

ASSAM DON BOSCO UNIVERSITY

Revised Syllabus applicable in 2024-2025

ELECTRICAL AND ELECTRONICS ENGINEERING

EEAD0093: ANALOG AND DIGITAL COMMUNICATIONS

(3 Credits - 45 hours) (L-T-P: 3-0-0)

BTECH EEE 7th semester

Course Outcomes:

CO1: Identify different analog and digital modulation techniques used in communication. (Remembering)

CO2: Analyze and compare different analog modulation schemes for their efficiency and bandwidth. (Analyzing)

CO3: Estimate the inter symbol interference in digital modulation schemes. (Evaluating)

Objective: This course aims to familiarize the students with the concepts of communication systems. The course enables one to understand different modulation techniques both in analog and digital domains. Also, the course enables one to understand the behaviour of a communication channel and errors associated.

Module I: Review of Signals and Systems and Analog Modulation (15 hours)

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Demodulation of DSB-SC, SSB, VSB signals. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals. Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

Module II: Transmitters and Receivers: (8 hours)

Classification of Transmitters, AM Transmitters, FM Transmitters, Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superheterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

Module III: Pulse Data Communication (8 hours)

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

Module IV: Signal Detection (4 hours)

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations.

Module V: Digital Modulation (10 hours)

Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying. Digital Modulation trade-offs.

Suggested Readings

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
3. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
4. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
5. Proakis J.G., "Digital Communications", 4th Edition, McGraw Hill, 2000.
6. H P Hsu, "Analog and Digital Communications", Special Indian Edition 2006, Tata McGraw Hill.

Mapping of COs to Syllabus

	Module I	Module II	Module III	Module IV	Module V
CO 1	H	M	M		M
CO 2		H	M	M	
CO 3	H				

CO 4	M				H
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COMPUTER SCIENCE AND ENGINEERING

CSOA0083: COMPUTER ORGANIZATION & ARCHITECTURE

(3 credits – 45 hours)

Course Outcomes

1. Recall the key terms and concepts related to computer organization and architecture. (Remembering)
2. Explain the organizational and architectural features of modern computer systems including the central processing unit, control unit, memory, input/output units, and pipelines. (Understanding)
3. Solve basic problems related to instruction execution, memory management, pipelining and input/output operations. (Apply)
4. Analyze various instruction set architectures, memory hierarchies, pipelines architectures, control units, and I/O units to understand their advantages and disadvantages. (Analyze)
5. Evaluate the performance of assembly language programs and design choices in the organizational and architectural components of a computer such as cache memory, pipelines etc. (Evaluate)
6. Construct assembly language programs and a simplified computer architecture, considering factors such as instruction set, memory architecture, and data path. (Construct)

Module I Introduction (8 hours)

Number representation; fixed and floating point number representation, IEEE standard for floating point representation. Error detection and correction codes: Hamming code. Digital computer generation, computer types and classifications, functional units and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Introduction to x86 architecture.

Module II Central Processing Unit (8 hours)

Addition and subtraction of signed numbers, look ahead, carry adders. Multiplication: Signed operand multiplication, Booth's Multiplication Algorithm; Division Algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Processor organization, general register organization, stack organization and addressing modes.

Module III Control Unit (10 hours)

Instruction types, formats, instruction cycles and subcycles (fetch and execute etc), micro- operations, execution of a complete instruction. Hardwired and microprogrammed control: microprogramme sequencing, wide branch addressing, and microinstruction with next address field, prefetching microinstructions, concept of horizontal and vertical microprogramming.

Module IV Memory (8 hours)

Basic concept and hierarchy, semiconductor RAM memories, 2D and 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues (performance, address mapping and replacement) Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.

Module V Input / Output (8 hours)

Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous and asynchronous communication, standard communication interfaces.

Module VI Pipelining (8 hours)

Basic Concepts, performance, floating point arithmetic, operations, instruction pipelining in RISC, pipelining in computer arithmetic, Data Hazard, Instruction hazard, Influence on Instruction set, datapath and controls consideration, Superscalar Operation.

Suggested Readings

1. William Stallings, Computer Organization and Architecture, Pearson
2. Vranesic, Hamacher and Zaky, Computer Organization, TMH
3. M. Morris Mano, Computer System Architecture, PHI
4. Hennessy and Patterson, Computer Organisation and Design, Morgan Kaufmann
5. Hennessy and Patterson, Computer Architecture - A Quantitative Approach, Morgan Kaufmann

6. John P Hayes, Computer Organization, McGraw Hill
7. K.K Tripathi, Rajesh K. Gangawar, Microprocessor and its Applications, Acme Learning, New Delhi
8. Brey, Barry B, INTEL Microprocessors, PHI

Mapping of COs to Syllabus

Course Ourcomes	Module 1	Module 2	Module 3	Module 4	Module 5	Module 6
CO 1	H	M			L	
CO 2	L		H	M		L
CO 3	H	H		L		
CO 4			L		H	H
CO 5		L		H		M
CO 6		H	H			

COMMERCE

CMIT0099: INDIRECT TAX LAW

(6 Credits-75 hours) (L-T-P: 5-1-0)

Objectives: This course will have a comprehensive understanding of various indirect tax laws, including GST, VAT, excise duty, customs duty and import& export. They will be equipped with the knowledge and skills necessary to navigate the legal framework, comply with regulations, strategize tax planning, and manage indirect taxes effectively in contemporary business scenarios.

COURSE/LEARNING OUTCOMES

After learning this course, the students will be able to:

- CO1: Define the various concepts related to Indirect taxes. (Remembering)
 CO2: Explain the provisions of the Indirect tax laws (including GST Act 2017). (Understanding)
 CO3: Execute the knowledge of the provisions of the indirect tax laws to the various situations in actual practice. (Applying)
 CO4: Analyse the procedures related to filing of returns, TDS and GST return filing. (Analysing)
 CO5: Evaluate the requirements of different assessee for filing tax returns under the indirect tax laws. (Evaluating)

Module I: Concept of Indirect Taxes (15 hours)

Concept and Features of Indirect Taxes, Difference between Direct and Indirect Taxes, Background of erstwhile Indirect Taxes (Central Excise, VAT etc.)

Module II: Introduction to Goods and Services Tax (GST) (20 hours)

Introduction to GST Law, Levy and Collection of CGST and IGST, Application of CGST/IGST law, Concept of Supply including Composite and Mixed Supplies, Charge of Tax including Reverse Charge, Exemption from Tax, Composition Levy, Basic concepts of Time, place and Value of Supply, ,

Module III: GST registration and Payment (18 hours)

Computation of GST Liability, Input tax credit, Registration, Tax Invoice – Electronic Way Bill, and Payment of Taxes, interest and other amounts, tax deducted at sources and collection of tax at sources and Returns

Module IV: Introduction to custom Law (12 hours)

Basic concept custom law, levy and exemption from custom duty, types of duty, valuation under custom Act 1962, refund

Module V: Import and Export under GST (10 hours)

Introduction, relevant definition, import under GST and export under GST

Mapping of COs to Syllabus

	Module 1	Module 2	Module 3	Module 4	Module 5
CO 1	H				
CO 2		H			
CO 3			H		
CO 4				H	

CO 5					H
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CMCR0067: CORPORATE RESTRUCTURING

(6 Credit-75 hours) (L-T-P: 5-1-0)

Course objectives:

1. Understanding why 'things go wrong'.
2. Gain understanding and insights on the laws, rules and procedures for corporate restructuring.
3. Insights on financial and strategic implications of restructuring.
4. Working on valuation to develop win-win restructuring deals.

Course outcome:

CO1: Remembering: Remembering key terms related to corporate restructuring.

CO2: Understanding: Understanding the different types of corporate restructuring initiatives.

CO3: Applying: Application of value drivers to develop restructuring synergies.

CO4: Analysing: Analysing empirical evidence on various corporate restructuring.

Module I: Fundamentals of Corporate restructuring (20 hours)

Corporate restructuring: Planning, Formulation and Execution of Various Corporate Restructuring Strategies - Mergers, Acquisitions, Takeovers, Disinvestments and Strategic Alliances, Demerger and Hiving off, Bankruptcy, equity restructuring, and spin-offs. Laws, rules and procedures governing corporate restructuring in India.

Module II: Drivers of valuation (25 hours)

Drivers of valuation: Weighted forecasts of growth in company revenue, Weighted forecasts of growth in company margin, Patterns of cash returned to shareholders, Changes in the company's debt-to-equity ratio, The economic conditions of the industry, Market volatility in the geographic areas in which the industry's major companies compete. Adjusted present value, WACC, capital cash flow, and discounted cash flow valuation.

Module III: Financial restructuring (15 hours)

Financial restructuring: Debt restructuring, Equity restructuring, reduction of capital, reorganization of share capital, buy back of shares –concept and necessity, procedure for buy back of shares.

Module IV: Restructuring of Sick companies (15 hours)

Revival, Rehabilitation and Restructuring of Sick Companies: Sick companies and their revival with special reference to the law and procedure relating to sick companies.

COs Mapping to Syllabus:

Outcome	Module I	Module II	Module III	Module IV
CO1	H	L	L	M
CO2	H	M	H	H
CO3	L	H	H	M
CO4	L	H	H	H

Suggested Readings

1. Higgins, Robert C. *Analysis for Financial Management* 8th edition (McGraw-Hill 2007)
2. Mergers and Acquisitions, Aurora, Shetty and Kale, Oxford, Latest Publication
3. Principles of Corporate Finance, Brealey & Myers, TATA McGraw Hill, Latest Edition
4. Corporate Finance, Ashvarath Damodaran, Wiley India, Latest Edition
5. Mergers, Acquisitions and business valuation, Excel books, Ravindhar Vadapalli, Latest Edition
6. Takeovers, Restructuring, and Corporate Governance, James J. Fred Weston, Mark L. Mitchell, J. Harold, Pearson, Latest Edition

COMPUTER APPLICATIONS

CADA0044: DATA STRUCTURES AND ALGORITHMS

(4 Credits – 60 Hours)

(Syllabus Remains the Same – Only COs and Mapping of CO to Syllabus have been updated)

Learning Objectives/Outcomes

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

- CO1: Demonstrate comprehension of various algorithmic design strategies, including brute force, divide-and-conquer, dynamic programming, greedy techniques, and backtracking. (Understanding)
- CO2: Choose and apply the appropriate data structure to the specified problem definition, and analyze algorithms for given problems. (Applying)
- CO3: Compare and analyse different design strategies and assess an algorithm in terms of correctness, computation cost and memory space used. (Evaluating)
- CO4: Design new algorithms for given problems by using the most appropriate algorithmic strategy considering the problem domain. (Creating)

Mapping of COs to Syllabus

Course Outcomes	Module I	Module II	Module III	Module IV	Module V
CO1	H	M			
CO2		H	H	H	
CO3		M	M	H	
CO4					H

CATC0048: THEORY OF COMPUTATION

(4 CREDITS – 60 HOURS)

(Syllabus Remains the Same – Only COs and Mapping of CO to Syllabus have been updated)

Course / Learning Outcomes

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

- CO 1: Demonstrate a comprehensive understanding of foundational concepts in automata theory, including Deterministic and Non-deterministic automata, Pushdown Automata, Parse Trees, Regular Languages, Linear Bounded Automata, and Turing Machines. (Understanding)
- CO 2: Make use of techniques, components and tools of a typical automated machine and apply it in designing new machines (Applying)
- CO 3: Design different types of deterministic and non-deterministic machines and understand their capabilities and limits. (Creating)
- CO 4: Evaluate the complexity for an automaton and current unsolved problems in theoretical Computer Science. (Evaluating)

Mapping of COs to Syllabus

Course Outcomes	Module I	Module II	Module III	Module IV
CO 1	M	M	M	M
CO 2		M	M	M
CO 3	M		H	H
CO 4			M	H

CAIT0022: INTERNET TECHNOLOGY AND APPLICATIONS

(4 Credits – 60 Hours)

(Syllabus Remains the Same – Only COs and Mapping of CO to Syllabus have been updated)

Course / Learning Outcomes

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

- CO1: Articulate the fundamental concepts related to the Internet, encompassing its historical evolution, domain name system, various services, connectivity mechanisms, and underlying protocols. (Understanding)
- CO2: Develop a responsive and visually appealing website by applying XHTML for structure, CSS for styling, and JavaScript for interactivity. (Applying)
- CO3: Analyze and troubleshoot the code of web pages, suggesting improvements for efficiency and maintainability. (Analyzing)
- CO4: Design and implement a fully functional web application that integrates server-side technologies along with client-side scripting (Creating)

Mapping of COs to Syllabus

Course Outcomes	Module I	Module II	Module III	Module IV
CO 1	H		L	M
CO 2		H	H	
CO 3		H	H	H
CO 4		M	M	H

ELECTRONICS and COMMUNICATION ENGINEERING

ECBE0051: BASIC ELECTRONICS (L-T-P: 1-0-0)

(1 Credit-15 hours)

Objective: This course will provide a broad overview of basic electronic components, devices and circuits. The students will develop the ability to apply the basic knowledge in design, analysis and operation of these devices and circuits.

Course Outcomes

1. Define the various terminologies related to semiconducting materials, basic electronic devices, and simple electronic circuits and systems. (Remembering)
2. Illustrate the basic working principle and operation of various active components like diodes and transistors. (Understanding)
3. Apply the knowledge of transistors to design amplifiers and oscillators. (Applying)
4. Analyse the characteristics/working principle/operation of semiconductors devices and systems. (Analysing)
5. Evaluate the performance & characteristics of different types of electronic circuits. (Evaluating)
6. Design and develop different types of electronic circuits (Creating)

Module I (4 hours)

Diodes and Applications: Semiconductor Diode – Construction, Operation, V-I Characteristics, Static & Dynamic Resistance, Ideal versus Practical, Diode Equivalent Circuits; Diode as a Switch, Diode as a Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Breakdown Mechanisms, Zener Diode – Operation and Applications; Opto-Electronic Devices – LEDs, Photo Diode and Applications.

Module II (5 hours)

Transistors: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action; BJT Configurations – Common Base, Common Emitter and Common Collector, Voltage Divider Bias Configuration; Field Effect Transistor (FET) – Construction, Characteristics of JFET, Depletion and Enhancement type Metal Oxide Semiconductor (MOS) FETs.

Module III (2 hours)

Amplifiers & Oscillators: Classification of transistor amplifiers and oscillators; Common Emitter Amplifier, Coupling and Bypass Capacitors, Distortion; Feedback Amplifiers – Principle, Advantages of Negative Feedback, Current Series and Voltage Series Feedback Amplifiers; Oscillators – Basic Features, RC Phase Shift, Wien Bridge, High Frequency LC and Non-Sinusoidal type Oscillators.

Module IV (4 hours)

Operational Amplifiers and Applications: Introduction to Op-Amp, Op-Amp as Differential Amplifier, Parameters of Op-Amp – CMRR, PSRR, Slew Rate; Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground, Inverting & Non-inverting amplifier.

Number System & Digital Electronics: Introduction to decimal and binary number system; Logic gates– AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR, universal gates.

ECAC0081 ANALOG AND DIGITAL COMMUNICATIONS (L-T-P: 3-0-0)

(3 credits – 45hrs)

Objective: This course is aimed at introducing to the student the fundamentals of the theory of Communication. The course will provide in-depth knowledge of communication fundamentals, various analog modulation techniques, base band and bandpass digital communications, performance of communication systems in the presence of noise.

Course Outcomes

1. Define various modulation techniques (Remembering)

2. Explain various modulation techniques (Understanding)
3. Implement techniques for analog as well as digital communication (Applying)
4. Compare various schemes of signal detection (Analyzing)
5. Choose schemes for signal generation and detection (Evaluating)

Module I (18 Hours)

Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals. Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and De-emphasis, Threshold effect in angle modulation

Module II (18 Hours)

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers. Coherent communication with waveforms- Probability of Error evaluations. Baseband Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Module III (9 Hours)

Digital Modulation tradeoffs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

Suggested Readings

1. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
4. Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering", John Wiley, 1965.
5. Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication", Kluwer Academic Publishers, 2004.
6. Proakis J.G., "Digital Communications", McGraw Hill, 4th Edition, 2000.

Mapping of COs to Syllabus

	Module 1	Module 2	Module 3
CO 1	H	H	L
CO 2	H	H	L
CO 3	M	M	M
CO 4	L	L	H
CO 5	M	M	M

MECHANICAL ENGINEERING

Old course structure for 7th semester Mechanical Engineering

Type	Category	Course Code	Course name	L-P-T	Credits
Theory	PC/IC	MNAM0051	Automation in Manufacturing	3-0-0	3
	PE III/DE	MNRC0052	Refrigeration and Air Conditioning	3-0-0	3
		MNSE0053	Non-conventional Sources of energy	3-0-0	3
		MNSN0054	Solid Mechanics	3-0-0	3
	PE IV/DE	MNER0055	Energy Conservation and Waste Heat Recovery	3-0-0	3
		MNAE0056	Automobile Engineering	3-0-0	3
	OE/IC	MNPE0057	Power Plant Engineering	3-0-0	3
MNQM0058		Total Quality Management	3-0-0	3	
Project	C/IC	MNMP6029	Major Project Phase I	0-0-2	2
Internship	Internship	MNIT6030	Industrial Training		3

New course structure for 7th semester Mechanical Engineering

Type	Category	Course Code	Course name	L-P-T	Credits
Theory	PC/IC	MNAM0051	Automation in Manufacturing	3-0-0	3

	PE III/DE	MNER0055	Refrigeration and Air Conditioning	3-0-0	3
		MNSE0053	Energy Conservation and Waste Heat Recovery	3-0-0	3
		MNSN0054	Solid Mechanics	3-0-0	3
	PE IV/DE	MNRC0052	Non-conventional Sources of energy	3-0-0	3
		MNAE0056	Automobile Engineering	3-0-0	3
	OE/IC	MNPE0057	Power Plant Engineering	3-0-0	3
MNQM0058		Total Quality Management	3-0-0	3	
Project	C/IC	MNMP6029	Major Project Phase I	0-0-2	2
Internship	Internship	MNIT6030	Industrial Training		3

ENGINEERING MECHANICS

L-3: T-1: P-0

(3rd sem MNE and CVE)

Course Outcomes:

After completing the course successfully the students will be able to-

CO1: Define various principles, definitions, theorems related to mechanics.(Remembering)

CO2: Compare and identify the various types of beams, truss and the effect of different loading on them.(Understanding)

CO3: Determine the centroid, centre of gravity and compute the area moment of inertia and mass moment of inertia of regular bodies.(Understanding)

CO4: Apply the concept of virtual work for relevant problem solving.(Applying)

CO5: Apply the principles of kinetics to compute the motion parameters or related forces of a given system. (Applying)

CO6: Applying the knowledge of vibration and its effect on a system.(Applying)

BTIP16: INTERNSHIP

3rd Semester Mechanical Engineering

Course Outcomes:

CO 1: Recognize basic business Communication Skills for engineering field (Remember).

CO 2: Relate the basic terminology/definitions of mechanical engineering in their day to day life (Understand)

BTIP13: INTERNSHIP SEMINAR

5th semester Mechanical Engineering

Course Outcomes:

CO1: Learn basic the real-time technical, managerial and life skills required at the job.(Understanding)

CO2: Expose students to the engineer's responsibilities and ethics.(Applying)

CO3: Applying basic engineering knowledge to understand design software, engineering equipments and system in the industry

MNMI6027: MINI PROJECT

5th semester Mechanical Engineering

Course Outcomes:

CO1: Develop ideas for implementing the theory knowledge in a practical manner.(Applying)

CO2: Identify the technical aspects of the project.(Applying)

CO3: Learn the use of basic principles of engineering, CAD/CAE softwares etc.(Understanding)

MNIT6030: INDUSTRIAL TRAINING

7th semester Mechanical Engineering

Course Outcomes:

CO1: Develop an awareness for the need and applications of standards in the industry. (Understanding)

CO2: Relate, apply and adapt relevant knowledge, concepts and theories within an industrial organization, practice and ethics. (Applying)

CO3: Prepare professional work reports and presentations. (Applying)

BTAP000: ACTIVITY POINT PROGRAMME FOR MECHANICAL ENGINEERING

Course Outcomes:

CO 1: Make use of engineering knowledge to enhance the quality of education, sanitation, tourism, cleanliness in the society. (Apply).

CO 2: Develop proper sustainable engineering solution for efficient use of energy, water, soil in the society. (Apply).

CO 3: Inculcate entrepreneurial mindset and societal commitment (Apply).

CO 4: Inculcate excellent soft skills along with leadership qualities and team spirit (Apply).

CIVIL ENGINEERING

CVSM0077: SOIL MECHANICS II

(3 credits – 45 hours)

Objectives:

1. This course will enable the students to apply the knowledge to various foundations and soil retaining structures.

2. Introduction to the application of geosynthetics for different site conditions.

Course /Learning Outcomes

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

CO1: Summarise the basic concepts of lateral earth pressure and theory of active and passive earth pressures. (Understand)

CO2: Design retaining wall subjected to various loads and sheet pile wall with different methods. (Apply)

CO3: Select most suitable type of foundation and evaluate load carrying capacity of shallow and deep foundations. (Apply, Evaluate)

CO4: Understand the applications of geosynthetics in civil engineering projects. (Understand)

Module I: Earth Pressure (8 hours)

Introduction, plastic equilibrium in soils: active and passive states, earth pressure at rest, active earth pressure: rankine's theory, active earth pressure of cohesive soils, passive earth pressure: rankine's theory, coulomb's wedge theory, culmann's graphical method for active pressure, consideration of surcharge, seepage, stratification, type of backfill, wall friction and adhesion.

Module II: Retaining walls: (8 hours)

Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting, cuts, excavations and sheet piles.

Module III: Bearing Capacity of Shallow Foundation (12 hours)

Introduction, significant depth, design criteria, modes of shear failures. detail study of bearing capacity theories (prandtl, rankine, terzaghi, skempton), bearing capacity determination using is code, presumptive bearing capacity. settlement, components of settlement & its estimation, permissible settlement, proportioning of footing for equal settlement, allowable bearing pressure. bearing capacity by use of penetration test data and by plate load test. bearing capacity of raft. factors affecting bearing capacity including water-table. contact pressure under rigid and flexible footings. floating foundation.

Module IV: Pile Foundations (12 hours)

Introduction, load transfer mechanism, types of piles according to their composition, their method of installation and their load carrying characteristics, piles subjected to vertical loads-pile load carrying capacity from static formula, dynamic formulae (enr and hiley), penetration test data and pile load test, pile group: carrying capacity, efficiency and settlement, negative skin friction. underreamed pile foundationits concept, design & field installation.

Module V: Introduction to Geosynthetics (5 hours)

Introduction to Geosynthetics : Definition, types of geosynthetics, properties of geosynthetics and various foundation/poor soil/civil engineering applications.

Suggested Readings

1. Gopal Ranjan, A. S. R Rao, Basic and Applied Soil Mechanics, New Age International Publishers
2. V. N. S. Murthy, Geotechnical Engineering, Marcel Dekker, Inc.
3. Dr. B.C. Punmia, Ashok Kr Jain and Arun Kr Jain, Soil Mechanics and Foundations, Laxmi Publications
4. P. Purushothama Raj, Soil Mechanics and Foundation Engineering, Pearson

Mapping of COs to Syllabus

	CO1	CO2	CO3
Module I	L	H	
Module II		M	H
Module III		H	

CVED6024: ENGINEERING GRAPHICS AND DESIGN**(3 credits) (L-T-P:1-0-4)****COURSE/LEARNING OUTCOMES****After completing the course students will be able to:**

CO1: Demonstrate drawing methodology of lettering with ISO specifications , concepts of representative factors for drawing various types of scales , the theory and methodology for different types of conic and cycloidal curves , the concept of orthographic projection for drawing projection of points , lines , planes and the concept of dimensioning , drawing complex solids , concept of isometric scale , projection and views , perspective projection of simple 1,2 and 3D figures.

CO2: Explain the application and functionalities of computer aided drafting software like QCAD and AUTOCAD.

CO3: Apply the theoretical knowledge of engineering drawing to draw precise , accurate , neat and unambiguous drawings following the proper dimensioning specifications and drawing methodology that would be required in design pertaining civil and mechanical engineering.

CO4: Judiciously evaluate the concept of drawing 1,2 and 3D figures in orthographic , isometric and perspective projections in line with BIS design and drawing specifications

Mapping of COs to Syllabus

	CO1	CO2	CO3	CO4
Module I			H	
Module II	M			
Module III	H			
Module IV	M			
Module V	M			H
Module VI		H		
Module VII		H		M
Module VIII		H	M	L
Module IX		H		H

CVCA6025: COMPUTER-AIDED CIVIL ENGINEERING DRAWING (LAB)**(2 Credits) (L:T:P :1-0-2)****COURSE /LEARNING OUTCOMES**

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

CO1: Do a detailed study of an engineering artefact.

CO2: Illustrate a design idea/concept graphically/visually.

CO3: Develop parametric design and the conventions of formal engineering drawing.

CO4: Construct and interpret 2D & 3D drawings and produce designs using a combination of 2D and 3D software.

Mapping of COs to Syllabus

	CO1	CO2	CO3	CO4
Module I	M			
Module II		H		
Module III	M		M	
Module IV			H	
Module V				H

CVEG6026: ENGINEERING GEOLOGY LAB**(1 Credits)****COURSE OUTCOMES****On completion of the course the students will be able to:**

CO1: Categorize rocks and minerals by their origin and engineering properties.

CO2: Develop the ability to prepare the geological section and maps and interpret the site conditions

Mapping of COs to Syllabus

	CO1	CO2
Expt 1	H	
Expt 2	H	
Expt 3	H	
Expt 4	H	
Expt 5	H	
Expt 6	H	
Expt 7	H	
Expt 8		H

CVFM6027: FLUID MECHANICS LAB:**(1 Credit)****COURSE OUTCOMES**

At the end of the course, the students will have the ability to:

At the end of the course, the students will have the ability to:

CO1: Understand stability of floating bodies and calculate hydrostatic pressures

CO2: Visualize fluid flow and calculate Reynold's number

CO3: Calculate coefficient of discharge for orifices.

List of Experiments: (Modified)

1. Determination of meta-centric height and stability of floating bodies.
2. Study of fluid pressure distribution on immersed bodies
3. Study of different types of pipe-flow using Reynold's apparatus
4. Study of discharge through orifices using orifice meter apparatus

Mapping of COs to Syllabus

	CO1	CO2	CO3
Expt 1	H		
Expt 2	H		
Expt 3		H	
Expt 4			H

CVSS6044: SOLID MECHANICS & STRUCTURAL ANALYSIS LABORATORY (***to be Introduced -Semester VI -Spring '25))****Credits -2****Course Outcomes:** Through this course, students should be able to**CO1:** Understand how to represent real structures by idealized structural systems and the deformations of structures under loading.**CO2:** Analyze various statically determinate structures including trusses, beams and frames.**CO3:** Apply various method to determine the deformations.**List of Practical's / Experiments**

1. **Clark -Maxwell Theorem:** Deflection of a simply supported beam and verification of Clark- Maxwell's theorem.
2. **Elastic property of beam:** To verify the elastic property of deflected beam.
3. **Bending moment and shear force:** To verify the bending moment and shear force for the simply supported beam.

4. **Moment area theorem:** To verify the moment area theorem for a beam.
5. **Behavior of columns:** Study of behavior of columns and struts with different end conditions.
6. **Experiment on Curved Beams:** To find the deflection of curved beams.
7. **Three hinge arch:** To verify the horizontal thrust for three hinge arch.
8. **Two-hinged arch:** Experiment on two-hinged arch.
9. **Portal frame:** To verify the sway for portal frame.
10. **Redundant frames:** To verify Forces in members of Redundant frames.
11. **Suspension Bridge:** Demonstration of the characteristics of a simple suspension bridge and examination of the relationship between applied loads and the suspension cable tension.

Suggested Readings

- THEORY OF STRUCTURES by S. RAMAMRUTHAM R. NARAYAN, DHANPAT RAI PUBLICATIONS.
- MECHANICS OF STRUCTURES VOL. I AND VOL .2 by DR. H. J. SHAH AND S. B. JUNNARKAR, CHAROTAR PUBLISHING HOUSE PVT. LTD.
- BASIC STRUCTURE ANALYSIS by C.S REDDY, MCGRAW HILL EDUCATION.

Mapping of COs to Syllabus

	CO1	CO2	CO3
Expt 1	M		H
Expt 2	H		
Expt 3		H	
Expt 4			H
Expt 5		H	
Expt 6		H	
Expt 7			
Expt 8			
Expt 9		H	
Expt 10		H	
Expt 11			

CVSG6029: SURVEYING & GEOMATICS LAB

1 Credit

COURSE OUTCOMES

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

CO1. Identify different types of surveying instruments and their applicability.

CO2. Execute profile levelling; determine Reduced Level, latitudes, departures, and coordinates of control points and balancing errors in a traverse and Implement curve setting work using appropriate instruments.

CO3. Operate the techniques, skills, and applicable tools of the discipline for application in engineering and surveying activities.

CO4. Investigate horizontal, vertical, and zenith angles with a transit, theodolite, and total station or survey grade GNSS instruments.

	CO1	CO2	CO3	CO4
Expt 1	H			
Expt 2	H		M	
Expt 3	H		H	
Expt 4	M	H	H	
Expt 5	H		H	
Expt 6	H		H	
Expt 7	H		H	
Expt 8	H	H	H	
Expt 9	H		H	
Expt 10	H		H	H

CVMT6030: MATERIALS, TESTING LAB**1 Credit**

CO1: Measure various physical properties of common construction materials

CO2: Conduct a meaningful hardness, tensile, and impact test and report the test results in a clear and useful manner

CO3: Determine appropriate tests to be employed to determine given mechanical properties using destructive techniques

CO4: Interpret and quantitatively determine standard mechanical properties from plots of stress versus strain.

1. Tension Test (UTM)
2. Compressive strength of aggregate and concrete
3. Tests on Cement & Aggregates
4. Soil Classification
5. Hardness test
6. Torsion Test
7. Concrete mix design
8. Impact Test

	CO1	CO2	CO3	CO4
Expt 1		H	H	H
Expt 2			H	
Expt 3	H			
Expt 4	H			
Expt 5	H	H		
Expt 6				
Expt 7				
Expt 8		H		

CVHE6031: HYDRAULIC ENGINEERING LAB**1 Credit****COURSE OUTCOMES**

At the end of the course, the students will have the ability to:

CO1: Calculate flow parameters for venturi flume.

CO2: Verify boundary layer theorem.

CO3: Understand gradually varied flow and rapid varied flow.

CO4: Visualize flow through pipes and identify laminar flow and turbulent flow.

CO5: Determine the head losses for flow through pipes.

	CO1	CO2	CO3	CO4	CO5
Expt 1				H	
Expt 2		M			
Expt 3		H			
Expt 4		M			
Expt 5			M		
Expt 6	M				
Expt 7	H				
Expt 8			H		
Expt 9			H		
Expt 10			H		
Expt 11			H		
Expt 12				H	
Expt 13				H	
Expt 14			H		
Expt 15					H

CVGE6032: GEOTECHNICAL ENGINEERING LAB**1 Credit****COURSE/LEARNING OUTCOMES****After successfully studying this course, students will be able to:**

CO1: Identify the index properties and engineering properties of soil.

CO2: Understand the laboratory tests used for determination of physical, index and Engineering properties of soil.

CO3: Calculate the values of different engineering properties of soil.

	CO1	CO2	CO3
Expt 1	H	H	H
Expt 2	H	H	H
Expt 3	H	H	H
Expt 4		H	
Expt 5		H	
Expt 6		H	
Expt 7		H	
Expt 8	H	H	
Expt 9	H	H	
Expt 10	H	H	
Expt 11		H	
Expt 12		H	
Expt 13		H	H
Expt 14		H	H
Expt 15		H	H
Expt 16		H	H
Expt 17		H	H
Expt 18		H	H
Expt 19		H	H
Expt 20		H	H

CVTE6034: TRANSPORTATION ENGINEERING LAB**(1 credit)****COURSE/LEARNING OUTCOMES**

After successfully studying this course, students will be able to:

CO1: Identify engineering properties of aggregates.

CO2: Calculate the engineering properties of soil.

CO3: Identify the grade & properties of bitumen.

List of Experiments

- To determine the IMPACT VALUE of coarse aggregates by use of IMPACT MACHINE.
- To determine the ABRASION VALUE of coarse aggregates by use of LOS ANGELES MACHINE.
- To determine the Flakiness Index and Elongation Index of coarse aggregates.
- To determine the MARSHALL STABILITY of Bitumen mix.
- To determine the SOFTENING POINT of Bitumen.
- To determine the DUCTILITY of Bitumen.
- To determine the Specific Gravity of Bitumen.
- To determine the Penetration of Bitumen.
- To determine the CALIFORNIA BEARING RATIO of soil.

	CO1	CO2	CO3
Expt 1	H		
Expt 2	H		
Expt 3	H		
Expt 4			H
Expt 5			H
Expt 6			H

Expt 7			H
Expt 8			H
Expt 9		H	

CVEE6033: ENVIRONMENTAL ENGINEERING LAB

1 Credit-(L-T-P:0-0-2)

COURSE/LEARNING OUTCOMES

After successfully studying this course, students will be able to:

- CO1: Implement and demonstrate instructions regarding various parameters of water and sewage quality testing and air quality assessment.
- CO2: Demonstrate experimental procedures for water and air quality analysis
- CO3: Produce report on various parameters of water and sewage quality tests and air quality analysis.
- CO4: Present and justify results of water and sewage quality tests air quality monitoring.

List of Experiments

1. Physical Characterization of water: Turbidity, Electrical Conductivity, pH
2. Analysis of solids content of water: Dissolved, Settleable, suspended, total, volatile, inorganic etc.
3. Alkalinity and acidity, Hardness: total hardness, calcium and magnesium hardness
4. Analysis of ions: copper, chloride and sulfate
5. Optimum coagulant dose
6. Chemical Oxygen Demand (COD)
7. Dissolved Oxygen (D.O) and Biochemical Oxygen Demand (BOD)
8. Break point Chlorination
9. Bacteriological quality measurement: MPN,
10. Ambient Air quality monitoring (TSP, RSPM, SO_x, NO_x)

	CO1	CO2	CO3	CO4
Expt 1		H	H	H
Expt 2		H	H	H
Expt 3		H	H	H
Expt 4		H	H	H
Expt 5	H			
Expt 6		H	H	H
Expt 7		H	H	H
Expt 8	H	H		
Expt 9	H	H	H	H
Expt 10	H	H	H	H

CVAC6037: ADVANCED CONCRETE LAB**(2 Credits) (L-T-P:0-0-4)****COURSE OUTCOMES:**

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

CO1: Explain various tests to assess the quality of concrete

CO2: Conduct Non-Destructive Tests on existing concrete structures.

CO3: Apply engineering principles to understand behavior of structural/ element and judge the quality standards of the concrete mix

CO4: Design high grade concrete and study the parameters affecting its performance.

List of Experiments/Assignments:

1. Study of stress-strain curve of high strength concrete, Correlation between cube strength, cylinder strength, split tensile strength and modulus of rupture.
2. Effect of cyclic loading on steel.
3. Non-Destructive testing of existing concrete members.
4. Behaviour of Beams under flexure, Shear and Torsion.
5. Determination of Workability of Concrete by
6. Flow Table
7. Slump Cone
8. V B Consisto meter
9. Compaction factor apparatus

Suggested Readings

1. Properties of Concrete, Neville A. M., 5th Edition, Prentice Hall, 2012.
2. Concrete Technology, Shetty M. S., S. Chand and Co., 2006.

	CO1	CO2	CO3	CO4
Expt 1	H		H	
Expt 2			H	
Expt 3	M	H		
Expt 4		H		
Expt 5				H