



# AHMEDABAD INSTITUTE OF TECHNOLOGY

## COMPUTER ENGINEERING DEPARTMENT

### CO STATEMENTS ( 2019-23 )

SR NO	Subject Name	CO
<b>SEMESTER-1 &amp; 2</b>		
1	<b>Basic Electrical Engineering</b>	CO1:Apply fundamental electrical laws and circuit theorems to electrical circuits.
		CO2:Analyze single phase and three phase AC circuits.
		CO3:Describe operating principle and applications of static and rotating electrical machines.
		CO4:Comprehend electrical installations, their protection and personnel safety.
2	<b>Environmental Sciences</b>	CO1:Introduction to environment, importance of environmental science, types of pollutions and control measures.
		CO2:Management of solid waste, Bio Medical waste & E waste.
		CO3:Apply knowledge to mitigate global environmental issues.
		CO4:Conceptualize the principles of Green Buildings and Smart cities & 4 R's
3	<b>Basic Mechanical Engineering</b>	CO1:Discuss the various sources of energy and basic terminology of Mechanical engineering
		CO2:Make calculations for commonly used working fluids i.e. ideal gasses and steam

		CO3:Analyze various heat engine cycles and understand construction and working of IC engines
		CO4:Discuss working and applications of steam boilers and various energy conversion systems
		CO5:Discuss various power transmission elements and properties of various engineering materials with their applications
4	<b>Physics</b>	CO1:The student will gain knowledge of basic theoretical and mathematical concept of electronic materials.comprehensive manner.
		CO2:The student will demonstrate understanding of basic principles, properties and applications associated with semiconducting materials. comprehensive manner.
		CO3:The student will demonstrate understanding of basic theory and properties associated with optoelectronic materials.
		CO4:The student will gain knowledge of the different measurements techniques to characterize various semiconducting, electrical and optoelectronic materials and devices.
		CO5:The student will demonstrate understanding of basic theory, properties and applications of Superconductivity.
5	<b>English</b>	CO1:Mention variety of forms of vocabulary in multiple situations in oral and written communication.
		CO2:Address the phonetics and the transcription pattern to answer correct pronunciation
		CO3:Expand the rules of Grammar and it's validation during speaking and writing with accuracy
		CO4:Indicate usages of grammar to enable competency in listening, speaking, reading and writing thru situational aspects
		CO5:Analyze various formal and informal documents of routine life and in professional set ups.
		CO6:Mention variety of aspects of writing in multiple situations by implementing the nuances like conscience, clarity, accuracy, organization and coherence

6	<b>Engineering Graphics &amp; Design</b>	CO1:Understand the conventions and the methods of engineering drawing
		CO2:Interpret engineering drawings using fundamental technical mathematics.
		CO3:Construct basic and intermediate geometry and comprehend the theory of projection.
		CO4:Improve their visualization skills so that they can apply these skills in developing new products
		CO5:Improve their technical communication skill in the form of communicative drawings ,Use computer software for engineering drawing.
7	<b>Mathematics - 2</b>	CO1:To use mathematical tools needed in evaluating vector calculus and their usage like Work, Circulation and Flux.
		CO2:To apply the Laplace transform as tools which are used to solve differential equations and Fourier integral representation.
		CO3:To solve the mathematical problem for the solutions of first order ordinary differential equations.
		CO4:To determine the solutions of higher order ordinary differential equations as an application of mathematical methods.
		CO5:To perform series solution methods and special functions like Bessels' functions.
8	<b>Basic Electronics</b>	CO1:Analyze the general purpose diode.
		CO2:Design biasing circuits for BJT
		CO3:Analyze BJT Circuits in small-signal domain
		CO4:Analyze basic FET Circuits
		CO5:Verify the functionalities of basic digital gates and logic families
		CO6:Analyze special-Purpose diode and transistor.
9	<b>Mathematics - 1</b>	CO1:To Use differential and integral calculus to improper integrals and to determine applications of definite integral. Apart from

		some other applications they will have a basic understanding of indeterminate forms, Beta and Gamma functions.
		CO2:To apply the various tests of convergence to sequence, series and the tool of power series and Fourier series for learning advanced Engineering Mathematics.
		CO3:To Calculate directional derivative,maximum or minimum rate of change and optimum value of functions of several variables.
		CO4:To compute the areas and volumes using multiple integral techniques.
		CO5:To execute matrix computation in a comprehensive manner.
10	<b>Programming for Problem Solving</b>	CO1 : Analyse algorithm/flowchart for given problem.
		CO2: Evaluate C program using algorithm/flowchart.
		CO3: Create programs using conditional and branching statements.
		CO4: Apply different C function on given problem.
		CO5: Create an application using the concepts of file management and array to solve engineering problems
<b>SEMESTER-3</b>		
11	<b>Effective Technical Communication</b>	CO1 : Define and discuss dynamics of Verbal and Non Verbal aspects of Communication
		CO2 : Write various formal documents of technical and professional communication
		CO3 : Write various formal documents of technical and professional communication
		CO4 : Illustrate and examine the knowledge of ethical aspects of engineering
		CO5 : Demonstrate and explain social and professional etiquettes
		CO6 : Plan self-development and practice self-assessment
12	<b>Probability and Statistics</b>	CO1 : Exemplify the terminologies of basic probability, two types of random variables and their probability functions

		CO2 : Analyze the behavior of various discrete and continuous probability distributions
		CO3 : Describe statistical data using the central tendency, correlation, correlation coefficient and also regression
		CO4 : Use the statistics for testing the significance of the given large and small sample data by using t- test, F- test and Chi-square test
		CO5 : Apply the fitting of various curves by method of least square
<b>13</b>	<b>Indian Constitution</b>	CO1 : Create awareness about law enactment and importance of Constitution.
		CO2 :Discuss Fundamental Rights and Fundamental Duties of the Indian Citizen to instill morality, social values, honesty, dignity of life and their social Responsibilities.
		CO3 : Create Awareness of their Surroundings, Society, Social problems and their suitable solutions while keeping rights and duties of the citizen keeping in mind
		CO4 : Summarise distribution of powers and functions of Local Self Government.
		CO5 : Understand the National Emergency, Financial Emergency and their impact on Economy of the country.
<b>14</b>	<b>Design Engineering - I A</b>	CO1 :Understand the design thinking and its socio-economical relevance.
		CO2 :Analyze AEIOU framework, mind mapping for the observation.
		CO3 :Identify the users and stakeholders and design the empathy canvas..
		CO4 : Validate the ideas through various approaches and compile the ideation canvas.
		CO5 :Identify the problem using the ideation canvas and based on it can solve the problem by identifying the various product functions and features and compile the product development canvas.

<b>15</b>	<b>Data Structures</b>	CO1 :Understand fundamentals of data structures and their applications essential for programming/problem solving.
		CO2 :Create various linear data structures with their representation and perform different operations on them.
		CO3 :Create various nonlinear data structures with their representation and perform different operations on them.
		CO4 :Evaluate the concepts of Hashing, File structure ,sorting and searching algorithms.
		CO5 :Analyse a problem to achieve optimal solution using suitable data structure methods.
<b>16</b>	<b>Database Management Systems</b>	CO1 :Analyze the different components of database management systems using E-R diagram
		CO2 :Apply the entities and their relationships from the problem statement using an E-R diagram that help in designing a database using normalization.
		CO3 :Create SQL, PL/SQL to solve the provided problem.
		CO4 :Create Relational Calculus and relational algebra to solve the provided problem.
		CO5 :Evaluate the concept of transaction, concurrency control, recovery, and security concepts in databases
		CO6 :Evaluate the goal of query processing, query optimization
<b>17</b>	<b>Digital Fundamentals</b>	CO1:Understand the number system and Boolean algebra to solve the provided problem.
		CO2 :Apply how logic gates and families operate, then use them to create simple circuits.
		CO3 :Create circuits with sequential and combinational logic.
		CO4 :Analyze the analogue to digital and digital to analogue conversion processes.
		CO5 :CreatePLDs to implement the stated logical problem
<b>SEMESTER- 4</b>		

<b>18</b>	<b>Design Engineering 1 B</b>	CO1 : Understand the design thinking process
		CO2 : Design a solution to an engineering problem
		CO3 : Identify needs and constraints of product development system
		CO4 : Create a prototype model
		CO5 : Evaluate the designed solution
		CO6 : Make economic decision for solution.
<b>19</b>	<b>Operating System</b>	CO1 : Create basic architectural components involved in operating systems design
		CO2 : Evaluate the process management policies and scheduling by CPU.
		CO3 :Evaluate the requirement for process synchronization and coordination handled by operating system.
		CO4 : Describe the memory management and its allocation policies
		CO5 :Analyze various device and resource management techniques for timesharing
		CO6 : Create designing a contemporary Operating Systems.
<b>20</b>	<b>Object Oriented Programming -I</b>	CO1 : Analyze Java constructs, features and libraries for simple problems.
		CO2 : Demonstrate use of classes, interfaces, objects and methods, override and overload methods, compile and execute programs.
		CO3 : Implement programs using exception handling, multithreading with synchronization.
		CO4 : Implement Concept Of Files, binary I/O, collection Frameworks for a given problem.
		CO5 : Design GUI based applications in a group using modern tools and frameworks.
<b>21</b>	<b>Computer Organization &amp; Architecture</b>	CO1 : Analyze the basic structure and functional units of a digital computer.
		CO2 : Examine assembly language program and evaluate various instructions using functional units of a computer.

		CO3 : Design processing unit using Arithmetic Logic Unit and Control Logic Unit.
		CO4 : Design circuits for interfacing memory and I/O with processor
		CO5 : Analyse the features and performance parameters of various computer architecture.
<b>22</b>	<b>Discrete Mathematics</b>	CO1 : Understand the basic principles of sets and operations in sets and apply counting principles to determine probabilities, domain and range of a function, identify one-to- one functions, perform the composition of functions and apply the properties of functions to application problems.
		CO2 : Establish the validity of an argument by writing it out using logical notation. Using truth tables, the properties of logic, and basic logic statements such as compound assertions, implications, inverses, converses, and contrapositives, to assess and simplify them. Using predicates, quantifiers, and logical connectives, one can create a logical phrase.
		CO3 : Apply relations and to determine their properties. Be familiar with recurrence relations
		CO4 : Analyse the properties of algebraic structures.
		CO5 : Interpret different traversal methods for trees and graphs. Model problems in Computer Science using graphs and trees.
<b>23</b>	<b>Principles of Economics and Management</b>	CO1 : Understand How Revenue Is Affected By Elasticity
		CO2 : Analyze Relationship Between Cost Function And Production Function
		CO3 : Analyze the optimal quantity and pricing decisions of firms in different market structures (perfect competition, monopoly, monopolistic competition) to achieve profit
		CO4 : Evaluate the basic principles of Planning, Organising, Controlling And Directing
		CO5 : Understand Ethical Dilemmas faced By Business And Managers



## SEMESTER- 5

<b>24</b>	<b>Design Engineering - II A</b>	CO1 : Discuss the processes involved in design Engineering
		CO2 : Analyze interesting interaction of various segments of humanities, disciplines and engineering in the progress of a design
		CO3 : Analyze use of AEIOU framework, logbook, mind mapping for the observation.
		CO4 : Identify the flow of the system and design the system accordingly.
		CO5 : Define the problem domain by identifying the various product functions and features and compile the product development canvas.
<b>25</b>	<b>Integrated Personality Development Course</b>	CO1 :Create holistic value based education for the students
		CO2 :Understand the different tools for student's overall development
		CO3 :Apply critical thinking
		CO4 :Analyze soft skills and hard skills
		CO5 :Understand the values of our country
		CO6 :Analyze the role models to learn from models who have a lived principles
<b>26</b>	<b>Analysis and Design of Algorithms</b>	CO1 : Create an algorithm for a given problem with asymptotic performance of an algorithm.
		CO2 : Evaluate the performance of divide and conquer algorithm.
		CO3 : Create an optimal solution by analyzing various method
		CO4 : Apply major graph algorithms in real life problems.
		CO5 : Create pattern matching algorithm to find particular pattern.
		CO6 : Evaluate polynomial and Non- polynomial problems.
<b>27</b>	<b>Professional ethics</b>	CO1 : Understand the Practical ethical dilemmas
		CO2 : Analyze relevant theoretical concepts related to professional ethics
		CO3 : Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories

		CO4 : Explore morals, values, ethics, and the law and their engineering practice
		CO5 : Apply learning from Indian history and ethos to ethical practices in engineering
<b>28</b>	<b>Computer Networks</b>	CO1 :Understand the basic terminologies used in networking and layered architecture of computer network
		CO2 : Apply basic protocols of application layer and its implementation
		CO3 :Apply the essential principles of a connectionless and connection-oriented protocols used for reliable data transfer, flow control and congestion control.
		CO4 :Analyze IP addressing and various routing algorithms to find shortest paths for network-layer packet delivery
		CO5 :Evaluate different link layer terminologies like error detection-correction, Multiple access protocol and Link layer addressing used in network.
<b>29</b>	<b>Software Engineering(Professional Elective - I)</b>	CO1 : Prepare SRS(Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
		CO2 : Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
		CO3 : Recognize how to ensure the quality of software product, different quality standards and software review techniques.
		CO4 : Apply various testing techniques and test plan in.
		CO5 : Explain modern agile development.
<b>30</b>	<b>Python for Data Science ( Open Elective - I)</b>	CO1 : Demonstrate different Python data types and their structures
		CO2 : Interpretation of the role of python in steps involved in data science
		CO3 : Illustrate the use of various operations for data cleansing and transformation
		CO4 :Analyze data visualization tools for data interpretation and insights of data

		CO5 : Perform data Wrangling with Scikit-learn applying exploratory data analysis
31	<b>Cyber Security</b>	CO1 : Analyze system and web vulnerability
		CO2 : Evaluate network defense tools
		CO3 :Examine the cyber laws
		CO4 :Investigate a cyber crime,prepare a report and apply laws for the case
<b>SEMESTER- 6</b>		
32	<b>Design Engineering II B</b>	CO1 : Understand the design thinking process
		CO2 : Design a solution to an engineering problem
		CO3 : Identify needs and constraints of product development system
		CO4 : Create a prototype model
		CO5 : Evaluate the designed solution
		CO6 : Make economic decision for solution.
32	<b>Integrated Personality Development Course</b>	CO1 :Create holistic value based education for the students
		CO2 :Understand the different tools for student's overall development
		CO3 :Apply critical thinking
		CO4 :Analyze soft skills and hard skills
		CO5 :Understand the values of our country
		CO6 :Analyze the role models to learn from models who have a lived principles
33	<b>Theory of Computation</b>	CO1 : Apply the techniques of discrete mathematics for theoretical computer science.
		CO2 : Design different formal languages and their relationship.
		CO3 : Classify grammars for different languages .
		CO4 : Build finite automata, push down automata and turing machine.

		CO5 : Analyze various concepts of undecidability and Computable Function for problem-solving situation.
<b>34</b>	<b>Advanced Java Programming( Professional Elective - III)</b>	CO1 : Apply Networking and Data base connectivity in Java for given application.
		CO2 : Demonstrate webpage with dynamic content and server side web application using Servlet and JSP.
		CO3 : Discuss web application framework JSF to build user interfaces.
		CO4 : Analyse Object Relation Mapping using Hibernate to build database dependent applications
		CO5 : Classify Model-View-Controller architecture to build complex client-server applications.
<b>35</b>	<b>Microprocessor and Interfacing</b>	CO1 :Demonstrate the various features of microprocessor, memory and I/O devices
		CO2 :Identify the hardware elements of 8085 microprocessor.
		CO3 :Select appropriate 8085 instructions based on size and functions to write an assembly language program
		CO4 :Design different interfacing system using concepts of memory and I/O interfacing.
		CO5 :Demonstrate the features of advance microprocessors.
<b>36</b>	<b>Web Programming (Professional Elective - II)</b>	CO1 :Use the various HTML tags with appropriate styles to display the various types of contents effectively
		CO2 :Develop the dynamic web pages using HTML, CSS and JavaScript applying web design principles to make pages effective
		CO3 :Develop the server side PHP scripts using various features for creating customized web services
		CO4 :Write the server side scripts for designing web based services with database connectivity
		CO5 :Develop a web application using advanced web programming features including AJAX and JQuery using concepts of Web API.

<b>37</b>	<b>Data Mining</b>	CO1 :Perform the preprocessing of data and apply mining techniques on it.
		CO2 :Identify the association rules, classification, and clusters in large data sets.
		CO3 :Solve real world problems in business and scientific information using data mining.
		CO4 :Use data analysis tools for scientific applications.
		CO5 :Implement various supervised machine learning algorithms.
<b>38</b>	<b>System Software (Professional Elective - III)</b>	CO1 :Classify different methodologies, concepts and approaches to System Software Programming.
		CO2 :Identify elements of language processors with various data structures used in development of one-pass and multi-pass assemblers.
		CO3 :Examine macro processor, its usage.
		CO4 :Build various system programs using language processor development tools such as YACC and Lex.
		CO5 :Design code optimization based solution for the given system problems by applying various techniques of compiler, interpreter and debugger.
<b>39</b>	<b>IOT and applications(Open elective - II)</b>	CO1 : Apply the architecture and functioning of IoT systems.
		CO2 : Analyse the various IoT protocols
		CO3 : Create an IoT system to take the benefit of the Clouds for computing and storage considering security issues.
		CO4 : Apply the benefits of IoT technologies for automating the various real-life challenges in various application areas
		CO5 : Create the software components of IoT system using Arduino/Raspberry Pi Programming.
<b>SEMESTER- 7</b>		

<b>40</b>	<b>Summer Internship</b>	CO1. Get exposure to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
		CO2. Get possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job(s).
		CO3. Gain experience in writing Technical reports / projects and presentation of it.
		CO4. Learn and gain exposure to the engineer's responsibilities and ethics.
		CO5. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations.
<b>41</b>	<b>Compiler Design</b>	CO1 : Analyze relationships among different phases of the compiler and its structure
		CO2 : Categorize parsing strategies for a compiler for various cases.
		CO3 : Design intermediate code using three address code and Machine code.
		CO4 : Classify various storage allocation strategies with run time environment using different data structures
<b>42</b>	<b>Artificial Intelligence</b>	CO1 : Analyze different search techniques in AI
		CO2 : Apply different types of logic and knowledge representation schemes
		CO3 : Apply various game playing techniques in programs.
		CO4 : Understand various advance applications of AI
		CO5 : Apply prolog programming using predicate logic
<b>43</b>	<b>Cloud Computing (Professional Elective - IV)</b>	CO1 : Evaluate strength and limitation of cloud computing
		CO2 : Analyze different cloud depoly and services architecture model
		CO3 : Understand various enterprise application in cloud computing
		CO4 : Apply the virtualization concepts

		CO5 :Analyze data security mechanism and SLA management in cloud
<b>44</b>	<b>Distributed System</b>	CO1: Explain architecture and communication systems in Distributed Systems
		CO2: Describe synchronization and various election algorithms in Distributed Systems
		CO3: Outline various consistency and replication protocols and methods
		CO4: Observe security threats and apply cryptography methods for security in Distributed Systems
		CO5: Contrast various types of Distributed Systems
<b>45</b>	<b>Information security ( Professional Elective - V)</b>	CO1 :Explain basic terminology of information security and conventional techniques of cryptography.
		CO2 :Apply standard symmetric key and asymmetric key algorithms used to provide confidentiality, integrity and authenticity.
		CO3 :Analyze algorithms of message integrity , message authentication and digital signature
		CO4 :Select proper key distribution and management schemes to solve security problems
		CO5 :Design secure applications using cryptographic mechanisms.
<b>46</b>	<b>Big Data Analytics ( Professional Elective - VI)</b>	CO1 :Identify big data application areas.
		CO2 :Understand big data framework.
		CO3 :Analyze data by applying selected techniques
		CO4 :Demonstrate an Integrated approach to big data.
		CO5 :Demostarte the Data Analytics in Big data.
<b>47</b>	<b>Machine Learning( Professional Elective - VI)</b>	CO1 :Analyze the fundamental issues and challenges in machine learning including data
		CO2 :Understand the methods of model selection and its complexity.

		CO3 :Analyze the underlying mathematical relationships within and across machine learning algorithms
		CO4 :Evaluate the various supervised learning algorithms using appropriate dataset.
		CO5 : Evaluate the various unsupervised learning algorithms using appropriate dataset.
		CO6 : Implement various machine learning algorithms in a range of real-world applications.
<b>48</b>	<b>Mobile Application Development(Open Elective - III)</b>	CO1 :Apply knowledge of pre-requirements and fundamental of android OS.
		CO2 :Analyse the android components using UI material designs
		CO3 :Create system database operations using android services
		CO4 :Apply knowledge of GPS,Geocoding, Graphics and Background services
		CO5 :Apply advance features of development and deployment in android system.
<b>50</b>	<b>Data Visualization</b>	CO1: Inspect various data visualization techniques in order to provide new insight.
		CO2: Apply appropriate data visualization techniques to provide trends/insights for the given dataset.
		CO3: Experiment visualization tools / techniques for various data analysis tasks..
		CO4: Given the application context for given data set, Outline the information Dashboard for access information based on user criteria.
<b>51</b>	<b>Distributed System</b>	CO1: Explain architecture and communication systems in Distributed Systems
		CO2: Describe synchronization and various election algorithms in Distributed Systems
		CO3: Outline various consistency and replication protocols and methods



		CO4: Observe security threats and apply cryptography methods for security in Distributed Systems
		CO5: Contrast various types of Distributed Systems
<b>52</b>	<b>Digital forensics(Open Elective - III)</b>	CO1 : Understand Forensic science and Digital Forensic concepts
		CO2 : Analyse various digital forensic Operandi and motive behind cyber attacks
		CO3 : Understand the cyber pieces of evidence, Digital forensic process model and their legal perspective.
		CO4 : Apply various forensic tools to investigate the cybercrime
		CO5 : Analyse the digital evidence used to commit cyber offences.
<b>SEMESTER- 8</b>		
<b>53</b>	<b>Internship/Project</b>	CO1 : Undertake problem identification, formulation and solution
		CO2 : Design engineering solutions to complex problems utilising a systematic approach and team work
		CO3 : Communicate with engineers and the community at large in written and oral forms
		CO4 : Demonstrate the knowledge and understanding of engineering and management principle and apply it to assigned project