

# AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

## B TECH COMPUTER SCIENCE & ENGINEERING

### 2019 Scheme Syllabus- Course Outcomes

#### S1S2 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
<b>BASICS OF CIVIL &amp; MECHANICAL ENGINEERING</b>	EST 120	CO 1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
		CO 2	Explain different types of buildings, building components, building materials and building construction
		CO 3	Describe the importance, objectives and principles of surveying.
		CO 4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
		CO 5	Discuss the Materials, energy systems, water management and environment for green buildings.
		CO 6	Analyse thermodynamic cycles and calculate its efficiency
		CO 7	Illustrate the working and features of IC Engines
		CO 8	Explain the basic principles of Refrigeration and Air Conditioning
		CO 9	Describe the working of hydraulic machines
		CO 10	Explain the working of power transmission elements
		CO 11	Describe the basic manufacturing, metal joining and machining processes
<b>BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING</b>	EST 130	CO 1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
		CO 2	Develop and solve models of magnetic circuits
		CO 3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
		CO 4	Describe working of a voltage amplifier
		CO 5	Outline the principle of an electronic instrumentation system
		CO 6	Explain the principle of radio and cellular communication
<b>CIVIL &amp; MECHANICAL WORKSHOP</b>	ESL 120	CO 1	Name different devices and tools used for civil engineering measurements
		CO 2	Explain the use of various tools and devices for various field measurements.
		CO 3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
		CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.

		<b>CO 5</b>	Compare different techniques and devices used in civil engineering measurements
		<b>CO 6</b>	Identify Basic Mechanical workshop operations in accordance with the material and objects
		<b>CO 7</b>	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
		<b>CO 8</b>	Apply appropriate safety measures with respect to the mechanical workshop trades
<b>PROGRAMING IN C</b>	<b>EST 102</b>	<b>CO 1</b>	Analyze a computational problem and develop an algorithm/flowchart to find its solution
		<b>CO 2</b>	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
		<b>CO 3</b>	Write readable C programs with arrays, structure or union for storing the data to be processed
		<b>CO 4</b>	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
		<b>CO 5</b>	Write readable C programs which use pointers for array processing and parameter passing
		<b>CO 6</b>	Develop readable C programs with files for reading input and storing output
<b>ELECTRICAL &amp; ELECTRONICS WORKSHOP</b>	<b>ESL 130</b>	<b>CO 1</b>	Demonstrate safety measures against electric shocks.
		<b>CO 2</b>	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
		<b>CO 3</b>	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
		<b>CO 4</b>	Identify and test various electronic components
		<b>CO 5</b>	Draw circuit schematics with EDA tools
		<b>CO 6</b>	Assemble and test electronic circuits on boards
		<b>CO 7</b>	Work in a team with good interpersonal skills
<b>ENGINEERING GRAPHICS</b>	<b>EST 110</b>	<b>CO 1</b>	Draw the projection of points and lines located in different quadrants
		<b>CO 2</b>	Prepare multiview orthographic projections of objects by visualizing them in different positions
		<b>CO 3</b>	Draw sectional views and develop surfaces of a given object
		<b>CO 4</b>	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
		<b>CO 5</b>	Convert 3D views to orthographic views
		<b>CO 6</b>	Obtain multiview projections and solid models of objects using CAD tools
<b>ENGINEERING</b>	<b>EST 100</b>	<b>CO 1</b>	Recall principles and theorems related to rigid body mechanics
		<b>CO 2</b>	Identify and describe the components of system of forces acting on the rigid body
		<b>CO 3</b>	Apply the conditions of equilibrium to various practical problems involving different force system.

<b>MECHANICS</b>		<b>CO 4</b>	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
		<b>CO 5</b>	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
<b>ENGINEERING CHEMISTRY</b>	<b>CYT 100</b>	<b>CO 1</b>	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
		<b>CO 2</b>	Understand applications.
		<b>CO 3</b>	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
		<b>CO 4</b>	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
		<b>CO 5</b>	Study various types of water treatment methods to develop skills for treating wastewater.
<b>ENGINEERING CHEMISTRY LAB</b>	<b>CYL 120</b>	<b>CO 1</b>	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
		<b>CO 2</b>	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
		<b>CO 3</b>	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
		<b>CO 4</b>	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
		<b>CO 5</b>	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
		<b>CO 6</b>	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum

# AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

## 2019 Scheme Syllabus- Course Outcomes

### S3S4 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
DISCRETE MATHEMATICAL STRUCTURES	MAT 203	CO1	Check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic <b>(Cognitive Knowledge Level: Apply)</b>
		CO2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion <b>(Cognitive Knowledge Level: Apply)</b>
		CO3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science <b>(Cognitive Knowledge Level: Understand)</b>
		CO4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science <b>(Cognitive Knowledge Level: Apply)</b>
		CO5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients <b>(Cognitive Knowledge Level: Apply)</b>
		CO6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups <b>(Cognitive Knowledge Level: Understand)</b>
DATA STRUCTURES	CST 201	CO1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm <b>(Cognitive Knowledge Level: Apply)</b>
		CO2	Identify the suitable data structure (array or linked list) to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem <b>(Cognitive Knowledge Level: Apply)</b>
		CO3	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed <b>(Cognitive Knowledge Level: Apply)</b>

		CO4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set <b>(Cognitive Knowledge Level: Apply)</b>
		CO5	Select appropriate sorting algorithms to be used in specific circumstances <b>(Cognitive Knowledge Level: Analyze)</b>
		CO6	Design and implement Data Structures for solving real world problems efficiently <b>(Cognitive Knowledge Level: Apply)</b>
<b>LOGIC SYSTEM DESIGN</b>	CST 203	CO1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers <b>(Cognitive Knowledge level: Understand)</b>
		CO2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates <b>(Cognitive Knowledge level: Apply)</b>
		CO3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA. <b>(Cognitive Knowledge level: Apply)</b>
		CO4	Design sequential circuits - Registers, Counters and Shift Registers. <b>(Cognitive Knowledge level: Apply)</b>
		CO5	Use algorithms to perform addition and subtraction on binary, BCD and floating point numbers <b>(Cognitive Knowledge level: Understand)</b>
<b>OBJECT ORIENTED PROGRAMMING USING JAVA</b>	CST 205	CO1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism <b>(Cognitive Knowledge Level: Apply)</b>
		CO2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs <b>(Cognitive Knowledge Level: Apply)</b>
		CO3	Illustrate how robust programs can be written in Java using exception handling mechanism <b>(Cognitive Knowledge Level: Understand)</b>
		CO4	Write application programs in Java using multithreading and database connectivity <b>(Cognitive Knowledge Level: Apply)</b>
		CO5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java <b>(Cognitive Knowledge Level: Apply)</b>
<b>DATA STRUCTURE S LAB</b>	CSL 201	CO1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements <b>(Cognitive Knowledge Level: Analyse)</b>

		<b>CO2</b>	Write a time/space efficient program to sort a list of records based on a given key in the record ( <b>Cognitive Knowledge Level: Apply</b> )
		<b>CO3</b>	Examine a given Data Structure to determine its space complexity and time complexities of operations on it ( <b>Cognitive Knowledge Level: Apply</b> )
		<b>CO4</b>	Design and implement an efficient data structure to represent given data ( <b>Cognitive Knowledge Level: Apply</b> )
		<b>CO5</b>	Write a time/space efficient program to convert an arithmetic expression from one notation to another ( <b>Cognitive Knowledge Level: Apply</b> )
		<b>CO6</b>	Write a program using linked lists to simulate Memory Allocation and Garbage Collection ( <b>Cognitive Knowledge Level: Apply</b> )
<b>OBJECT ORIENTED PROGRAMMING LAB (IN JAVA)</b>	<b>CSL 203</b>	<b>CO1</b>	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java (Cognitive Knowledge Level: <b>Apply</b> )
		<b>CO2</b>	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files (Cognitive Knowledge Level: <b>Apply</b> )
		<b>CO3</b>	Implement robust application programs (Cognitive Knowledge Level: <b>Apply</b> )
		<b>CO4</b>	Implement application programs in Java using multithreading and database connectivity (Cognitive Knowledge Level: <b>Apply</b> )
		<b>CO5</b>	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java (Cognitive Knowledge Level: <b>Apply</b> )
<b>SUSTAINABLE ENGINEERING</b>	<b>MCN201</b>	<b>CO 1</b>	Understand the relevance and the concept of sustainability and the global initiatives in this direction
		<b>CO 2</b>	Explain the different types of environmental pollution problems and their sustainable solutions
		<b>CO 3</b>	Discuss the environmental regulations and standards
		<b>CO 4</b>	Outline the concepts related to conventional and non-conventional energy
		<b>CO 5</b>	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
<b>DESIGN AND ENGINEERING</b>	<b>EST 200</b>	<b>CO 1</b>	Explain the different concepts and principles involved in design engineering.
		<b>CO 2</b>	Apply design thinking while learning and practicing engineering.
		<b>CO 3</b>	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
		<b>CO 1</b>	Understand the core values that shape the ethical behaviour of a professional.

<b>PROFESSIONAL ETHICS</b>	<b>HUT 200</b>	<b>CO 2</b>	Adopt a good character and follow an ethical life.
		<b>CO 3</b>	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
		<b>CO 4</b>	Solve moral and ethical problems through exploration and assessment by established experiments.

		CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
GRAPH THEORY	MAT 206	CO 1	Explain vertices and their properties, types of paths, classification of graphs and trees & their properties. <b>(Cognitive Knowledge Level: Understand)</b>
		CO 2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs. <b>(Cognitive Knowledge Level: Understand)</b>
		CO 3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's and Floyd-Warshall algorithms for finding shortest paths. <b>(Cognitive Knowledge Level: Apply)</b>
		CO 4	Explain planar graphs, their properties and an application for planar graphs. <b>(Cognitive Knowledge Level: Apply)</b>
		CO 5	Illustrate how one can represent a graph in a computer. <b>(Cognitive Knowledge Level: Apply)</b>
		CO 6	Explain the Vertex Color problem in graphs and illustrate an example application for vertex coloring. <b>(Cognitive Knowledge Level: Apply)</b>
COMPUTER ORGANIZATION AND ARCHITECTURE	CST 202	CO1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer <b>(Cognitive knowledge: Understand)</b>
		CO2	Explain the types of memory systems and mapping functions used in memory systems <b>(Cognitive Knowledge Level: Understand)</b>
		CO3	Demonstrate the control signals required for the execution of a given instruction <b>(Cognitive Knowledge Level: Apply)</b>
		CO4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it <b>(Cognitive Knowledge Level: Apply)</b>
		CO5	Explain the implementation aspects of arithmetic algorithms in a digital computer <b>(Cognitive Knowledge Level: Apply)</b>
		CO6	Develop the control logic for a given arithmetic problem <b>(Cognitive Knowledge Level: Apply)</b>
DATABASE MANAGEMENT SYSTEMS	CST 204	CO1	Summarize and exemplify fundamental nature and characteristics of database systems <b>(Cognitive Knowledge Level: Understand)</b>
		CO2	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams. <b>(Cognitive Knowledge Level: Apply)</b>
		CO3	Model and design solutions for efficiently representing and querying data using relational model <b>(Cognitive Knowledge Level: Analyze)</b>



		CO4	Demonstrate the features of indexing and hashing in database applications ( <b>Cognitive Knowledge Level: Apply</b> )
		CO5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems ( <b>Cognitive Knowledge Level: Apply</b> )
		CO6	Explain various types of NoSQL databases ( <b>Cognitive Knowledge Level: Understand</b> )
OPERATING SYSTEMS	CST 206	CO1	Explain the relevance, structure and functions of Operating Systems in computing devices. ( <b>Cognitive knowledge: Understand</b> )
		CO2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems. ( <b>Cognitive knowledge: Understand</b> )
		CO3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors ( <b>Cognitive knowledge: Understand</b> )
		CO4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems. ( <b>Cognitive knowledge: Understand</b> )
		CO5	Explain the memory management algorithms in Operating Systems. ( <b>Cognitive knowledge: Understand</b> )
		CO6	Explain the security aspects and algorithms for file and storage management in Operating Systems. ( <b>Cognitive knowledge: Understand</b> )
DIGITAL LAB	CSL 202	CO 1	Design and implement combinational logic circuits using Logic Gates (Cognitive Knowledge Level: <b>Apply</b> )
		CO 2	Design and implement sequential (Cognitive Knowledge Level: <b>Apply</b> )
		CO 3	Simulate functioning of digital circuits using programs written in a Hardware Description Language (Cognitive Knowledge Level: <b>Apply</b> )
		CO 4	Function effectively as an individual and in a team to accomplish a given task of designing and implementing digital circuits (Cognitive Knowledge Level: <b>Apply</b> )
OPERATING SYSTEMS LAB	CST 206	CO1	Illustrate the use of systems calls in Operating Systems. ( <b>Cognitive knowledge: Understand</b> )
		CO2	Implement Process Creation and Inter Process Communication in Operating Systems. ( <b>Cognitive knowledge: Apply</b> )
		CO3	Implement First Come First Served, Shortest Job First, Round Robin and Priority- based CPU Scheduling Algorithms. ( <b>Cognitive knowledge: Apply</b> )
		CO4	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms. ( <b>Cognitive knowledge: Apply</b> )

		CO5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems. <b>(Cognitive knowledge: Apply)</b>
		CO6	Implement modules for Storage Management and Disk Scheduling in Operating Systems. <b>(Cognitive knowledge: Apply)</b>

## AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY 2019 Scheme Syllabus- Course Outcomes

### S5S6 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
<b>FORMAL LANGUAGES AND AUTOMATA THEORY</b>	<b>CST 301</b>	CO1	Classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable. [Cognitive knowledge level: Understand]
		CO2	Explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation. [Cognitive knowledge level: Understand]
		CO3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language. [Cognitive knowledge level : Apply]
		CO4	Design Turing machines as language acceptors or transducers. [Cognitive knowledge level: Apply]
		CO5	Explain the notion of decidability. [Cognitive knowledge level: Understand]
<b>COMPUTER NETWORKS</b>	<b>CST 303</b>	CO1	Explain the features of computer networks, protocols, and network design models (Cognitive Knowledge: Understand)
		CO2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication (Cognitive Knowledge: Apply)
		CO3	Explain the design issues of data link layer, link layer protocols, bridges and switches (Cognitive Knowledge: Understand)
		CO4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11) (Cognitive Knowledge: Understand)
		CO5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network (Cognitive Knowledge: Apply)
		CO6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking (Cognitive Knowledge: Understand)

<b>SYSTEM SOFTWARE</b>	<b>CST 305</b>	<b>CO1</b>	Distinguish softwares into system and application software categories. (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Identify standard and extended architectural features of machines. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Identify machine dependent features of system software (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Identify machine independent features of system software. (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Design algorithms for system softwares and analyze the effect of data structures. (Cognitive Knowledge Level: Apply)
		<b>CO6</b>	Understand the features of device drivers and editing & debugging tools.(Cognitive Knowledge Level: Understand)
<b>MICROPROCES SORS AND MICROCONTRO LLERS</b>	<b>CST 307</b>	<b>CO1</b>	Illustrate the architecture, modes of operation and addressing modes of microprocessors (Cognitive knowledge: Understand)
		<b>CO2</b>	Develop 8086 assembly language programs. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Demonstrate interrupts, its handling and programming in 8086. (Cognitive Knowledge Level: Apply))
		<b>CO4</b>	Illustrate how different peripherals (8255,8254,8257) and memory are interfaced with microprocessors. (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Outline features of microcontrollers and develop low level programs. (Cognitive Knowledge Level: Understand)
<b>MANAGEMENT OF SOFTWARE SYSTEMS</b>	<b>CST 309</b>	<b>CO1</b>	Demonstrate Traditional and Agile Software Development approaches (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Prepare Software Requirement Specification and Software Design for a given problem. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project. (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework. (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices. (Cognitive Knowledge Level: Apply)

<b>SYSTEM SOFTWARE AND MICROPROCES SORS LAB</b>	<b>CSL 331</b>	<b>CO1</b>	Develop 8086 programs and execute it using a microprocessor kit. (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Develop 8086 programs and, debug and execute it using MASM assemblers (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Implement and execute different scheduling and paging algorithms in OS (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Design and implement assemblers, Loaders and macroprocessors. (Cognitive Knowledge Level: Apply)

<b>DATABASE MANAGEMENT SYSTEMS LAB</b>	<b>CSL 333</b>	<b>CO1</b>	Design database schema for a given real world problem-domain using standard design and modeling approaches. (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Construct queries using SQL for database creation, interaction, modification, and updation. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Design and implement triggers and cursors. (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Implement procedures, functions, and control structures using PL/SQL. (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Perform CRUD operations in NoSQL Databases. (Cognitive Knowledge Level: Apply)
		<b>CO6</b>	Develop database applications using front-end tools and back-end DBMS. (Cognitive Knowledge Level: Create)
<b>DISASTER MANAGEMENT</b>	<b>MCN 301</b>	<b>CO1</b>	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand).
		<b>CO2</b>	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
		<b>CO3</b>	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).
		<b>CO4</b>	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply)
		<b>CO5</b>	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
		<b>CO6</b>	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
<b>INDUSTRIAL ECONOMICS &amp; FOREIGN TRADE</b>	<b>HUT 300</b>	<b>CO1</b>	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)
		<b>CO2</b>	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
		<b>CO3</b>	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
		<b>CO4</b>	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)

		<b>CO5</b>	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
<b>MANAGEMENT FOR ENGINEERS</b>	<b>HUT 310</b>	<b>CO1</b>	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
		<b>CO2</b>	Describe the functions of management (Cognitive Knowledge level: Understand).
		<b>CO3</b>	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
		<b>CO4</b>	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
		<b>CO5</b>	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
		<b>CO6</b>	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
<b>COMPILER DESIGN</b>	<b>CST 302</b>	<b>CO1</b>	Explain the phases in compilation process (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization and code generation) and model a lexical analyzer (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Compare different types of parsers (Bottom-up and Top-down) and construct parser for a given grammar (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Build Syntax Directed Translation for a context free grammar, compare various storage allocation strategies and classify intermediate representations (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Illustrate code optimization and code generation techniques in compilation (Cognitive Knowledge Level: Apply)
<b>COMPUTER GRAPHICS AND IMAGE PROCESSING</b>	<b>CST 304</b>	<b>CO1</b>	Describe the working principles of graphics devices (Cognitive Knowledge level: Understand)
		<b>CO2</b>	Illustrate line drawing, circle drawing and polygon filling algorithms (Cognitive Knowledge level: Apply)
		<b>CO3</b>	Demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms (Cognitive Knowledge level: Apply)

		<b>CO4</b>	Summarize visible surface detection methods(Cognitive Knowledge level: Understand)
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		<b>CO5</b>	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships(Cognitive Knowledge level: Apply)
		<b>CO6</b>	Solve image enhancement and segmentation problems using spatial domain techniques(Cognitive Knowledge level: Apply)
<b>ALGORITHM ANALYSIS AND DESIGN</b>	<b>CST 306</b>	<b>CO1</b>	Analyze any given algorithm and express its time and space complexities in asymptotic notations. (Cognitive Level: Apply)
		<b>CO2</b>	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms. (Cognitive Level: Apply)
		<b>CO3</b>	Illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations. (Cognitive Level: Apply)
		<b>CO4</b>	Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and Bound and Backtracking algorithm design techniques (Cognitive Level: Apply)
		<b>CO5</b>	Classify a problem as computationally tractable or intractable, and discuss strategies to address intractability (Cognitive Level: Understand)
		<b>CO6</b>	Identify the suitable design strategy to solve a given problem. (Cognitive Level: Analyze)
<b>COMPREHENSIVE COURSE WORK</b>	<b>CST 308</b>	<b>CO1</b>	Comprehend the concepts of discrete mathematical structures (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Comprehend the concepts and applications of data structures (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Comprehend the concepts, functions and algorithms in Operating System (Cognitive Knowledge Level: Understand))
		<b>CO4</b>	Comprehend the organization and architecture of computer systems (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Comprehend the fundamental principles of database design and manipulation (Cognitive Knowledge Level: Understand)
		<b>CO6</b>	Comprehend the concepts in formal languages and automata theory Cognitive Knowledge Level: Understand)

<b>NETWORKING LAB</b>	<b>CSL332</b>	<b>CO1</b>	Use network related commands and configuration files in Linux Operating System. (Cognitive Knowledge Level: Understand).
		<b>CO2</b>	Develop network application programs and protocols. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Analyze network traffic using network monitoring tools. (Cognitive Knowledge Level: Apply)

		<b>CO4</b>	Design and setup a network and configure different network protocols. (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Develop simulation of fundamental network concepts using a network simulator. (Cognitive Knowledge Level: Apply)
<b>MINI PROJECT</b>	<b>CSD 334</b>	<b>CO1</b>	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)
<b>DATA ANALYTICS</b>	<b>CST 322</b>	<b>CO1</b>	Illustrate the mathematical concepts for data analytics (Cognitive Knowledge Level: Apply)
		<b>CO2</b>	Explain the basic concepts of data analytics (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Illustrate various predictive and descriptive analytics algorithms (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Describe the key concepts and applications of Big Data Analytics (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Demonstrate the usage of Map Reduce paradigm for Big Data Analytics (Cognitive Knowledge Level: Apply)
		<b>CO6</b>	Use R programming tool to perform data analysis and visualization (Cognitive Knowledge Level: Apply)



# AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

## 2019 Scheme Syllabus- Course Outcomes

### S7 S8 B.Tech (2019) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
ARTIFICIAL INTELLIGENCE	CST401	CO1	Explain the fundamental concepts of intelligent systems and their architecture (Cognitive Knowledge Level: Understanding)
		CO2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems. (Cognitive Knowledge Level: Understanding )
		CO3	Solve Constraint Satisfaction Problems using search techniques. (Cognitive Knowledge Level: Apply )
		CO4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems. (Cognitive Knowledge Level: Apply )
		CO5	Illustrate different types of learning techniques used in intelligent systems (Cognitive Knowledge Level: Understand)
COMPILER LAB	CSL411	CO1	Implement lexical analyzer using the tool LEX. (Cognitive Knowledge Level: Apply)
		CO2	Implement Syntax analyzer using the tool YACC. (Cognitive Knowledge Level: Apply)
		CO3	Design NFA and DFA for a problem and write programs to perform operations on it. (Cognitive Knowledge Level: Apply)
		CO4	Design and Implement Top-Down parsers. (Cognitive Knowledge Level: Apply)
		CO5	Design and Implement Bottom-Up parsers. (Cognitive Knowledge Level: Apply)

		<b>CO6</b>	Implement intermediate code for expressions. (Cognitive Knowledge Level: Apply)
<b>SEMINAR</b>	<b>CSQ413</b>	<b>CO1</b>	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
		<b>CO2</b>	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
		<b>CO3</b>	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
		<b>CO4</b>	Give a presentation about an academic document (Cognitive knowledge level: Apply).
		<b>CO5</b>	Prepare a technical report (Cognitive knowledge level: Create)
<b>PROJECT PHASE I</b>	<b>CSD415</b>	<b>CO1</b>	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
		<b>CO2</b>	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
		<b>CO3</b>	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
		<b>CO4</b>	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
		<b>CO5</b>	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
		<b>CO6</b>	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply)
<b>CLOUD COMPUTING</b>	<b>CST423</b>	<b>CO1</b>	Explain the various cloud computing models and services. (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Demonstrate the significance of implementing virtualization techniques. (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Explain different cloud enabling technologies and compare private cloud platforms (Cognitive Knowledge Level: Understand)
		<b>CO4</b>	Apply appropriate cloud programming methods to solve big data problems. (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Describe the need for security mechanisms in cloud (Cognitive Knowledge Level: Understand)
		<b>CO6</b>	Compare the different popular cloud computing platforms (Cognitive Knowledge Level: Understand)

<b>DISTRIBUTED COMPUTING</b>	<b>CST402</b>	<b>CO1</b>	Summarize various aspects of distributed computation model and logical time. (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Illustrate election algorithm, global snapshot algorithm and termination detection algorithm. (Cognitive Knowledge Level: Apply)
		<b>CO3</b>	Recognize the significance of deadlock detection and shared memory in distributed systems. (Cognitive Knowledge Level: Understand)
		<b>CO4</b>	Explain the concepts of failure recovery and consensus. (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Illustrate distributed file system architectures. (Cognitive Knowledge Level: Understand)
<b>NETWORK SECURITY PROTOCOLS</b>	<b>CST434</b>	<b>CO1</b>	Explain authentication protocols, X.509 authentication service and Public Key Infrastructure (PKI).(Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Identify the security mechanisms in E mail security services. (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Summarize the network and transport layer security services provided in a secure communication scenario. (Cognitive Knowledge Level: Apply)
		<b>CO4</b>	Describe real time communication security and application layer security protocols. (Cognitive Knowledge Level: Apply)
		<b>CO5</b>	Explain the concepts of firewalls and wireless network security. (Cognitive Knowledge Level: Understand)
<b>CLIENT SERVER ARCHITECTURE</b>	<b>CST426</b>	<b>CO1</b>	Explain the basics of client/server systems and the driving force behind the development of client/server systems (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Outline the architecture and classifications of client/server systems (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Choose the appropriate client/server network services for a typical application (Cognitive Knowledge Level: Understand)
		<b>CO4</b>	Describe management services and issues in network (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Compare and summarize the web extensions and choose appropriate web services standards for an application (Cognitive Knowledge Level: Understand)
		<b>CO1</b>	Explain the various mobile computing applications, services, design considerations and architectures (Cognitive knowledge: Understand)

<b>MOBILE COMPUTING</b>	<b>CST476</b>	<b>CO2</b>	Describe the various technology trends for next generation cellular wireless networks and use the spreading concept on data transmission (Cognitive knowledge: Apply)
		<b>CO3</b>	Summarize the architecture of various wireless LAN technologies (Cognitive knowledge: Understand)
		<b>CO4</b>	Identify the functionalities of mobile network layer and transport layer (Cognitive knowledge: Understand)
		<b>CO5</b>	Explain the features of Wireless Application Protocol (Cognitive knowledge: Understand)
		<b>CO6</b>	Explain the fundamental concepts of next generation mobile networks(Cognitive knowledge: Understand)
<b>INTERNET OF THINGS</b>	<b>CST448</b>	<b>CO1</b>	Outline the fundamentals of IoT and its underlying physical and logical architecture(Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Explain the hardware architectures for IoT (Cognitive Knowledge Level : Understand)
		<b>CO3</b>	Outline the Network architectures for IoT(Cognitive Knowledge Level : Understand)
		<b>CO4</b>	Implement data analytics on the IoT platforms (Cognitive Knowledge Level : Apply)
		<b>CO5</b>	Appreciate the security considerations in IoT (Cognitive Knowledge Level : Understand)
		<b>CO6</b>	Implement IoT applications using the available hardware and software. (Cognitive Knowledge Level : Apply)
<b>BLOCKCHAIN TECHNOLOGIES</b>	<b>CST428</b>	<b>CO1</b>	Illustrate the cryptographic building blocks of blockchain technology. (Cognitive Knowledge Level: Understand)
		<b>CO2</b>	Explain the fundamental concepts of blockchain technology. (Cognitive Knowledge Level: Understand)
		<b>CO3</b>	Summarize the classification of consensus algorithms. (Cognitive Knowledge Level: Understand)
		<b>CO4</b>	Explain the concepts of first decentralized cryptocurrency bitcoin. (Cognitive Knowledge Level: Understand)
		<b>CO5</b>	Explain the use of smart contracts and its use cases. (Cognitive Knowledge Level: Understand)
		<b>CO6</b>	Develop simple applications using Solidity language on Ethereum platform. (Cognitive Knowledge Level: Apply)
		<b>CO1</b>	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).

<b>PROJECT PHASE II</b>	<b>CSD416</b>	<b>CO2</b>	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
		<b>CO3</b>	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
		<b>CO4</b>	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
		<b>CO5</b>	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
		<b>CO6</b>	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

## AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

### 2015 Scheme Syllabus- Course Outcomes

#### S3 S4 B.Tech

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
<b>DISCRETE COMPUTATIONAL STRUCTURES</b>	<b>MAT 202</b>	<b>CO1</b>	Infer the concepts and operations on discrete structures such as sets, relations and functions. (Understand)
		<b>CO2</b>	Verify the validity of an argument using propositional & predicate logic (Analyze)
		<b>CO3</b>	Construct proofs using direct proof, proof by contraposition, proof by contradiction and proof by cases, and mathematical induction (Analyze)
		<b>CO4</b>	Outline solutions to the problems using algebraic structures (understand)
		<b>CO5</b>	Develop solutions to the problems using counting techniques,combinatorics and recurrence relations (Apply)
		<b>CO6</b>	Build solution to analytical and logical problems (Apply)
<b>SWITCHING THEORY AND LOGIC DESIGN</b>	<b>CS203</b>	<b>CO1</b>	Compare various positional number systems and binary codes.(Understand)
		<b>CO2</b>	Apply Boolean algebra,K-map and Quine Mc-Cluskey to minimize logic functions (Apply)
		<b>CO3</b>	Design combinational circuit using gates
		<b>CO4</b>	Design sequential circuits using Flip-Flops
		<b>CO5</b>	Design and implement digital systems using basic programmable blocks and formulate various digital systems using HDL(Apply)
		<b>CO6</b>	Apply algorithms for addition/subtraction operations on Binary,BCD and Floating Point (Apply)

<b>DATA STRUCTURES</b>	<b>CS205</b>	<b>CO1</b>	Compute the performance of data structures using asymptotic notations for simple problems.(Apply)
		<b>CO2</b>	Solve real world problems efficiently using different linear data structures(Analyze)
		<b>CO3</b>	Design algorithm for different applications using non linear data structure with at most 1000 lines of code (1 kLoC)( Analyze)
		<b>CO4</b>	Analyze various searching and sorting techniques(Analyze )
		<b>CO5</b>	Implement data structures for basic memory management schemes. (Apply)
		<b>CO6</b>	Recommend a data structure from a set of data structures for a given real-world application. (Evaluate)
<b>ELECTRONICS DEVICES &amp; CIRCUITS</b>	<b>CS207</b>	<b>CO1</b>	Students will be able to communicate effectively without mother tongue influence
		<b>CO2</b>	Students will be able to perform well in oratory,interview & group discussion
		<b>CO3</b>	Students will be able to critically think and solve a particular problem
		<b>CO4</b>	Students will be able to understand the significance of engineering ethics and human values
		<b>CO5</b>	Students will demonstrate an effective leadership & team playing skill
<b>DATA STRUCTURE LAB</b>	<b>CS231</b>	<b>CO1</b>	Implement the various operations of linear as well as non-linear data structures. (Apply)
		<b>CO2</b>	Have practical knowledge about the area of application of various data structures(Understand)
		<b>CO3</b>	Solve Problems using dynamic memory allocation(Apply)
		<b>CO4</b>	Implementing various searching and sorting algorithms(Apply)
		<b>CO5</b>	Solve simple problems using non linear data structure(Apply)
		<b>CO6</b>	Develop a Micro project by selecting the most suitable data structure for the given scenario(Create)
<b>ELECTRONICS CIRCUITS LAB</b>	<b>CS 233</b>	<b>CO1</b>	Identify basic electronic components, design and develop electronic circuits.
		<b>CO2</b>	Design and demonstrate functioning of given discrete analog circuits
		<b>CO3</b>	Make use of computer simulation software for electronic circuits and how to use it proficiently for design and development of electronic circuits.
		<b>CO4</b>	Develop basic knowledge in solid state electronics including diodes, BJT, and operational amplifier
		<b>CO5</b>	Explain the concepts and their applications in engineering
<b>LIFE SKILLS</b>	<b>HS210</b>	<b>CO1</b>	Students will be able to communicate effectively without mother tongue influence
		<b>CO2</b>	Students will be able to perform well in oratory,interview & group discussion
		<b>CO3</b>	Students will be able to critically think and solve a particular problem
		<b>CO4</b>	Students will be able to understand the significance of engineering ethics and human values
		<b>CO5</b>	Students will demonstrate an effective leadership & team playing skill
		<b>CO1</b>	Construct analytic functions using C-R equation (understand).

<b>LINEAR ALGEBRA &amp; COMPLEX ANALYSIS</b>	<b>MA 201</b>	<b>CO2</b>	Construct a region corresponds to certain transformations(analyze)
		<b>CO3</b>	Interpreting different singularities of analytic function.(analyze)
		<b>CO4</b>	Applying residue theorem to solve real definite integral(apply)
		<b>CO5</b>	Applying matrix method to Solve any given system of linear equations(apply)
		<b>CO6</b>	Determination of Eigen values of a matrix for diagonalizing a matrix(apply & analyze)

<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>	<b>CS202</b>	<b>CO1</b>	Infer the basic structure and functional units of a digital computer (Understand)
		<b>CO2</b>	Analyze the effect of addressing modes on the execution time of a program (Analyze)
		<b>CO3</b>	Implement multiplication and division in ALU using different Arithmetic Algorithms(Apply)
		<b>CO4</b>	Select appropriate interfacing standards for I/O devices(Analyze)
		<b>CO5</b>	Identify the pros and cons of different types of control logic design in processors(Understand)
<b>OPERATING SYSTEMS</b>	<b>CS204</b>	<b>CO1</b>	Identify the significance of operating system in computing devices. (Understand)
		<b>CO2</b>	Exemplify the communication between application programs and hardware devices through system calls. (Understand)
		<b>CO3</b>	Compare and illustrate various process scheduling algorithms. (Analyse)
		<b>CO4</b>	Apply appropriate memory and file management schemes. (Apply)
		<b>CO5</b>	Illustrate various disk scheduling algorithms. (Apply)
		<b>CO6</b>	Appreciate the need of access control and protection in an operating system.(Understand)
<b>OBJECT ORIENTED DESIGN AND PROGRAMMING</b>	<b>CS206</b>	<b>CO1</b>	To understand object oriented principles in software design process
		<b>CO2</b>	To apply various object oriented feature like inheritance dataabstraction,encapsulation and polymorphism to solve various computing problem
		<b>CO3</b>	To develop java programs for real application using java construct and libraries
		<b>CO4</b>	To implement exception handling in java
		<b>CO5</b>	To implement gui and event handling in java
		<b>CO6</b>	To develop applet in java techlogies
<b>PRINCIPLES OF DATABASE DESIGN</b>	<b>CS208</b>	<b>CO1</b>	Illustrate the fundamental concepts of databases. (Understand)
		<b>CO2</b>	Construct an Entity-Relationship (E-R) model from specifications and to perform the transformation of the conceptual model into corresponding logical data structures. (Apply)
		<b>CO3</b>	Model a relational database following the design principles. (Apply)
		<b>CO4</b>	Develop queries for relational database in the context of practical applications (Apply)
		<b>CO5</b>	Illustrate fundamental principles of data organization, query optimization and concurrent transaction processing. (Understand)
		<b>CO6</b>	Appreciate the latest trends in databases. (Understand)
		<b>CO1</b>	Implement the various operations of linear as well as non-linear data structures. (Apply)

<b>DATA STRUCTURE LAB</b>	<b>CS231</b>	<b>CO2</b>	Have practical knowledge about the area of application of various data structures(Understand)
		<b>CO3</b>	Solve Problems using dynamic memory allocation(Apply)
		<b>CO4</b>	Implementing various searching and sorting algorithms(Apply)
		<b>CO5</b>	Solve simple problems using non linear data structure(Apply)
		<b>CO6</b>	Develop a Micro project by selecting the most suitable data structure for the given scenario(Create)
<b>FREE AND OPEN SOURCE SOFTWARE LAB</b>	<b>CS232</b>	<b>CO1</b>	Identify and apply various Linux commands
		<b>CO2</b>	Develop shell scripts and GUI for specific needs or application
		<b>CO3</b>	Able to use distributed revision control system tools
		<b>CO4</b>	Perform basic level application deployment using tools
		<b>CO5</b>	Perform kernel configuration, packet management and installations
<b>DIGITAL SYSTEMS LAB</b>	<b>CS234</b>	<b>CO1</b>	To Realize functions using basic gates and Design Arithmetic Circuits Half Adder, Full Adder, Half Subtractor ,Full Subtractor and BCD adder
		<b>CO2</b>	To Design and implement various combinational circuits like Comparators , Multiplexers , Demultiplexers
		<b>CO3</b>	To Realize flipflops using gates R,S,T,D,JK
		<b>CO4</b>	To Design and implement Shift Registers
		<b>CO5</b>	To Design and implement Synchronous counters , Asynchronous Counters, and Shift register counter
		<b>CO6</b>	To develop projects using digital circuits which has real life applications
<b>BUSINESS ECONOMICS</b>	<b>HS200</b>	<b>CO1</b>	Understand the basic concepts in Business economics
		<b>CO2</b>	Apprehend the micro economic principles in production function
		<b>CO3</b>	Determine Break Even Point
		<b>CO4</b>	Analyze the basic macro – economic concepts and monetary theory
		<b>CO5</b>	Apply an appropriate investment method in business decision
		<b>CO6</b>	Understand the basics of financial accounting.
<b>PROBABILITY DISTRIBUTIONS, TRANSFORMS AND NUMERICAL METHODS</b>	<b>MA202</b>	<b>CO1</b>	Interpreting Discrete and continuous probability density functions and special probability distributions (understand)
		<b>CO2</b>	Interpreting every continuous function as a fourier integral
		<b>CO3</b>	Applying Laplace transforms to solve differential equation(Apply)
		<b>CO4</b>	Discussing different numerical methods to solve various engineering problems(Understand)



# AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

## 2015 Scheme Syllabus- Course Outcomes

### S5 S6 B.Tech (2015) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
	CS301	CO1	Classify formal languages into regular, context-free, context sensitive and Recursively Enumerable languages.
THEORY OF COMPUTATION		CO2	Design finite state automata, regular grammar, regular expression and Myhill- Nerode relation representations for regular languages.
		CO3	Design push-down automata and context-free grammar representations for context-free languages.
		CO4	Design Turing Machines for accepting recursively enumerable languages.
		CO5	Understand the notions of decidability and undecidability of problems, Halting problem.
		CO6	Simulate Finite State / Pushdown Automata / Turing Machine.
SYSTEM SOFTWARE	CS303	CO1	Distinguish different software into different categories and Compare the architecture of SIC/SICXE Machine.
		CO2	Design, analyze and implement one pass, two pass or multi pass assembler.
		CO3	Design, analyze and implement loader and linker.
		CO4	Design, analyze and implement macro processors.
		CO5	Critique the features of modern editing /debugging tools.
MICROPROCESSORS AND MICROCONTROLLERS	CS305	CO1	Describe different modes of operations of a typical microprocessor
		CO2	Develop 8086 assembly language programs using sub routines, macros, stack and passing parameters.
		CO3	Apply interrupts in 8086 programming.
		CO4	Interface microprocessors with various external devices.
		CO5	Compare the architectural features of Microprocessors and microcontrollers.
		CO6	Design assembly language programs using 8051 microcontroller
DATA COMMUNICATION	CS307	CO1	Apply different data transmission techniques in data communication
		CO2	Compare different transmission media based on transmission impairments and channel capacity.
		CO3	Apply signal encoding techniques of Digital Data Digital Signals and Analog Data Digital Signals
		CO4	Classify different multiplexing techniques for a given scenario.
		CO5	Design suitable error detection and error correction algorithms to achieve error free data communication.
		CO6	Compare different switching techniques in data communication.
GRAPH THEORY AND COMBINATORICS	CS309	CO1	Demonstrate the knowledge of fundamental concepts in graph theory
		CO2	Discuss the properties and characterization of graph and trees
		CO3	Use graphs for solving real life problems
		CO4	Distinguish different graph representations like planar, matrix and solve problems

		<b>CO5</b>	Develop different algorithms for graph related problems in different domains of engineering and science
<b>SYSTEM SOFTWARE</b>	<b>CS331</b>	<b>CO1</b>	Compare and analyze CPU Scheduling Algorithms like FCFS, Round Robin, SJF and Priority
		<b>CO2</b>	Implement synchronization techniques using semaphores.
		<b>CO3</b>	Implement banker's algorithm for deadlock avoidance.
		<b>CO4</b>	Implement file allocation and disk scheduling techniques.
		<b>CO5</b>	Implement system software such as loaders, assemblers and macro processor.
<b>APPLICATION SOFTWARE DEVELOPMENT LAB</b>	<b>CS333</b>	<b>CO1</b>	Query a database using SQL DMLDDL commands. (Apply)
		<b>CO2</b>	Implement integrity constraints on a database using RDBMS (Apply)
		<b>CO3</b>	Develop PL/SQL programs using procedure and functions.(Apply)
		<b>CO4</b>	Apply cursors and triggers on database (Apply)
		<b>CO5</b>	Design and implement database for a given application.(Apply)
<b>DESIGN ANALYSIS AND ALGORITHM</b>	<b>CS302</b>	<b>CO1</b>	Illustrate performance analysis of algorithms using time as a metric.[Apply]
		<b>CO2</b>	Compute the cost for performing a given simple computing operation. [Apply]
		<b>CO3</b>	Implement some of the common graph/tree-based algorithms. [Apply]
		<b>CO4</b>	Solve problems using appropriate strategy.[Analyze]
		<b>CO5</b>	Identify the commonly referred complexity classes.[Comprehend]
<b>COMPILER DESIGN</b>	<b>CS304</b>	<b>CO1</b>	Explain the phases of compilation
		<b>CO2</b>	Design Lexical analyzer using finite automata
		<b>CO3</b>	Implement a simple parser using basic parsing algorithms
		<b>CO4</b>	Develop Synthesis phase of a compiler for small programs with simple programming constructs
		<b>CO5</b>	Illustrate storage and error handling techniques used in a typical compiler
<b>COMPUTER NETWORK</b>	<b>CS306</b>	<b>CO1</b>	Illustrate the different aspects of Networks, Protocols and Network Reference models.
		<b>CO2</b>	Evaluate the working of various IEEE standards of MAC sub layer and data link layer protocols
		<b>CO3</b>	Apply appropriate routing algorithms for a network.(
		<b>CO4</b>	Describe the important aspects and functions of network layer, transport layer and application layer in internetworking
		<b>CO5</b>	Describe the important aspects and functions of application layer in internetworking.
		<b>CO6</b>	Implement data link or network or application layer protocols within a simulated networking environment
<b>MICROPROCESSOR LAB</b>	<b>CS332</b>	<b>CO1</b>	Familiarize 8051 Trainer Kit and MASM to access registers, and Memory (K2)
		<b>CO2</b>	Develop assembly language programs for problem solving using software interrupts and various assembler directives.(K3)
		<b>CO3</b>	Implement interfacing of various I/O devices to the microprocessor/microcontroller through assembly language programming.(K3)

		<b>CO4</b>	Familiarize 8051 Trainer Kit to access registers, Internal RAM & ROM, External ROM(K2)
		<b>CO5</b>	Develop 8051 programs using 8051 Trainer Kit(K3)
<b>NETWORK PROGRAMMING LAB</b>	<b>CS334</b>	<b>CO1</b>	To familiarize network related commands and configuration files in Linux OS(Applying)
		<b>CO2</b>	Implementing OS programs related to process and threads (Applying)
		<b>CO3</b>	Implement network application programs (Applying)
		<b>CO4</b>	Simulate wired and wireless scenarios using NS2 (Applying)
		<b>CO5</b>	Analyze network traffic using network monitoring tools (Analyze)
<b>COMPUTER VISION</b>	<b>CS362</b>	<b>CO1</b>	Understand models of image formation. (Understand)
		<b>CO2</b>	Understand image feature detection and matching techniques. (Understand)
		<b>CO3</b>	Apply various algorithms for pattern recognition. (Apply)
		<b>CO4</b>	Apply various algorithms for clustering. (Apply)
		<b>CO5</b>	Understand structural pattern recognition and feature extraction techniques. (Understand)
<b>WEB TECHNOLOGY</b>	<b>CS368</b>	<b>CO1</b>	Understand different components in web technology and to know about CGI & CMS (Understand)
		<b>CO2</b>	Develop Interactive web pages using HTML and XHTML (Apply)
		<b>CO3</b>	Present a professional document using Cascaded Style Sheets(CSS) with responsive frameworks like Bootstrap (Apply)
		<b>CO4</b>	Construct websites for user interactions using JavaScript and JQuery (Apply)
		<b>CO5</b>	Infer different information interchange formats like XML and JSON (Understand)
		<b>CO6</b>	Develop web applications using PHP web based frameworks like Laravel (Apply)
<b>PRINCIPLES OF MANAGEMENT</b>	<b>HS300</b>	<b>CO1</b>	Understand managerial roles and functions
		<b>CO2</b>	Recognize the application of management theories in organizational operations
		<b>CO3</b>	Apprehend the relevance of planning in management
		<b>CO4</b>	Explain different techniques in decision making.
		<b>CO5</b>	Comprehend HRD function.
		<b>CO6</b>	Examine various approaches to leadership

# AL AZHAR COLLEGE OF ENGINEERING & TECHNOLOGY

## 2015 Scheme Syllabus- Course Outcomes

### S7,S8 B.Tech (2015) Syllabus

COURSE NAME	COURSE CODE	COURSE OUTCOME CODE	COURSE OUTCOME STATEMENTS
COMPUTER GRAPHICS	CS401	CO1	Compare various graphics devices. Understand (K2)
		CO2	Implement algorithms for line drawing, circle drawing and polygon filling. Apply (K3)
		CO3	Apply geometrical transformation on 2D and 3D objects. Apply (K3)
		CO4	Understand algorithms for clipping. Understand (K2)
		CO5	Understand projection techniques and visible surface detection methods. Understand (K2)
		CO6	Understand basic concepts of image processing. Understand (K2)
PROGRAMMING PARADIGMS	CS403	CO1	Illustrate scope and binding of names and control flow structures in different programming languages
		CO2	Compare different data types in different programming languages
		CO3	Differentiate control abstraction mechanisms
		CO4	Illustrate functional, logic and scripting languages
		CO5	Understand object oriented constructs in different programming languages
		CO6	Interpret the concepts of run-time program management and different concurrency constructs
COMPUTER SYSTEM ARCHITECTURE	CS405	CO1	Summarize the various parallel computer models
		CO2	Analyze the advanced processor technologies
		CO3	Compare different multiprocessor system inter connecting mechanism
		CO4	Analyze different message passing mechanism and different pipelining techniques
		CO5	Interpret the memory hierarchy technology and mechanisms for enforcing cache coherence
		CO6	Appraise the concept of multithreaded and data flow architecture
PROGRAMMING PARADIGMS	CS403	CO1	Illustrate scope and binding of names and control flow structures in different programming languages
		CO2	Compare different data types in different programming languages
		CO3	Differentiate control abstraction mechanisms
		CO4	Illustrate functional, logic and scripting languages
		CO5	Understand object oriented constructs in different programming languages
		CO6	Interpret the concepts of run-time program management and different concurrency constructs
CRYPTOGRAPHY AND NETWORK SECURITY	CS409	CO1	Classify the Substitution and transposition techniques in Cryptography.
		CO2	Relate different symmetric and asymmetric cryptographic algorithms. (DES, AES, RSA, Diffie Hellman key exchange algorithm etc.)
		CO3	Compare the data integrity algorithms including Hash, Message Authentication Code algorithms, and digital signature.
		CO4	Interpret IP Security and System security.

		<b>CO5</b>	Summarize different web security techniques.
		<b>CO6</b>	Appraise concepts of multithreaded and data flow architectures.
<b>COMPILER DESIGN LAB</b>	<b>CS431</b>	<b>CO1</b>	Implement the techniques of Lexical and Syntax analysis
		<b>CO2</b>	Apply the knowledge of LEX and YACC to develop programs
		<b>CO3</b>	Generate Intermediate code for a given code
		<b>CO4</b>	Implement Optimization techniques and generate machine code
		<b>CO5</b>	Demonstrate the various phases of compiler for an customized language
<b>SEMINAR AND PROJECT</b>	<b>CS 451</b>	<b>CO1</b>	identify various problems related to society/industry/research problem, solved by using engineering fundamentals.
<b>PRELIMINARY</b>		<b>CO2</b>	To understand how various aspects of projects including planning, analysis, software development and implementation, including cost estimation.
		<b>CO3</b>	To effectively apply knowledge gained to benefit society/industry; or to work towards research outcomes.
		<b>CO4</b>	To effectively and efficiently plan, design and implement projects using modern tools and techniques.
		<b>CO5</b>	To effectively plan and work as a team to meet all criteria of project and to
		<b>CO6</b>	To understand the impact of software project/product related to its usage, impact in environment, security and ethical practice in design and development of project.
<b>BIOINFORMATICS</b>	<b>CS465</b>	<b>CO1</b>	Interpret the concepts of bioinformatics and computational biology
		<b>CO2</b>	Infer different types of biological databases and tools
		<b>CO3</b>	Construct sequence alignment algorithms and scoring methods for nucleic acids and protein sequences
		<b>CO4</b>	Develop phylogenetic trees and hidden markov models for bioinformatics analysis
		<b>CO5</b>	Infer structure, content and density of prokaryotes and eukaryotes genomes
		<b>CO6</b>	Predict protein folding and RNA structure with different predicting and folding algorithms
<b>MACHINE LEARNING</b>	<b>CS467</b>	<b>CO1</b>	Differentiate different learning approaches, and to interpret theoretical foundations of supervised learning
		<b>CO2</b>	Contrast the different dimensionality reduction techniques
		<b>CO3</b>	Apply theoretical foundations of decision trees to identify best split and Bayesian classifier to label data points
		<b>CO4</b>	Illustrate the working of classifier models like SVM, Neural Networks and identify classifier model for typical machine learning application.
		<b>CO5</b>	Identify the state sequence and evaluate a sequence emission probability from a given HMM
		<b>CO6</b>	Illustrate and apply clustering algorithms and identify its applicability in real life problems

<b>DISASTER MANAGEMENT</b>	<b>CE488</b>	<b>CO1</b>	Illustrate various terminologies related to disasters
		<b>CO2</b>	Summarize the impact of various natural disasters and its management measures
		<b>CO3</b>	Outline the nature of impact coastal disasters
		<b>CO4</b>	Illustrate the types of anthropogenic disasters

		<b>CO5</b>	Demonstrate fundamental concepts of water and atmospheric pollution
		<b>CO6</b>	Explain disaster management plans for floods, tidal waves
<b>ENVIRONMENTAL HEALTH AND SAFETY</b>	<b>CE 494</b>	<b>CO1</b>	Summarize occupational health and toxicology
		<b>CO2</b>	Summarize the noise pollution, radiation hazard, biological hazard and chemical hazard in the work place
		<b>CO3</b>	Illustrate the causes effects and solution for the radiation hazards and air pollution in the workplace
		<b>CO4</b>	Interpret the electrical hazards and construction safety measures in the workplace.
		<b>CO5</b>	Summarize the water pollution and hazardous waste management
		<b>CO6</b>	Compare various pollution controls in process industries
<b>DATA MINING AND WARE HOUSING</b>	<b>CS 402</b>	<b>CO1</b>	The student will understand the concept of data mining and its applications.
		<b>CO2</b>	To understand various data pre-processing techniques to improve the quality of data and efficiency and the ease of the mining process.
		<b>CO3</b>	The student will understand the concept of data classification methods
		<b>CO4</b>	The student will understand the concept of association rule mining methods
		<b>CO5</b>	To understand the unsupervised learning techniques and the algorithm used for data clustering.
		<b>CO6</b>	The student will understand the advanced data mining techniques and the popular data mining tools used.
<b>EMBEDDED SYSTEMS</b>	<b>CS 404</b>	<b>CO1</b>	Demonstrate the role of individual components involved in a typical embedded system
		<b>CO2</b>	analyse the characteristics of different computing elements and select the most appropriate one for an embedded system
		<b>CO3</b>	model the operation of a given embedded system
		<b>CO4</b>	substantiate the role of different software modules in the development of an embedded system
		<b>CO5</b>	develop simple tasks to run on an RTOS
		<b>CO6</b>	examine the latest trends prevalent in embedded system design
<b>CLOUD COMPUTING</b>	<b>CS 468</b>	<b>CO1</b>	Identify the significance of implementing virtualization techniques
		<b>CO2</b>	Interpret the various cloud computing models and services
		<b>CO3</b>	Compare the various public cloud platforms and software environments.
		<b>CO4</b>	Apply appropriate cloud programming methods to solve big data problems.
		<b>CO5</b>	Appreciate the need of security mechanisms and the use of various available cloud services
		<b>CO6</b>	Applying various cloud services in Scheduling Applications etc.