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	

II YEAR – I SEMESTER

S No.	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	20HS0864	Human Values and Professional Ethics	3	-	-	-/3*
Contact Periods / Week			19	-	11	**24.5**
			Total/Week 30			

*Note: Applicable from 2021-22 batch onwards

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**			

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	Bridge Engineering				
	20CE0138	Remote Sensing & GIS				
5	**Open Elective Course (OEC)– I**		3	-	-	3
	20EE0227	Generation of Energy from Waste				
	20ME0322	Non- Conventional Energy Resources				
	20EC0451	Introduction to Communication Systems				
	20CS0550	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**			

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				
	20ME0354	General Mechanical Engineering				
	20EC0452	Elements Of Embedded Systems				
	20CS0551	Java Programming				
	20HS0814	Intellectual Property Rights				
6	20CE0128	Environmental Engineering Lab	-	-	3	1.5
7	20CE0129	Computer aided design for civil engineering applications	-	-	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**			

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

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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. Satyanarayana Bh, 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.

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3	-	-	3

(20HS0848) ENGINEERING PHYSICS
(Common to CE & AGE)

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*"- Oxford Publications, 2015.

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(20ME0351) BASIC ELECTRICAL & MECHANICAL ENGINEERING
(Common to CIVIL & AGE)

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.

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I B.Tech. – I Sem.

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3	-	-	3

(**20CS0501**) **C PROGRAMMING AND DATA STRUCTURES**
(Common to CE, CSE, CSM, CIC, CSIT & AGE)

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- Applications of 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

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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 Revised Edition, 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

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(20HS0850) ENGINEERING PHYSICS LAB
(Common to CE & AGE)

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.

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-	-	3	1.5

(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 PROGRAMMING AND DATA STRUCTURES LAB
(Common to CE, CSE, CSM, CIC, CSIT & AGE)

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 doubly
    linked 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 & AGE)

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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, 12[th]Edition, 2014
3. Garg Nishu Gupta R.L, *Engineering Mathematics Volumes-I & II,* Pearson Education, 2014

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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 used in 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 Sesha Maheswaramma and Mridula Chugh, *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) COMMUNICATIVE ENGLISH
(Common to CE, CSE, CSM,CIC, CSIT & AGE)

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 to short 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 attitude Positive 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 by Premchand 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 Kishwar Naheed

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 Sathyavathi from 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 Kalam from Paths to Skills in English

TEXT BOOK
1. Pushpa Relia .P & Sanjay Mihhra .K *EnglishAll Round: Communication Skills for Undergraduation Learners* Vol. I, Orient Black Swan Publishers, First Edition, 2019
2. Prof.Sundaravalli.G et al. *Paths to Skills in English*, Orient Black swan, 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.* Heinley ELT; 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. Virendranath Yandamuri, *Soft Skills for Engineer*, Yaswin Publication, 2nd Edition, 2009

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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

COURSE OBJECTIVES

The objectives of this course

1. *Can understand difference between rigid and deformable bodies and their applications inengineering*
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. *Describe the principles associated with centroid, centre of gravity, moment of inertia andapply these principles for various two dimensions geometric sections*
5. *Explain fundamental principles of deformable bodies and compute various types of stress,strain and 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
Compound Stresses: Two-dimensional system - Stress at a point on a plane - Principal stresses and principal planes – Mohr's circle of stress

UNIT – V

Thin Cylinders: Thin cylindrical shells, Longitudinal and circumferential stresses; Hoop, Longitudinal and volumetric strains; Changes in dimensions of thin cylinders
Thick Cylinders: Lame's theory, Distribution of hoop and radial stresses across thickness,Design of thick cylinders, Compound cylinders, Difference of radii for shrinkage

TEXT BOOKS

1. Bhavikatti S S, *A Textbook of Engineering Mechanics* (As per the latest Syllabus JNTU,Anantpur), New Age International, 3rd Edition, 2016
2. Dr. R. K. Bansal, *A Textbook of Strength of materials*, Laxmi Publications, 6th Edition, 2018

REFERENCES

1. D.S. Kumar, *Engineering Mechanics*, S.K. KATARIA & SONS, 3rd Edition
2. K. Vijaya Kumar Reddy, J. Suresh Kumar, Singer's *Engineering Mechanics: Statics andDynamics,* B.S. Publications, 3rd Edition, 2011
3. J L Meriam, L G Kraige, *Engineering Mechanics: Dynamics,* Wiley India Pvt. 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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(20HS0811) COMMUNICATIVE ENGLISH LAB
(Common to CE, CSE, CSM, CIC, CSIT & AGE)

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 Lab with 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. Dhamija Sethi, *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.Ashraf Rizvi, Director, Jaipuria Institute of Management, Lucknow, *Effective Technical Communication*, McGraw Hill Education; Second edition,27 July 2017

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I B.Tech – II Sem.

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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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(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 rights perspective

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 Indian nationalism

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 Judiciar**y**

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.

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(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.

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(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

II B.Tech – I Sem.

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(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 calculate, 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

TEXT BOOKS
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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(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. Sandeep Mantri, *Practical Building Construction and its Management*, Satya Publisher, New Delhi

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(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 layer flows*

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 Book House ,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 University Press, 1st Edition, 2010
5. Rama Durgaiah D., *Fluid Mechanics and Machinery*, New Age International,1st Edition,2002

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(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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(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 of correct 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 (Fly Leveling)

6. Determination of elevation of various points with level by rise & fall method (Check Leveling)

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 of Surveying,* 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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(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. *Assess the 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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(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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(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

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(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, 44[th]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. Iyengar T.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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(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 - Model laws

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 Book House, 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 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 University Press, 1st Edition, 2010
5. Rama Durgaiah D, *Fluid Mechanics and Machinery*, New Age International,1st Edition, 2002

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(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)

After completing 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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(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. Gopal Rajan and A.S.R. Rao, *Basic and Applied Soil Mechanics,* New Age Publications, *2nd revised edition*, 2014

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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. Devdas Menon- *Structural Analysis*, Alpha Science International, Limited, 2010

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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

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(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

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(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

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(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

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(20CE0119) STRUCTURAL DESIGN

COURSE OBJECTIVES

The objectives of this course are,
1. *To learn the design methodologies for different RCC and steel structural members.*
2. *To design different structural elements according to the codal provisions and detailing the reinforcement.*
3. *To make the student conversant with the design principles of steel structural elements as per IS Codal provisions.*

COURSE OUTCOMES (COs)

On successful completion of this course, the student will be able to
1. *Understand the various design parameters in Limit State method of RCC design.*
2. *Design singly, doubly and flanged beams sections.*
3. *Design of RCC slabs for various loading conditions.*
4. *Design RCC columns to distribute the super structure loads to the subsoil.*
5. *Design simple connections between structural members including Bolted and welded connections.*
6. *Design tension and compression members.*

UNIT – I

RCC structures: Concepts of Reinforced Concrete Design – Limit State Method – Material – Stress Vs Strain Curves for Concrete & Steel – Safety Factors – Characteristic Values – Stress Block Parameters – IS: 456 –2000.

Beams: Limit State Method – Design of Singly Reinforced, Doubly Reinforced and Flanged beam Sections.

Limit State of Serviceability: Limit State Design for Serviceability in Case of Deflection and Cracking. Codal Provisions

UNIT – II

Design for Shear, Torsion & Bond: Limit State Analysis and Design of Section for Shear and Torsion – Concept of Bond.

Design of RC Slabs: Design of One way and Two way slabs. Design of Dog legged staircase.

UNIT – III

Design of RC Compression Members: Types of columns – Design of Axially Loaded columns – Design of columns for Uni-axial and biaxial bending.

Design of RC Foundation: Design of isolated square and rectangular footing.

UNIT – IV

Steel Structures: Types of structural steel – Mechanical properties of steel – Principles of Limit State Design.

Connections: Specifications and types of bolted & Welded Connections – Design of bolted and welded connections.

Tension Members: Design strength of members - Design of tension members

UNIT – V

Design of Compression Members: Buckling class – Slenderness ratio - Design of single section and compound Angles - Design of Laced and Battened type columns.

Design of Beams: Simple and built-up beams – Laterally supported beams.

TEXT BOOKS

1. Ashok K. Jain, *Reinforced Concrete (Limit State Design)* 7e, New Chand & Bros Publishers, 2012
2. S.S. Bhavikatti, *Design of Steel Structures,* IK International Publication House, New Delhi, 2017

REFERENCES

1. Subramanian. N, *Design of Reinforced Concrete Structures,* Oxford University Press, 2014
2. Krishna Raju N, *Reinforced Concrete Design: IS: 456-2000 Principles and Practice,* New Age International Pvt Ltd Publishers, 2018.
3. Devadoss Menon and Pillai S, *Reinforced Concrete Design,* McGraw Hill Education India Private Limited, 3rd edition, 2017.
4. Duggal,S.K, *Limit State Design of Steel Structures*, McGraw-Hill Education, 2019.
5. Subramanian, N, *Steel Structures - Design and Practice,* Oxford University Press, 2015.

Codes/Tables

1. IS 456: 2000 Plain and Reinforced Concrete - Code of Practice
2. IS 800: 2007 General Constructions in Steel - Code of Practice
3. Steel table.

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(20CE0120) TRANSPORTATION ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. To familiarize with various elements and geometric design of highways.

2. To design the pavements.

3. To understand the various aspects of railway engineering.

COURSE OUTCOMES (COs)

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

1. Recognize significance of highway alignment and can carry out engineering surveys for highway location.

2. Design various geometric elements of highway.

3. Implement traffic studies, traffic regulations and can design intersection and traffic signals.

4. Design flexible and rigid pavements as per IRC.

5. Describe different components of permanent way in railway track.

6. Design various components of railway track.

UNIT – I

Highway Alignment and Surveys: Highway alignment - Basic requirements - Controlling factors - Engineering surveys for highway location.

Highway Geometric Design: Importance of geometric design- Design controls and criteria- Highway cross section elements- Sight distance elements- Stopping sight distance, overtaking sight distance and intermediate sight distance- Design of horizontal alignment- Design of super elevation and extra widening- Design of transition curves-Design of vertical alignment- Gradients- Vertical curves.

UNIT – II

Traffic Engineering: Traffic studies - Flow - Speed - Travel time - Delay and O-D study – PCU - Peak hour factor - Parking study - Accident study - Highway capacity and level of service of rural highways and urban roads. Traffic signs - Types - Traffic signals - Types - Signal design by Webster's method - Design of intersections.

UNIT – III

Pavement Design: Types of pavement - Components and their functions - Design factors - Flexible pavement design (IRC: 37-2012) - IRC methods based on CBR only - Rigid pavement design (IRC: 58-2011) - Calculation of stresses - Design of Dowel bars and Tie bars – Group index method - Expansion and contraction joints.

UNIT – IV
Railway Engineering: Cross section of permanent way - Functions and requirements of rails, sleepers and ballast - Types of gauges - Creep of rails -Theories related to creep - Coning of wheels - Adzing of sleepers - Rail fastenings.

UNIT – V
Geometric Design of Railway Track: Gradients - Grade compensation - Cant and negative super elevation - Cant deficiency - Degree of curves - Safe speed on railway track - Points and Crossings - Layout and functioning of left hand turn out and right hand turn out - Station yards - Signalling and Interlocking.

TEXT BOOKS
1. S.K.Khanna & C.E.G.Justo, *Highway Engineering,* New Chand & Bros, 10th edition, 2012.
2. S.C.Saxena and S.P.Arora, *A Text Book of Railway Engineering*, Dhanpat Rai Publications, New Delhi, 2011.

REFERENCES
1. L.R.Kadiyali and Lal, *Traffic Engineering and Transportation Planning*, Khanna Publications, 9th edition, 1999.
2. L.R.Kadiyali and Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications, 7th edition, 2013.
3. Rangwala SC, *Railway Engineering,* Charotar Publishing House Pvt. Ltd., 27th edition, 2017.

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(20CE0121) ESTIMATION, COSTING AND VALUATION

COURSE OBJECTIVES

The objectives of this course

1. To learn the main items of work in building and different types of estimates.

2. To understand the quantity calculations of various items of building works, roads and canal

3. To learn various specifications and the rate analysis of various items of building works

COURSE OUTCOMES (COs)

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

1. Apply different methods of estimates for calculating the quantities of building works

2. Calculate the quantity of earthwork in roads and canals

3. Estimate the quantities of the reinforcement in the beams, slabs, columns with foundation and staircase

4. Work out the rate analysis of various items of building works

5. Explain specifications of various items of building works

6. Assess valuation of assets

UNIT – I

Estimating and Estimate of buildings: Estimate – Types of estimates – Main items of work – Units of measurements – Methods of building estimates – Detailed estimates of buildings using individual wall method and centre line method

UNIT – II

Road estimating and Earth work for canals: Estimate of earthwork by Mid-section, Trapezoidal and Prismoidal formula – Estimate of pitching of slopes – Estimate of earthwork from L-sections – Estimate of earthwork in hill road – Estimate of metalled road – Estimate of C.C. Track way – Earthwork in canals

UNIT – III

R.C.C works: Percentage steel reinforcement – Standard hooks and cranks of reinforcement bars – Estimate of R.C.C. slab – Estimate of R.C.C. beam – Estimate of R.C.C. T-beam slab – Estimate of R.C.C. column with foundation – Estimate of R.C.C. staircase – Estimate of R.C.C. staircase

UNIT – IV

Analysis of rates: Analysis of rates of building works – Earth work – Cement concrete in foundation – Reinforced cement concrete – Damp proof course – Brickwork – Stone masonry – Flooring – Roofing – Plastering – Finishing

UNIT – V

Specifications: Detailed specifications of building works – Earthwork – Cement concrete – Reinforced cement concrete – Damp proof course – Brickwork – Plastering – Pointing– Cement concrete floor – Mosaic floor – White and colour washing – Painting – Varnishing – Woodwork – Doors and Windows

Valuation: Valuation – Purpose of valuation – Gross income – Net income – Outgoings – Scrap value – Salvage value – Capital cost – Year's purchase – Sinking fund – Depreciation – Methods of valuation – Valuation of Freehold & Leasehold properties – Fixation of rent

TEXTBOOKS

1. B.N. Dutta, *Estimating and Costing in Civil Engineering*, UBS publishers, 27th Revised Edition, 2017
2. M. Chakraborthi, *Estimation, Costing, Specifications and Valuation in Civil Engineering*, Chakraborthi publisher, 24th Edition, 2010

REFERENCES

1. B.S. Patil, *Civil Engineering Contracts and Estimations*, Universities Press, 4th Edition, 2015
2. G.S. Birdie, *Estimating and Costing*, Dhanpat Rai Publisher, 2014
3. D.D.Kohli and Ar. R.C.Kohli, *Estimation and Costing (Civil),* S.Chand & Company Pvt.Ltd, 2013

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(20CE0136) FOUNDATION ENGINEERING
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES

To make the student understand

1. *Bearing capacity and settlement of shallow foundations.*
2. *The concepts involved in computing lateral earth pressures on retaining walls.*
3. *The load-carrying capacity of pile foundations and settlement of pile groups.*
4. *The well foundation and construction aspects of caisson foundation.*
5. *The General Criteria for design of machine foundations and vibration analysis.*

COURSE OUTCOMES (COs)

At the end of the course the student will able to

1. *Describe different earth pressures and calculate active and passive earth pressures using Rankine's theory,* Coulomb's theory and graphical techniques.
2. *Establish the stability of retaining walls.*
3. *Discuss various theories on bearing capacity and field tests and apply them to estimate the bearing capacity of soils and conduct settlement analysis.*
4. *Classify various types of pile foundation, analyze the load carrying capacity of pile and pile groups.*
5. *Classify various shapes and components of wells and analyze, and understand design and construction aspects of Caissons.*
6. *Classify various types of pile walls, and design of anchors.*

UNIT – I

Earth Pressure Theories: Introduction – Plastic Equilibrium in Soils – Active and Passive States – Earth Pressure at Rest– Rankine's Theory – Coulomb's Wedge Theory – Culmann's and Rebhann's Graphical Methods for Active Earth Pressure

Retaining Walls: Types of retaining walls – Stability Consideration for Gravity Retaining Walls

UNIT – II

Shallow Foundations: Types and choice of foundation – Depth of foundation – Types of shear failures – safe bearing capacity – Terzaghi's analysis – Meyerhof's analysis – Skempton's analysis – IS Method – Bearing Capacity from Standard Penetration Test –Effect of water table on bearing capacity - Plate load test

Settlement: Types of settlement – Tolerable settlements – Allowable soil pressure for both cohesion less and cohesive soils

UNIT – III

Pile Foundations: Necessity – Classification – Load carrying capacity of piles – Static methods – Dynamic formulae – In-situ penetration tests – pile load tests – Negative skin friction – Group action in piles – Settlement of pile groups

UNIT – IV

Well Foundations: Introduction–Types – Different shapes of wells – Forces Acting on Wells - Components of wells – Grip length – Design Criteria – Sinking of wells – Measures for Rectification of Tilts and Shifts

Caisson Foundation: Introduction – Design Aspects of Caissons –Types of caissons – Construction Aspects of Caissons

UNIT- V

Sheet Pile walls: Types of sheet pile walls– Free Cantilever sheet pile– Cantilever sheet pile in Cohesionless Soils– Cantilever sheet pile in penetrating clay– Anchored sheet pile with free Earth support– Rowe's Moment Reduction curves– Anchored sheet pile with fixed Earth support– Design of Anchors– Illustrative Examples– Problems.

TEXTBOOKS

1. K.R. Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers.
2. C. Venkataramaiah, *Geotechnical Engineering,* New Age International Pvt Ltd.

REFERENCES

1. V.N.S. Murthy, *Geotechnical Engineering,* CRC Press, New York, Special Indian Edition.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundation* Laxmi Publications Pvt Ltd., New Delhi, 16th Edition, 2005.
3. Joseph E. Bowles, P.E., S.E., *Foundation Analysis and Design,* McGraw-Hill Companies New York, 5th Edition, 1997.

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(20CE0137) BRIDGE ENGINEERING
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES
This course deals with different types of Bridges like deck slab bridge, T – Beam Bridge and gives a good knowledge on different components of bridges.

COURSE OUTCOMES (COs)
On completion of the course, the students will be able to:
1. *To conduct necessary site investigations and estimate the loads for bridges*
2. *Study various design aspects associated with design of Piers and Abutments.*
3. *Study the design elements of plate girder and composite bridges.*
4. *Design the basic components of bridge structures like bridge deck slabs, longitudinal girders, transverse girders, piers and well foundations.*
5. *Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components.*
6. *Know the methods of design of structural components of different types of Bridges of design of structural components of different types ofBridges*

UNIT - I
Introduction: Importance of Site Investigation In Bridge Design. Highway Bridge Loading Standards - Impact Factor - Railway Bridge Loading Standards (B.G. ML Bridge) Various Loads in Bridges
Box Culvert: General Aspects. Design Loads, Design of Box Culvert Subjected to RC Class AA Tracked Vehicle Only.
Bridge Bearings: General Features – Types of Bearings – Design Principles of Steel Rocker & Roller Bearings – Design of A Steel Rocker Bearing – Design of Elastometric Pad Bearing.

UNIT - II
Deck Slab Bridge: Introduction – Effective Width Method of Analysis Design of Deck Slab Bridge (Simply Supported) Subjected To Class AA Tracked Vehicle Only.

UNIT - III
Beam & Slab Bridge (T-Beam Bridge): General Features – Design Of Interior Panel of Slab – Pigeauds Method – Design of a T-Beam Bridge Subjected to Class AA Tracked Vehicle Only.

UNIT – IV
Plate Girder Bridge: Introduction – Elements of a Plate Girder and their Design. Design of a Deck Type Welded Plate Girder – Bridge of Single Line B.G.

Composite Bridges: Introduction – Advantages – Design of Composite Bridges Consisting of RCC Slabs over Steel Girders' Including Shear Connectors

UNIT V
Piers & Abutments: General Features – Bed Block – Materials Piers & Abutments Types of Piers – Forces Acting on Piers – Stability Analysis of Piers – General Features of Abutments – Forces Acting on Abutments – Stability Analysis Of Abutments – Types of Wing Walls Approaches – Types of Bridge Foundations (Excluding Design).

TEXT BOOKS
1. Ponnu Swamy, *Bridge Engineering*, McGraw Hill Company, New Delhi.
2. N.Krishnam Raju, *Design of Bridges*, Oxford & IBH, Publishing Company Pvt Ltd., Delhi.

REFERENCES
1. B.C. Punmia, Ashok Kumar Jain And Arun Kumar Jain, *Design of Steel Structures*, Laxmi Publications, New Delhi.
2. D.J.Victor, *Essentials of Bridge Engineering,* Oxford IBH Publishers Ltd
3. B.C. Punmia, Ashok Kumar Jain And Arun Kumar Jain, *Design Of R.C.C. Structures*, Laxmi Publications, New Delhi.
4. T.R.Jagadish & M.A.Jayaram, *Design of Bridges Structure*, Prentice Hall Of India Pvt., Delhi.
5. Relevant – IRC & Railway Bridge Codes.

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(20CE0138) REMOTE SENSING & GIS
(Professional Elective Course (PEC-I)

COURSE OBJECTIVES

1. *To provide students the Photogrammetric techniques, concepts, components of Photo grammetry.*
2. *To introduce the students to the basic concepts and principles of various components of remote sensing. To provide an exposure to GIS and its practical applications in Civil Engineering Analyze the energy interactions in the atmosphere and earth surface features*
3. *Provide background knowledge and understanding of principles of RS, RS Sensors and systems*

COURSE OUTCOMES

On completion of the course the students will have knowledge on

1. *Detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance*
2. *Analysis of RS and GIS data and interpreting the data for Photogrammetric.*
3. *Overview of information retrieval of earth surface features using multi-resolution, multi-scale and multi-temporal imagery*
4. *Introduction of image processing and classification techniques*
5. *Enable spatial and temporal thinking to relate remote sensing for real-world applications.*
6. *To Predict Water Resources Applications by using Remote Sensing and GIS Principles.*

UNIT – I

Introduction to Photogrammetry: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT – II

Remote Sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT – III

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for

GIS.

Types of Data Representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT – IV

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT – V

Water Resources Applications: Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

TEXT BOOKS
1. B. Bhatta, *Remote Sensing and GIS,* Oxford University Press, New Delhi.
2. Gorge Joseph, *Fundamentals of Remote Sensing*, Universities press, Hyderabad

REFERENCES
1. Satheesh Gopi, *Advanced Surveying: Total Station GIS and Remote* Sensing by Pearson Publication.
2. S. Kumar, *Basics of Remote Sensing & GIS* by Laxmi Publications.
3. M. Anji Reddy, *Remote Sensing and GIS* by B.S. Publications, New Delhi.
4. Kang, Tsung Chang, *GIS* by TMH Publications & Co.,

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(20EE0227) GENERATION OF ENERGY FROM WASTE
(Open Elective Course (OEC-I)

COURSE OBJECTIVES
The objectives of this course:
1. To understand different types of waste as fuel.
2. To introduce Pyrolysis methods and conversion processes.
3. To understand gasification methods for biomass.
4. To learn concepts of biomass resources, combustion types and biogas plant technology.

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. Analyse agro based, forest residue and industrial waste conversion processes.
2. Manufacture of Pyrolytic oils and gases.
3. Manufacture of charcoal, yields and applications.
4. Understand various types of gasifiers operation.
5. Understand inclined and fluidized bed combustors operation.
6. Understand types of biogas plants and biomass energy programme in India.

UNIT- I
Introduction to Energy from waste: Classification of waste as fuel – Agro based- Forest residue- Industrial waste- MSW- conversion devices- Incinerators- Gasifiers- Digestors.

UNIT- II
Bio-mass Pyrolysis: Pyrolysis- Types- Slow-Fast- Manufacture of Charcoal- methods- yields and application. Manufacture of Pyrolytic oils and gases – yields and applications.

UNIT- III
Biomass Gasification: Gasifiers- Fixed bed system- Downdraft and Updraft gasifiers- Fluidized bed gasifiers- construction and operation- Gasifier burner arrangement for thermal heating.

UNIT- IV
Biomass Combustion: Biomass stoves- Types- Inclined combustors- Fluidized bed combustors- construction and operation of above biomass combustors.

UNIT- V
Properties of Biogas: Biogas plant Technology and status – Biomass resources and their classification- Biomass conversion processes- thermo chemical conversion – Direct Combustion- Biomass gasification- Pyrolysis and liquefaction – bio-chemical conversion-

anaerobic digestion- Types of biogas plants- applications-Biomass Energy Programme in India.

TEXT BOOKS

1. Desai Ashok V. *, Non-Conventional Energy- Wiley Eastern Ltd 2010.*
2. Khandelwal K.C. and Mahdi SS*, Biogas Technology* – A Practical Hand Book –Vol I & II. Tata Mc Graw Hill Publishing Co Ltd., 2008.

REFERENCES

1. Challal D.S., *Food, Feed and Fuel from Biomass* –IBH Publishing Co Pvt Ltd., 1991.
2. GD Roy, *Non-conventional Energy Sources*-,Khanna Publishers, 6th Edition
3. Khahid Rehman Hekeem, *Mohammad Jawald., Umar Rashid*, Biomass & Bioenergy - Springer International Publishing Ltd.

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(20ME0322) NON- CONVENTIONAL ENERGY RESOURCES
(Open Elective Course (OEC-I)

COURSE OBJECTIVES

The objective of the course is to

1. *Know the importance of energy, resources of renewable energy, their usage and impact on environment.*
2. *Recognize the significance of solar energy, its harnessing technologies & its applications.*
3. *Identify the method of exploiting energy from wind and parameters to be considered for the selection of site for wind turbine installation.*
4. *Explain the concept of bio energy and its conversion devices.*
5. *Differentiate various renewable energies such as tidal energy, fuel cells.*

COURSE OUTCOMES

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

1. *State various sources of energies, its availability and explain the importance of them by observing the global energy scenario.*
2. *Distinguish the types of solar energy tapping devices and describe the method of harnessing the solar energy.*
3. *Summarize the wind energy systems and elucidate the impact of it in environmental aspects.*
4. *Describe the biomass conversion process and list out various bioenergy applications.*
5. *Interpret the knowledge of renewable energies such as tidal energy, OTEC.*
6. *Identify numerous applications renewable energy resources and illustrate its harnessing technologies.*

UNIT-I

Fundamentals of Energy system: Energy source, various forms of renewable energy, Conservation of energy and Energy scenario, need for non-conventional energy sources, alternative energy sources, Environmental consequences of oil fuel use, Role of new and renewable sources.

Solar Radiation: Environmental Impact of solar power, Direct & Diffuse Radiation, Terrestrial and extra-terrestrial solar radiation, Solar radiation on tilted surface- Measurement of Solar Radiation using Pyranometer, Pyrheliometer, and Sunshine recorder.

UNIT-II

Solar thermal conversion: Flat Plate and Concentrating Collectors – Solar direct Thermal Applications– Solar thermal Power Generation

Photo voltaic Conversion: Fundamentals of Solar Photo Voltaic Conversion – Solar Cells – Solar PV Power Generation – Solar PV Applications.

UNIT-III
Wind Energy: Wind Formation - Site Selection for Wind Turbine – wind speed and power relations, power extracted from the wind.
Wind Energy System: Types of Wind Energy Systems – Components of Wind Turbine – Horizontal Vs Vertical axis turbine -Performance –Safety and Environmental Aspects.

UNIT-IV
Bio – Energy: Origin of biomass, Bioenergy conversion technology – Biomass gasifiers: classification of biomass gasifiers, Biogas plants: classification of biogas plant.
Bio Fuel: Ethanol production – Biodiesel – Cogeneration - Applications of Biofuel.

UNIT-V
Hydrogen Energy: production of Hydrogen-Storage and Transportation of Hydrogen, Safety aspects and Applications of hydrogen.
Other Sources of Energy: Tidal energy – Wave Energy –OTEC Cycles - Open and Closed OTEC cycles, Geothermal Energy- Types of cycles.

TEXT BOOKS
1. R. K.Rajput, *Non-conventional Energy Sources and Utilization,* S. Chand Publishers, 2nd Edition, 2014.
2. G. D Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 1st Edition, 2010.
3. Nicholas Jenkins & Janaka Ekanayake, *Renewable Energy Engineering*, Cambridge University Press; 1st Edition, 2017.

REFERENCES
1. Dr. R K Singal, *Non-Conventional Energy Resources*, S.K Kataria & Sons, 4th Edition, 2014.
2. John Twidell & Tony Weir, *Renewable Energy Sources*, Routledge publisher, 3rd Edition, 2015.
3. Sukhatme. S.P, *Solar Energy, Principles of Thermal Collection and Storage,* Tata McGraw Hill Publishing Company Limited, 6th Edition, 1990.

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(20EC0451) INTRODUCTION TO COMMUNICATION SYSTEMS
(Open Elective Course (OEC-I)

COURSE OBJECTIVES

The objectives of this course:

1. *To study the fundamental concepts of the analog communication system.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *The students to be able to understand, analyze, and design fundamental digital communication systems.*
4. *The course focuses on developing digital communication systems.*
5. *To understand basics of various Communication.*

COURSE OUTCOMES (COs)

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

1. *Demonstrate knowledge in elements of Analog Digital and Wireless Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Understand the principle involved in different modulation techniques.*
4. *Understand the basic principles of baseband and pass band digital modulation schemes.*
5. *Analyze probability of error performance of digital systems and are able to design digital communications.*
6. *Implement various Keying and accessing techniques in real time wireless communication systems.*

UNIT- I

Communication: Introduction, Elements of communication systems, wired Communications systems, Wireless Communications systems, Modulation, Need of modulation, modulation Methods, difference between Analog and Digital communication.

Amplitude Modulation & Demodulation: DSB-FC(AM) modulation& its demodulation, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Single sideband (SSB) transmission, Comparison of various amplitude modulation techniques.

UNIT- II

Angle Modulation & Demodulation: Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM) and Wide band FM (WBFM), Phase modulation (PM).

UNIT- III

Noise in Communication Systems: Types of noise, Noise figure.

Analog Pulse Modulation Schemes: Pulse amplitude modulation (PAM), Pulse Width modulation (PWM) and Pulse Position modulations (PPM).

UNIT IV
Digital Communication: Introduction-Elements of digital communication systems, sampling process, quantization, quantization noise.
Source Coding Systems: Pulse-Code Modulation (PCM), Differential PCM (DPCM), Delta modulation (DM), Comparison of PCM, DPCM, DM.
Pass Band Data Transmission: Introduction, Amplitude shift keying (ASK), binary phase shift keying (BPSK), Binary Frequency shift keying (BFSK) Comparison of ASK, PSK, FSK.

UNIT V
Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communication Systems, Examples of wireless communication Systems – Paging Systems, Cordless Telephone, Cellular Telephone Systems, Overview of generation of cellular systems.
Multiple Access Techniques for Wireless Communications: Introduction to Multiple Access, FDMA, TDMA, CDMA, SDMA.

TEXT BOOKS
1. *Communication Systems,* Simon Haykin, Wiley India Edition, 4th Edition, 2011.
2. *Modern Digital & Analog Communication Systems,* B.P. Lathi, &Zhi Ding, Oxford University Press, International 4th edition, 2010.

REFERENCES
1. *Digital and Analog Communication Systems,* Sam Shanmugam, John Wiley, 2005.
2. *Communication Systems – An Introduction to Signals & Noise in Electrical Communication,* Bruce Carlson, & Paul B. Crilly, McGraw-Hill, 5th Edition, 2010
3. *Digital Communications,* Bernard Sklar, Prentice-Hall PTR, 2nd edition, 2001.
4. *Principles of Communication Systems,* Herbert Taub& Donald L Schilling, Tata McGraw-Hill, 3rd Edition, 2009.
5. *Modern Communication Systems Using MATLAB,* J.G.Proakis, M Salehi, Gerhard Bauch, CENGAGE, 3rd Edition, 2013.

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III B.Tech. – I Sem.

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(20CS0550) RELATIONAL DATABASE MANAGEMENT SYSTEM
(Open Elective Course (OEC-I)

COURSE OBJECTIVES

The objectives of this course:

1. *Explain different issues involved in the design and implementation of a database system.*
2. *Explain physical and logical database designs, database modelling, relational, hierarchical, and network models*
3. *Introduce data manipulation language to, update, query and manage a database*
4. *Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling and designing a DBMS.*

COURSE OUTCOMES (COs)

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

1. *Develop relational algebra expressions for queries and optimize them.*
2. *Design the databases using E_R method for a given specification of requirements.*
3. *Apply Normalization techniques on given database.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Implement the isolation property, including locking, time stamping based on concurrency control and Serializability of scheduling.*
6. *Understand Physical Storage Media and RAID concepts.*

UNIT- I
Introduction: Database System Applications, Purpose of Database Systems, View of Data, Data Abstraction, Data Independence, Data Models, Database Languages, Database Architecture, Database Users and Administrators.

UNIT-II
Introduction to Data base design: ER diagrams, Entities, Attributes and Entity sets, Relationships and Relationship sets.
Relational Algebra and Calculus: Relational Algebra - Selection and Projection, Set operations, Renaming, Joins.

UNIT-III
Form of Basic SQL Query- Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set - Comparison Operators, Aggregate Operators, NULL values - Comparison using Null values

UNIT-IV

Introduction to Schema Refinement- Problems Caused by redundancy, Normal Forms - FIRST, SECOND, THIRD Normal forms.

Properties of Decompositions: Lossless join Decomposition, Dependency preserving Decomposition - FOURTH Normal Form, FIFTH Normal form.

UNIT- V

Recoverability: System Recovery – Media Recovery –Two Phase locking – Deadlock-Detection, Recovery and Prevention.

Physical Storage and Database Concepts: Overview of Physical Storage Media and RAID.

TEXT BOOK

1. *Database System Concepts*, Sixth Edition, Abraham Silberschatz, Henry F. Korth and S. Sudharshan , Tata McGraw Hill, 2011

REFERENCES

1. *Database Management Systems*, 3rd Edition, Raghurama Krishnan, Johannes Gehrke, McGrawHill Education,2003.
2. *Principles of Database and Knowledge – Base Systems*, J. D. Ullman, Vol 1 Computer Science Press.
3. *Database Systems Concepts*, Peter Rob & Carlos Coronel, Cengage Learning, 2008.
4. *Introduction to Database Systems*, C.J. Date, Pearson Education.
5. *Database Management Systems*, G.K. Gupta, McGraw Hill Education.

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(20HS0813) MANAGEMENT SCIENCE
(Open Elective Course (OEC-I)

COURSE OBJECTIVES

1. To understand the basic concepts, principles and processes of management
2. To help the students gain an understanding of the functions, responsibilities of managers
3. To get an awareness about the latest developments and contemporary issues in the field of management

COURSE OUTCOMES

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

1. Utilize appropriate theoretical frameworks to real life business and managerial problems
2. Identify appropriate operational risks and develop appropriate responses to them
3. Apply human resource principles to recruit, select and manage employees to achieve organizational goals
4. Enact strategy, including contingent plans for the effective management of the organization
5. Identify, plan, and implement the projects and evaluate the performance of the projects
6. Analyze effective application of latest developments to diagnose and solve organizational problems

UNIT I

Introduction To Management: Management-Concept and meaning-Nature-Functions-Management as a science and art and both. Schools of management thought-Taylor's scientific theory-Henry Fayol's principles- Weber's Ideal Bureaucracy - Elton Mayo's Human relations-Systems theory- Situational or Contingency theory-Social responsibilities of management.
Organizational Structure and Design: Features of organizational structure-work specialization- Departmentation -Span of control-Centralization and Decentralization.
Organisational Designs-Line organization-Line & Staff Organization-Functional Organization-Matrix Organization-Project Organization-Committee form of organization.

UNIT II

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study- Statistical Quality Control**:** *C* chart, *P* chart, (simple Problems) Deming's contribution to quality.
Material Management: Objectives-Inventory- Functions, types, inventory classification techniques-EOQ-ABC Analysis-Purchase Procedure and Stores Management.
Marketing Management: Concept- Meaning - Nature-Functions of Marketing- Marketing Mix- Channels of distribution -Advertisement and sales promotion- Marketing Strategies based on Product Life Cycle

UNIT III

Human Resources Management (HRM): HRM- Definition and meaning – nature- Managerial and Operative functions-Evolution of HRM-Human Resource Planning(HRP)- Employee Recruitment-sources of recruitment- employee selection- process and tests in employee selection- Employee training and development-On- the- job and Off- the- job training methods-Performance Appraisal systems- Concept-MethodsofPerformanceAppraisal- Placement-EmployeeInduction-WageandSalary Administration-Objectives-Essentials of Wage and Salary Administration-Job Analysis- Process -Job Evaluation-Employee Grievances- techniques of handling Grievances.

UNIT IV

Strategic Management: Definition& meaning-Setting of Vision- Mission- Goals- Corporate Planning Process- Environmental Scanning-Steps in Strategy Formulation and Implementation-SWOT Analysis. **Project Management (PERT/CPM):**Network Analysis- Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying Critical Path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple Problems)

UNIT V

Contemporary Issues In Management: The concept of MIS-Materials Requirement Planning (MRP)-Just-In-Time(JIT) System-Total Quality Management (TQM)- Six Sigma Concept- Supply Chain Management-Enterprise Resource Planning (ERP)- Performance Management- Business Process Outsourcing (BPO), Business Process Re-engineering and Bench Marking -Balanced Score Card-Knowledge Management.

TEXT BOOKS
1. A.R Aryasri: *Management Science*, TMH,2013
2. Stoner, Freeman, *Gilbert, Management,* Pearson Education, New Delhi, 2012.

REFERENCES
1. Kotler Philip & Keller Kevin Lane: *Marketing Management*, PHI, 2013.
2. Koontz &Weihrich: *Essentials of Management*, 6/e, TMH, 2005.
3. Thomas N.Duening& John M.Ivancevich, *Management Principles and Guidelines*, Biztantra.
4. KanishkaBedi, *Production and Operations Management*, Oxford University Press, 2004.
5. Memoria&S.V.Gauker, *Personnel Management*, Himalaya, 25/e,2005

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(20CE0122) COMPUTER AIDED DESIGN LAB

COURSE OBJECTIVES

1. To understand software skills regarding analysis and design.

2. To understand the scope of STAADPRO software

3. To understand to analyze and design frames, trusses and slabs.

COURSE OUTCOMES (COs)

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

1. List and discuss various basic commands of STAADPRO or Equivalent.

2. Discuss the software skills regarding analysis and design.

3. Analyze and Design any 2-D & 3-D Framed Structures.

4. Analyze and Design of One -Way Slab & Two-Way Slab.

5. Discuss the Retaining Wall and its Analysis & Design.

6. Analyze and Design of Multi-storeyed Building & Overhead Tank.

LIST OF EXPERIMENTS

1. 2-D RC Frame Analysis and Design
2. 3-D RC Frame Analysis and Design
3. Steel Tabular Truss Analysis and Design
4. Retaining Wall Analysis and Design
5. One -Way Slab Analysis & Design
6. Two-Way Slab Analysis & Design
7. Column Analysis & Design
8. Design of Overhead Tank
9. Analysis of Multistoried Building
10. Design of Multistoried Building

Any eight experiments may be conducted

Software Required:

• STAADPRO or Equivalent

TEXTBOOKS

1. Sesha Prakash, M.N. and C.S. Suresh, *Computer Aided Design Lab Manual*

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(20CE0123) TRANSPORTATION ENGINEERING LAB

COURSE OBJECTIVES

Objective of this course is

1. *To learn the various aspects of aggregate and its engineering behaviour*

2. *To introduce bitumen & its engineering behaviour*

3. *To understand the concept of traffic behaviour*

COURSE OUTCOMES (COs)

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

1. *Conduct test on road aggregates to estimate their mechanical properties*

2. *Perform shape tests on aggregates and decide their suitability as road aggregates*

3. *Conduct tests on bitumen to find its properties and purity*

4. *Conduct tests on bitumen to identify its grade*

5. *Perform traffic volume studies*

6. *Perform vehicle speed studies*

LIST OF EXPERIMENTS

1. Aggregate crushing value test
2. Aggregate impact test
3. Specific gravity and Water absorption test of coarse aggregate
4. Los Angeles abrasion test
5. Shape test (Flakiness index & Elongation index)
6. Penetration test on bitumen
7. Bitumen ductility test
8. Bitumen softening point test
9. Bitumen flash and fire point tests
10. Stripping value test
11. Traffic volume studies at mid-block and data analysis
12. Traffic volume studies at intersection and data analysis

Any eight experiments may be conducted

REFERENCES

1. S.K.Khanna and C.E.G Justo, *Highway Materials Testing Laboratory Manual*, New Chand Bros, Roorkee

2. Ajay.K.Duggal & Vijay.P.Puri, Lab *Manual on Highway Engineering*, New Age Publications, New Delhi

3. Relevant IS Code

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(20CE0124) TOTAL STATION

COURSE OBJECTIVES

The objectives of this course

1. The objective of the Total Station is to enable the students to get practical training in the field work

2. At the end of the Total Station , each student shall have mapped and contoured the area

3. The Total Station record shall include all original field observations, calculations and plots

COURSE OUTCOMES (COs)

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

1. Principles of total station and different methodologies used in it.

2. Basics of total station instrument.

3. To determine the area of a particular site by using Total Station

4. To determine the length and Azimuth(Traversing) using Total Station

5. To determine the height of a remote point by using Total Station

6. Find out various physical quantities of a site/field using Total Station

LIST OF EXPERIMENTS

1. Determination of area by using Total Station
2. Traversing using Total Station
3. Determination of Remote height using Total Station
4. Distance, gradient, difference in height between to inaccessible points using Total Station
5. Stake-Out Using Total Station

REFERENCES

1. Satheesh Gopi & R.Sathikumar & N.Madhu, *Advanced Surveying (Total Station, GIS and Remote Sensing)*, Pearson Education, 2nd Edition, 2008
2. R.Subramanian, *Fundamentals of Surveying and Levelling,* Oxford University Press, India, 1st Edition
3. Arora K. R, *Surveying Vol-I*, Rajsons Publications Pvt. Ltd. 10th Edition

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(20HS0817) ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

COURSE OBJECTIVES

The objective of the course is to

1. *Impart basic principles of thought process, reasoning and inference.*
2. *Connect society and nature through sustainability.*
3. *Know Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
4. *Introduce Indian knowledge system and Indian perspective of modern scientific world-wide.*
5. *Learn the basic principles of Yoga and holistic health care system.*

COURSE OUTCOMES

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

1. *Connect up the basic principles of thought process.*
2. *Understand Holistic life style of yogic science and wisdom capsules in Sanskrit literature.*
3. *Analyze the society and nature through sustainability.*
4. *Explain Indian knowledge system and Indian perspective of modern science.*
5. *Use the basic principles of Yoga and holistic health care system.*

UNIT-I

➢ Basic structure of Indian Knowledge System: 4 ved
➢ 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & SthapthyaAdi.,)

UNIT-II

➢ 6 Vedanga (Shisha, Kalppa, Nirukha, VYkaran, Jyothish & Chand)
➢ 4 Upanga (Dharma Shastra, Meemamsa, Purana & TharkaShastra)

UNIT-III

➢ Modern Science and Indian Knowledge System
➢ Yoga and Holistic Healthcare

UNIT-IV

➢ Philosophical Tradition (Nyaya, ,Sankhya, Yog, Jain &Boudha
➢ Indian Linguistic Tradition –(Phonology, morphology, syntax andsemantics)

UNIT-V

➢ Indian Artistic Tradition - Chitrakala,Vasthukala, Sangeetha, Nruthya Sahithya
➢ Case studies

TEXT BOOKS

1. Sivaramakrishnan (Ed.), *Cultural Heritage of India-course material*, Bharatiya VidyaBhavan, Mumbai. 5thEdition, 2014.
2. Swami Jitatmanand, *Modern Physics and Vedant*, Bharatiya VidyaBhavan.
3. Swami Jitatmanand, *Holistic Science and Vedant*, Bharatiya VidyaBhavan.
4. Fritzof Capra, *Tao of Physics.*
5. Fritzof Capra, *The Wave of life.*

REFERENCES

1. VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International ChinmayFoundation, Velliarnad, Arnakulam.
2. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with VyasaBhashya, Vidyanidhi Prakashan, Delhi 2016.
3. RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidh Prakashan, Delhi 2016.
4. P B Sharma (English translation), Shodashang Hridayan
5. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya VidyaBhavan, Mumbai. 5th Edition, 2014.
6. S.C. Chaterjee& D.M. Datta, An Introduction to Indian Philosophy, University of Calcutta, 1984.
7. K.S. Subrahmanialyer, Vakyapadiya of Bhartrihari, (Brahma Kanda), DeccanCollege Pune 1965.
8. Panini Shiksha, MotilalBanarasidas
9. V.N. Jha, Language, Thought and Reality, Vasudevasharan AGRAWAL Kala yevam Samskruthi, Shithya Bhavan Elahabad, 1952.
10. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
11. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987.
12. R. Nagaswamy, Foundations of Indian Art, Tamil Arts Academy, 2002.

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(20CE0125) ENVIRONMENTAL ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. *To equip the students with the principles and design of water treatment units and distribution system*
2. *The objectives of this course is to help students to develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants*
3. *To develop a student's skill in evaluating the performance of water and wastewater treatment plants*

COURSE OUTCOMES (COs)

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

1. *Forecast population, Estimate the water demand for a town or city during design period*
2. *Describe water quality criteria and standards, and their relation to public health*
3. *An ability to Design the various functional units in water treatment and distribution system*
4. *Estimate sewage generation and Design of sewer system*
5. *Recognize characteristics and composition of wastewater*
6. *Design of the unit operations and processes that are used in sewage treatment and sludge disposal*

UNIT – I

Introduction to Water Supply: Importance and Necessity of protected water supply system - Objectives of protected water supply system- Flow chart of public water supply system

Water Demand and Quantity Studies: Estimation of water demand for a town or city-Types of water demands- Percapita demand- Factors affecting the percapita demand-Variations in the Demand-Design period-Factors affecting the design period- Population studies-Methods of population forecasting - Sources of water - Surface and subsurface sources-Factors governing the selection of source of water

UNIT – II

Quality and Analysis of Water: Characteristics of water – Physical, Chemical and Biological - Analysis of water – Physical, Chemical and Biological- Water borne diseases-Drinking water quality standards.

Water Treatment: Layout and general outline of water treatment units –Screening-Types of screens – Sedimentation - Principles – Design factors – Coagulation-Methods of feeding coagulation – Flocculation - Filtration – Theory – Classification of filters –Comparison -

Design of filters – Disinfection – Methods – Chlorination – Forms - Break point chlorination - Water Softening – Hardness – Types - Methods of removal of hardness

UNIT – III
Water Distribution: Distribution systems – Requirements-Methods of distribution- Layout of Water distribution systems - Waste detection and prevention – House service connection
Introduction to Sanitation: Sources of waste water generation- System of sanitation – Relative merits & demerits – Collection and conveyance of wastewater – Sewerage – Classification of sewerage systems
Estimation of Sewage Flow: Estimation of sewage flow and storm water drainage –DWF- Factors affecting DWF- Hydraulics of sewers and storm drains– Design of sewers – Materials for sewers- Appurtenances in sewerage – Cleaning and ventilation of sewers

UNIT – IV
Wastewater Characteristics: Characteristics of sewage – Physical, Chemical and Biological - Decomposition of sewage- Examination of sewage – Biological Oxygen Demand-Chemical Oxygen Demand
Wastewater Treatment: Layout and general outline of various units in a wastewater treatment plant–Primary treatment-Screens–Grit Chamber– Skimming tanks – Sedimentation tanks – Principles & design – Secondary treatment – Activated sludge process - Trickling filters – Standard and high rate trickling filters – Comparison

UNIT – V
Disposal of Sewage and Sludge Treatment: Methods of waste water disposal-Self-purification–Oxygen sag curve - Sludge treatment processes-Flow chart-Sludge thickening and digestion – Factors – Design of digestion tank
Disposal of Sludge: Sludge dewatering- Disposal of sludge – Methods - Septic tanks and Imhoff Tanks - Working principles and design – Soak pits and Dispersion trench

TEXT BOOKS
1. Garg, S.K., *Environmental Engineering Vol. I & II*, Khanna Publishers, New Delhi, 2015
2. Modi, P.N., *Water Supply & Waste Water Engineering, Vol. I & II*, Standard Book House, New Delhi, 2010

REFERENCES
1. Punmia, B.C., Jain, A.K., and Jain.A.K, *Water Supply & Waste Water Engineering, Vol. I & II*, Laxmi Publications, 2010
2. Duggal K.N*., Elements of Environmental Engineering,* S.Chand and Co. Ltd., New Delhi, 2014
3. Metcalf and Eddy, *Wastewater Engineering-Treatment and Reu*se, Tata McGraw-Hill Company, New Delhi, 2010
4. *Manual on Water Supply and Treatment*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999
5. *Manual on Sewerage and Sewage Treatment Systems Part A, B and C*, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013

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(20CE0126) HYDROLOGY AND WATER RESOURCES ENGINEERING

COURSE OBJECTIVES

The objectives of this course

1. Understand the concept of hydrology and components of hydrologic cycle such as precipitation, infiltration, evaporation and transpiration

2. Quantify runoff and use concept of unit hydrograph

3. Demonstrate different methods of irrigation, methods of application of water and irrigation procedure

4. The fundamental idea behind this course is to make student aware of canal regulation works and cross drainage works

5.The course also targeted to teach students the concepts of major irrigation structures such as gravity dams, earthen dams and its prerequisites namely reservoir planning

COURSE OUTCOMES (COs)

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

1. Explain importance of hydrology, hydrological cycle and estimate precipitation, runoff, evaporation, evapotranspiration and infiltration. Classify different type of geological formation of ground water and estimate yield

2. Classify various types of irrigation and describe principals of irrigation

3. Explain the principals of crop water requirements and determine the irrigation crop water requirements

4. Describe canal regulation works and design various elements in canal regulation works

5. Classify different types of cross drainage works and explain the concepts of reservoir planning

6. Classify various types of dams and spillways.

UNIT – I

Introduction to Hydrology: Engineering Hydrology and its applications; Hydrologic Cycle; Precipitation- Types and Forms; Evaporation- Factors affecting & measurement of Evaporation; Infiltration - Factors affecting & measurement of infiltration - Infiltration Indices; Run-off- Factors affecting Run-off - Computation of Run-off

Hydrograph Analysis: Hydrograph-Unit Hydrograph- Construction and limitations of Unit Hydrograph - Application of Unit Hydrograph - S-Hydrograph

UNIT – II

Ground Water: Aquifer – Aquiclude – Aquifuge - Aquifer parameters; Porosity - Specific yield - Specific retention; Types of aquifers - Well Hydraulics - Darcy's Law - Steady radial flow to a well; Dupuit's theory for confined and unconfined aquifers

Irrigation: Introduction - Necessity and importance of Irrigation - Advantages and effects of Irrigation - Types of Irrigation - Methods of Application of Irrigation water -Duty and Delta - Relation between Duty and Delta - Factors affecting Duty - Methods of improving Duty

UNIT – III

Water Requirement of Crops: Types of Soils; Gross Command Area - Culturable Command Area - Culturable Cultivated and Uncultivated Area; Kor Depth and Kor Period - Crop seasons and Crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Consumptive use of water - Factors affecting consumptive use

Canal Regulation Works: Canal falls- Necessity and location of falls- Types and classification of falls; Roughening devices; Design of sarada type fall; Canal regulators- Off take alignment- Head regulators and cross-regulators- Design of cross-regulator and distributary head regulator

UNIT – IV

Cross Drainage Works: Introduction- Types of cross drainage works- Selection of suitable type of cross drainage work- Classification of aqueducts and siphon aqueducts.

Reservoir Planning: Introduction- Investigations for reservoir planning- Selection of site or a reservoir- Zones of storage in a reservoir; Storage capacity and yield- Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Life of reservoir; Flood routing- Methods of flood routing Graphical Method (Inflow storage discharge curves method)

UNIT – V

Dams: General: Introduction- Classification according to use- Classification according to material- Gravity dams- Arch dams- Buttress dams- Steel dams- Timber dams- Earth dams and rock fill dams- Advantages and disadvantages- Physical factors governing selection of type of dam- Selection of site for a dam

Gravity Dams and spillways: Introduction- Forces acting on a gravity dam- Combination of loading for design- Modes of failure- Stability requirements- Principal and shear stresses- Stability analysis- Elementary profile of a gravity dam- Practical profile of a gravity dam- Limiting height of a gravity dam- High and low gravity dams- Galleries- Types of spillways- Spillway crest gates-Types and description only.

TEXT BOOKS

1. K Subramanya, *Engineering Hydrology*, McGraw Hill Publication, 4th Edition
2. Dr. B.C. Punmia, Dr. Pande Brij Basi Lal, Ashok Kumar Jain, Dr. Arun Kumar Jain, *Irrigation and Water Power Engineering*, Laxmi Publications,16th Edition

REFERENCES

1. Dr. P.N. Modi, *Irrigation Water Resources and Power Engineering*, Standard Book House, 9th Edition
2. Dr. P. Jaya Rami Reddy, *A Textbook of Hydrology*, Laxmi Publications, 3rd Edition
3. Santhosh Kumar Garg, *Water Resource Engineering Vol.I & Vol. II*, Khanna Publishers, 23rd Edition
4. Arora, K.R., Irrigation, Water Power and Water Resources Engineering, Standard Publishers Distributors, New Delhi, 2009

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(20CE0127) CONSTRUCTION PROJECT MANAGEMENT

COURSE OBJECTIVES

The objectives of this course

1. To make the student understand various functionaries of the construction project management

2. To make the student work with construction project management tools such as bar charts, CMP & PERT

3. To gain the knowledge of material management, quality management, safety management and contracts in construction practice

COURSE OUTCOMES (COs)

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

1. Describe importance, types, phases, participants of construction projects and summarize functions of construction management

2. Develop bar chart, mile stone charts and can explain the basic principles of network techniques

3. Analyze PERT & CPM networks to find various time estimates and identify critical activities and path

4. Optimize the cost and can update CPM network

5. Discuss significance of material management and quality management of construction projects

6. Recognize various issues related to construction safety and can describe fundamentals of construction contracts

UNIT – I

Construction Project: Importance of Construction – Indian Construction Industry – Types of Construction - Construction Project – Phases of Construction Project – Construction Project Management and its relevance – Participants of construction project – Functions of construction management

Construction Planning: Types of project plans – Work breakdown structure – Bar charts – Milestone Charts – Elements of Network – Development of Network – Difference between AoA and AoN diagram – Common errors in drawing the network

UNIT-II

PERT Network Analysis: Uncertainties – Time estimates – Frequency distribution – Earliest expected time – Latest allowable occurrence time – Slack – Critical Path

CPM Network Analysis: CPM process – CPM network – Activity time estimate – Earliest event time – Latest allowable occurrence time – Float – Critical activities and critical path

UNIT – III

CPM Cost Model: Project cost – Indirect project cost – Direct project cost – Slope of direct cost curve – Total project cost and optimum duration – Contracting the network for cost optimization – Steps in time cost optimization

CPM Updating: Updating Process – Data required for updating – Steps in the process of updating – When to update

Resources Allocation: Resources usage profiles – Resources smoothing – Resources levelling

UNIT – IV

Material Management: Material procurement – Material management functions – Inventory management

Quality Management: Construction quality – Inspection – Quality control – quality assurance in projects – Total quality management – Cost of quality – Audit

UNIT-V

Safety Management: Construction accidents – Causes – Prevention of accidents – Safety measures – Cost of accidents – Safety and health management systems

Construction Contract: Contract document – Classification of contracts – Bidding process – CPWD contract conditions

TEXT BOOKS

1. Kumar Neeraj Jha, *Construction Project Management – Theory and Practice*, Pearson Education India, 2011
2. Dr. B. C. Punmia & K. K. Khandelwal, *Project Planning and Control with PERT and CPM,* Lakshmi Publications New Delhi

REFERENCES

1. B Sengupta & H Guha, *Construction Management and Planning*, McGraw Hill Education (India) Private Limited, 1st edition, 2015
2. Saurabha Kumar Soni, *Construction Management and Equipment*, SK Kataria & Sons, 2014
3. Robert L. Peurifoy, William B. Ledbetter and Clifford J. Schexnayder, *Construction Planning, Equipment and Methods*, McGraw-Hill Higher Education, 6th Edition, 2001

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(20CE0139) CONCRETE TECHNOLOGY
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES

1. *To know the physical and chemical properties of cement and admixtures.*
2. *To understand the basic behaviour of concrete, its application in varied environment, help them to handle the material on site*
3. *To give basic and essential knowledge to graduate students about concrete as well as latest developments in concrete technology*
4. *Enrich the practical knowledge on mix design principles, concepts and methods.*

COURSE OUTCOMES (COs)

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

1. *Describe various properties of cement and aggregates*
2. *Conduct tests on hardened concrete*
3. *Understand the influence of creep and shrinkage on performance of concrete*
4. *Evaluate the strength of hardened concrete using various NDT methods*
5. *Observe the significance of durability of concrete while designing a concrete mixes*
6. *Design concrete mixes for the intended grades*

UNIT – I

Cements & Admixtures: Portland Cement – Chemical Composition – Hydration, Setting of Cement – Structure of Hydrated Cement –Different Types of Cement – Grades of cement – Mechanical Strength of Cement Gel - Water Held In Hydrate Cement Paste – Heat of Hydration Of Cement – Influence of Compound Composition on Properties of Cement - Admixtures.

Aggregates:- : Classification of Aggregate – Particle Shape and Texture – Bond Strength & Other Mechanical Properties of Aggregate – Specific Gravity, Bulk Density, Porosity, Absorption & Moisture Content of Aggregate – Soundness of Aggregate – Deleterious Substance in Aggregate-Alkali Aggregate Reaction – Thermal Properties – Sieve Analysis – Fineness Modulus –Grading Curves – Grading of Fine & Coarse Aggregates – Gap Graded Aggregate - Bulking of Sand

UNIT – II

Hardened Concrete: Water / Cement Ratio – Abram's Law – Gel Space Ratio –Strength of Concrete – Maturity Concept – Strength in Tension & Compression – Compression Tests – Tension Tests — Flexure Tests – Splitting Tests – Relation Between Compressive & Tensile Strength-Factors Affecting Strength-Curing Methods.

UNIT – III

Elasticity, Creep & Shrinkage: Modulus of Elasticity – Dynamic Modulus of Elasticity – Poisson's Ratio – Creep of Concrete – Factors Influencing Creep – Relation Between Creep & Time– Nature of Creep – Effects of Creep & Shrinkage – Types of Shrinkages.

Non-Destructive Testing Methods: Introduction to Non-Destructive Testing Methods – Rebound Hammer – Ultra Pulse Velocity Method – Pullout - Profometer - Codal Provisions for NDT

UNIT – IV

Permeability and Durability: Permeability – Sulphate attack – Methods of controlling Sulphate attack– Attack of sea water – Acid attack – Chloride attack – Corrosion of steel – Corrosion control – Deterioration of concrete by Abrasion, Erosion and Cavitation – Effects of some Materials on Durability – Surface treatment of Concrete.

UNIT – V

Mix Design: Durability of Concrete – Quality Control of Concrete – Factors Considered in Mix Proportions – Statistical Methods of Mix Design – Acceptance Criteria –Proportioning of Concrete Mixes by ACI & IS10262 Methods.

TEXTBOOKS

1. M.L.Gambhir, *Concrete Technology,* Tata McGraw-Hill Publishers, New Delhi
2. M.S. Shetty, *Concrete Technology,* S. Chand & Co

REFERENCES

1. A.M. Neville, *Properties of Concrete,* Pearson Publication, 4th edition
2. P.K.MehtaandJ.M.Monteiro,*Concrete:Microstructure,PropertiesandMaterials*,McGrawHill Publishers
3. Krishna Raju*, Design of Concrete Mix*, CBS Publishers
4. J.Prasad & C.G.K.Nair, *Non Destructive Test and Evaluation of Materials,* McGraw-Hill Publishers, New Delhi

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III B.Tech – I Sem.

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(20CE0140) AIRPORT PLANNING AND DESIGN
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES

The objectives of this course

1. To familiarize with Airport planning issues along with the designing of runways

2. To learn the various aspects of structural design of Airport pavements

3. To understand visual aids and necessary inputs required for Airport grading and drainage

COURSE OUTCOMES (COs)

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

1. Collect vital data required for planning of an airport by conducting various surveys and can prepare various drawings

2. Classify various types of airports

3. Design features and various geometric elements pertaining to runways

4. Design various types of airport pavements

5. Recognize the importance of various visual aids such as airport marking and lighting

6. Design various surface and sub-surface drainage systems for an airport

UNIT – I

Airport Planning: General- Regional Planning- Data Required before Site Selection- Airport Site Selection- Surveys for Site Selection- Drawings to be prepared- Estimation of Future Air Traffic Needs

UNIT – II

Runway Design: Runway Orientation- Basic Runway Length- Corrections for Elevation, Temperature and Gradient- Airport Classification- Runway Geometric Design- Airport Capacity- Runway Configurations- Runway Intersection Design

UNIT – III

Structural Design of Airport Pavements: Introduction- Various Design Factors- Design Methods for Flexible Pavement- Design Methods for Rigid Pavement- LCN System of Pavement Design- Joints in Cement Concrete Pavement- Airport Pavement Overlays- Design of an Overlay

UNIT – IV

Geometric Design of Runways and Taxiways: Aircraft characteristics – Influence of Characteristics on Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications – Functions of Taxiways – Taxiway Geometric Design – Geometric Elements and Standard Specifications – Runway and Taxiway Lighting.

UNIT – V

Airport Grading And Drainage: General- Computation of Earthwork- Airport Drainage- Special Characteristics and Requirements of Airport Drainage- Design Data- Surface Drainage Design Subsurface Drainage Design

TEXT BOOKS

1. S.K.Khanna, M.G.Arora and S.S.Jain, *Airport Planning and Design,* Nem Chand & Bros, 6th edition, 2009

2. Dr. L. R. Kadyali, Dr. N. B. Lal, *A Text Book of Principle and practices of Highway Engineering including Expressways and Airport Engineering*, Khanna Publications,7th edition, 2013.

REFERENCES

1. Rangwala SC, *Airport Engineering,* Charotar Publishing House Pvt. Ltd., 17th edition, 2019

2. Dr. S. K. Sharma, *Highway Engineering including Airport Pavements*

3. Virendra Kumar, *Air Transportation Planning and Design*

4. Subash C Saxena, *Airport Engineering: Planning & Design*

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III B.Tech – II Sem.

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(20CE0141) ADVANCED STRUCTURAL DESIGN
(Professional Elective Course (PEC-II)

COURSE OBJECTIVES

The objectives of this course

1. Familiarize Students with different types of Connections and relevant IS codes

2. Equip student with concepts of design of Flat slabs, water tanks, retaining walls, plate girder and gantry girder.

COURSE OUTCOMES (COs)

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

1. Analyse and design flat slabs for the given building dimensions.

2. Design circular and rectangular water tanks.

3. Detail the reinforcing bars for retaining walls for horizontal back fill.

4. Analyse and design plate girder

5. Analyse and design gantry girder

6. design the structure for stability, strength and serviceability

UNIT – I

Analysis and Design of a flat slab (Interior panel only)

UNIT – II

Analysis and Design of circular and rectangular water tank resting on the ground

UNIT – III

Analysis and Design of cantilever and counter fort retaining wall with horizontal back fill

UNIT – IV

Analysis and Design of a Plate girder

UNIT – V

Analysis and Design of a Gantry girder

TEXT BOOKS

1. Krishna Raju, *Structural Design and Drawing (RCC and Steel),*Universities .Press, New Delhi.

2. Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, *R.C.C Structures*, Laxmi Publications, New Delhi.

REFERENCES

1. Varghese, *Advanced RCC,* PHI Publications, New Delhi.

2. M.L.Gambhir, *Design of RCC structures*, P.H.I. Publications, New Delhi.
3. S.S.Bhavikatti, *Design of Steel Structures: By Limit State Method as per IS: 800-2007*, I.K.International Publishing House Pvt Ltd., New Delhi, 3rd Edition.
4. S.K.Duggal, *Limit State Design of Steel Structures*, Tata McGraw Hill Publications, 1st Edition.

IS Codes:
1. IS 456-2000
2. IS 800 – 2007

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(20EE0235) INDUSTRIAL INSTRUMENTATION
(Open Elective Course (OEC-II)

COURSE OBJECTIVES
The objectives of this course are:
1. *To Analyse the Common errors that occur in measurement systems, and their classification.*
2. *To understand the characteristics of signals, their representation, and signal modulation techniques.*
3. *To learn the Methods of Data Transmission, Telemetry, and Data acquisition.*
4. *To study working principles of different Signal Analyzers and Digitalmeters.*
5. *To learn about several types of transducers and their use for measurement of non-electrical quantities.*

COURSE OUTCOMES (COs)
On successful completion of this course, the student will be able to
1. *Identify and explain the types of errors occurring in measurement systems.*
2. *Differentiate among the types of data transmission and modulation techniques.*
3. *Apply digital techniques to measure voltage, frequency and speed.*
4. *Analyse the working principles of different Signal Analyzers and Digitalmeters.*
5. *Understand the operation of several types of transducers.*
6. *Choose suitable Transducers for the measurement of non-electrical quantities.*

UNIT-I
Characteristics of Signals and their representation: Measuring Systems, Performance Characteristics, Static Characteristics, Dynamic Characteristics; Errors in Measurement Gross Errors, Systematic Errors, Statistical Analysis of Random Errors. Signals and their Representation: Standard Test, Periodic, Aperiodic, Modulated Signal, Sampled Data, Pulse Modulation and Pulse Code Modulation.

UNIT-II
Data Transmission, Telemetry and DAS: Methods of Data Transmission–General Telemetry System .Frequency Modulation (FM), Pulse Modulation (PM), Pulse Amplitude Modulation (PAM), Pulse Code Modulation (PCM) Telemetry. Comparison of FM, PM, PAM and PCM. Analog and Digital Data Acquisition Systems –Components of Analog DAS–Types of Multiplexing Systems: Time Division and Frequency Division Multiplexing –Digital DAS–Block Diagram—Modern Digital DAS (Block Diagram)

UNIT-III
Signal Analyzers, Digital Meters: Wave Analyzers- Frequency Selective Analyzers, Heterodyne, Application of Wave Analyzers-Harmonic Analyzers, Total Harmonic

Distortion, Spectrum Analyzers, Basic Spectrum Analyzers, Spectral Displays, Vector Impedance Meter, QMeter. Peak Reading and RMS Voltmeters, Digital Voltmeters-Successive Approximation, Ramp and Integrating Type- Digital Frequency Meter-Digital Multimeter- Digital Tachometer

UNIT-IV
Transducers: Definition of Transducers, Classification of Transducers, Advantages of Electrical Transducers, Characteristics and Choice of Transducers; Principle of Operation of Resistive, Inductive, Capacitive Transducers, LVDT, Strain Gauge and its Principle of Operation, Gauge Factor, Thermistors, Thermocouples, Synchros, Piezo electric Transducers, Photovoltaic, Photo Conductive Cells, Photodiodes.

UNIT-V
Measurement of Non-Electrical Quantities: Measurement of strain, Gauge Sensitivity, Measurement of Displacement, Velocity, Angular Velocity, Acceleration, Force, Torque, Temperature, Pressure, Flow, Liquid level.

TEXTBOOKS
1. K. *Sawhney, Dhanpat Rai & Co.* A course in Electrical and Electronic Measurements and Instrumentation, A, 2012
2. *D.V.S. Murty*, Transducers and Instrumentation, , Prentice Hall of India, 2nd Edition, 2004

REFERENCES
1. *A. Dhelfrick and W.D. Cooper,*Modern Electronic Instrumentation and Measurement technique, *Pearson/Prentice Hall of India., 1990.*
2. *H.S. Kalsi Tata* ,Electronic Instrumentation, *McGraw-Hill Edition, 2010.*
3. *T.R. Padmanabhan,* Industrial Instrumentation–Principles and Design, Springer,

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(20ME0354) GENERAL MECHANICAL ENGINEERING
(Open Elective Course (OEC-II)

COURSE OBJECTIVES

Objective of this course is to

1. *Impart knowledge on Selection of Engineering materials and* Mechanical Handling Equipment.
2. *Understand about Automation, CAD, CAM and CIM.*
3. *Know the various Industrial Robot applications.*
4. *Learn about advanced manufacturing systems like NC, CNC and DNC system.*
5. *Study the construction details of the Automobile systems like engines.*
6. *Learn about Refrigeration and Air conditioning systems.*

COURSE OUTCOMES

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

1. *List the Selection of Engineering materials and Mechanical Handling Equipments.*
2. *Apply Automation, CAD, CAM and CIM in the manufacturing.*
3. *Explicate the various Industrial Robot applications.*
4. *Classify various Machining processes like NC, CNS and DNC system and determine the best suitable process to machine a component.*
5. *Recognize the different parts of the automobile system and know the importance of IC Engines in automobiles.*
6. *Distinguish various types of Refrigeration and Air conditioning systems.*

UNIT-I
Materials Selection Process: Mechanical properties of materials, Materials classification: metals, ceramics, Polymers, Biomaterials, Materials selection process steps.
Mechanical Handling Equipment- Introductions to belts, conveyors, power transmission devices.

UNIT-II
CAD/CAM: Role of computers in manufacturing - CAD, Design process – CAM - CIM, Scope of CIM - Advantages - Benefits.
Introduction to Automation: Automation, Need - Types - Basic Elements - Strategies and Levels of Automation.

UNIT-III
Introduction to Industrial Robotics: Classification of Robot Configurations, functional line diagram - Principle components - Degrees of freedom – Joints - Advantages, Applications.

Machine Tools: Conventional Machine Tools, Types - Traditional Vs NC machining – Advanced Machine Tools, Classifications - NC, CNC and DNC systems – Advantages, Disadvantages.

UNIT-IV
I.C. Engines- Definition of Engine and Heat Engine, I.C Engine Classification –Parts of an IC Engine, Working of Two Stroke and Four Stroke Engines.
Automobile Engineering: Layout of Automobile, Types, Components - Vehicle chassis, frame and body construction.

UNIT-V
Refrigeration: Introduction to Refrigeration- Classifications of Refrigeration systems-Vapour compression and Vapour absorption systems.
Air conditioning: Introduction to Air conditioning - Classifications of Air conditioning systems-window air conditioning system, split conditioning system, Central air conditioning system.

TEXT BOOKS
1. Mikel P.Groover *Automation, Production systems and Computer Integrated Manufacturing Systems, Pearson Higher Education, Inc., 3rd Edition, 2014.*
2. R. K. Rajput, *Engineering Materials and Metallurgy*, S. Chand Publishers, 3rd Edition, 2008.
3. C.P. Arora & Domkundwar, *Refrigeration and Air conditioning*, McGraw Hill, 3rd Edition, 2010.

REFERENCES
1. Kirpal Singh, *Automobile Engineering,* Vol.1 & Vol.2, Standard Publishers Distributors, 13th Edition, 2013
2. R.K.Rajput, *Thermal Engineering*, Laxmi Publications, 6th Edition, New Delhi, 2010.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 17th edition, 2012

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(20EC0452) ELEMENTS OF EMBEDDED SYSTEMS
(Open Elective Course (OEC-II)

COURSE OBJECTIVES

The objectives of this course is to

1. *Understand the fundamental concepts of embedded systems.*
2. *Learn the core of embedded systems.*
3. *Learn to program the open source electronics.*
4. *Understand the principles of Internet of Things (IoT).*
5. *Understand the concepts of Internet of Things (IoT).*

COURSE OUTCOMES

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

1. *Differentiate between general computing system and the embedded system, also recognize the classification of embedded systems.*
2. *Enumerate and describe the components of an embedded system.*
3. *Learn about open source electronics platform.*
4. *Program an embedded system by interfacing sensors & actuators.*
5. *Identify the basic building blocks of Internet of Things and characteristics.*
6. *Implement their own ideas in various application areas of Embedded systems and IoT.*

UNIT – I

Introduction to Embedded Systems: Definition –Embedded systems vs General computing systems – History – Classification – Purpose - Major application areas – Characteristics – Architecture of embedded system – CPU, RAM & ROM, timers, clocks, address bus & data bus – overview of design process of embedded systems – programming languages and tools for embedded design.

UNIT – II

Typical Embedded System: Core of the embedded system– RISC vs CISC design philosophy– Memory – Harvard and Von-Neuman architecture–sensors and actuators– Other system components – reset, brownout protection, oscillator, RTC, Watch dog timer. Embedded firmware.

UNIT – III

Communication: Communication Interfaces – Onboard (I2C, SPI, UART, 1-wire interface, parallel interface), External (RS-232 & RS-485, USB, IEEE 1394, IrDA, Bluetooth, Wi-Fi, ZigBee, GPRS.

UNIT – IV

Designing of Embedded Systems with Arduino Microcontrollers: Introduction to Arduino platform– Overview of Arduino UNO board–ATMega328/P Block diagram–Pin functions– Introduction to Arduino programming –Interfacing & programming sensors –Interfacing & programming actuators Interfacing & programming serial communication devices.

UNIT – V

Introduction to IOT: Introduction to Internet of Things– reference architecture of IoT– Internet principles – IP addresses, MAC addresses, TCP and UDP ports– Application layer protocols– Data protocols– MQTT, XMPP, CoAP– challenges of IoT, Case studies demonstrating IoT – Home automation, cities, Environment, Agriculture.

TEXT BOOKS

1. Shibu K V, *Introduction to Embedded systems,* Tata McGraw-Hill Education, 1st Edition, 2009.
2. Raj Kamal, *Embedded systems,* Tata McGraw-Hill Education, 2nd Edition, 2011.
3. Arshdeep Bahga, Vijay Madisetti, *Internet of Things: A Hands-On Approach,* Universities Press/Orient Black Swan Pvt. Ltd, 1st Edition, 2015.

REFERENCES

1. Adrian McEwen & Hakim Cassimally, *Designing of Internet of Things*, John Wiley and sons Ltd, 1st Edition, 2014.

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(20CS0551) JAVA PROGRAMMING
(Open Elective Course (OEC-II)

COURSE OBJECTIVES

The objectives of this course:

1. *Introduce standard tools and techniques for software development.*
2. *Understand the object oriented approach for automated software build process.*
3. *Introduce the concepts of AWT framework.*

COURSE OUTCOMES (COs)

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

1. *Implement simple abstract data types and design abstraction functions.*
2. *Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.*
3. *Apply object-oriented design patterns for problem solving.*
4. *Implement Exception handling with synchronization.*
5. *Execute programs on Multithreading and String handling concepts.*
6. *Design applications with an event-driven graphical user interface.*

UNIT- I

The Java Language: Importance of Java -Programming Paradigms -The History and Evolution of Java -Java Byte Code.

Introduction of OOP: Abstraction, Encapsulation, Inheritance, Polymorphism-Understanding static -Varargs -Data Types -Type Casting -Java Tokens - Java Statements - Arrays.

UNIT- II

Introducing Classes –Class Fundamentals -Declaring Objects -Introducing Methods Introduction to Constructors -Garbage Collection-Introducing final -Inheritance - Method Overriding -abstract classes -Packages and Interfaces

UNIT- III

Exception Handling - Exception Fundamentals - Exception Types -Uncaught Exceptions - Using try and catch - Nested try Statements -throw -throws –finally -Creating Your Own Exception Subclasses - Chained Exceptions.

UNIT-IV

Multithreaded Programming - The Java Thread Model -Thread Priorities -The Thread Class and the Runnable Interface - Creating Multiple Threads -Using isAlive( ) and join( ) – Synchronization- String Handling.

UNIT- V

Generics-A simple Generic Example-General form of Generic class -Generic Interfaces Collection Framework-Collections overview, Collection class, Collection interfaces.

Introducing the AWT - Using AWT Controls-Layout Managers -Introducing Swing - Exploring Swing.

TEXT BOOKS

1. Herbert Schildt, *The Complete Reference Java,* Eighth Edition, McGraw Hill.
2. Y Daniel Liang, *Introduction to Java programming* — Que E &T.

REFERENCES

1. P.J. Deitel and H.M. Deitel, *Java for Programmers,* Pearson education.
2. Bruce Eckel, *Thinking in Java*, Pearson Education.

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(20HS0814) INTELLECTUAL PROPERTY RIGHTS
(Open Elective Course (OEC-II)

COURSE OBJECTIVES

1. *To provide an understanding of the concept and significance of intellectual property rights.*
2. *To understand the concept of trademarks, copy rights, patents and the need for their protection.*
3. *To comprehend the concept of competition, unfair competition and the latest developments in the laws pertaining to intellectual property rights.*

COURSE OUTCOMES (COs)

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

1. *Become aware of intellectual property rights, concepts, treaties, agencies and international organizations involved in sanctioning IP rights.*
2. *Identify different types of intellectual properties, ownership rights and the scope of the protection.*
3. *Get an adequate knowledge on patents, trademarks, copy rights and to get property rights for their intellectual work.*
4. *Able to identify, apply, and assess ownership rights, registration processes for IP rights.*
5. *To discern the approaches for intellectual property management and intellectual property audits.*
6. *Demonstrate knowledge and understanding on unfair competition and latest developments in IP rights at international level.*

UNIT-I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of Patents: Foundation of patent law, patent searching process, ownership rights

and transfer

UNIT-IV
Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secret elitigation.
Unfair Competition: Misappropriation right of publicity, False advertising.

UNIT-V
New Development Of Intellectual Property: new developments in trade mark law; copy right law, patent law, intellectual property audits -International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS
1. *Intellectual property right*, Deborah, E. Bouchoux, Cengage learning
2. *Intellectual property rights: Protection and Management.* India, Nityananda KV, Cengage Learning India Private Limited.

REFERENCES
1. *Intellectual property right - Unleashing the knowledge economy*, Prabuddha ganguli, Tata McGraw Hill Publishing Company Ltd.
2. *Law relating to Intellectual Property rights.* India. Ahuja VK IN: Lexis Nexis
3. *Intellectual Property Rights,* India. Neeraj P &Khushdeep D, PHI learning pvt limited.

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(20CE0128) ENVIRONMENTAL ENGINEERING LAB

COURSE OBJECTIVES

The objectives of this course

1. *The laboratory provides knowledge of estimating various parameters like pH, Chlorides, Hardness and Alkalinity in water*
2. *For effective water treatment, the determination of optimum dosage of coagulant and chloride demand is also included*
3. *The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD of effluent*

COURSE OUTCOMES (COs)

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

1. *Describe and use the water and wastewater sampling procedures and sample preservations*
2. *Conduct the physical tests on drinking water and compare the result with standards*
3. *Perform the test on drinking water to estimate various chemical constituents*
4. *Conduct test on drinking water to access biological contamination*
5. *Perform the total solids test to estimate the level of contamination of waste water*
6. *Decide the optimal coagulant dose required to treat water*

LIST OF EXPERIMENTS

1. Determination of pH
2. Determination of Conductivity
3. Determination of Acidity of Water
4. Determination of Alkalinity of Water
5. Determination of Chlorides
6. Determination of Hardness of Water
7. Determination of Residual Chlorine
8. Determination of Dissolved Oxygen
9. Determination of Biochemical Oxygen Demand
10. Conducting Jar test for determining optimum dosage of coagulant
11. Determination of Total Solids, Total Dissolved Solids & Settle able Solids

Any eight experiments may be conducted

TEXT BOOKS
1. Sawyer, C.N., McCarty, P.L. & Parkin, G.F., *Chemistry for Environmental Engineering,* McGraw Hill India, Fifth Edition,2017
2. Mathur, R.P, *Water & Wastewater Testing Lab Manual*, Roorkee

REFERENCES
1. *Standard Methods for the Examination of Water and Wastewater*, A.P.H.A., American Public Health Association
2. Lab Manual, *ISO 14001 Environmental Management,* Regulatory Standards for Drinking Water and Sewage disposal
3. Dr.G. Kotaiah and Dr.N. Kumara Swamy, *Environmental Engineering Lab Manual*, Charotar Publishers, Anand

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(20CE0129) COMPUTER AIDED DESIGN FOR CIVIL ENGINEERING APPLICATIONS

COURSE OBJECTIVES

1. *To introduce students to various Civil Engineering open source software*
2. *To train students to on various analysis and design problems in Civil Engineering*

COURSE OUTCOMES (COs)

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

1. *Work on spread sheets to address various civil engineering applications*
2. *Perform earthwork calculations, concrete mix design and equipment costing using Excel*
3. *Design traffic signal system using VISSIM*
4. *Design storm water runoff system using SWMM*
5. *Design combined and sanitary sewers using SWMM*
6. *Analyse the water distribution water*

LIST OF SKILLS

1. Design of Traffic Signal System
2. Earthwork Calculations
3. Design of Storm water runoff
4. Design of Combined and Sanitary Sewers
5. Analysis of Water Distribution Network
6. Concrete Mix Design
7. Equipment Costing

SOFTWARE REQUIRED:

1. MS Excel
2. VISSIM
3. SWMM
4. EPANET

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(20CE0130) CIVIL ENGINEERING LAB (VIRTUAL LAB)

COURSE OBJECTIVES

1. To introduce student to virtual lab environment

COURSE OUTCOMES (COs)

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

1. *Conduct Brinell Hardness Test, Rockwell Hardness Test and Vickers Hardness test on the same metal and report different hardness values.*
2. *Study Fatigue and Creep test in virtual labs and report observations*
3. *Reynold's Experiment and give observations on different types of flows*
4. *Find out bursting pressure of a pipe*
5. *Conduct BOD & COD test in virtual environment on wastewater sample.*
6. *Determine optimum dose of Alum*

LIST OF EXPERIMENTS

Following experiments are conducted in virtual environment:
1. Brinell, Rockwell and Vickers Hardness Tests
2. Fatigue and Creep Tests
3. Reynold's Experiment
4. Bursting of Pipe
5. BOD & COD Tests
6. Optimum Dose of Alum

REFERENCES

1. Virtual Labs - Civil Engineering (vlab.co.in)

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(20HS0859) ENGLISH FOR CORPORATE COMMUNICATION SKILLS LAB

COURSE OBJECTIVES

The objective of this course is to

1. Improve the students' fluency in English, through a well-developed vocabulary

2. Enable those listening spoken English at normal conversational speed by English speakers

3. Respond appropriately in different social-cultural and professional contexts

4. Develop drafting skills among the students.

5. Develop Inter-personal and Intra-personal Skills

COURSE OUTCOMES

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

1. Use fluency in English for all kinds of professional communication

2. Enhancing job required skills for getting success in their professions

3. Improving Effective Speaking Abilities for their business or professional correspondence

4. Prepare effective Interview techniques to get job in the present scenario

5. Using the appropriate skills in all kinds of professional activities

6. Use effective communicative approaches by preparing job application, report and other kinds of spoken and written correspondences.

UNIT I
COMMUNICATIVE COMPETENCY

1. Functional English
2. Reading Comprehension
3. Vocabulary for competitive purpose
4. Spotting Errors

UNIT II
TECHNICAL WRITING

5**.** Cover Letter
6. Curriculum vitae
7. Report writing

UNIT III
PRESENTATIONAL SKILLS

8. Impromptu Speech
9. Oral presentation
10. Power point presentation
11. Poster presentation

UNIT IV
CORPORATE SKILLS
12. Problem Solving
13. Team Work
14. Leadership Skills

UNIT V
GETTING READY FOR JOB
15. Group Discussion
16. Interview skills

Minimum requirements for English for Corporate Communication Skills 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. English for Corporate Communication Skills Lab with 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. Effective Tech Communication, Rizvi, Tata McGraw – Hill Education, 2007.
2. Communication skills, Sanjay Kumar & Pushpalatha, Oxford University Press, 2012.
3. Writing Tutor. Advanced English Learners' Dictionary, 9th Edition, Oxford University Press, 2015.
4. Powerful Vocabulary Builder, Anjana Agarwal, New Age International Publishers, 2011.
5. Listening Extra, Miles Craven, Cambridge University Press, 2008.

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

III B.Tech – II Sem.

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(20HS0801) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES

The objectives of this course is to

1. *Identify environmental problems arising due to engineering and technological activities and the science behind those problems.*
2. *Identify the importance of interlinking of food chains.*
3. *Learn about various attributes of pollution management and waste management practices.*

COURSE OUTCOMES (COs)

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

1. *Recognize the physical, chemical and biological components of the earth's systems and show how they function.*
2. *Characterize and analyze human impacts on the environment.*
3. *Integrate facts, concepts and methods from multiple disciplines and apply to environmental Problems.*
4. *Create informed opinions about how to interact with the environment on both a personal and a social level.*
5. *Perform independent research on human interactions with the environment.*
6. *Recognize the ecological basis for regional and global environmental issues*

UNIT – I

Introduction: Definition, Scope and Importance of environmental science, Need for Public Awareness

Natural Resources: Forest resources: Use and over-exploitation, deforestation, Mining, dams and their effects on forests and tribal people.

Water Resources: Use and over utilization of surface and ground water- Floods, drought, conflicts over water, dams' benefits and problems

Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral Energy resources: Renewable and Non- Renewable sources of energy. Solar energy, Hydro electrical energy, Wind energy, Nuclear energy

UNIT-II

Ecosystems: Concept of an ecosystem, structure and function of an ecosystem. Producers, Consumers and Decomposers. Biogeochemical cycles, Ecological succession, energy flow in an ecosystem, Food chains, food webs and ecological pyramids. Types of ecosystems (a) Forest ecosystem, (b) Grassland ecosystem, (c) Desert ecosystem, (d) Aquatic ecosystem.

UNIT-III

Biodiversity and its Conservation: Introduction, Definition, genetic, species and ecosystem diversity, Bio-geographical classification of India, India as a Mega diversity Nation, Hot spots of biodiversity, Value of biodiversity, Threats to biodiversity, Endemic, Endangered and Extinct species of India, In-Situ and Ex-situ conservation of biodiversity.

UNIT-IV

Environmental Pollution and Global Environmental Issues

Natural Disasters: Droughts, Floods, Cyclone, Landslides, Earthquake.

Pollution episodes: Air pollution, Water pollution, Land pollution, Noise pollution, Automobile, Nuclear pollution. Global warming, Acid rain, Ozone layer depletion and controlling measures

Global Environmental Issues: Population Growth, Urbanizations, Land Management, Water and Waste Water Management. Climate change and impacts on human environment

Solid Waste Management: causes, effects and control measures of Municipal solid wastes. E-waste and management, Role of an individual in prevention of pollution

UNIT-V

Environmental Legislations, Laws, Policies for Sustainable Development: Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water Act. Wildlife protection Act, Forest conservation Act. Municipal Solid Waste management International conventions/Protocols Earth summit, Kyoto protocol and Montreal Protocol Unsustainable to sustainable development, Role of NGO's for Sustainable development. Role of IT in Environment, GIS methods for Sustainable development

Field Work- visit to a local area to document environmental assets, river ,forest, grassland/hill, mountain and polluted sites (urban/rural/industrial/Agriculture).study simple ecosystems.

TEXT BOOKS

1. A.Kaushik and C.P.Kaushik, Environmental Sciences, 5th edition, New Age international publishers, 2015.
2. M.Anji Reddy, Text Book of Environmental Science and Technology, BS Publications, 2016.

REFERENCES

1. Anil Kumar and Arnab Kumar De, Environmental Studies, New Age International Publishers, New Delhi, 3rd Edition 2015.
2. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances andStandards", Vol.I and II, Enviro Media, 2016.
3. Rajagopalan.R, "Environmental Studies-From Crisis to Cure", Oxford University Press, 2005.