MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE

MADANAPALLE

(UGC-AUTONOMOUS)

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DEPARTMENT OF CIVIL ENGINEERING

Course Structure

&

Detailed Syllabi

For the students admitted to

B. Tech. Regular Four Year Degree Programme from the Academic Year 2023-24

and

B. Tech. Lateral Entry Scheme from the Academic Year 2024-25

DEPARTMENT OF CIVIL ENGINEERING

MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE, MADANAPALLE

B. Tech Four Year Curriculum Structure

Branch: CIVIL ENGINEERING

Total Credits	160 Credits for 2023(Regular) & 120 Credits 2024(Lateral Entry) Admitted Batch onwards

I. Induction Program and Holistic Development Activities

Sl.No	Title	Duration
1	Induction Program (Mandatory)	Three weeks' duration at the start of First Year

R23 - Curriculum Structure
I Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	23ENG101	Communicative English	2	0	0	2	2
2	BSC	23MAT101	Linear Algebra and Calculus	3	0	0	3	3
3	BSC	23CHE101	Engineering Chemistry	3	0	0	3	3
4	ESC	23CME101	Basic Civil and Mechanical Engineering	3	0	0	3	3
5	ESC	23CSE101	Introduction to Programming	3	0	0	3	3
6	BSC	23ENG201	Communicative English Laboratory	0	0	2	2	1
7	BSC	23CHE201	Engineering Chemistry Laboratory	0	0	2	2	1
8	ESC	23CSE201	Computer Programming Laboratory	0	0	3	3	1.5
9	ESC	23ME201	Engineering Workshop	0	0	3	3	1.5
10	HSMC	23HUM201	Health and Wellness, Yoga and Sports	-	-	1	1	0.5
Total				**14**	**0**	**11**	**25**	**19.5**

I Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BSC	23MAT102	Differential Equations and Vector Calculus	3	0	0	3	3
2	BSC	23PHY101	Engineering Physics	3	0	0	3	3
3	ESC	23EEE101	Basic Electrical and Electronics Engineering	3	0	0	3	3
4	ESC	23ME101	Engineering Graphics	1	0	4	5	3
5	PCC	23CE101	Engineering Mechanics	3	0	0	3	3
6	BSC	23PHY201	Engineering Physics Laboratory	0	0	2	2	1
7	ESC	23EEE201	Electrical and Electronics Engineering Workshop	0	0	3	3	1.5
8	ESC	23CSE202	IT Workshop	0	0	2	2	1
9	PCC	23CE201	Engineering Mechanics and Building Practices Laboratory	0	0	3	3	1.5
10	HSMC	23HUM202	NSS / NCC / Scouts and Guides / Community Service	-	-	1	1	0.5
Total				**13**	**0**	**15**	**28**	**20.5**

(L = Lecture, T = Tutorial, P = Practical, C = Credit

R23 - Curriculum Structure
II Year I Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	23HUM101	Universal Human Values	2	1	0	3	3
2	BSC	23MAT103	Probability and Statistics for Engineers	3	0	0	3	3
3	ESC	23CE102	Strength of Materials	3	0	0	3	3
4	PCC	23CE103	Surveying	3	0	0	3	3
5	PCC	23CE104	Fluid Mechanics and Hydraulics	3	0	0	3	3
6	PCC	23CE202	Surveying Laboratory	0	0	3	3	1.5
7	PCC	23CE203	Strength of Materials Laboratory	0	0	3	3	1.5
8	SEC	23CE601	Building Planning and Drawing	1	0	2	3	2
9	AUC	23CHE901	Environmental Science	2	0	0	2	-
Total				**17**	**1**	**8**	**26**	**20**

II Year II Semester

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	23HUM102	Economics and Financial Accounting For Engineers	2	0	0	2	2
2	ESC		Design Thinking and Innovation Related Courses (Refer ANNEXURE - II)	1	0	2	3	2
3	PCC	23CE105	Engineering Hydrology	3	0	0	3	3
4	PCC	23CE106	Concrete Technology	3	0	0	3	3
5	PCC	23CE107	Structural Analysis	3	0	0	3	3
6	PCC	23CE108	Environmental Engineering	3	0	0	3	3
7	PCC	23CE204	Concrete Technology Laboratory	0	0	3	3	1.5
8	PCC	23CE205	Fluid Mechanics and Hydraulics Laboratory	0	0	3	3	1.5
9	SEC	23CE602	Remote Sensing and Geographical Information Systems	1	0	2	3	2
Total				**16**	**0**	**10**	**26**	**21**

(L = Lecture, T = Tutorial, P = Practical, C = Credit

ANNEXURE - I

THREE WEEK MANDATORY INDUCTION PROGRAMME

- Yoga and Meditation
- Sports and Games
- NSS
- NCC
- MITS Social Responsibility Club
- Management module
- Design Thinking
- Spoken and Written Communication

- ***Proficiency modules***

  - Basic Computer Proficiency
  - Interpersonal skills
  - Computer Graphics
  - Web programming
  - Mobile Apps
  - Vocabulary enhancement

HOLISTIC DEVELOPMENT ACTIVITIES

Description of Activities

1. Physical and Health
2. Culture
3. Literature and Media
4. Social Service
5. Self-Development
6. Nature and Environment
7. Innovation

ANNEXURE - II

DESIGN THINKING AND INNOVATION RELATED COURSES (To be offered under MOOC's Category from SWAYAM – NPTEL)		
Sl. No.	**Course Code**	**Course Title**
1	23IIC5M01	Design, Technology and Innovation
2	23IIC5M02	Introduction on Intellectual Properties to Engineers and Technologists
3	23IIC5M03	Product Engineering and Design Thinking
4	23IIC5M04	Intellectual Property Rights and Competition Law
5	23IIC5M05	Innovation, Business Model and Entrepreneurship
6	23IIC5M06	Understanding Incubation and Entrepreneurship
Any new Innovation and Incubation Course offered by SWAYAM NPTEL can be appended in future.		

I Year I Semester

B. Tech I Year I Semester

23ENG101 COMMUNICATIVE ENGLISH

L	T	P	C
2	0	0	2

Pre-requisite: None

Course Objectives:

The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

UNIT I Lesson: HUMAN VALUES: Gift of Magi (Short Story) 9 hours

Listening: Identifying the topic, the context and specific pieces of information by listeningto short audio texts and answering a series of questions.

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 ofinformation.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II Lesson: NATURE: The Brook by Alfred Tennyson (Poem) 9 hours

Listening: Answering a series of questions about main ideas and supporting ideas afterlistening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structuretalks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to linkthe ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics)

Grammar: Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT III Lesson: BIOGRAPHY: Elon Musk 9 hours

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what

isdiscussed

Reading: Readinga text in detail by making basic inferences -recognizing and interpretingspecific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT IV Lesson: INSPIRATION: The Toys of Peace by Saki 9 hours

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT V Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay) 9 hours

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Course Outcomes:

CO1: Understand the topic, context, and pieces of specific information from personal , professional and social situations

CO2: Apply discourse markers to speak clearly in formal discussions

CO3: Analyze and apply grammatical structures to formulate contextualized phrases and sentences

CO4: Analyze texts and images to write summaries based on global comprehension

CO5: Draft coherent paragraphs and structured essays

Text Books:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources

Grammer

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23MAT101 LINEAR ALGEBRA AND CALCULUS

L	T	P	C
3	0	0	3

Course Objectives:

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.

UNIT I MATRICES 9 hours

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of non-singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

UNIT II EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION 9 hours

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem,Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonicalforms by Orthogonal Transformation.

UNIT III CALCULUS 9 hours

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT IV PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS) 9 hours

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functionsof two variables, method of Lagrange multipliers.

UNIT V MULTIPLE INTEGRALS (MULTI VARIABLE CALCULUS) 9 hours

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

Course Outcomes:

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

CO1: Solve the system of linear equations and apply the matrix algebra techniques in practical applications.

CO2: Utilize the Eigenvalues, Eigenvectors and applications of diagonalization in the field of Science and Technology.

CO3: Relate the results of mean value theorems in real life problems.

CO4: Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.

CO5: Compute the area and volume by interlinking them to appropriate double and triple integrals.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition

2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14^{th} Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, AlphaScience International Ltd., 2021 5^{th} Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5^{th}Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9^{th}edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23CHE101 ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

UNIT I WATER TECHNOLOGY 9 hours

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolved Oxygen - Boiler troubles –Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment – Ion-exchange processes - desalination of brackish water, reverse osmosis (RO), electrodialysis and Specifications for drinking water as per BIS and WHO standards.

UNIT II ELECTROCHEMISTRY AND APPLICATIONS 9 hours

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Zinc-air battery, Sodium-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium-ion batteries- working principle of the batteries including cell reactions; Fuel Cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.
Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III POLYMERS AND FUEL CHEMISTRY 9 hours

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization, Poly Dispersity Index (PDI) & it's significance.
Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC, Nylon 6,6 and Bakelite.
Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.
Fuels – Types of fuels, calorific value of fuels, numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum, Octane and Cetane number- alternative fuels- propane, methanol, ethanol and bio fuel-bio diesel.

UNIT IV MODERN ENGINEERING MATERIALS 9 hours

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications
Refractories- Classification, Properties, Factors affecting the refractory materials and Applications.
Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.
Building materials- Portland Cement, constituents, Setting and Hardening of cement (with chemical reactions).

UNIT V SURFACE CHEMISTRY AND NANOMATERIALS 9 hours

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Braggs Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents,

Adsorption isotherm (Freundlich and Langmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Course Outcomes:

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

CO1: Explain the estimation of impurities present in water like hardness and softening of impure water.

CO2: Explain the working principles of batteries & demonstrate the corrosion prevention methods and factors affecting corrosion

CO3: Explain the preparation, properties, and applications of thermoplastics, thermosetting, elastomers & conducting polymers & explain calorific values, octane number, refining of petroleum and cracking of oils.

CO4: Explain the setting and hardening of cement, properties of composites, lubricants & refractories.

CO5: Summarize the concepts of colloids, micelle and nanomaterials.

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.

2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e,Oxford University Press, 2010.

3. G V Subba Reddy, K N Jayaveera, C Ramachandraiah, Engineering Chemistry, McGraw-Hill; First Edition, 2019.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.

2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.

3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23CME101 BASIC CIVIL AND MECHANICAL ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives:

- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
- Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation's economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

PART A: BASIC CIVIL ENGINEERING

UNIT I BASICS OF CIVIL ENGINEERING 8 hours

Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNIT II SURVEYING 8 hours

Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

UNIT III TRANSPORTATION ENGINEERING 8 hours

Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Course Outcomes:

CO1: Identify various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Measure of distances, angles and levels through surveying.

CO3: Identify various transportation infrastructures, sources of water and various water conveyance, storage structures like dams and reservoirs.

Text Books:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt.Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers.2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. FifthEdition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, KhannaPublishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, KhannaPublishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

UNIT I **8 hours**

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries andSociety-Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II **8 hours**

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III **8 hours**

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants. Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Course Outcomes:

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

CO1: Understand the role and importance of mechanical engineering and engineering materials

CO2: Identify the different manufacturing processes for engineering applications and explain the basics of thermal engineering and its applications.

CO3: Explain the working of different mechanical power transmission systems, power plants and robotics.

Text Books:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India)Pvt. Ltd.

2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications,(India) Pvt. Ltd.

3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengagelearning India Pvt. Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I

2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak MPandey, Springer publications

3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt.Ltd.

4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, TataMcGraw Hill publications (India) Pvt. Ltd.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23CSE101 INTRODUCTION TO PROGRAMMING

L	T	P	C
3	0	0	3

Course Objectives:

- Comprehensive knowledge to computer systems, programming languages, and problem-solving techniques.
- Know the concept of control structures and their usage in programming.
- Introduce to the arrays, memory models, and basic string concepts
- Gain a knowledge from the concept of functions, including declaration, definition, and various aspects of function usage.
- Acquire the advanced programming concepts, including user-defined data types, pointers, and file handling.

UNIT I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING **9 hours**

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting. Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II CONTROL STRUCTURES **9 hours**

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

UNIT III ARRAYS AND STRINGS **9 hours**

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings, String Operations and String functions.

UNIT IV POINTERS & USER DEFINED DATA TYPES **9 hours**

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions, Dynamic memory allocation.

UNIT V FUNCTIONS & FILE HANDLING **9 hours**

Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling

Note: The syllabus is designed with C Language as the fundamental language of implementation**.**

Course Outcomes:

A student after completion of the course will be able to

CO1: Illustrate the basic computer concepts and programming principles of C language.

CO2: Develop programs using various control structures in 'C'.

CO3:Design applications using arrays and basic string manipulation.

CO4: Demonstrate the applications of pointers, user-defined types and dynamic memory allocation.

CO5: Design various applications using functions and file concepts.

Text Books:

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg,Prasad, CENGAGE, 3rd edition.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-HillEducation, 2008.

2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition

3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988

4. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education,1996

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23ENG201 COMMUNICATIVE ENGLISH LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews.

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Course Outcomes:

CO1: Understand the English speech sounds, stress, rhythm, intonation and syllabic division for better listening and speaking
CO2: Apply communication strategies and implement them in language learning activities.
CO3: Analyze and enhance job-relevant writing skills
CO4: Evaluate and exhibit professionalism in debates and group discussions.
CO5: Make effective presentations by developing public speaking abilities

Suggested Software:

1. Walden Infotech
2. Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India,2016
3. Hewing's, Martin. Cambridge *Academic English* (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed),Kindle, 2013

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year I Semester

23CHE201 ENGINEERING CHEMISTRY LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

- To verify the fundamental concepts with experiments

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter
13. Determination of Viscosity of a solution using Ostwald's Viscometer
14. Determination of cell constant and conductance of solutions

Course Outcomes:

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer materials.

CO3: Determine the physical properties like adsorption and viscosity.

CO4: Estimate the Iron and Calcium in cement.

CO5: Calculate the hardness of water.

Reference Books:

1. Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

2. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year I Semester

23CSE201 COMPUTER PROGRAMMING LABORATORY

L	T	P	C
0	0	3	1.5

Course Objectives:

- Provide hands-on experience in programming fundamentals, algorithm design, and basic problem-solving techniques.
- Enable students to implement control structures for program flow control in practical scenarios.
- Reinforce understanding of arrays, memory models, and string manipulation through practical exercises
- Provide hands-on practice with functions, function calls, and parameter manipulation using pointers.
- Offer practical exposure to advanced programming concepts, including user-defined data types, file handling, and pointer operations.

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writingthe first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
ii) Exposure to Turbo C, gcc
iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a seriesof finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers
ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:
Lab 3: Simple computational problems using arithmetic expressions.
Problems to Practice:

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT II

WEEK 4
Objective: Explore the full scope of expressions, type-compatibility of variables & constantsand operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:
Lab4: Write C program to solve Simple computational problems using the operator' precedence and associativity
Problems to Practice:

i) Evaluate the following expressions.
    a. A+B*C+(D*E) + F*G
    b. A/B*C-B+A*D/3
    c. A+++B---A
    d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5
Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Write C program for Problems involving if-then-else structures.
Problems to Practice:

i) Write a C program to find the max and min of four numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6
Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when

eachof these statements is more appropriate to use.
Suggested Experiments/Activities:
Tutorial 6: Loops, while and for loops
Lab 6: Write a C program for Iterative problems e.g., the sum of series
Problems to Practice:

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT III

WEEK 7:
Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:
Tutorial 7: 1 D Arrays: searching.
Lab 7:Write a C program to solve 1D Array manipulation, linear search
Problems to Practice:

i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8:
Objective: Explore the difference between other arrays and character arrays that can be usedas Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:
Tutorial 8: 2 D arrays, sorting and Strings.
Lab 8: Write a C program to solve Matrix problems, String operations, Bubble sort
Problems to Practice:

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gainexperience processing command-line arguments received by C

Suggested Experiments/Activities:
Tutorial 9: Pointers, structures and dynamic memory allocation
Lab 9: Write a C program for Pointers and structures, memory dereference.
Problems to Practice:

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details alongwith the total.
v) Write a C program to implement realloc()

WEEK 10:

Objective: Experiment with C Structures, Unions, bit fields and self-referential structures(Singly linked lists) and nested structures

Suggested Experiments/Activities:
Tutorial 10: Bitfields, Self-Referential Structures, Linked lists
Lab10 : Bitfields, linked lists
Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the samewithout using bit- fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bitfields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent,
Lab 11: Write a C program to solve Simple functions using call by value, solving differential equations using Eulers theorem.

Problems to Practice:

i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.

iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Euler'smethod

WEEK 12:

Objective: Explore how recursive solutions can be programmed by writing recursive functionsthat can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Write C program for Recursive functions.

Problems to Practice:

i) Write a recursive function to generate Fibonacci series.
ii) Write a recursive function to find the lcm of two numbers.
iii) Write a recursive function to find the factorial of a number.
iv) Write a C Program to implement Ackermann function using recursion.
v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Write a C program to solve Simple functions using Call by reference, Dangling pointers.

Problems to Practice:

i) Write a C program to swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem using a C program.
iii) Write a C program to copy one string into another using pointer.
iv) Write a C program to find no of lowercase, uppercase, digits and othercharacters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore thedifferences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: Write a C program to handle File operations.

Problems to Practice:

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() and fwrite()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-linearguments.
v) Find no. of lines, words and characters in a file.
vi) Write a C program to print last n characters of a given file.

Course Outcomes:

CO1: Implement coding and debugging the simple programs, create algorithms, and practice problem solving strategies.

CO2: Demonstrate programs that incorporate conditional statements, loops, and break/continue statements to control program execution.

CO3: Apply coding for real time examples with arrays, array indexing, and manipulate strings in programming tasks.

CO4: Create, call, and debug functions, modify function parameters using pointers, and gain practical knowledge of variable scope within functions.

CO5: Apply user-defined data types, manipulate files, pointer operations to solve real-world programming challenges.

Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.

2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India

2. Byron Gottfried, Schaum's Outline of Programming with C, McGraw Hill

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year I Semester

23ME201ENGINEERING WORKSHOP

L	T	P	C
0	0	3	1.5

Course Objectives:

To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

1. **Demonstration**: Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in woodworking and make following joints.
   a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridlejoint
3. **Sheet Metal Working**: Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
   a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
   a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire punctureand change of two-wheeler tyre
5. **Electrical Wiring**: Familiarity with different types of basic electrical circuits and make the following connections.
   a) Parallel and series b) Two-way switch c) Godown lighting
   d) Tube light e) Three phase motor f) Soldering of wires
6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.
7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

Course Outcomes:

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.

2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, MediaPromoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year I Semester

23HUM201 HEALTH AND WELLNESS, YOGA AND SPORTS

L	T	P	C
0	0	1	0.5

Course Objectives:

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

UNIT I **5 hours**

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index(BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT II **5 hours**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III **5 hours**

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
ii) Practicing general and specific warm up, aerobics
iii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Course Outcomes:

After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning,2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty,
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as manyas Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

I Year II Semester

B. Tech I Year II Semester

23MAT102 DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

L	T	P	C
3	0	0	3

Course Objectives:

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

UNIT I DIFFERENTIAL EQUATIONS OF FIRST ORDER AND FIRST DEGREE **9 hours**

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

UNIT II LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER (CONSTANT COEFFICIENTS) **9 hours**

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III PARTIAL DIFFERENTIAL EQUATIONS **9 hours**

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV VECTOR DIFFERENTIATION **9 hours**

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V VECTOR INTEGRATION **9 hours**

Line Integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

Course Outcomes:

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

CO1: Find the solution of engineering problems formulated in the form of linear first order differential equations.

CO2: Solve the linear higher order differential equations related to various engineering fields.

CO3: Determine the solutions for linear partial differential equations that model the physical processes.

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO5: Estimate the work done against field, circulation and flux using vector calculus.

Text Books:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10thEdition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, PearsonPublishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones andBartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha ScienceInternational Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23PHY101 ENGINEERING PHYSICS

L	T	P	C
3	0	0	3

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

UNIT I WAVE OPTICS 9 hours

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

UNIT II CRYSTALLOGRAPHY AND X-RAY DIFFRACTION 9 hours

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT III QUANTUM MECHANICS AND FREE ELECTRON THEORY 9 hours

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT IV SEMICONDUCTORS 9 hours

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

UNIT V DIELECTRIC AND MAGNETIC MATERIALS 9 hours

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility

and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

Course Outcomes:

CO1: Apply the knowledge of Interference, Diffraction and Polarization techniques for materials testing and explore their applications in both science and technology.

CO2: Explain the crystal structure in terms of atomic positions, unit cells, and crystal symmetry and also relate the crystal symmetry to the symmetry observed in a diffraction pattern.

CO3: Evaluate the Schrodinger wave equations for simple potentials and explain the concept of conductivity of different types of materials.

CO4: Distinguish the semiconductors using Fermi level and identify the type of semiconductors using Hall effect.

CO5: Explain the origin of fundamental magnetic phenomena and types of magnetic materials. Understand the induced fields in dielectrics, and electrical behaviour of dielectrics.

Text Books:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, S. Chand Publications, 11th Edition 2019.

2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.

2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.

3. Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.2010

4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23EEE101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives:

- To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT I DC & AC CIRCUITS **8 hours**

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT II MACHINES AND MEASURING INSTRUMENTS **8 hours**

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III ENERGY RESOURCES, ELECTRICITY BILL & SAFETY MEASURES **8 hours**

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops,Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricitytariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker(MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types,Safety Precautions to avoid shock

Course Outcomes:

After the completion of the course students will be able to

CO1: Infer the basic AC and DC electrical circuits.

CO2: Analyze construction and operation of AC and DC machines, different electrical measuring instruments.

CO3: Illustrate operation of various power generating stations, energy consumption and electrical safety.

Text Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, FirstEdition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti,Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, ThirdEdition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019,Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford UniversityPress, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

UNIT I SEMICONDUCTOR DEVICES 8 hours

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor - CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION 8 hours

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS 8 hours

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of BooleanAlgebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XORand XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

Course Outcomes:

After the completion of the course students will be able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes, transistors, and their applications.

CO3: Analyze logic gates and its applications in design of combinational circuits.

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.

2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.

2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall,India, 2002.

3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,Pearson Education,2009.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23ME101 ENGINEERING GRAPHICS

L	T	P	C
1	0	4	3

Course Objectives:

- To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
- To impart knowledge on the projection of points, lines and plane surfaces
- To improve the visualization skills for better understanding of projection of solids
- To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
- To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

UNIT I **9 hours**

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.
Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.
Scales: Plain scales, diagonal scales and vernier scales.

UNIT II **9 hours**

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.
Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes
Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III **9 hours**

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV **9 hours**

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.
Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V **9 hours**

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

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).

Course Outcomes:

Students will use the Auto CAD software and will be able to

CO1: Construct the geometrical constructions, engineering curves and scales.

CO2: Draw the projections of points, straight lines and planes

CO3: Draw the projections of solids in various positions

CO4: Sketch the sections of solids and developments of surfaces

CO5: Draw the conversion of the isometric views to orthographic views and vice versa.

Text Books:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.

2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.

3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, TataMcGraw Hill, 2017.

Mode of Evaluation: Day-to-day Evaluation, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23CE101 ENGINEERING MECHANICS

L	T	P	C
3	0	0	3

Course Objectives:

- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- To apply the Work-Energy method to particle motion.
- To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

UNIT I **9 hours**

Introduction to Engineering Mechanics– Basic Concepts. Scope and Applications
Systems of Forces: Coplanar Concurrent Forces– Components in Space–Resultant–Moment of Force and its Application –Couples and Resultant of Force Systems.
Friction: Introduction, limiting friction and impending motion, Coulomb'slaws of dryfriction, coefficient of friction, Cone of Static friction.

UNIT II **9 hours**

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces,converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium forSpatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses.

UNIT III **9 hours**

Centroid: Centroids of simple figures (from basic principles)–Centroids of Composite Figures. Centre of Gravity: Centre of gravity of simple body (from basic principles), Centre of gravity of composite bodies, Pappus theorems..
Area Moments of Inertia: Definition– Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.
Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT IV **9 hours**

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion-Impulse Momentum method.

UNIT V **9 hours**

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

Course Outcomes:

On Completion of the course, the student should be able to

CO1: Determine the Resultant force, frictional forces acting on bodies in contact.

CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.

CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.

CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.

CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

Text Books:

1. Engineering Mechanics, S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., , McGraw HillEducation 2017. 5th Edition.
2. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli , Universitypress. 2020. First Edition.
3. A Textbook of Engineering Mechanics, S.S Bhavikatti. New age internationalpublications 2018. 4th Edition.

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw HillEducation. 2017. First Edition.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., PHI, 2002. 4th Edition.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., John Wiley, 2008. 6th Edition.
4. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press,2014. Second Edition
5. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23PHY201 ENGINEERING PHYSICS LABORATORY

L	T	P	C
0	0	2	1

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

List of Experiments:

1. Determination of radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a Compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non-uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.

Note: Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode.

Course Outcomes:

CO1: Know the various phenomena of light practically and gain knowledge about various optical technique methods.

CO2: Verify the theoretical concepts of optics, magnetism and dielectrics by hands on experiment.

CO3: Apply the scientific process in the conduct of semiconductor experiments and report the experimental findings.

CO4: Understand mechanical phenomena by instruments and apply them in real time applications.

CO5: Acquire and interpret experimental data to examine the physical laws.

Web Resources:

www.vlab.co.in
https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype

Reference Books:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.

3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year II Semester

23EEE201 ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

L	T	P	C
0	0	3	1.5

Course Objectives:

To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set,wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that hardware tools and instruments are learned to be usedby the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by thestudents.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
   - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LABORATORY

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Note: Minimum Six Experiments to be performed.

Course Outcomes:

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

CO1: Analyze basic DC circuits.

CO2: Understand the usage of common electrical & electronic measuring instruments.

CO3: Understand the basic characteristics of electrical machines and perform energy calculations.

PART B: ELECTRONICS ENGINEERING LABORATORY

Course Objectives:

- To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifier.
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gatesusing ICs.
8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters,AC Voltmeters, CROs, all the required active devices.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using Hardware / Software.

Course Outcomes:

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

CO1: Plot and discuss the characteristics of various electron devices.

CO2: Explain the operation of a digital circuit.

Reference Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, PearsonEducation, 2021.

2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version,Pearson Education,2009.

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year II Semester

23CSE202 IT WORKSHOP

L	T	P	C
0	0	2	1

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSSTo teach basic command line interface commands on Linux.
- To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

PC Hardware & Software Installation

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Labinstructors should verify the work and follow it up with a Viva. Also students need to go throughthe video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Labinstructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configuredas dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finallystudents should demonstrate, to the instructor, how to access the websites and email. If there isno internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD
Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

EXCEL
Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.
Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP
Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

POWER POINT
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT
Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Course Outcomes:

CO1: Gain expertise in computer hardware, assembly, and dual-boot OS configuration, enhancing their ability to manage and troubleshoot computer systems effectively.

CO2: Learn to connect to the LAN, configure browsers, use search engines effectively, and practice cyber hygiene for secure internet use.

CO3: Create well-formatted documents and presentations using Microsoft Office and Latex

CO4: Gain proficiency in using Excel or its FOSS equivalent for tasks like scheduling, GPA calculation, data manipulation, and formatting.

CO5: Craft effective and tailored inputs to obtain desired responses from AI tools like ChatGPT.

Reference Books:

1. Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech,2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfins on and KenQuamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCOPress, Pearson Education, 3rd edition

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year II Semester

23CE201 ENGINEERING MECHANICS AND BUILDING PRACTICES LABORATORY

L	T	P	C
0	0	3	1.5

Course Objectives:

The students completing the course are expected to

- Verify the Law of Parallelogram of Forces and Lami's theorem.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative Materials.

Students have to perform any 10 of the following Experiments:

List of Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.
6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
9. Field-Visit to understand the Quality Testing - report.
10. Safety Practices in Construction industry
11. Demonstration of Non-Destructive Testing - using Rebound Hammer & UPV
12. Study of Plumbing in buildings.

Course Outcomes:

On completion of the course, the student should be able to:

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.

CO3: Determine the Centre of gravity different configurations

CO4: Perform Quality Testing and Assessment Procedures and principles of Non- Destructive Testing.
CO5: Exposure to safety practices in the construction industry.

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech I Year II Semester

23HUM202 NSS/NCC/SCOUTS AND GUIDES/COMMUNITY SERVICE

L	T	P	C
0	0	1	0.5

Course Objectives:

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

UNIT I ORIENTATION **5 hours**

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II NATURE & CARE **5 hours**

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III COMMUNITY SERVICE **5 hours**

Activities:

i) Conducting One Day Special Camp in a village contacting village-area leaders-Surveyin the village, identification of problems- helping them to solve via media-authorities-experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
v) Any other programmes in collaboration with local charities, NGOs etc.

Course Outcomes:

After completion of the course the students will be able to

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.

CO3: Explore human relationships by analyzing social problems.

CO4: Determine to extend their help for the fellow beings and downtrodden people.

CO5: Develop leadership skills and civic responsibilities.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
2. Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
3. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering",McGraw Hill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. "Introduction to EnvironmentalEngineering and Science", Pearson Education, New Delhi. 2/e 2007

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting vivavoce on the subject.

II Year I Semester

B. Tech II Year I Semester

23HUM101 UNIVERSAL HUMAN VALUES

L	T	P	C
2	1	0	3

Course Prerequisite: None or Universal Human Values I (desirable)

Course Description :

The course has 28 lectures and 14 tutorials in 5 Units. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

Course Objectives: None. Universal Human Values-I (desirable)

The main objectives of the course is to

1. help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure happiness and prosperity in continuity, which are the core aspirations of all human beings.
2. facilitate the development of a Holistic perspective among students towards life and profession based on right understanding of the Human reality, family, society and the rest of nature. Such holistic perspective forms the basis of Universal Human Values (UHV) and movement towards value-based living in a natural way.
3. highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4. aid the students to realize their full human potential and act accordingly.
5. assist the students to live with feeling of relationship, harmony and co-existence.

UNIT I INTRODUCTION TO VALUE EDUCATION 8 hours

Lecture 1: Understanding Value Education
Lecture 2: self-exploration as the Process for Value Education
Tutorial 1: Practice Session PS1 - Sharing about Oneself
Lecture 3: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 - Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations
Tutorial 3: Practice Session PS3 - Exploring Natural Acceptance

UNIT II HARMONY IN THE HUMAN BEING 8 hours

Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 - Exploring the difference of Needs of self and body.
Lecture 9: The body as an Instrument of the self
Lecture 10: Understanding Harmony in the self
Tutorial 5: Practice Session PS5 - Exploring Sources of Imagination in the self
Lecture 11: Harmony of the self with the body
Lecture 12: Programme to ensure self-regulation and Health
Tutorial 6: Practice Session PS6 - Exploring Harmony of self with the body

UNIT III HARMONY IN THE FAMILY AND SOCIETY **10 hours**

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction
Lecture 14: 'Trust' – the Foundational Value in Relationship
Tutorial 7: Practice Session PS7 - Exploring the Feeling of Trust
Lecture 15: 'Respect' – as the Right Evaluation
Tutorial 8: Practice Session PS8 - Exploring the Feeling of Respect
Lecture 16: Other Feelings, Justice in Human-to-Human Relationship
Lecture 17: Understanding Harmony in the Society
Lecture 18: Vision for the Universal Human Order
Tutorial 9: Practice Session PS9 - Exploring Systems to fulfil Human Goal

UNIT IV HARMONY IN THE NATURE/EXISTENCE **8 hours**

Lecture 19: Understanding Harmony in the Nature
Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature
Tutorial 10: Practice Session PS10 - Exploring the Four Orders of Nature
Lecture 21: Realizing Existence as Co-existence at All Levels
Lecture 22: The Holistic Perception of Harmony in Existence
Tutorial 11: Practice Session PS11 - Exploring Co-existence in Existence.

UNIT V IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS **8 hours**

Lecture 23: Natural Acceptance of Human Values
Lecture 24: Definitiveness of (Ethical) Human Conduct
Tutorial 12: Practice Session PS12 - Exploring Ethical Human Conduct
Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order
Lecture 26: Competence in Professional Ethics
Tutorial 13: Practice Session PS13 - Exploring Humanistic Models in Education
Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies
Lecture 28: Strategies for Transition towards Value-based Life and Profession
Tutorial 14: Practice Session PS14 - Exploring Steps of Transition towards Universal Human Order

Course Outcomes:

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

CO1: Understand the Natural Acceptance and basic human aspiration.
CO2: Aware of themselves and self-regulation.
CO3: Recognize human-human relationship (Justice) and identify human goals in the society.
CO4: Appreciate the harmony in the nature and existence.
CO5: Develop as socially and ecologically responsible engineers in handling problems with sustainable solutions (user-friendly and eco-friendly).

Text Books:

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books:

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

Online Learning Resources

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

10. https://uhv.org.in/
11. https://www.youtube.com/@UniversalHumanValues/playlists
12. https://fdp-si.aicte-india.org/index.php

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23MAT103 PROBABILITY AND STATISTICS FOR ENGINEERS

L	T	P	C
3	0	0	3

Course Prerequisite: 23MAT101, 23MAT102

Course Description:

This course provides an introduction to probability, distributions and statistics with applications. Topics include: Conditional probability, Random variables, Probability distributions, Joint densities, Bayesian inference, Hypothesis testing, Confidence intervals, Correlation and linear regression.

Course Objectives:

This course enables students to

1. To revise the elementary concepts of probability and random variables.
2. To analyze and interpret basic summary and modeling techniques for Multi-variate data.
3. To introduce new techniques for carrying out probability calculations and identifying probability distributions.
4. To understand the foundations for statistical inference involving confidence intervals and hypothesis testing.
5. To analyze the statistical experimental designs.

UNIT I PROBABILITY AND RANDOM VARIABLES 9 hours

Introduction to Probability, sample space and events, Axioms of probability, theorems on probability, conditional probability, multiplication theorem and independence of events, Bayes theorem.

Random Variables - Types of Random Variables - Probability Mass Function - Probability Density Function- Distribution Function and its properties. Expectation – Properties of Expected Value - Variance - Moment generating function.

UNIT II PROBABILITY DISTRIBUTIONS 9 hours

Discrete Distributions: Bernoulli trail, Binomial distribution, Poisson approximation to the binomial distribution, Poisson distribution and Hyper geometric distribution –properties.

Continuous Distributions: Uniform, Exponential distribution, Gamma distribution, Normal distribution. Normal probability rule and Chebyshev's inequality

UNIT III JOINT DISTRIBUTIONS 9 hours

Joint Densities and Independence - Marginal Distributions (discrete & continuous)- Expectation and Covariance, Correlation, Conditional densities and Regression, Curves of Regression.

UNIT IV HYPOTHESIS TESTING 9 hours

Population, sampling, formulation of null hypothesis, alternative hypothesis, level of significance, types of errors and power of the test. Large Sample Tests: Test for single mean, single proportion, difference of means, difference of proportions, Confidence interval for parameters in one sample and two sample problems, t test for single mean, difference of means, test for ratio of variances.

UNIT V ANALYSIS OF VARIANCE AND DESIGN OF EXPERIMENTS 9 hours

Analysis of Variance: One-way and two-way classifications. Principles experimental design, Randomized Block Design (RBD) and Latin Square Design.

Course Outcomes:

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

CO1: Understand the probability concepts and their importance in engineering.
CO2: Apply discrete and continuous probability distributions to solve various engineering problems.
CO3: Get an idea about joint density functions, distribution functions to the random variables and analyze the multivariate problems in engineering
CO4: Perform test of hypothesis as well as calculate confidence interval for a population parameter for single sample and two sample cases.
CO5: Analyse the statistical experimental designs for various engineering problems.

Text Books:

1. J.S. Milton and J.C. Arnold, Introduction to Probability and Statistics, 4th edition, 2003 Tata McGraw-Hill Publications.
2. Dr.B.S.Grewal, " Higher Engineering Mathematics", Khanna Publications, 42nd Edition.

Reference Books:

1. Sheldon M. Ross: Introduction to Probability and Statistics for Engineers and Scientists, 4th Edition, Elsevier, Academic Press, 2010.
2. Walpole, R.E., Myers R.H., Myer S.L., Ye. K: Probability and Statistics for Engineers and Scientists, 8th ed., Pearson Education, 2008.
3. Johnson, R.A. Miller Freund's: Probability and Statistics, 7th Edition, PHI, 2005.
4. Sheldon Ross: A First Course in Probability, 6th Edition, Pearson Education, 2002.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23CE102 STRENGTH OF MATERIALS

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand the nature of stresses and strains developed in simple geometries
2. To understand the concepts of failure modes of columns and its strength
3. To understand concept of flexural and shear stresses
4. To understand the effect of torsion on shafts, combined stresses and strains
5. To understand the deflection of various types of beams subjected to different loading Conditions.

UNIT I SIMPLE STRESSES AND STRAINS 9 hours

Concept of stress and strain- Types of stresses and strains- St. Venant's principle, Elasticity and plasticity - Hooke's law - Stress - Strain diagram for mild steel - Working stress - Factor of safety - Lateral strain, Poisson's ratio and volumetric strain - Elastic moduli and the relationship between them - Bars of varying section - composite bars - Temperature stresses. Strain Energy - Resilience - Gradual, sudden, impact and shock loadings - simple applications.

UNIT II SHEAR FORCE AND BENDING MOMENT AND COLUMNS AND STRUTS 9 hours

SHEAR FORCE AND BENDING MOMENT: Concept of Shear Force (SF) and Bending Moment (BM) - SF and BD diagrams for Cantilever and Simply supported and Overhanging beams (One side and both sides) under point load(s) (Vertical and Inclined), part and whole Uniformly Distributed Load(s), Uniformly Varying Load(s) and moment(s) -Calculation of maximum value and its location of SF and BM for all above load cases- Analyzing the basic problems from SF diagram.

COLUMNS AND STRUTS: Axially loaded compression members- Crushing load and Buckling load - Euler's theory for long columns- Rankine's theory- Analyzing the basic problems for Euler's and Rankine's theory.

UNIT III FLEXURAL AND SHEAR STRESSES 9 hours

BENDING STRESSES: Assumptions - Derivation of bending - Neutral axis - Determination of bending stresses - Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle, Channel sections and built-up sections - Design of simple beam sections.

SHEAR STRESSES: Shear Stresses- Derivation of shear stress formula - Shear stress distribution across various beam sections.

UNIT IV TORSION AND COMPOUND STRESSES AND STRAINS 9 hours

TORSION: Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion.

COMPOUND STRESSES AND STRAINS: Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress and their applications, Two dimensional stress-strain system, principal strains and principal axis of strain.

UNIT V DEFLECTIONS OF BEAMS 9 hours

Slope and deflection- Relationship between moment, slope and deflection, Determine slopes and deflections of the determinate beams (Simply supported and Cantilever) using Double integration method, Macaulay's method, Moment area method and Conjugate beam method.

Course Outcomes:

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

CO1: Analyse the simple stress and strain in mechanics of solids

CO2: Analyse the beams to find the max shear force and bending moment and analysis the columns to find crushing and buckling strength.

CO3: Analyse bending and shear stresses for different types of beams with different sections

CO4: Analyse structural members subjected to torsion, compound stresses and strain.

CO5: Compute deflections of various beams.

Text Books:

1. S. Ramamrutham and R. Narayanan, Strength of Materials, Dhanpat Rai Publishing Company
2. R K Rajput, Strength of Material, S Chand Publications
3. Gere and Timoshenko , Mechanics Of Materials, 2nd Edition, CBS Publisher.

Reference Books:

1. Beer, F. P., Johnston, E. R. and DeWolf, J. T., Mechanics of Materials, Third Edition, McGraw- Hill International Edition, 2002.
2. Lardner, T. J, Archer, R. R., Mechanics of Solids, an introduction, International Edition, McGraw-Hill, 1994.
3. Shames, I. H., Introduction to Solid Mechanics, 2nd Edition, Prentice Hall of India Private Ltd. New Delhi, 1980.
4. Vaidyanathan R., Perumal P. and Lingeswari S., Mechanics of Solids and Structures, Volume I, Laxmi Publications (P) Ltd., New Delhi II, First Ed. 2017.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23CE103 SURVEYING

L	T	P	C
3	0	0	3

Course Objectives:

1. To apply knowledge of mathematics, science, and engineering to understand the measurement
2. Techniques and equipment used in land surveying
3. To Prepare the student to plan and conduct field work and application of scientific methodology in handling field samples.
4. To equip the candidate with the art, science and technology of cartography and applications of GIS in Mapping Resources.
5. To develop the skills in surveying and thematic mapping.

UNIT I **9 hours**

INTRODUCTION TO SURVEYING: Definition- Classifications - Basic Principles-Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting.

COMPASS AND PLANE TABLE SURVEYING: Compass – Basic principles - Types - Bearing - Systems and conversions- Sources of errors - Local attraction - Magnetic Declination -Dip Traversing - Plotting - Adjustment of closing error – applications - Plane table and its accessories - Merits and demerits - Radiation - Intersection - Resection – Traversing- sources of errors – applications.

UNIT II LEVELLING: **9 hours**

Level line - Horizontal line - Datum - Bench marks -Levels and staves – temporary and permanent adjustments – Methods of levelling - Fly levelling - Check leveling – Procedure in levelling - Booking -Reduction - Curvature and refraction - Reciprocal levelling – Sources of Errors in levelling- Precise levelling - Types of instruments - Adjustments - Field procedure and it application.

UNIT III THEODOLITE SURVEYING **9 hours**

Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants – Anallactic

UNIT IV CURVES **9 hours**

Elements of simple and compound curves; Method of setting out- Elements of Reverse curve; Transition curve- length of curve- Elements of transition curve; Vertical curves.

UNIT V MODERN FIELD SURVEY SYSTEMS **9 hours**

Principle of Electronic Distance Measurement, Modulation, Types of EDM instruments, Total Station - Parts of a Total Station - Accessories -Advantages and Applications; Global Positioning Systems- Segments, GPS measurements, errors and biases, Surveying with GPS, Co-ordinate transformation, accuracy considerations - Introduction to GIS, different GIS software, basic data types and coordinate systems

Course Outcomes:

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

CO1: Apply the knowledge, techniques, skills, and applicable tools for surveying activities.

CO2: Determine the levels of real world boundaries and points.

CO3: Identify the different types of theodolite surveying at field.

CO4: Identify different types of curves setting at field.

CO5: Apply the basics of modern survey instrument for surveying and mapping purpose.

Text Books:

1. 1. T. P. Kanetkar and S. V. Kulkarni, Surveying and Levelling Parts 1 & 2
2. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015
3. C Venkatramaiah, Textbook of Surveying, Universities Press

Reference Books:

1. Elements of Geomatics by P.R. Wolf.
2. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
3. C Venkatramaiah, Textbook of Surveying, Universities Press
4. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011
5. Madhu, N, Sathikumar, R and Satheesh Gobi, Advanced Surveying: Total Station, GIS and Remote Sensing, Pearson India, 2006.
6. Chandra, A.M., Higher Surveying, Third Edition, New Age International (P) Limited, 2002.
7. Anji Reddy, M., Remote sensing and Geographical information system, B.S. Publications, 2001

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23CE104 FLUID MECHANICS AND HYDRAULICS

L	T	P	C
3	0	0	3

Course Prerequisites: 23MAT101, 23MAT101, 23CE101

Course Objectives:

1. To provide a basic understanding of the properties and behavior of matter (fluids) by means of analytical equations.
2. To develop an understanding about hydrostatic and dynamics law, principle of buoyancy and stability of a floating body and application of mass, momentum and energy equation in fluid flow.
3. To measure the flow using Bernoulli equation, flow through pipes and flow past immersed bodies.
4. To provide a basic knowledge on the importance of dimensional analysis and similarity techniques.

UNIT I **10 hours**

FLUID PROPERTIES: The Concept of a Fluid - Physical Properties of Fluids (Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity: Dynamic and Kinematic Viscosity, Compressibility, Surface tension, Capillary Effect, Vapour Pressure and Cavitation), Newtons law of viscosity, Types of Fluids.

FLUID STATICS: Types of Pressure, Pascal's Law, Hydrostatic Law, Pressure Measurement Devices, Pressure Head, Pressure Diagram, Centre of Pressure, Forces on Plane and Curved Surfaces, Buoyancy and Floatation: Archimedes's Principle, Metacentre, Stability of Submerged and Floating Bodies.

UNIT II FLUID KINEMATICS AND DYNAMICS **9 hours**

KINEMATICS: Types of Flows, Stream lines, Equipotential lines, Stream Function and Velocity Potential Function, Flow Net- (Properties and Uses), Continuity Equation (3-D Cartesian Form).

DYNAMICS: Forces Acting on Fluid in Motion, Euler's Equation along a Streamline, Bernoulli's Theorem, Limitations , Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Orifices, Time required for Emptying the Tank, Concept of HGL and TEL.

UNIT III PIPE FLOW **8 hours**

Reynold's Experiment, Hazen Poisulle's Equation for Viscous Flow through Circular Pipes, Major and Minor Losses, Concept of Equivalent Pipe, Dupit's Equation , Pipes in Series, Parallel and Syphon

UNIT IV OPEN CHANNEL FLOW **9 hours**

Classification of Flows In Open Channel, Geometric Elements, Chezy's and Manning's Formula, Uniform Flow Computations, Hydraulically Efficient Section (Rectangular, Triangular, Trapezoidal), Depth Energy Relationship in OCF.

UNIT V **9 hours**

GVF: Classification of Channel Slopes, Dynamic Equation of GVF (Assumption and Derivation), Classification of GVF Profiles- Practical Examples, Direct Step Method of Computation of GVF Profiles

RVF: Hydraulic Jump, Conjugate Depth Relationship, Characteristics, Uses and Types of Hydraulic Jump, Hydraulic Jump as an Energy Dissipater.

DIMENSIONAL AND MODEL ANALYSIS: Buckingham's π theorem - model analysis dimensionless number - scales ratios for distributed models.

Course Outcomes:

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

CO1: Identify the important fluid properties and application of hydrostatic law to determine the forces on plane and curved surfaces.

CO2: Classify flows and determine the rate of flow through tanks / pipes using discharge measurement devices.

CO3: Compute the energy losses in pipe flow and understand the concept of equivalent pipe.

CO4: Identify the types of flows, energy-depth relationship in OCF and design hydraulically most efficient channel sections.

CO5: Analyze the GVF profiles and compute the energy loss in hydraulic jump and its efficiency as energy dissipating device.

Text Books:

1. R.K. Bansal, "A Textbook of Fluid Mechanics and Hydraulic Machines (SI Units), Laxmi Publication
2. K Subramanya, "Flow in Open Channels," 5th Edition, McGraw Hill Education.

Reference Books:

1. A.K. Jain "Fluid Mechanics" Khanna Publication.
2. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010
3. Yunus A Cengel and John M Cimbala, "Fluid Mechanics Fundamentals and Applications" (SI Units), Tata McGraw-Hill Education, 3rd Edition, 2017.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23CE202 SURVEYING LABORATORY

L	T	P	C
0	0	3	1.5

Course Prerequisites Intermediate Mathematics, Physics

Course Description:

This course covers practical usage of various surveying instruments for different field measurements like lengths, angles, areas, volumes and elevations.

Course Objectives:

1. Know about various linear and angular measuring instruments .
2. Take Measurements in the linear and angular view.
3. Determine the area and volume by interpreting the data obtained from surveying activities
4. Know modern equipment such as total station.
5. Draft field notes from survey data

List of Experiments:

1. Chain survey of road profile with offsets in case of road widening..
2. Plot the site by referring the FMB (field measurement book)
3. Determination of distance between two inaccessible points by using compass.
4. Plane table survey; finding the area of a given boundary by the method of Radiation
5. Fly levelling: Height of the instrument method and rise & fall method (differential leveling) and draw the contours
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of distance between two inaccessible point by using total station.
10. Determination of area and perimeter using total station.
11. Setting out a curve
12. Surveying camp.

(Minimum of 10 Experiments to be performed)

List of Major Equipment

1. Chains, tapes, Ranging rods (2M and 3M), cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses.
4. Levelling instruments.
5. Total Station and Digital Theodolite

Course Outcomes:

The students after completing the course will be able to:

CO1: Measure various linear and angular measurements of a land.

CO2: Measure the vertical measurements and able to draw contours of land.

CO3: Calculate the area and volume by interpreting the data obtained from surveying activities.

CO4: Measure the heights and distances along with area by using modern equipment such as total station.

CO5: Prepare field notes from survey data.

Text Book

1. Surveying and Levelling Parts 1 & 2 by T. P. Kanetkar and S. V. Kulkarni.
2. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.

URLs

1. Video Lectures, IIT Kanpur
Online Course http://freevideolectures.com/Course/98/Surveying

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech II Year I Semester

23CE203 STRENGTH OF MATERIALS LABORATORY

L	T	P	C
0	0	3	1.5

Course Prerequisites None

Course Description:

This course covers the different tests that are necessary for any structure before construction. The materials to be tested in the laboratory are MS steel, HYSD steel, Wood, Concrete/Brick, springs.

Course Objectives:

1. To understand the behaviour of materials under different types of loading.
2. To find tensile strength, compressive strength, bending strength and shear strength of the supplied specimen.
3. To find the hardness of different materials.
4. To find the modulus of elasticity and modulus of rigidity of the materials.
5. To find the strain energy required to break the specimen.

List of Experiments:

1. Tension test on Steel bar.
2. Bending test on (Steel/Wood) Cantilever beam
3. Bending test on simply supported beam.
4. Torsion test
5. Hardness test (Rockwell/Brinell).
6. Compression test on wood or concrete.
7. Shear test
8. Impact test (Izod and Charpy)
9. Compression test on masonry/Brick
10. Water absorption and efflorescence test on brick.
11. Use of electrical resistance strain gauges (for demonstration).

(Minimum of 10 Experiments to be performed)

LIST OF EQUIPMENTS

1. UTM for conducting tension test on rods
2. Steel or Wooden beam for flexure test
3. Torsion testing machine
4. Brinell /Rock well hardness testing machine

5. Spring testing machine
6. Compression testing machine
7. Izod / Charpy Impact machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauges
10. Continuous beam setup.

Course Outcomes:

The students after completing the course will be able to:

CO1: Determine the tensile and shear strength of various types and grades of ductile materials.

CO2: Examine the compressive strength of various types of brittle materials.

CO3: Analyse the deflections at various positions along the length of the beam for different types of beams/spring and correlate it with existing theorems.

CO4: Determine the torsional properties of ductile materials.

CO5: Examine the hardness and impact value for different kinds of metals.

Text Books

1. 1. Moondra, H. S., and Gupta R., Laboratory Manual for Civil Engineering, CBS Publication, 2013

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B.Tech II Year I Semester
Skill Enhanced Course - I

23CE601 BUILDING PLANNING AND DRAWING **L T P C**
1 0 2 2

Pre-requisite: None

Course Description:
The Building Planning and Drawing Laboratory course teaches students to create precise architectural drawings using industry standards and tools. Emphasis is on building plans, elevations, sections, and detailing for effective communication and constructability.

Course Objectives:

1. Initiating the student to different building bye-laws and regulations.
2. Imparting the planning aspects of residential buildings and public buildings.
3. Giving training exercises on various signs and bonds.
4. Giving training exercises on different building units.
5. Imparting the skills and methods of planning of various buildings.

UNIT I INTRODUCTION – CONVENTIONAL SIGNS AND SYMBOLS **6 hours**

Introduction: In architecture and construction, building drawings must meet standards for clarity and precision, typically including views like plans, elevations, sections, and details. Dimensions are expressed in standard units, ensuring consistency and accuracy. Good drawings clearly communicate all necessary information, using correct scales, symbols, and annotations to avoid misunderstandings during construction. This ensures the architect's vision is effectively translated into a tangible structure.

Sample Experiments:
1. Detailing & Drawing of Sign Conventions.

UNIT II DESIGN OF BONDING **6 hours**
Masonry bonding, Types of bonding.

Sample Experiments:
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.

UNIT III DESIGN OF OPENINGS **6 hours**

Sample Experiments:
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows
6. Detailing & Drawing of Ventilators & Roofs

UNIT IV RESIDENTIAL BUILDING LINE DIAGRAMS USING BUILDING BYE-LAWS **6 hours**

In this unit, students will create line diagrams of residential buildings following building bye-laws. They will then develop detailed plans, elevations, and sections from these diagrams for single-story buildings. The focus is on accurate drafting and adherence to architectural standards.

Sample Experiments:

7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.

8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.

UNIT V ARCHITECTURAL DRAWINGS FOR SPECIALIZED BUILDINGS **6 hours**

In this unit, students will focus on creating detailed plans, elevations, and sections for specialized building types, specifically hospital and industrial buildings. Emphasis will be placed on understanding the unique design requirements and functional aspects of these structures, ensuring that the architectural drawings meet the specific needs of each building type.

Sample Experiments:

9. Drawing of Plan, Elevation & Section for Hospital Building.

10. Drawing of Plan, Elevation & Section for Industrial Building.

Course Outcomes:

The students after completing the course will be able to:

CO1: Plan various buildings as per the building by-laws.

CO2: Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.

CO3: Draw signs and bonds.

CO4: Draw different building units.

CO5: Draw building elements and plan the buildings as per requirements.

Text Book(s)

1. Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh
2. Building planning and drawing by M. Chakraborti.
3. Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Books

1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, NewDelhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai.
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

Mode of Evaluation: Continuous Internal Evaluation and End Semester Examination

B. Tech II Year I Semester
Audit Course

23CHE901 ENVIRONMENTAL SCIENCE

L	T	P	C
2	0	0	0

Course Objectives:
This course enables students to

1. To make the students to get awareness of the environment.
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3. To save the earth from the inventions by the engineers.

UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 6 hours

Definition, Scope, and Importance – Need for Public Awareness.
Natural Resources: Energy resources**-** Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

UNIT II ECOSYSTEMS 7 hours

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a) Forest ecosystem.
b) Grassland ecosystem
c) Desert ecosystem.
d) Aquatic ecosystems (freshwater - ponds, streams, lakes, rivers, marine ecosystem- oceans, estuaries)

Biodiversity and its Conservation : Introduction, Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Specific case studies.

UNIT III ORDERED STRUCTURES 6 hours

Definition, Cause, effects, and control measures of:
Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards
Pollution case studies - Role of an individual in the prevention of pollution

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes
Disaster management: floods, earthquakes, cyclones and landslides.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 5 hours

Sustainable Development Goals, From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rainwater harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6 hours

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health – Case studies.

Field Work: Visit a local area to document environmental assets River/forest grassland/hill/mountain – Polluted site - Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes.

Course Outcomes:

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

CO1: Exploring different types of renewable and non-renewable energy sources.

CO2: Students will learn about the structure and function of different ecosystems.
CO3: Students will learn about different types of pollution (air, water, soil) and their sources, effects, and control measures.
CO4: Exploring the science behind climate change, its evidence, and its impacts on ecosystems and human societies.
CO5: Understanding demographic factors and their environmental implications.

Text Books:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press, Third Edition, 2021.
2. Palaniswamy, “Environmental Studies”, Pearson Education, Second Edition, 2014.
3. S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K. Raghavan Nambiar, “Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd. Second Edition, 2008.
5. A. Koushik & C. P. Koushik, Perspectives in Environmental Studies, New Age International, Fourth Edition, 2006.

Reference Books:

1. Deeksha Dave and E. Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications, Second Edition, 2012.
2. M. Anji Reddy, “Textbook of Environmental Sciences and Technology”, BS Publication, Second Edition, 2023.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, Third Edition, 2009.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private Limited, Second Edition, 2004.
5. G.R. Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House, Fourth Edition, 2014.
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private Limited, Third Edition, 2007.

Online Resources:

1. Atika Qazi; Fayaz Hussain; Nasrudin ABD. Rahim; Glenn Hardaker; Daniyal Alghazzaw, "Towards sustainable energy: a systematic review of renewable energy sources, technologies, and public opinions," 10.1109/ACCESS.2019.2906402, IEEE Access, vol. 7, pp. 63837-63851, 2019.
2. Gina Garland, Samiran Banerjee, Anna Edlinger, Emily Miranda Oliveira, Chantal Herzog, Raphaël Wittwer, Laurent Philippot, Fernando T. Maestre, Marcel G. A. van der Heijden, "A closer look at the functions behind ecosystem multifunctionality: A review," https://doi.org/10.1111/1365-2745.13511, Journal of Ecology, vol. 109, no. 2, pp. 600-613, 2021.
3. Siddiqua, A, Hahladakis, J.N. and Al-Attiya, “An overview of the environmental pollution and health effects associated with waste landfilling and open dumping,” https://doi.org/10.1007/s11356-022-21578-z, Environmental Science and Pollution Research, 29(39), pp.58514-58536, 2022.
4. Seddon N, Chausson A, Berry P, Girardin C.A, Smith A. and Turner B, “Understanding the value and limits of nature-based solutions to climate change and other global challenges,” https://doi.org/10.1098/rstb.2019.0120, Philosophical Transactions of the Royal Society B, 375(1794), p.20190120, 2020.
5. Hannes Weber and Jennifer Dabbs Sciubba, "The effect of population growth on the environment: evidence from European regions," https://doi.org/10.1007/s10680-018-9486-0, European Journal of Population, vol. 35, pp. 379-402, 2019.

Mode of Evaluation: Assignments and Mid Term Tests

II Year II Semester

B. Tech II Year II Semester

23HUM102 ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS

L	T	P	C
2	0	0	2

Course Prerequisite: NIL

Course Description:

The Engineering Economics and Financial Accounting aims to provide an insight into production, cost analysis, market structure, Accounting Basic concepts and financial Statement Analysis. The course is designed to give emphasis on the application of real life examples on various fundamental issues of economics and accounts. This course introduces the accounting system, principles, types of accounts, and financial statements etc. The ratio analysis and financial analysis are useful to know the positions of financial statements are explained to know the analysis of financial matters.

Course Objectives:

This course enables students to

1. Describe the nature of engineering economics in dealing with the issues of scarcity;

2. Know the supply, demand, production and cost analysis to analyze the impact of economic events on markets;

3. Explain the different market structures and price determination in various market conditions.

4. Explain the accounting principles, types of accounting and preparation of final accounts; and

5. Describe the financial statement analysis and investment evaluation through ratios and capital budgeting techniques.

UNIT I DEMAND ANALYSIS 7 hours

Scope and Significance of Economics- Elements of market Economy: Demand, Supply and Market Equilibrium- Theory of Demand, Elasticity of Demand, Supply and Law of Supply.

UNIT II PRODUCTION AND COST ANALYSIS 7 hours

Production Function – Short-run and long-run production – Cost Analysis: Cost concepts - Cost Structure of Firms and Output Decision- Break-Even Analysis (BEA) – significance and Limitations of BEA - Determination of Break Even Point (Simple Problems).

UNIT III MARKET STRUCTURE AND PRICING 6 hours

Classification of Markets - General Equilibrium and efficiency of Perfect competition, Monopoly, Monopolistic – Price determination under Perfect, Monopoly, and Monopolistic Competition, Pricing objectives- Pricing Strategies.

UNIT IV BASICS OF ACCOUNTING 7 hours

Accounting - Double Entry System - Accounting Principles - Classification of Accounts - Rules of Debit & Credit- Accounting Cycle: Journal, Ledger, Trial Balance. Final Accounts: Trading Account - Profit & Loss Account - Balance Sheet with Adjustments, (Simple Problems).

UNIT V FINANCIAL RATIO ANALYSIS AND CAPITAL BUDGETING 7 hours

Ratio Analysis - Liquidity, Solvency, Activity and Profitability Ratios - Capital Budgeting. (Simple Problems).

Course Outcomes:

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

CO1: Understand Engineering economics basic concepts,

CO2: Analyze the concepts of demand, elasticity, supply, Production, Cost Analysis and its essence in floating of an organization,

CO3: Compare various different market structures and identify suitable market,

CO4: Demonstrate an understanding and analyzing the accounting statements, and

CO5: Exhibit the ability to apply knowledge of ratio analysis and capital budgeting techniques in financial statement analysis and investment evaluation respectively.

Text Books:

1. Case E. Karl & Ray C. Fair, "Principles of Economics", Pearson Education, 8th Edition, 2007
2. Aryasri: Business Economics and Financial Analysis, 4/e. MGH.
3. Financial Accounting, S. N. Maheshwari, Sultan Chand, 2009
4. Varshney & Maheswari: Management Economics, Sultan Chand
5. Financial Statement Analysis, Khan and Jain, PHI, 2009
6. Financial Management, Prasanna Chandra, T.M.H, 2009

Reference Books:

1. Lipsey, R. G. & K. A. Chrystal , "Economics", Oxford University Press, 11th Edition, 2007
2. Samuelson P. A. & Nordhaus W. D. "Economics", Tata McGraw-Hill 18th Edition, 2007
3. Financial Management and Policy, Van Horne, James, C., Pearson, 2009.
4. Financial Management, I. M. Pandey, Vikas Publications

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23CE105 ENGINEERING HYDROLOGY

L	T	P	C
3	0	0	3

Course Description:

The course covers Hydrological cycle, Measurement of precipitation and various losses, Infiltration, Evaporation, Runoff and its measurement, Stream Flow Measurement, Hydrographs, Concept of Unit Hydrographs and its use in practical field, Estimation and Prediction of Floods, Wells and aquifers, well discharge.

Course Objectives:

1. To introduce the basics/fundamentals of hydrological cycle, precipitation, runoff, evaporation and other losses.
2. To introduce the concepts of Hydrographs and their use.
3. To measure and predict runoff and flood.
4. To understand the concepts in flood and well hydraulics.

UNIT I HYDROLOGIC CYCLE 9 hours

INTRODUCTION: Hydrologic cycle - watershed and water-budget equation - history of hydrology - world water balance - applications in engineering.

PRECIPITATION: forms of precipitation - characteristics of precipitation in India - measurement of precipitation - rain gauge network - mean precipitation over an area - depth-area-duration relationships - maximum intensity/depth-duration-frequency relationship - Probable Maximum Precipitation (PMP) - rainfall data in India.

EVAPORATION: Process evaporimeters - evapotranspiration - measurement of evapotranspiration – evapotranspiration equations - potential evapotranspiration over India - actual evapotranspiration - interception - depression storage

UNIT II 9 hours

INFILTRATION: Infiltration capacity - measurement of infiltration - modelling infiltration capacity - classification of infiltration capacities - infiltration indices.

RUNOFF: Surface Runoff Models - SCS-CN method of estimating runoff volume - flow-duration curve - flow-mass curve.

UNIT III 9 hours

STREAM FLOW MEASUREMENT: Measurement of Stage and Velocity - Direct and Indirect methods - Stage-Discharge relationships-Rating curve - Extrapolation of rating curve.

HYDROGRAPHS: hydrograph - factors affecting runoff hydrograph - components of hydrograph - base flow separation - effective rainfall - unit hydrograph - S-Curve - Instantaneous UH Synthetic UH.

UNIT IV FLOODS 9 hours

FLOOD ESTIMATION: Flood Estimation by Rational method - empirical method -Unit Hydrograph Method - Flood frequency studies: Gumbel's method - Log-Pearson Type III Distribution

FLOOD HYDRAULICS: Basic Equations - Flood Routing-Reservoir routing - Channel routing - Hydrologic Storage Routing - Attenuation - Hydrologic Channel Routing - Muskingum Method - Runge Kutta Method

UNIT V WELL HYDRAULICS 9 hours

Introduction-Forms of Subsurface water - Aquifer Properties – Compressibility - Equation of Motion - Wells - Steady flow into well - Unsteady flow in a confined aquifer – Well Losses - Specific capacity - Ground water recharge

Course Outcomes:

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

CO1: Estimate the areal average precipitation over the basin using the knowledge of hydrological cycle.
CO2: Identify losses and calculate runoff excluding the initial losses.
CO3: Measure stream flow, use hydrograph to estimate runoff.
CO4: Estimate flood using flood routing techniques.
CO5: Estimate ground water flow under various circumstances.

Text Books:

1. V. T. Chow, D. R. Maidment, and L. W. Mays; Applied Hydrology, McGraw Hill International Editions

Reference Books:

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
2. K Subramanya, Water Resources Engineering through Objective Questions, Tata Mc- Graw Hill.
3. G L Asawa, Irrigation Engineering, Wiley Eastern
4. L W Mays, Water Resources Engineering, Wiley.
5. J D Zimmerman, Irrigation, John Wiley & Sons
6. C S P Ojha, R Berndtsson and P Bhunya, Engineering Hydrology

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23CE106 CONCRETE TECHNOLOGY

L	T	P	C
3	0	0	3

Course Description:

This course covers ingredients of concrete and admixtures,properties of fresh concrete and hardened concrete, testing of hardened concrete and mix design. The course further covers special concretes used in construction industry.

Course Objectives:

1. The main aim of this course is to explain properties of ingredients of concrete admixtures and procedures for testing concrete ingredients.
2. To make the student to understand fresh and hardened characteristics of concrete and also to enable the students to identify different mix design procedures and produce concrete mix proportions.
3. To explains the characteristics of emerging concretes.

UNIT I **9 hours**

CEMENTS: Types of cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers.
AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Maximum aggregate size .

UNIT II **9 hours**

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage - Water / Cement ratio and admixtures – Properties of fresh Concrete -Workability and its tests– Factors affecting workability – Segregation & bleeding – Mixing and vibration of concrete, Shotcrete.

UNIT III **9 hours**

HARDENED CONCRETE: AAbram's Law – Nature of strength of concrete –Maturity concept – casting and curing of concrete, mechanical properties – Factors affecting mechanical properties – Relation between compression & tensile strength – Codal provisions for NDT..

UNIT IV **9 hours**

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

UNIT V **9 hours**

MIX DESIGN AND SPECIAL CONCRETES: Factors in the choice of mix proportions –Quality control of concrete- Statistical methods -Concepts Proportioning of concrete mixes by ACI method and IS Code method Polymer concrete - Fibre reinforced concrete – Factors affecting properties of FRC, High performance concrete – Self-healing concrete.

Course Outcomes:

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

CO1: Identify different properties of concrete ingredients and estimate the properties through various test procedures.
CO2: Explain the basic characteristics of fresh and hardened concrete.
CO3: Test the mechanical properties of hardened concrete..
CO4: Design the concrete mix as per various international codes.
CO5: Explain the characteristic and applications of special concrete.

Text Books:

1. T. Chow, D. R. Maidment, and L. W. Mays; Applied Hydrology, McGraw Hill International Editions
2. Shetty, M.S., Concrete Technology, S.Chand & Co, 2004.

Reference Books:

1. Gambhir, M.L., Concrete Technology, Tata Mc. Graw Hill Publishers, New Delhi.
2. Santha Kumar, A.R., Concrete Technology, Oxford university Press, New Delhi.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23CE107 STRUCTURAL ANALYSIS

L	T	P	C
3	0	0	3

Course Description:

This course includes the basics of Structural analysis including the idealizations of different types of structures, support conditions and its loadings, and analysing the determinate and indeterminate structures using different methods.

Course Objectives:

1. To determine the whether a structure is determinate or indeterminate.
2. To analyse the beams and frames using slope deflection method.
3. To analyse the beams and frames using moment distribution method.
4. To analyse the beams and frames using Kani's method.
5. To analyse the continuous beams using three moment theorem.

UNIT I ENERGY THEOREMS 9 hours

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

UNIT II ANALYSIS OF INDETERMINATE STRUCTURES 9 hours

Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Rolling loads, Influence Lines, Unit load method & other methods.

UNIT III FIXED BEAMS & CONTINUOUS BEAMS 9 hours

Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT IV SLOPE-DEFLECTION METHOD 9 hours

Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

UNIT V MOMENT DISTRIBUTION METHOD 9 hours

Introduction to moment distribution method and Kanis method- Application to continuous beams with and without settlement of Supports-Analysis of single bay storey portal frames without sway.

Course Outcomes:

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

CO1: Determine the whether a structure is determinate or indeterminate

CO2. Analyse the continuous beams using three moment theorem.

CO3. Analyse the beams and frames using slope deflection method.

CO4. Analyse the beams and frames using moment distribution method.

CO5. Analyse the beams and frames using Kani's method.

Text Books:

1. Ramamrutham, S., & Narayan, R.,Theory of Structures, Dhanpat Rai Publishing Co. (P.) Ltd., 2017.
2. Menon, D., Structural Analysis, Narosa publishers, 2008.

Reference Books:

1. Ghali,A., Nevilee, A.M., & Brown, T.G., Structural Analysis, CRC Press, 2012
2. Wang, C. K., Intermediate Structural Analysis, McGraw Hill, 1989.
3. Reddy, C. S., Basic Structural Analysis, Tata McGraw Hill, 2007.
4. Hibbler, R. C., Structural Analysis, Pearson Education, 2006.
5. Negi, L. S., and Jangid R.S, Structural Analysis, Tata McGraw Hill, 2006

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23CE108 ENVIRONMENTAL ENGINEERING

	L	T	P	C
Course Prerequisites: 23CE104	**3**	**0**	**0**	**3**

Course Description:

The course covers demand, quality, treatment and distribution of water along with characterization, collection, low cost treatment of waste water and household drainage. Similarly, air pollution, noise pollution and solid waste management are also included. Further the course also covers basic laboratory

Course Objectives:

1. To explain water quality standards, treatment, distribution of water and design of various water treatment units.
2. To analyze the characteristics of wastewater and design various units of sewage treatment system.
3. To design various low cost wastewater treatment system and sludge disposal units.
4. To explain various impacts of air and noise pollution and various methods to control them air and noise pollution
5. To describe about solid waste generation, characterization, impacts and various management Techniques.

UNIT I WATER SUPPLY ENGINEERING 9 hours

Water- Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demands, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs, water treatment plant layout and design of various treatment units.

UNIT II WASTEWATER ENGINEERING 9 hours

Sewage- Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

UNIT III LOW COST WASTEWATER AND SLUDGE TREATMENT 9 hours

Working principle of oxidation ponds, oxidation ditches, design of - septic tanks, soak pits and Imhoff tanks, Sludge characterization, sludge thickening, sludge digestion, factors affecting sludge digestion, Biogas recovery, various methods of sludge conditioning, dewatering and disposal.

UNIT IV AIR AND NOISE POLLUTION 9 hours

Air - Composition and properties of air, urban air pollution, Air quality standards, Measures and major equipment for air pollution control, Noise - Basic concept, measurement and various noise control methods.

UNIT V SOLID WASTE MANAGEMENT 9 hours

Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Effects of solid waste on environment: effects on air, soil, water surface and ground, health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle, Disposal methods.

Course Outcomes:

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

CO1: Estimate water demand and design various units of surface water treatment plant

CO2. Estimate sewage generation and perform basic design of the unit operations that are used in sewage treatment.

CO3. Explain various low cost wastewater and sludge treatment techniques

CO4. Describe the impacts of air and noise pollution and review various air and noise pollution control methods

CO5. Discuss about the impacts of solid waste and various solid waste management techniques

Text Books:

1. Birdie, G.S, Birdie, J.S., Water supply and sanitary Engineering, Including Environmental Engineering, Water and Air Pollution Laws and Ecology, Dhanpat Rai Publications, 1996.
2. Punmia, B.C, Ashok Kr Jain, Arun Kr Jain., Waste Water Engineering, Laxmi Publications, 1998.
3. Peavy, H., Rowe, D.R, Tchobanoglous, G. Environmental Engineering, Mc-Graw - Hill International Editions, New York 1985
4. Integrated Solid Waste Management, Tchobanoglous, Theissen & Vigil. McGraw Hill Publication
5. Metcalf & Eddy, Wastewater Engineering Treatment and Dispose, McGraw Hill Publication

Reference Books:

1. Gambhir, M.L., Concrete Technology, Tata Mc. Graw Hill Publishers, New Delhi.
2. Santha Kumar, A.R., Concrete Technology, Oxford university Press, New Delhi.

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23CE204 CONCRETE TECHNOLOGY LABORATORY

L	T	P	C
0	0	3	1.5

Course Prerequisites None

Course Description:

The course will provide knowledge and skills of concrete material testing

Course Objectives:

1. To gain experience regarding the determination of properties of different building materials.
2. To provide an opportunity to learn how to measure the parameters which governs the quality of the materials,
3. To learn the principles and procedures of testing concrete materials and to get hands on experience by conducting the tests and evolving inferences.

List of Experiments:

Aggregate:

1. Specific Gravity and Water Absorption of fine and coarse aggregate.
2. Sieve analysis of fine and coarse aggregate
3. Bulk density for fine and coarse aggregates
4. Bulking of sand

Cement:

5. Normal Consistency of cement
6. Fineness of cement.
7. Initial setting time and final setting time of cement.
8. Specific gravity and soundness of cement.
9. Compressive strength of cement mortar cube.

Concrete:

10. Workability test on concrete by compaction factor, slump, Vee-bee and flow table.
11. Cube strength of concrete
12. Split tensile strength of concrete
13. Non-Destructive testing on concrete

Special concretes:

14. Tests on Self Compacting Concrete (for demonstration)

(Minimum of 10 Experiments to be performed)

LIST OF EQUIPMENTS

1. Pycnometers.
2. Vicat's apparatus
3. Specific gravity bottle.
4. Le-chatelier's apparatus.
5. Slump cone and compaction factor apparatus
6. Rebound hammer, Pulse velocity equipments.
7. CTM
8. Flow table

Course Outcomes:

The students after completing the course will be able to:

CO1: Identify different properties of aggregates through various test procedures.

CO2. Apply different test method to check the physical and mechanical properties of cement.

CO3. Test the mechanical properties of fresh concrete

CO4. Test the mechanical properties of hardened concrete.

CO5. Test various types of special concrete.

Reference Books

1. Concrete Technology Laboratory Manual Prepared by MITS Staff.

2. Shetty.M.S (2002), Concrete Technology, S.Chand& Co., Ltd, Ramnagar.

3. IS: 10262 - 2009, Indian Standard specification for Methods of Mix design.

4. IS: 383 - 1987, Indian Standard specification for Test for Fine and Coarse aggregates.

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech II Year II Semester

23CE205 FLUID MECHANICS AND HYDRAULICS LABORATORY

L	T	P	C
0	0	3	1.5

Course Prerequisites None

Course Description:

The course includes Calibration of flow meters; Bernoulli's apparatus; performance of turbines And pumps; various losses through pipes.

Course Objectives:

Students should be able to verify the principles studied in theory by performing the experiments in lab.

List of Experiments:

1. Determination of Coefficient of discharge for Venturimeter
2. Determination of Coefficient of discharge for Orifice meter.
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable

Head method.

5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine
11. Efficiency test on centrifugal pump
12. Efficiency test on reciprocating pump

(Minimum of 10 Experiments to be performed)

List of Equipments

1. Venturimeter setup
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Pelton wheel and Francis turbines.
10. Centrifugal and Reciprocating pumps.

Course Outcomes:

The students after completing the course will be able to:

CO1: Use flow measurement instruments and notches.

CO2. Apply Bernoulli's equation to find the losses in pipe and discharge.

CO3. Perform the test on pumps and turbines to find their efficiency.

CO4. Prepare reports on the data collected and use graphical techniques to interpret the data.

CO5. Use pumps and turbines for supply of water and power generation for the benefit of society.

Text Books:

1. Majumdar Bireswar, Fluid Mechanics with Laboratory Manual, Second Edition, PHI Learning.

2. Raikar, R. V., Laboratory Manual Hydraulics And Hydraulic Machines, PHI Learning

Mode of Evaluation: Continuous Internal Evaluation, Model Test and End Semester Examination

B. Tech II Year II Semester

23CE602 REMOTE SENSING AND AND GEOGRAPHICAL INFORMATION SYSTEMS

L	T	P	C
1	0	2	2

Course Objectives:

1. Introduce the basic principles of Remote Sensing and GIS techniques and its application to Civil Engineering.
2. Learn various types of sensors and platforms and understand the principles of spatial analysis techniques in GIS.
3. Introduce GIS software to understand the process of digitization, creation of thematic map from toposheets and maps.

UNIT I INTRODUCTION TO REMOTE SENSING 6 hours

Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) - Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

Sample Experiments:

1. Georeferencing a Toposheet or Map
2. Digitization and Attribute table creation.

UNIT II DIGITAL IMAGE ANALYSIS 6 hours

Digital Image Characteristics, Digital Image Data Formats, Band Interleaved by Pixel (BIP), Band Interleaved by Line (BIL), Band Sequential (BSQ) - Visual Interpretation Elements, Preprocessing, Enhancement, Classification, Supervised classification, Unsupervised classification.

Sample Experiments:

3. Creation of Thematic Map

UNIT III INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEM 6 hours

Principles, Components and Applications of GIS - Map projections, Spatial Data Structure.

Sample Experiments:

4. Calculation of Feature geometry – Length, Area & Perimeter.

UNIT IV RASTER AND VECTOR DATA FORMATS 6 hours

Data Inputs, Data Manipulation, Data Retrieval, Data Analysis - Spatial data analysis: Overlay Function-Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum path analysis.

Sample Experiments:

5. Contour map – developing TIN & DEM from Contour.
6. Stream network – Stream ordering map.

UNIT V OVERLAY FUNCTION **6 hours**

Vector Overlay Operations, Raster Overlay Operations, Arithmetic Operators, Comparison and Logical Operators, Conditional Expressions - Network Analysis: Components of network, Transportation network - Optimum path analysis.

Sample Experiments:

7. Watershed - calculate Hydro-geomorphological parameters.
8. Transportation Network Map – Route analysis.

Course Outcomes:

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

CO1: Explain the concepts of remote sensing, sensors and their characteristics.
CO2. Develop data models and data structures to introduce various Raster and Vector Analysis capabilities in GIS.
CO3. Digitize and create thematic map and extract important features to calculate geometry.
CO4. Perform surface analysis over Contour to develop digital elevation model.
CO5. Perform simple analysis in water resources and transportation engineering.

GIS SOFTWARE: QGIS / ArcGIS

Text Books:

1. QGIS User Guide
2. ArcGIS User Manual by ESRI

Reference Books:

1. Schowengerdt, R. A (2006) 'Remote Sensing', Elsevier publishers.
2. Burrough P A and R.A. McDonnell, (1998) 'Principals of Geographical Information Systems', Oxford University Press.
3. George Joseph (2013) 'Fundamentals of Remote Sensing', Universities Press.

Web Reference:

https://onlinecourses.nptel.ac.in/noc22_ce26/preview

Mode of Evaluation: Assignments, Mid Term Tests and End Semester Examination.