seepage through soils – Flow Net for Two-dimensional flow–Applications of Flow Net

UNIT-II

Compaction: Compaction phenomenon– Factors affecting compaction - Effects of compaction on soil properties –Standard and Modified Proctor's test - Field Compaction methods

Consolidation: Types of Consolidation -Consolidation test -Terzaghi's One Dimensional Consolidation Theory-e-p and e-log p curves

UNIT – III

Stress Distribution in Soils: Boussinesq's equation for point load - Line Load – Strip load – Rectangle load – Circular load -Westergaard's equation- Pressure Bulbs– Newmark's Influence Chart

Shear Strength of Soils: Stress at a point - Mohr's Circle of stress- Mohr's-Coulomb Failure Theory -Methods of determining the shear strength parameters - Types of shear tests based on drainage conditions

UNIT – IV

Earth Slope Stability: Types of Slope Failures -Factor of safety- Stability analysis of Infinite slopes of Cohesionless and Cohesive soils -Friction Circle Method - Method of Slices - Bishop's Simplified-Taylor's Stability Number

UNIT – V

Soil Exploration: Stages in Sub-surface explorations - Open excavation methods of soil exploration - Boring for exploration - Sampling in soils -Standard Penetration Tests - Cone Penetration Test -Field Plate Load Test- Execution of soil exploration program and report

TEXTBOOKS

1. K.R.Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, Delhi,7th edition, 2019
2. C.Venkataramaiah, *Geotechnical Engineering,* New Age Publications, 6th edition, 2018

REFERENCES

1. V.N.S. Murthy, *Soil Mechanics and Foundation Engineering,* CBS Publishers and Distributor's,2016
2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation,* Laxmi publications Pvt. Ltd., New Delhi,2017
3. Manoj Dutta&Gulati S.K, *Geotechnical Engineering,* McGraw-Hill Publishers, New Delhi,2010
4. GopalRajan and A.S.R. Rao,*Basic and Applied Soil Mechanics,* New Age Publications, *2nd revised edition,* 2014

R20 **B.Tech – CE**

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II B.Tech – II Sem.

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(20CE0115) STRUCTURAL ANALYSIS

COURSE OBJECTIVES

The objectives of this course

1. *To have knowledge of maximum shear force and bending moment due to moving loads*
2. *To learn and analyze continuous beams and frames by slope deflection method, and moment distribution method*
3. *To learn and analyze continuous beams by flexibility method and stiffness methods*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to

1. *Classify statically and kinematically determinate and indeterminate structures and outline role of equilibrium and compatible equations in structural analysis*
2. *Draw the shear force and bending moment at a section of a beam under moving load*
3. *Describe the concept of energy methods and apply theorems based on virtual work on analysis if deflection of beams and trusses*
4. *Analyze continuous beams and portal frames by slope deflection method*
5. *Analyze continuous beams and portal frames by moment distribution method*
6. *Analyze indeterminate structures such as continuous beams, portal frames using stiffness and flexibility matrix methods*

UNIT – I

Influence Lines and Moving Loads: Influence Lines for Reactions, BM and SF; Curves of Maximum BM and SF for Single, Two and Multipoint Loads, UDL Longer and Shorter than Span–Enveloping Parabolic and EUDL–Forces in Truss Member

UNIT – II

Energy Methods: Strain Energy Due to Axial Load, Bending Moment and Shear Forces–Virtual Work–Maxwell's–Betti's theorems–Castigliano's First Theorem and Unit Load Method–Deflection of Simple Beams and Pin-Jointed Trusses

UNIT – III

Slope Deflection Method: Slope Deflection Equation–Application to Continuous Beams with Degree of Indeterminacy Not Exceeding Three–Effect of Sinking–Analysis of Single Bay and Single Storey Portal Frames with and without Sway

UNIT – IV

Moment Distribution Method: Stiffness and Carry Over Factors–Distribution Factors–Analysis of Continuous Beams Degree of Indeterminacy Not Exceeding Three, Effect of Sinking - Analysis of Single Bay and Single Storey Portal Frames with and without Sway

UNIT – V

Matrix Methods of Structural Analysis: Static and Kinematic Indeterminacy of Structures – Equilibrium and Compatibility Conditions

Flexibility Method: Flexibility Methods–Applications to Continuous Beams (Degree of Static Indeterminacy Not Exceeding Three)

Stiffness Method: Introduction–Application to Continuous Beams (Degree of Kinematic Indeterminacy Not Exceeding Three)

TEXTBOOKS

1.Bhavikatti, S.S, *Structural Analysis – Vol. I*by, Vikas Publishing Pvt Ltd., New Delhi, 2010

2. Bhavikatti, S.S, *Structural Analysis – Vol. II* by, Vikas Publishing Pvt Ltd., New Delhi, 2013

REFERENCES

1. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, *Theory of structures*, Laxmi Publications Pvt. Ltd., New Delhi,2017
2. Vaidyanadhan, R and Perumal P, *Comprehensive Structural Analysis – Vol. 1 & Vol. 2*, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
3. L.S. Negi& R.S. Jangid, *Structural Analysis*, Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003
4. R. C. Hibbeler, Structural *Analysis*, Pearson Education, Ninth edition, 2017
5. DevdasMenon- *Structural Analysis*, Alpha Science International, Limited, 2010

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
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II B.Tech – II Sem.

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(20CE0112) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

COURSE OBJECTIVES

The objectives of this course

1. *To learn the concepts of Venturimeter & Orifice meter*
2. *To learn the concepts of notch's*
3. *To learn the basic concepts of turbines*
4. *To learn the basics concepts of different types of pumps*

COURSE OUTCOMES (COs)

On successful completion of this course, the student should be able to

1. *Calibrate Venturimeter & Orifice meter*
2. *Calculate losses in flows*
3. *Estimate the efficiency of different pumps*
4. *Study the performance of different turbines*
5. *Study importance of liquid properties and its methods of determination*
6. *Calculate forces and pressure due to fluid action under different conditions*

LIST OF EXPERIMENTS

1. Verification of Bernoulli's equation.
2. Calibration of Coefficient of discharge for Venturimeter.
3. Calibration of Coefficient of discharge for Orifice meter.
4. Calibration of Friction factor. (Major losses experiment)
5. Determination of loss of head due to sudden contraction (Minor losses experiment)
6. Impact of jet on vanes.
7. Performance test on Pelton wheel turbine.
8. Performance test on Francis turbine.
9. Efficiency test on centrifugal pump.
10. Study on Hydraulic jump.

Any eight experiments may be conducted

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

II B.Tech – II Sem.

L	T	P	C
-	-	3	1.5

(20CE0116) ENGINEERING GEOLOGY LAB

COURSE OBJECTIVES

The objectives of this course

1. *Study of physical properties and identification of minerals and Rocks*
2. *Drawing of sections for Geological maps showing tilted beds, faults, uniformities etc.*
3. *Solve simple structural geology problem*

COURSE OUTCOMES (COs)

After performing these experiments, the students are able to

1. *Identify and classify minerals by their Physical properties*
2. *Identify and classify Rocks by their Physical properties*
3. *Draw the sections for geological maps showing tilted beds, faults, uniformities*
4. *Interpret the geological maps on practical applications in Civil Engineering*
5. *Follow standards in geological investigations*
6. *Analyze the Structural Geology Problems*

LIST OF EXPERIMENTS

1. Study of Physical Properties and Identification (any six minerals)
2. Study of Physical Properties and Identification of Igneous, Sedimentary and Metamorphic Rocks (two rocks from each category totalling six rocks)
3. Study of Geology maps and Interpretation of Geological Sections (any two map and any two models)
4. Study of Structural Geology problems (any two strike and dip problems)

TEXT BOOKS

1. CVRK Prasad, *Elementary Exercises in Geology*, Universities press

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

II B.Tech – II Sem.

L	T	P	C
-	-	3	1.5

(20CE0117) GEOTECHNICAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course

1. *Find index properties such as specific gravity, field density, Atterberg's limits and sieve analysis on soils to classify soils*
2. *Find the engineering properties such as permeability, maximum dry density and corresponding optimum moisture content, shear strength and CBR values of soils*

COURSE OUTCOMES (COs)

On successful the completion of this course, the student will be able to

1. *Conduct tests on fine grained soils to determine Atterberg's limits*
2. *Conduct fields test to find out field density of cohesive and cohesion less soils*
3. *Perform sieve analysis and sedimentation analysis to classify the soil*
4. *Conduct field tests on soil to estimate soil permeability*
5. *Conduct compaction test and draw compaction curve to find out optimum moisture content and maximum dry density*
6. *Conduct shear tests to predict shear strength of the soil*

LIST OF EXPERIMENTS

1. Specific gravity of soil solids
2. Atterberg's limits (liquid limit, plastic limit and shrinkage limit)
3. Field density test-Core cutter and Sand replacement method
4. Grain size distribution-Sieve analysis
5. Permeability of soil (constant and variable head method)
6. Compaction test
7. California bearing ratio test
8. Consolidation test
9. Unconfined compression test
10. Direct shear test

Any eight experiments may be conducted

TEXT BOOKS

1. K.V.S. Appa Rao & V.C.S. Rao, *Soil Testing Lab Manual*, University Science Press, Laxmi Publications, 2016
2. S.Mittal and J.P. Shukla, *Soil Testing for Engineers*, Khanna Publishers, Sixth Edition

R20 **B.Tech – CE**

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)

II B.Tech – II Sem.

L	T	P	C
1	-	2	2

(20CE0118) COMPUTER AIDED DRAWING

COURSE OBJECTIVES

Objective of this course is to impart the necessary drafting and drawing using AUTO CAD

COURSE OUTCOMES (COs)

On completion of this course, the students will be able to

1. *Describe the hardware requirement and install Auto CAD*
2. *Draw basic geometric objects*
3. *Work on modifying tools to incorporate changes drawing*
4. *Create and work with different layers in CAD drawing*
5. *Publish and print the CAD drawing as per the requirements*
6. *Develop a building drawing using Auto CAD*

LIST OF EXPERIMENTS

1. Introduction to Auto CAD, hardware requirements and installation of software
2. Working with Drawing Tools
3. Using Modifying Tools
4. Using Status Bar
5. Working with Layers
6. Writing Standard and Annotative Texts
7. Adding Standard and Annotative Dimensions
8. Working with Blocks, Groups and Attributes
9. Plot and Publish Auto CAD Drawing
10. Final Project

Software Used: AUTO CAD

R20

B.Tech – CE

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
(AUTONOMOUS)
DEPARTMENT OF CIVIL ENGINEERING

Honour Degree

S. No	Course Code	Subjects	Credit	Year / Semester
1	20CE0180	Stability of Structures	3	II / II
2	20CE0181	Geotechnical Measurements and Explorations	3	
3	20CE0182	Advanced Geotechnical Engineering	3	III / I
4	20CE0183	Global Navigation Satellite System	3	
5	20CE0184	Transportation Safety Systems	3	III / II
7	20CE0185	Advanced Design of Steel Structures	3	IV / I
8	20CE0186	Mini Project	5	IV / I
9		MOOC	3	IV / II
	Total Credits		20	

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B.Tech – CE

SIDDARTHA INSTITUTE OF SCIENCE AND TECHNOLOGY::PUTTUR
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DEPARTMENT OF CIVIL ENGINEERING

Minor Degree

S. No	Course Code	Subjects	Credit	Year / Semester
1	20CE0164	Mechanics of Solids	3	II / II
2	20CE0110	Geographic Information System	2	II / II
3	20CE0109	Fluid Mechanics	3	III / I
4	20CE0118	Computer Aided Drawing	2	III / I
5	20CE0111	Hydraulic Engineering	3	III / II
6	20CE0104	Surveying & Geomatics	3	IV / I
7		MOOC1	2	IV / II
8		MOOC2	2	IV / II
	Total Credits		20	