



# AMC ENGINEERING COLLEGE

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

## STATEMENTS

### PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member

	and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Professional Skills: Ability to design, develop and evaluate innovative projects which meet the requirements of industry.
PSO2	Ability to do Research and Development using the modern computing technology for society.

### **Program Educational Objectives (PEOs) of Department**

**After course completion CSE graduates will be able to:**

<b>PEO 1</b>	Graduates acquire advanced knowledge of Computer Science Engineering and excel in leadership roles to serve the society.
<b>PEO 2</b>	Graduates of the program will apply Computer Science and Engineering and excel in leadership computer science professional.
<b>PEO 3</b>	Graduates adapt Value-Based Proficiency in solving real time problems.

**Course Title: Data Structures and Applications****Course Code: 18CS32**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C202.1	Explain fundamentals of data structures and their applications essential for programming/problem solving
C202.2	Illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs
C202.3	Demonstrate sorting and searching algorithms
C202.4	Find suitable data structure during application development/Problem Solving

**Course Title: Analog and Digital Electronics****Course Code: 18CS33**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C203.1	Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741 opamp IC
C203.2	Make use of simplifying techniques in the design of combinational circuits.
C203.3	Illustrate combinational and sequential digital circuits
C203.4	Demonstrate the use of flipflops and apply for registers
C203.5	Design and test counters, Analog-to-Digital and Digital-to-Analog conversion technique

**Course Title: Computer Organization****Course Code: 18CS34**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C204.1	Explain the basic sub systems of a computer, their organization, structure and operation.
C204.2	Illustrate the concept of programs as sequences of machine instructions.
C204.3	Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.
C204.4	Describe memory hierarchy and concept of virtual memory.
C204.5	Describe arithmetic and logical operations with integer and floating-point operands.

**Course Title: Computer Organization**

**Course Code: 18CS35**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C205.1	Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to software engineers.
C205.2	Explain the fundamentals of object oriented concepts.
C205.3	Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. Differentiate system models, use UML diagrams and apply design patterns.
C205.4	Discuss the distinctions between validation testing and defect testing.
C205.5	Recognize the importance of software maintenance and describe the intricacies involved in software evolution. Apply estimation techniques, schedule project activities and compute pricing.

**Course Title: Analog and Digital Electronics Laboratory**

**Course Code: 18CSL37**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C207.1	Analog components and circuits including Operational Amplifier, Timer, etc..
C207.2	Combinational logic circuits.
C207.3	Flip - Flops and their operations.
C207.4	Counters and registers using flip-flops..
C207.5	Synchronous and Asynchronous sequential circuits.

**Course Title: Data Structures Laboratory****Course Code: 18CSL38**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C208.1	This laboratory course enables students to get practical experience in design, develop, implement, analyze and evaluation/testing of Asymptotic performance of algorithms.
C208.2	Linear data structures and their applications such as stacks, queues and lists
C208.3	Non-Linear data structures and their applications such as trees and graphs.
C208.4	Sorting and searching algorithms

**Course Title: Constitution of India, Professional Ethics and Cyber Law Course Code: 18CPC39**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C209.1	know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens
C209.2	Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society
C209.3	Know about the cybercrimes and cyber laws for cyber safety measures

**Course Title: Design and Analysis of Algorithm****Course Code: 18CS42**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C210.1	Explain various computational problem solving techniques.
C210.2	Apply appropriate method to solve a given problem.
C210.2	Describe various methods of algorithm analysis

**Course Title: Operating Systems****Course Code: 18CS43**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C211.1	Introduce concepts and terminology used in OS
C211.2	Explain threading and multithreaded systems
C211.3	Illustrate process synchronization and concept of Deadlock
C211.4	Introduce Memory and Virtual memory management, File system and storage techniques

**Course Title: Microcontroller and Embedded System****Course Code: 18CS44**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C212.1	Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system
C212.2	Program ARM controller using the various instructions
C212.3	Identify the applicability of the embedded system
C212.4	Comprehend the real time operating system used for the embedded system

**Course Title: Object Oriented Concepts****Course Code: 18CS45**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C213.1	Learn fundamental features of object oriented language and JAVA
C213.2	Set up Java JDK environment to create, debug and run simple Java programs.
C213.3	Create multi-threaded programs and event handling mechanisms.
C213.4	Introduce event driven Graphical User Interface (GUI) programming using applets and swings.

**Course Title: Data Communication**

**Course Code: 8CS46**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C214.1	Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
C214.2	Explain with the basics of data communication and various types of computer networks
C214.3	Demonstrate Medium Access Control protocols for reliable and noisy channels.
C214.4	Expose wireless and wired LANs.

**Course Title: Design and Analysis of Algorithm Laboratory**

**Course Code: 18CSL47**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C215.1	Design and implement various algorithms in JAVA
C215.2	Employ various design strategies for problem solving
C215.3	Measure and compare the performance of different algorithms

**Course Title: Microcontroller and Embedded Systems Laboratory**

**Course Code: 18CSL48**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C216.1	Develop and test Program using ARM7TDMI/LPC2148
C216.2	Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler

**Course Title: Management, Entrepreneurship for IT industry**

**Course Code:18CS51**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C301.1	Explain the principles of management, organization and entrepreneur
C301.2	Discuss on planning, staffing, ERP and their importance
C301.3	Infer the importance of intellectual property rights and relate the institutional support

**Course Title: Computer Networks and Security**

**Course Code: 18CS52**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C302.1	Demonstration of application layer protocols
C302.2	Discuss transport layer services and understand UDP and TCP protocols
C302.3	Explain routers, IP and Routing Algorithms in network layer
C302.4	Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
C302.5	Illustrate concepts of Multimedia Networking, Security and Network Management

**Course Title: Database Management System**

**Course Code: 18CS53**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C303.1	Provide a strong foundation in database concepts, technology, and practice.
C303.2	Practice SQL programming through a variety of database problems.
C303.3	Demonstrate the use of concurrency and transactions in database
C303.4	Design and build database applications for real world problems.

**Course Title: Automata theory and Computability**

**Course Code: 18CS54**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C304.1	Introduce core concepts in Automata and Theory of Computation
C304.2	Identify different Formal language Classes and their Relationships
C304.3	Design Grammars and Recognizers for different formal languages
C304.4	Prove or disprove theorems in automata theory using their properties
C304.5	Determine the decidability and intractability of Computational problems

**Course Title: Application Development using Python**

**Course Code: 18CS55**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C305.1	Learn the syntax and semantics of Python programming language.
C305.2	Illustrate the process of structuring the data using lists, tuples and dictionaries.
C305.3	Demonstrate the use of built-in functions to navigate the file system.
C305.4	Implement the Object Oriented Programming concepts in Python
C305.5	Appraise the need for working with various documents like Excel, PDF, Word and Others.

**Course Title: Unix Programming**

**Course Code: 18CS56**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C306.1	Interpret the features of UNIX and basic commands.
C306.2	Demonstrate different UNIX files and permissions
C306.3	Implement shell programs.
C306.4	Explain UNIX process, IPC and signals.

**Course Title: Computer Network Laboratory**

**Course Code: 18CSL57**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C307.1	Demonstrate operation of network and its management commands
C307.2	Simulate and demonstrate the performance of GSM and CDMA
C307.3	Implement data link layer and transport layer protocols.

**Course Title: DBMS Laboratory with mini project**

**Course Code: 18CSL58**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C308.1	Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
C308.2	Strong practice in SQL programming through a variety of database problems
C308.3	Develop database applications using front-end tools and back-end DBMS

**Course Title: System Software and Compilers**

**Course Code: 18CS61**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C309.1	Define System Software.
C309.2	Familiarize with source file, object file and executable file structures and libraries
C309.3	Describe the front-end and back-end phases of compiler and their importance to students

**Course Title: Computer Graphics and Visualization**

**Course Code: 18CS62**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C310.1	Explain hardware, software and OpenGL Graphics Primitives.
C310.2	Illustrate interactive computer graphic using the OpenGL.
C310.3	Design and implementation of algorithms for 2D graphics Primitives and attributes.
C310.4	Demonstrate Geometric transformations, viewing on both 2D and 3D objects
C310.5	Infer the representation of curves, surfaces, Color and Illumination models

**Course Title: Web Technology and its applications**

**Course Code: 18CS63**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C311.1	Illustrate the Semantic Structure of HTML and CSS
C311.2	Compose forms and tables using HTML and CSS
C311.3	Design Client-Side programs using JavaScript and Server-Side programs using PHP
C311.4	Infer Object Oriented Programming capabilities of PHP
C311.5	Examine JavaScript frameworks such as jQuery and Backbone

**Course Title: Data Mining and Data Warehousing**

**Course Code: 18CS641**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C312.1	Define multi-dimensional data models..
C312.2	Explain rules related to association, classification and clustering analysis.
C312.3	Compare and contrast between different classification and clustering algorithms

**Course Title: Object Oriented Modelling and Design**

**Course Code: 18CS642**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C313.1	Describe the concepts involved in Object-Oriented modelling and their benefits.
C313.2	Demonstrate concept of use-case model, sequence model and state chart model for a given problem.
C313.3	Explain the facets of the unified process approach to design and build a Software system.
C313.4	Translate the requirements into implementation for Object Oriented design.
C313.5	Choose an appropriate design pattern to facilitate development procedure

**Course Title: Cloud Computing and its Applications**

**Course Code: 18CS643**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C314.1	Explain the fundamentals of cloud computing
C314.2	Illustrate the cloud application programming and aneka platform
C314.3	Contrast different cloud platforms used in industry

**Course Title: Advanced JAVA and J2EE**

**Course Code: 18CS644**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C315.1	Identify the need for advanced Java concepts like Enumerations and Collections
C315.2	Construct client-server applications using Java socket API
C315.3	Make use of JDBC to access database through Java Programs
C315.4	Adapt servlets to build server side programs
C315.5	Demonstrate the use of JavaBeans to develop component-based Java software

**Course Title: Mobile Application Development**

**Course Code: 18CS651**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C316.1	Learn to setup Android application development environment
C316.2	Illustrate user interfaces for interacting with apps and triggering actions
C316.3	Interpret tasks used in handling multiple activities
C316.4	Identify options to save persistent application data
C316.5	Appraise the role of security and performance in Android applications

**Course Title: Programming in JAVA**

**Course Code: 18CS653**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C317.1	Learn fundamental features of object oriented language and JAVA
C317.2	Set up Java JDK environment to create, debug and run simple Java programs.
C317.3	Learn object oriented concepts using programming examples
C317.4	Study the concepts of importing of packages and exception handling mechanism.
C317.5	Discuss the String Handling examples with Object Oriented concepts

**Course Title: System Software Laboratory**

**Course Code: 18CSL66**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C318.1	To make students familiar with Lexical Analysis and Syntax Analysis phases of Compiler Design and implement programs on these phases using LEX & YACC tools and/or C/C++/Java
C318.2	To enable students to learn different types of CPU scheduling algorithms used in operating system
C318.3	To make students able to implement memory management - page replacement and deadlock handling algorithms

**Course Title: Computer Graphics Laboratory with mini project**

**Course Code: 18CSL67**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C319.1	Demonstrate simple algorithms using OpenGL Graphics Primitives and attributes..
C319.2	Implementation of line drawing and clipping algorithms using OpenGL functions
C319.3	Design and implementation of algorithms Geometric transformations on both 2D and 3D objects.

**Course Title: Mobile Application Development**

**Course Code: 18CSMP68**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C320.1	Learn and acquire the art of Android Programming.
C320.2	Configure Android studio to run the applications
C320.3	Understand and implement Android's User interface functions.
C320.4	Create, modify and query on SQLite database
C320.5	Inspect different methods of sharing data using services

**Course Title: Artificial Intelligence and Machine Learning****Course Code: 18CS71**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C401.1	Explain Artificial Intelligence and Machine Learning
C401.2	Illustrate AI and ML algorithm and their use in appropriate applications

**Course Title: Big Data Analytics****Course Code: 18CS72**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C402.1	Understand fundamentals of Big Data analytics
C402.2	Explore the Hadoop framework and Hadoop Distributed File system
C402.3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data
C402.4	Employ MapReduce programming model to process the big data
C402.5	Understand various machine learning algorithms for Big Data Analytics, Web Mining and SocialNetwork Analysis

**Course Title Software Architecture and Design Patterns****Course Code: 18CS731**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C403.1	Learn fundamental features of object oriented language and JAVA
C403.2	Set up Java JDK environment to create, debug and run simple Java programs.
C403.3	Learn object oriented concepts using programming examples
C403.4	Study the concepts of importing of packages and exception handling mechanism.
C403.5	Discuss the String Handling examples with Object Oriented concepts

**Course Title: Advanced Computer Architecture**

**Course Code: 18CS733**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C404.1	Describe computer architecture.
C404.2	Measure the performance of architectures in terms of right parameters.
C404.3	Summarize parallel architecture and the software used for them

**Course Title: User Interface Design**

**Course Code: 18CS734**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C405.1	To study the concept of menus, windows, interfaces
C405.2	To study about business functions
C405.3	To study the characteristics and components of windows and the various controls for the windows
C405.4	To study about various problems in windows design with color, text, graphics and to study the testing methods

**Course Title: Natural Language Processing**

**Course Code: 18CS743**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C406.1	Analyze the natural language text.
C406.1	Define the importance of natural language.
C406.1	Understand the concepts Text mining
C406.1	Illustrate information retrieval techniques.

**Course Title: Artificial Intelligence and Machine Learning Laboratory Course Code: 18CSL76**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C407.1	Implement and evaluate AI and ML algorithms in and Python programming language

**Course Title: Internet of Things**

**Course Code: 18CS81**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C408.1	Assess the genesis and impact of IoT applications, architectures in real world.
C408.2	Illustrate diverse methods of deploying smart objects and connect them to network..
C408.3	Compare different Application protocols for IoT.
C408.4	Infer the role of Data Analytics and Security in IoT.
C408.5	Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry

**Course Title: Mobile Computing**

**Course Code: 18CS821**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C409.1	Define concepts of wireless communication.
C409.2	Compare and contrast propagation methods, Channel models, capacity calculations multiple antennas and multiple user techniques used in the mobile communication
C409.3	Explain CDMA, GSM. Mobile IP, Wimax and Different Mobile OS
C409.4	Illustrate various Markup Languages CDC, CLDC, MIDP; Programming for CLDC, MIDlet model and security concerns

**Course Title: Storage Area Networks**

**Course Code: 18CS822**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C410.1	Evaluate storage architectures,
C410.2	Define backup, recovery, disaster recovery, business continuity, and replication
C410.3	Examine emerging technologies including IP-SAN
C410.4	Understand logical and physical components of a storage infrastructure
C410.5	Identify components of managing and monitoring the data center

**Course Title: NoSQL Database**

**Course Code: 18CS824**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C413.1	Define, compare and use the four types of NoSQL Databases (Document-oriented, Key-Value Pairs, Column-oriented and Graph).
C413.2	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
C413.3	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases.

**Course Title: Analog and Digital Electronics**

**Course Code: 17CS32**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO02.1	Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741 opamp IC
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CO202.3	Illustrate combinational and sequential digital circuits
CO202.	Demonstrate the use of flipflops and apply for registers
CO202.5	Design and test counters, Analog-to-Digital and Digital-to-Analog conversion techniques

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M.TECH

2018-19

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PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
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	and leader in a team, to manage projects and in multidisciplinary environments.
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**After course completion CSE graduates will be able to:**

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<b>PEO 2</b>	Graduates of the program will apply Computer Science and Engineering and excel in leadership computer science professional.
<b>PEO 3</b>	Graduates adapt Value-Based Proficiency in solving real time problems.

**Course Title: Advances in Operating Systems**

**Course Code: 18SCS12**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C102.1	Define the fundamentals of Operating Systems.
C102..2	Explain distributed operating system concepts that includes architecture, Mutual exclusion algorithms, Deadlock detection algorithms and agreement protocols
C102..3	Illustrate distributed resource management components viz. the algorithms for implementation of distributed shared memory, recovery and commit protocols
C102.4	Identify the components and management aspects of Real time, Mobile operating Systems

**Course Title: Multi Core Architecture and Programming**

**Course Code: 18SCS152**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C103.1	Define technologies of multicore architecture and performance measures
C103.2	Demonstrate problems related to multiprocessing
C103.3	Illustrate windows threading, posix threads, openmp programming
C103.4	Analyze the common problems in parallel programming
C103.5	Define technologies of multicore architecture and performance measures

**Course Title: IOT and ADBMS Laboratory**

**Course Code: 18SCSL16**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C104.1	To provide students with contemporary knowledge in Data Compression and Coding
C104.2	To equip students with skills to analyze and evaluate different Data Compression and Coding methods
C104.3	To be instrumental to handle multi dimension data compression
C104.4	To acquire practical knowledge on advanced databases and its applications
C104.5	To analyze and work on areas like Storage, Retrieval, Multi valued attributes, Triggers and other complex objects, Algorithms etc related to ADBMS.

**Course Title: Machine Learning Techniques**

**Course Code: 18SCS31**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C201.1	Choose the learning techniques with this basic knowledge
C201.2	Apply effectively neural networks and genetic algorithms for appropriate applications.
C201.3	Apply bayesian techniques and derive effectively learning rules
C201.4	Choose and differentiate reinforcement and analytical learning techniques

**Course Title: Information and Network Security**

**Course Code: 18SCS322**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C202.1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
C202.2	Identify the security issues in the network and resolve it.
C202.3	Evaluate security mechanisms using rigorous approaches, including theoretical

**Course Title: Natural Language Processing and Text Mining**

**Course Code: 18SCS333**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C203.1	Analyze the natural language text.
C203.2	Generate the natural language.
C203.3	Demonstrate Text mining
C203.4	Apply information retrieval techniques.



**AMC ENGINEERING COLLEGE  
DEPARTMENT OF INFORMATION SCIENCE AND ENGINEERING  
2018-2019**

**STATEMENTS**

**PROGRAM OUTCOMES (PO)**

<b>PO1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
<b>PO5</b>	<b>Modern tool usage:</b> Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO11</b>	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAM SPECIFIC OUTCOMES (PSO)**

<b>PSO1</b>	<b>Professional Skills:</b> Ability of using mathematical methodologies for analysis of computing concepts, data structure, computer hardware, layered technologies and suitable algorithm
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	which in turn helps students to model, design and implement a system to meet specific requirement
<b>PSO2</b>	<b>Software Skills:</b> Ability to grasp the software development lifecycle and methodologies of software systems and to build software engineering system of varying complexity

**Course Title: Data Structures and Applications**

**Course Code: 18CS32**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C232.1	Explain fundamentals of data structures and their applications essential for programming/problem solving
C232.2	Illustrate linear representation of data structures: Stack, Queues, Lists, Trees and Graphs
C232.3	Demonstrate sorting and searching algorithms
C232.4	Find suitable data structure during application development/Problem Solving

**Course Title: Analog and Digital Electronics**

**Course Code: 18CS33**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C233.1	Explain the use of photo electronics devices, 555 timer IC, Regulator ICs and uA741 opamp IC
C233.2	Make use of simplifying techniques in the design of combinational circuits.
C233.3	Illustrate combinational and sequential digital circuits
C233.4	Demonstrate the use of flipflops and apply for registers
C233.5	Design and test counters, Analog-to-Digital and Digital-to-Analog conversion technique

**Course Title: Computer Organization****Course Code: 18CS34**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C234.1	Explain the basic sub systems of a computer, their organization, structure and operation.
C234.2	Illustrate the concept of programs as sequences of machine instructions.
C234.3	Demonstrate different ways of communicating with I/O devices and standard I/O interfaces.
C234.4	Describe memory hierarchy and concept of virtual memory.
C234.5	Describe arithmetic and logical operations with integer and floating-point operands.
C234.6	Illustrate organization of a simple processor, pipelined processor and other computing systems.

**Course Title: Software Engineering****Course Code: 18CS35**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C235.1	Outline software engineering principles and activities involved in building large software programs. Identify ethical and professional issues and explain why they are of concern to software engineers.
C235.2	Explain the fundamentals of object oriented concepts.
C235.3	Describe the process of requirements gathering, requirements classification, requirements specification and requirements validation. Differentiate system models, use UML diagrams and apply design patterns.
C235.4	Discuss the distinctions between validation testing and defect testing.
C235.5	Recognize the importance of software maintenance and describe the intricacies involved in software evolution. Apply estimation techniques, schedule project activities and compute pricing.
C235.6	Identify software quality parameters and quantify software using measurements and metrics. List software quality standards and outline the practices involved.

**Course Title: Analog and Digital Electronics Laboratory**

**Course Code: 18CSL37**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C237.1	Analog components and circuits including Operational Amplifier, Timer, etc.
C237.2	Combinational logic circuits.
C237.3	Flip - Flops and their operations.
C237.4	Counters and registers using flip-flops..
C237.5	Synchronous and Asynchronous sequential circuits.
C237.6	A/D and D/A converters

**Course Title: Data Structures Laboratory**

**Course Code: 18CSL38**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C238.1	This laboratory course enables students to get practical experience in design, develop, implement, analyze and evaluation/testing of Asymptotic performance of algorithms.
C238.2	Linear data structures and their applications such as stacks, queues and lists
C238.3	Non-Linear data structures and their applications such as trees and graphs.
C238.4	Sorting and searching algorithms

**Course Title: Constitution of India, Professional Ethics and Cyber Law**

**Course Code: 18CPC39**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C239.1	know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens
C239.2	Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society
C239.3	Know about the cybercrimes and cyber laws for cyber safety measures

**Course Title: Design and Analysis of Algorithm**

**Course Code: 18CS42**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C242.1	Explain various computational problem solving techniques.
C242.2	Apply appropriate method to solve a given problem.
C242.2	Describe various methods of algorithm analysis

**Course Title: Operating Systems**

**Course Code: 18CS43**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C243.1	Introduce concepts and terminology used in OS
C243.2	Explain threading and multithreaded systems
C243.3	Illustrate process synchronization and concept of Deadlock
C243.4	Introduce Memory and Virtual memory management, File system and storage techniques

**Course Title: Microcontroller and Embedded System****Course Code: 18CS44**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C244.1	Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system
C244.2	Program ARM controller using the various instructions
C244.3	Identify the applicability of the embedded system
C244.4	Comprehend the real time operating system used for the embedded system

**Course Title: Object Oriented Concepts****Course Code: 18CS45**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C245.1	Learn fundamental features of object oriented language and JAVA
C245.2	Set up Java JDK environment to create, debug and run simple Java programs.
C245.3	Create multi-threaded programs and event handling mechanisms.
C245.4	Introduce event driven Graphical User Interface (GUI) programming using applets and swings.

**Course Title: Data Communication****Course Code: 18CS46**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C246.1	Comprehend the transmission technique of digital data between two or more computers and a computer network that allows computers to exchange data.
C246.2	Explain with the basics of data communication and various types of computer networks
C246.3	Demonstrate Medium Access Control protocols for reliable and noisy channels.
C246.4	Expose wireless and wired LANs.

**Course Title: Design and Analysis of Algorithm Laboratory**

**Course Code: 18CSL47**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C247.1	Design and implement various algorithms in JAVA
C247.2	Employ various design strategies for problem solving
C247.3	Measure and compare the performance of different algorithms

**Course Title: Microcontroller and Embedded Systems Laboratory**

**Course Code: 18CSL48**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C248.1	Develop and test Program using ARM7TDMI/LPC2148
C248.2	Conduct the experiments on an ARM7TDMI/LPC2148 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler

**Course Title: Management, Entrepreneurship for IT industry**

**Course Code: 18CS51**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C351.1	Explain the principles of management, organization and entrepreneur
C351.2	Discuss on planning, staffing, ERP and their importance
C351.3	Infer the importance of intellectual property rights and relate the institutional support

**Course Title: Computer Networks and Security**

**Course Code: 18CS52**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C352.1	Demonstration of application layer protocols
C352.2	Discuss transport layer services and understand UDP and TCP protocols
C352.3	Explain routers, IP and Routing Algorithms in network layer
C352.4	Disseminate the Wireless and Mobile Networks covering IEEE 802.11 Standard
C352.5	Illustrate concepts of Multimedia Networking, Security and Network Management

**Course Title: Database Management System**

**Course Code: 18CS53**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C353.1	Provide a strong foundation in database concepts, technology, and practice.
C353.2	Practice SQL programming through a variety of database problems.
C353.3	Demonstrate the use of concurrency and transactions in database
C353.4	Design and build database applications for real world problems.

**Course Title: Automata theory and Computability**

**Course Code: 18CS54**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C354.1	Introduce core concepts in Automata and Theory of Computation
C354.2	Identify different Formal language Classes and their Relationships
C354.3	Design Grammars and Recognizers for different formal languages
C354.4	Prove or disprove theorems in automata theory using their properties
C354.5	Determine the decidability and intractability of Computational problems

**Course Title: Application Development using Python**

**Course Code: 18CS55**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C355.1	Learn the syntax and semantics of Python programming language.
C355.2	Illustrate the process of structuring the data using lists, tuples and dictionaries.
C355.3	Demonstrate the use of built-in functions to navigate the file system.
C355.4	Implement the Object Oriented Programming concepts in Python
C355.5	Appraise the need for working with various documents like Excel, PDF, Word and Others.

**Course Title: UNIX Programming**

**Course Code: 18CS56**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C356.1	Interpret the features of UNIX and basic commands.
C356.2	Demonstrate different UNIX files and permissions
C356.3	Implement shell programs.
C356.4	Explain UNIX process, IPC and signals.

**Course Title: Computer Network Laboratory**

**Course Code: 18CSL57**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C357.1	Demonstrate operation of network and its management commands
C357.2	Simulate and demonstrate the performance of GSM and CDMA
C357.3	Implement data link layer and transport layer protocols.

**Course Title: DBMS Laboratory with Mini project**

**Course Code: 18CSL58**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C358.1	Foundation knowledge in database concepts, technology and practice to groom students into well-informed database application developers.
C358.2	Strong practice in SQL programming through a variety of database problems
C358.3	Develop database applications using front-end tools and back-end DBMS

**Course Title: File Structures**

**Course Code: 18IS61**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C361.1	Explain the fundamentals of file structures and their management
C361.2	Measure the performance of different file structures
C361.3	Organize different file structures in the memory
C361.4	Demonstrate hashing and indexing techniques

**Course Title: Software Testing**

**Course Code: 18IS62**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C362.1	Differentiate the various testing techniques
C362.2	Analyze the problem and derive suitable test cases.
C362.3	Apply suitable technique for designing of flow graph
C362.4	Explain the need for planning and monitoring a process

**Course Title: Web Technology and its applications**

**Course Code: 18CS63**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C363.1	Illustrate the Semantic Structure of HTML and CSS
C363.2	Compose forms and tables using HTML and CSS
C363.3	Design Client-Side programs using JavaScript and Server-Side programs using PHP
C363.4	Infer Object Oriented Programming capabilities of PHP
C363.5	Examine JavaScript frameworks such as jQuery and Backbone

**Course Title: Data Mining and Data Warehousing**

**Course Code: 18CS641**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Define multi-dimensional data models..
C364.2	Explain rules related to association, classification and clustering analysis.
C364.3	Compare and contrast between different classification and clustering algorithms

**Course Title: Object Oriented Modelling and Design****Course Code: 18CS642**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Describe the concepts involved in Object-Oriented modelling and their benefits.
C364.2	Demonstrate concept of use-case model, sequence model and state chart model for a given problem.
C364.3	Explain the facets of the unified process approach to design and build a Software system.
C364.4	Translate the requirements into implementation for Object Oriented design.
C364.5	Choose an appropriate design pattern to facilitate development procedure

**Course Title: Cloud Computing and its Applications****Course Code: 18CS643**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Explain the fundamentals of cloud computing
C364.2	Illustrate the cloud application programming and aneka platform
C364.3	Contrast different cloud platforms used in industry

**Course Title: Advanced JAVA and J2EE****Course Code: 18CS644**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Identify the need for advanced Java concepts like Enumerations and Collections
C364.2	Construct client-server applications using Java socket API
C364.3	Make use of JDBC to access database through Java Programs
C364.4	Adapt servlets to build server side programs
C364.5	Demonstrate the use of JavaBeans to develop component-based Java software

**Course Title: Information Management System**

**Course Code: 18IS645**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Explain the Role of information management system in business
C364.2	Evaluate the role of the major types of information systems in a business environment and their relationship to each other

**Course Title: Mobile Application Development**

**Course Code: 18CS651**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C365.1	Learn to setup Android application development environment
C365.2	Illustrate user interfaces for interacting with apps and triggering actions
C365.3	Interpret tasks used in handling multiple activities
C365.4	Identify options to save persistent application data
C365.5	Appraise the role of security and performance in Android applications

**Course Title: Introduction to Data Structures and Algorithm**

**Course Code: 18CS652**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C365.1	Identify different data structures in C programming language
C365.2	Appraise the use of data structures in problem solving
C365.3	Implement data structures using C programming language

**Course Title: Programming In Java**

**Course Code: 18CS653**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C365.1	Learn fundamental features of object oriented language and JAVA
C365.2	Set up Java JDK environment to create, debug and run simple Java programs.
C365.3	Learn object oriented concepts using programming examples.
C365.4	Study the concepts of importing of packages and exception handling mechanism.
C365.5	Discuss the String Handling examples with Object Oriented concepts

**Course Title: Introduction to Operating System**

**Course Code: 18CS654**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C365.1	Explain the fundamentals of operating system
C365.2	Comprehend multithreaded programming, process management, memory management and storage management
C365.3	Familiar with various types of operating systems

**Course Title: Software Testing Laboratory****Course Code: 18ISL66**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C366.1	Analyse the requirements for the given problem statement
C366.2	Design and implement various solutions for the given problem
C366.3	Employ various design strategies for problem solving.
C366.4	Construct control flow graphs for the solution that is implemented
C366.5	Create appropriate document for the software artifact

**Course Title: File Structures Laboratory with Mini Project****Course Code: 18ISL67**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C367.1	Apply the concepts of Unix IPC to implement a given function.
C367.2	Measure the performance of different file structures
C367.3	Write a program to manage operations on given file system.
C367.4	Demonstrate hashing and indexing techniques

**Course Title: Mobile Application Development****Course Code: 18CSMP68**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C368.1	Learn and acquire the art of Android Programming.
C368.2	Configure Android studio to run the applications.
C368.3	Understand and implement Android's User interface functions.
C368.4	Create, modify and query on SQLite database
C368.5	Inspect different methods of sharing data using services.

**Course Title: Artificial Intelligence and Machine Learning**

**Course Code: 18CS71**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C471.1	Explain Artificial Intelligence and Machine Learning
C472.2	Illustrate AI and ML algorithm and their use in appropriate applications

**Course Title: Big Data Analytics**

**Course Code: 18CS72**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C472.1	Understand fundamentals of Big Data analytics
C472.2	Explore the Hadoop framework and Hadoop Distributed File system
C472.3	Illustrate the concepts of NoSQL using MongoDB and Cassandra for Big Data
C472.4	Employ MapReduce programming model to process the big data
C472.5	Understand various machine learning algorithms for Big Data Analytics, Web Mining and Social Network Analysis

**Course Title: Software Architecture and Design Patterns**

**Course Code: 18CS731**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C473.1	Learn How to add functionality to designs while minimizing complexity
C473.2	What code qualities are required to maintain to keep code flexible?.
C473.3	To Understand the common design patterns.
C473.4	To explore the appropriate patterns for design problems

**Course Title: High Performance Computing**

**Course Code: 18CS732**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C473.1	Introduce students the design, analysis, and implementation, of high performance computational science and engineering applications
C473.2	Illustrate on advanced computer architectures, parallel algorithms, parallel languages, and performance-oriented computing

**Course Title: Advanced Computer Architectures**

**Course Code: 18CS733**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C473.1	Describe computer architecture.
C473.2	Measure the performance of architectures in terms of right parameters
C473.3	Summarize parallel architecture and the software used for them

**Course Title: User Interface Design**

**Course Code: 18CS743**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	To study the concept of menus, windows, interfaces
C474.2	To study about business functions
C474.3	To study the characteristics and components of windows and the various controls for the windows
C474.4	To study about various problems in windows design with color, text, graphics and To study the testing methods

**Course Title: Digital Image Processing**

**Code: 18CS741**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	Define the fundamental concepts in image processing
C474.2	Evaluate techniques followed in image enhancements
C474.3	Illustrate image segmentation and compression algorithms

**Course Title: Network Management**

**Course Code: 18CS742**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	Illustrate the need for interoperable network management.
C474.2	Explain the concepts and architecture behind standards based network management.
C474.3	Differentiate the concepts and terminology associated with SNMP and TMN
C474.4	Describe network management as a typical distributed application

**Course Title: Natural Language Processing**

**Course Code: 18CS743**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	Analyze the natural language text.
C474.2	Define the importance of natural language
C474.3	Understand the concepts Text mining.
C474.4	Illustrate information retrieval techniques.

**Course Title: Cryptography**

**Course Code: 18CS744**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	Define cryptography and its principles
C474.2	Explain Cryptography algorithms
C474.3	Illustrate Public and Private key cryptography
C474.4	Explain Key management, distribution and certification
C474.5	Explain authentication protocols
C474.6	Tell about IPSec

**Course Title: Robotic Process Automation Design & Development**

**Course Code: 18CS745**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	To understand Basic Programming concepts and the underlying logic/structure
C474.2	To Describe RPA , where it can be applied and how its implemented
C474.3	To Describe the different types of variables, Control Flow and data manipulation techniques
C474.4	To Understand Image, Text and Data Tables Automation
C474.5	To Describe automation to Email and various types of Exceptions and strategies to handle

**Course Title: Introduction to Big Data Analytics**

**Course Code: 18CS751**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C475.1	Interpret the data in the context of the business.
C475.2	Identify an appropriate method to analyze the data
C475.3	Show analytical model of a system

**Course Title: Python Application Programming**

**Course Code: 18CS752**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C475.1	Learn Syntax and Semantics and create Functions in Python.
C475.2	Handle Strings and Files in Python.
C475.3	Understand Lists, Dictionaries and Regular expressions in Python
C475.4	Implement Object Oriented Programming concepts in Python
C475.5	Build Web Services and introduction to Network and Database Programming in Python.

**Course Title: Introduction to Artificial Intelligence**

**Course Code: 18CS753**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C475.1	Identify the problems where AI is required and the different methods available
C475.2	Compare and contrast different AI techniques available
C475.3	Define and explain learning algorithms

**Course Title: Introduction to Dot Net Framework for Application Development**

**Course Code: 18CS754**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C475.1	Inspect Visual Studio programming environment and toolset designed to build applications for Microsoft Windows
C475.2	Understand Object Oriented Programming concepts in C# programming language
C475.3	Interpret Interfaces and define custom interfaces for application
C475.4	Build custom collections and generics in C#
C475.5	Construct events and query data using query expressions

**Course Title: Artificial Intelligence and Machine Learning Laboratory**

**Course Code:**

**18CSL76**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C476.1	Implement and evaluate AI and ML algorithms in and Python programming language

**Course Title: Internet of Things**

**Course Code: 18CS81**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C481.1	Assess the genesis and impact of IoT applications, architectures in real world
C481.2	Illustrate diverse methods of deploying smart objects and connect them to network
C481.3	Compare different Application protocols for IoT.
C481.4	Infer the role of Data Analytics and Security in IoT
C481.5	Identify sensor technologies for sensing real world entities and understand the role of IoT in various domains of Industry.

**Course Title: Mobile Computing**

**Course Code: 18CS821**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C482.1	Define concepts of wireless communication.
C482.2	Compare and contrast propagation methods, Channel models, capacity calculations multiple antennas and multiple user techniques used in the mobile communication.
C482.3	Explain CDMA, GSM. Mobile IP, Wimax and Different Mobile OS
C482.4	Illustrate various Markup Languages CDC, CLDC, MIDP; Programming for CLDC, MIDlet model and security concerns

**Course Title: Storage Area Networks**

**Course Code: 18CS822**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C482.1	Evaluate storage architectures
C482.2	Define backup, recovery, disaster recovery, business continuity, and replication.
C482.3	Examine emerging technologies including IP-SAN
C482.4	Understand logical and physical components of a storage infrastructure
C482.5	Identify components of managing and monitoring the data center
C482.6	Define information security and identify different storage virtualization technologies

**Course Title: NOSQL Database**

**Course Code: 18CS823**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C482.1	Define, compare and use the four types of NoSQL Databases (Document-oriented, KeyValue Pairs, Column-oriented and Graph)
C482.2	Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases..
C482.3	Explain the detailed architecture, define objects, load data, query data and performance tune Document-oriented NoSQL databases

**Course Title: Multicore Architecture and Programming**

**Course Code: 18CS824**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C482.1	Define technologies of multicore architecture and performance measures
C482.2	Demonstrate problems related to multiprocessing
C482.3	Illustrate windows threading, posix threads, openmp programming
C482.4	Analyze the common problems in parallel programming



# AMC ENGINEERING COLLEGE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

## STATEMENTS

### PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Develop the components for analog and digital systems, communication systems, control and signal processing systems using acquired knowledge of basic skills and various design tools.
PSO2	Formulate the solution for interdisciplinary problems through acquired programming knowledge in the respective domain by complying real-time constraints.

**Course Title: Basic Electronics**

**Course Code: 18ELN14/24**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C104.1	Explain the operation and applications of basic analog/digital devices.
C104.2	Apply knowledge of number systems, Boolean algebra and different building blocks of digital electronics to implement given logical expressions and vice versa.
C104.3	Explain the principle of Feedback amplifiers, oscillators, IC555 timer, basic communication system and mobile communication
C104.4	Obtain the different performance indices for simple analog circuits.
C104.5	Prepare presentations on assigned self-study topics based on the significance and scope of electronics in providing solutions for needs of society and multiple disciplines of engineering.

**Course Title: Electronics Instrumentation**

**Course Code:17EC32**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C205.1	Describe the operations of measuring instruments.
C205.2	Apply the concepts of ammeters and voltmeters for current and voltage measurements.
C205.3	Utilize AC and DC bridges for passive component measurement.
C205.4	Analyze transducers for measuring temperature, pressure, distance and intensity.
C205.5	Develop independent learning on latest electronics instruments.

**Course Title: Analog Electronics**

**Course Code:17EC33**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C202.1	Explain the importance of BJT, FET, Feedback, oscillators and power amplifiers.
C202.2	Calculate the design parameters for JFET and BJT based amplifiers given the constraints.
C202.3	Apply the knowledge of electronic components, inductors, capacitors, transformers, resistors, BJTs and FETs to obtain different types of oscillators, power amplifiers and regulators.
C202.4	Analyze characteristics of BJTs and FETs to obtain frequency response and classify power amplifiers given the constraints.
C202.5	Design different types of RF and AF oscillators and Regulators for different voltage ranges.

**Course Title: Digital Electronics**

**Course Code:17EC34**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C203.1	Discuss the basic principles of the digital circuits and their significance.
C203.2	Apply the knowledge of simplification techniques, combinational circuits and flip-flops to get the optimized digital circuits.
C203.3	Classify the different types of combinational and sequential circuits.
C203.4	Analyze different types of combinational and sequential circuits based on the given application with the given specifications.
C203.5	Chose the correct answer for the given questions by applying the concepts of digital electronics.

**Course Title: Network Analysis**

**Course Code:17EC35**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C204.1	Describe the basic concepts of source transformation, network reduction using loop, node analysis and resonant circuits.
C204.2	Apply the knowledge of basic circuit law and simplify the network using reduction techniques.
C204.3	Apply the knowledge of Network Theorems and Laplace transforms for network solutions.
C204.4	Analyze the AC and DC steady state and Transient responses and two port parameters of the network.
C204.5	Comprehend the concepts of network theorems, Laplace transforms, Transient analysis, and network parameters through self study and write a short quiz.

**Course Title: Engineering Electromagnetics**

**Course Code:17EC36**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C206.1	Explain several basic laws and principles of electric field, magnetic field, their properties, electromagnetic field and wave propagation.
C206.2	Solve problems analytically and numerically for energy, potential along with concepts of current and conductors using vector calculus.
C206.3	Apply Maxwell's equations for wave propagation.
C206.4	Analyze wave propagation using Maxwell's equations.
C206.5	Analyze the nature of electromagnetic wave propagation and the way it helps in developing the higher electronics and communication systems

**Course Title: Analog Electronics Lab**

**Course Code:17ECL37**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C207.1	Demonstrate the working of simple passive components, Rectifiers, Voltage Regulator Circuits, Amplifiers and Oscillator circuits
C207.2	Analyze the output and transfer characteristics of BJT, JFET and MOSFET devices from experimental readings
C207.3	Evaluate the performance of BJT amplifiers in CE and CC configurations practically
C207.4	Analyze various performance parameters for rectifiers, voltage regulators and amplifier circuits
C207.5	Test the operation of simple electronic circuits using appropriate design and assembly techniques.

**Course Title: Digital Electronics Lab**

**Course Code: 17ECL38**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C208.1	Demonstrate the truth table of given expressions using logic gates.
C208.2	Design Synchronous and Asynchronous Counters for the given data.
C208.3	Develop the Combinational Circuits for the given specification.
C208.4	Apply the concepts of counters and adders to simulate the same by using Multisim software .
C208.5	Apply the concepts of the given digital circuits to simulate the same by using Multisim software.

**Course Title: Signals & Systems**

**Course Code: 17EC42**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C212.1	Describe the mathematical models, convolution tool, Fourier and Z transformation techniques for characterizing signals and systems.
C212.2	Apply the mathematical tool of convolution, concepts of Fourier and Z transforms to find the response of both Discrete and Continuous time systems.
C212.3	Analyze the system response and system behavior based on the impulse response, input output equations and transform techniques.
C212.4	Select appropriate methods for basic signal processing applications.
C212.5	Comprehend the applications of the concepts of signals and systems in communication, control and signal processing as through self study and write as hort quiz.

**Course Title: Control Systems**

**Course Code: 17EC43**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C211.1	Explain the concepts of mathematic model and transfer function of electrical, mechanical and electromechanical systems.
C211.2	Develop the transfer function of a given control system using block diagram reduction techniques and signal flow graph method.
C211.3	Determine the time domain response for first and second order systems and steady state errors.
C211.4	Analyze the stability of the system, state variables and model of digital control system.
C211.5	Conduct survey on recent trends and technology on control systems as an individual.

**Course Title: Principles of Communication Systems****Course Code: 17EC44**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C213.1	Discuss generation and detection of AM signals, FM signals, the concepts of random process, various types of noise ,its effects, pulse modulation and sampling techniques
C213.2	Apply fundamentals of modulation techniques to compute various performance parameters.
C213.3	Apply the concepts of random process and various types of noise& its effects in communication systems.
C213.4	Analyze AM, FM, pulse modulation, sampling techniques and effects of noise over these systems.
C213.5	Conduct research on assigned topics, related to practical broadcast communication systems utilizing the knowledge of analog and digital communication to present a report as part of a small team.

**Course Title: Linear Integrated Circuits****Course Code: 17EC45**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After studying this course, Student will have the ability to
C214.1	Discuss the various parameters, characteristics and specifications of OpAmp and related Circuits.
C214.2	Apply the various electrical laws to obtain voltage /current/waveform in Linear integrated circuits
C214.3	Analyze linear integrated circuits and its applications based on OpAmp
C214.4	Explain fundamental applications of OpAmp and related integrated circuits
C214.5	Design and demonstrate various linear integrated circuits Applications

**Course Title: Microprocessors**

**Course Code: 17EC46**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C210.1	Explain the various addressing modes and instruction set of 8086.
C210.2	Apply the concept of assembly language programming in 8086 using various instruction sets.
C210.3	Apply DOS 21H interrupts, function calls, procedures and macros for modular programming.
C210.4	Experiment an assembly language program by interfacing microprocessor to various devices for simple applications by effectively utilizing microprocessor peripherals.
C210.5	Explain various interdisciplinary applications of microprocessors along with the advancement in the field of processors.

**Course Title: Microprocessors Lab**

**Course Code: 17ECL47**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After studying this course, Student will have the ability to
C215.1	Build assembly level language Programs to perform arithmetic, logical and data transfer applications on 8086 Microprocessor.
C215.2	Examine assembler directives, DOS Interrupts, branch and loop operations.
C215.3	Write assembly level language to Interface a microprocessor to various devices for simple applications.
C215.4	Test effectively to utilize microprocessor peripherals and their interfacing components to find its application in the real world.
C215.5	Develop a project to solve a practical problem on 8086 Microprocessor in a team.

**Course Title: LIC & Communication LAB**

**Course Code: 17ECL48**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
<b>C216.1</b>	Design a second order LPF, HPF for a given frequency.
<b>C216.2</b>	Design a Schmitt trigger, astable and monostable multivibrators using IC555.
<b>C216.3</b>	Demonstrate Frequency synthesis using PLL and IF amplifier. R-2R DAC, DSBSB generation using balance modulator.
<b>C216.4</b>	Demonstrate modulation and demodulation of AM, FM, PAM, PWM and PPM schemes.
<b>C216.5</b>	Demonstrate Schmitt trigger circuit using op-amp.

**Course Title: Digital Communication**

**Course Code: 15EC61**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
<b>C309.1</b>	Describe mathematical representation of signal, symbol, noise and channels, concepts of spread spectrum.
<b>C309.2</b>	Apply the concept of spread spectrum technologies to digital communication, signal conversion to symbols and signal processing to symbols in transmitter and receiver and channel blocks.
<b>C309.3</b>	Compute performance parameters and transfer rates for low pass and band pass symbol under ideal and corrupted band limited and non band limited channels.
<b>C309.4</b>	Analyze the performance of the signals in a digital communication system both in the time and frequency domain, baseband and pass band digital communication system in terms of error rate and spectral efficiency.
<b>C309.5</b>	Write MATLAB codes for generating PSD of a given sequence, Digital modulation techniques- BPSK, QPSK, and BFSK Simulate and tabulate the results.

**Course Title: ARM microcontroller and embedded system**

**Course Code: 15EC62**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
<b>C310.1</b>	Explain the background of the ARM architecture, instruction set, interrupt handling, embedded system components and the basics of operating system for embedded system.
<b>C310.2</b>	Apply the embedded system components and their interfacing with the I/O subsystems of an embedded system.
<b>C310.3</b>	Analyze different computational model design used in embedded systems, features of RTOS and debugging techniques.
<b>C310.4</b>	Classify embedded systems, major applications and purpose of Embedded system.
<b>C310.5</b>	Survey on embedded system components and RTOS.

**Course Title: VLSI Design**

**Course Code: 15EC63**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C311.1	Explain the characteristics of different types of devices in MOS family and related circuits
C311.2	Apply the concepts of Lambda Based design rules to obtain stick diagrams and Layout diagrams of different types of MOS logic
C311.3	Apply the concepts of Series and parallel connection of nMOS and pMOS to obtain different types of MOS logic and to calculate resistance and capacitance values
C311.4	Analyze ALU Subsystem Design, Adders and Multipliers, parity generator, multiplexer, PLA and related BJT and FET Circuits
C311.5	Design of an inverter, buffer and transmission gate using Mentor Graphics Tool in Linux environment.

**Course Title: Computer Communication Networks**

**Course Code: 15EC64**

CO.No.	OUTCOMES
	After completing the course the student will be able to:
C312.1	Describe the basic concepts of computer communication and the TCP-IP reference model.
C312.2	Choose the appropriate IEEE standards for wired & wireless LAN and Bluetooth.
C312.3	Analyze the functions of protocols specified in the data link layer, network layer and transport layer.
C312.4	Select the suitable connecting devices for various computer networks.
C312.5	Survey on the future of computer networks in the next five years.

**Course Title: Cellular Mobile Communication**

**Course Code: 15EC651**

CO. NO	OUTCOMES
	After completing the course the student will be able to:
C313_1.1	Understand the evolution and basics of cellular communication systems.
C313_1.2	Apply the understanding of statistical characterization of urban mobile channels to compute the performance for simple modulation schemes.
C313_1.3	Examine the call processing protocols, limitations of GSM, GPRS and CDMA to meet high data rate requirements and improve quality of service.
C313_1.4	Analyze the voice and data call flow handling for various scenarios in GSM and CDMA systems for national and international interworking situations.
C313_1.5	Survey on “Recent Trend’s in Mobile Communication and Wireless Sensor Networks”.

**Course Title: Artificial Neural Network**

**Course Code: 15EC653**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C313_3.1	Describe the concepts and techniques of various neural network models, architecture and learning algorithms
C313_3.2	Apply neural networks to particular application
C313_3.3	Analyze the neural network to know how to improve the performance of neural network
C313_3.4	Analyze whether neural networks are appropriate to a particular application.
C313_3.5	Write a program for different application of neural networks

**Course Title: Digital Switching system**

**Course Code: 15EC654**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C313_4.1	Describe the evolution and basics of Tele-communication networks and digital transmission of data.
C313_4.2	Analyze the fundamentals of tele-communication of probability to form models for telecommunication traffic and its measurements.
C313_4.3	Apply knowledge of networks and computer organization to understand Digital Switching system software.
C313_4.4	Analyze multi stage switching structures involving time and space switching stages.
C313_4.5	Comprehend and write assignment from the given article effectively as an individual..

**Course Title: Digital System design using VERILOG**

**Course Code: 15EC663**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C314_3.1	Explain the design approach based on programmable logic for system design.
C314_3.2	Explain the principles of combinational and sequential design using verilog.
C314_3.3	Analyze the concept of memory and integrated circuits and its fabrication methodology.
C314_3.4	Analyze the different interfacing and design methodology for the optimized design of the given digital system.
C314_3.5	Design the optimized digital circuits with the help of Xilinx tool by referring IEEE paper.

**Course Title: Embedded Controller Lab**

**Course Code: 15ECL67**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C315.1	Write the basic programs using embedded C.
C315.2	Apply the interfacing concepts using GPIO to interface Displays, keyboard, Motors.
C315.3	Apply the interfacing concepts to DAC and ADC with FRARM cortex M3.
C315.4	Experiment the interrupts, serial communication and timer concepts in Arm cortex M3.
C315.5	Demonstrate inter processor communication using arm cortex M3.

**Course Title: Computer Network Lab****Course Code: 15ECL68**

<b>CO.No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
C316.1	Simulate linking of nodes, agents and to connect application protocol on them using NCTUNS tool.
C316.2	Develop Ethernet LAN using node using NCTUNS tool.
C316.3	Develop wired, wireless topology, link state algorithm using NCTUNS tool.
C316.4	Develop different networking protocols.
C316.5	Develop a C/C++ code to perform network security.

**Course Title: Microwave And Antennas****Course Code: 15EC71**

<b>CO.No</b>	<b>OUTCOMES</b> After completing the course, the student will be able to:
C401.1	Describe the theoretical principles underlying the semiconductor diodes, microwave devices and their parameters using basic knowledge of transmission lines.
C401.2	Compute the basic network theory using S Parameters and the different types of passive devices of microwave used for Communication systems.
C401.3	Explain various strip lines, working principles, characteristics, applications of different types of practical antennas and mechanism of radio wave propagation.
C401.4	Analyze different types of antennas and their characteristics.
C401.5	Research, and identify the safety provisions to minimize the effects of microwave hazards, assignment on antenna system, modern wireless communication and their impact on society /environment.

**Course Title: Digital Image Processing**

**Course Code: 15EC72**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C402.1	Explain the fundamental concepts of digital image processing.
C402.2	Determine the relationship between pixels in an image and apply the concepts of image enhancement techniques.
C402.3	Apply the image restoration techniques in image processing and also color image processing
C402.4	Analyze morphological operations, segmentation and wavelet transforms methods
C402.5	Analyze the image processing techniques using MATLAB tool as a member in a team and give effective presentation.

**Course Title: Power Electronics**

**Course Code: 15EC73**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C403.1	Describe basic concepts of Power Electronics, their applications & classification of power electronic circuits.
C403.2	Sketch the steady state and switching characteristics of power transistors and thyristors.
C403.3	Explain the principle of operation of controlled rectifiers, AC voltage controllers, choppers and inverters.
C403.4	Analyze various power converter circuits like controlled rectifiers, inverters, choppers, AC voltage controllers and thyristor triggering, commutation circuits.
C403.5	Design suitable circuits to conduct Steady state characteristics of power devices and to control the speed of AC/DC motors.

**Course Title: Bio Medical Signal Processing**

**Course Code: 15EC742**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course, the student will be able to:
C404-2.1	Explain the basic Bio Medical signals, system, objectives and draw backs, basics of ECG and EEG feature extraction
C404-2.2	Use the basic mathematical, scientific and computational skills necessary to analyze ECG,EEG signals.
C404-2.3	Apply classical and modern filtering and compression techniques for ECG and EEG signals
C404-2.4	Analyze the cardiologic and neurological signals.
C404-2.5	Give a seminar on latest solutions developed for society and environment using the Bio medical Signal Processing concept.

**Course Title: Satellite Communication**

**Course Code: 15EC755**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course, the student will be able to:
C405_5.1	Explain the fundamental principles of satellite communication systems and their applications.
C405_5.2	Apply the analytical and practical techniques applicable for propagation impairments and space link in space segment and earth segment.
C405_5.3	Analyze the orbit elements, heights, time, limits of visibility and different angles of inclination for Geostationary orbits.
C405_5.4	Analyze the uplink and down link power requirements for various multiple access techniques.
C405_5.5	Demonstrate technical seminar as a team about the recent trends in Satellite Communications for the optimal utilization of bandwidth.

**Course Title: Advanced Communication Lab**

**Course Code: 15ECL76**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C406.1	Analyze the basic circuits to carry out modulation experiments and multiplexing using discrete electronic components.
C406.2	Interpret the characteristics of various antennas and losses in optical fiber.
C406.3	Determine the characteristics and parameters associated with microwave devices and optical waveguides.
C406.4	Simulation and computation of parameters of the digital modulation techniques.
C406.5	Test the digital modulation circuits and display the waveforms.

**Course Title: VLSI LAB**

**Course Code: 15ECL77**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
<b>C407.1</b>	Write a verilog code for digital circuits using mentor graphics tool.
<b>C407.2</b>	Analyze the digital circuits by simulation and synthesis.
<b>C407.3</b>	Design schematic and layout of analog circuits.
<b>C407.4</b>	Analyze the DC, AC and transient analysis, DRC, PEX, LVS, time optimization, power and area to the given constraint for analog circuits.
<b>C407.5</b>	Analyze the synthesis and simulation of BCD adder.

**Course Title: Project Viva Voce**

**Course Code: 15ECP78**

<b>CO. No.</b>	<b>After completing the course the student will be to:</b>
C408.1	Examine related papers to identify a suitable project by making use of the technical and engineering knowledge gained from previous courses with the awareness of impact of technology on the society.
C408.2	Survey and substantiate complex engineering problems related to selected project.
C408.3	Select the methodology and modern tools required for the implementation of the project.
C408.4	Construct a team; distribute the work and commit to professional ethics and responsibilities as a member in a team and individual.
C408.5	Communicate technical and general information by means of oral as well as written presentation skills with professionalism.

**Course Title: Wireless Cellular And LTE 4G Broadband**

**Course Code: 15EC81**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C409.1	Explain the system architecture and the functional standard specified in LTE 4G.
C409.2	Apply the concepts of OFDM with FDMA,TDMA,CDMA, OFDMA, SCFDMA, OFDMA-S CFDMA in LTE and multiple antennas for a wireless system.
C409.3	Analyze the role of LTE radio interface protocols , EPS Data convergence protocols ,UTRAN and mobility management.
C409.4	Analyze the Performance of resource management and packet data processing and transport algorithms.
C409.5	Survey on recent trends and technologies of wireless cellular and LTE 4G Broadband to assess the issues related to society.

**Course Title: Fiber Optic Network****Course Code: 15EC82**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C410.1	Explain the Basic operational techniques in optical Fiber communication system.
C410.2	Analyze the operating principles of optical sources, Detectors, Connectors and Couplers
C410.3	Apply the concepts and principles of WDM to advanced devices, basic applications of optical networks.
C410.4	Evaluate the performance of Optical Receivers, Analog and Digital links.
C410.5	Read and Comprehend the latest applications of OFC network through Seminars.

**Course Title: Speech Processing****Course Code: 15EC832**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course, the student will be able to:
C411_2.1	Model speech production system and describe the fundamentals of speech.
C411_2.2	Apply the knowledge to different speech parameters and an appropriate speech model for a given application
C411_2.3	Analyze speech recognition system.
C411_2.4	Synthesis the speaker identification systems.
C411_2.5	Identify an application of speech processing and give a seminar.

<b>CO No.</b>	<b>OUTCOMES</b>
	After completing the course, the student will be able to:
C411_4.1	Discuss the fundamentals of machine learning and Basics of different algorithms,
C411_4.2	Explain theory of probability and statistics related to machine learning and decision tree concepts,
C411_4.3	Apply neural networks, Bayes classifier and k nearest neighbor, for problems appear in Machine learning.
C411_4.4	Explain concept learning, ANN, Bayes classifier, k nearest neighbor, Q.
C411_4.5	Simulate different algorithms of Machine learning using pythons and libraries.

**Course Title: Network and Cyber Security**

**Course Code: 15EC835**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C411_5.1	Explain the concept of web security consideration, threats SSL layer, HTTP, TLS and SSH.
C411_5.2	Apply the security concepts to E- mail and Internet Protocol.
C411_5.3	Analyze cyber security concepts with case study.
C411_5.4	Infer recent approaches on network and cyber security by referring research papers.

CO.No.	OUTCOMES
C412.1	Survey and Substantiate complex Engineering problem related to selected subject of interest.
C412.2	Select the methodology and modern tool required for the implementation of the topic.
C412.3	Commit to professional ethics and responsibilities as a member in team/individual.
C412.4	Design and demonstrate proposed work with in the proper time allocation and management.
C412.5	Communicate technically and general information by means of oral/written presentation skills with professionalism.

**Course Title: Project Viva Voce**

**Course Code: 15ECP85**

<b>CO. No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
C413.1	Construct a team, distribute the work and commit to professional ethics and responsibilities as a member in a team and individual.
C413.2	Design & Demonstrate the proposed work in module wise with proper time allocation and finance management.
C413.3	Assess the post analysis implementation and identify its future scope, issues and impact.
C413.4	Communicate technical and general information by means of oral as well as written presentation skills with professionalism.
	<b>OUTCOMES</b>
<b>CO.No.</b>	After completing the course the student will be able to:
C414.1	Identify the emerging technical field by applying the engineering concepts from the research repository
C414.2	Survey the related literature for better understanding.
C414.3	Analyze the methodology used in the identified paper.
C414.4	Prepare the power point presentation and documentation by applying ethical principles with committed professional responsibilities as an individual.
C414.5	Discuss the issues and future scope for available technology.



# AMC ENGINEERING COLLEGE

M.Tech in VLSI & ES

## STATEMENTS

### INSTITUTE VISION

To be a leader in imparting value based Technical Education and Research for the benefit of society.

### INSTITUTE MISSION

- To provide state of the art Infrastructure facilities.
- To implement modern pedagogical methods in delivering the academic programs with experienced and committed faculty.
- To create a vibrant ambience that promotes Learning, Research, Invention and Innovation.
- To undertake manpower and skill development programmes for Academic Institutions and Industries.
- To enhance Institute Industry Interface through Collaborative Research and Consultancy
- To generate and disseminate knowledge through training programme/workshops/seminars/conferences/publications.
- To be a more comprehensive college in terms of the number of programs offered.
- To relentlessly pursue professional excellence with ethical and moral values.

### DEPARTMENT VISION

To develop outstanding Electronics and Communication Engineers to meet the ever changing Social and Technological needs of the Society.

### DEPARTMENT MISSION

MoD1	To provide State-of-the-Art infrastructure in Electronics and Communication Engineering.
MoD2	To disseminate strong theoretical and practical exposure to meet the emerging trends in the industry.
MoD3	To promote a free thinking environment with innovative teaching-learning pedagogy.
MoD4	To develop value based socially responsible professionals for the betterment of the Society.

### PROGRAM EDUCATIONAL OBJECTIVES (PEO)

PEO1	Develop and excel in their chosen profession on technical front and/or progress towards advanced continuing education, Inter-disciplinary Research and Entrepreneurship.
PEO2	Become reputed and innovative solution provider to complex system design problems or challenges relevant to Electronics and Communication.
PEO3	Progress as effective team members and achieve a leadership position with trust, mutual respect and professional ethics.
PEO4	Become responsible and pro-active citizens for the overall welfare and progress of the Society.

### PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
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PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Develop the components for analog and digital systems, communication systems, control and signal processing systems using acquired knowledge of basic skills and various design tools.
PSO2	Formulate the solution for interdisciplinary problems through acquired programming knowledge in the respective domain by complying real-time constraints.

**Course Title: ADVANCED ENGINEERING MATHEMATICS**

**Course Code: 18ELD11**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO101.1	Understand vector spaces, basis, linear transformations and the process of obtaining matrix of linear transformations arising in magnification and rotation of images.
CO101.2	Apply the technique of singular value decomposition for data compression, least square approximation in solving inconsistent linear systems.
CO101.3	Utilize the concepts of functional and their variations in the applications of communication systems, decision theory, synthesis and optimization of digital circuits.
CO101.4	Learn the idea of random variables (discrete/continuous) and probability distributions in analyzing the probability models arising in control systems and system communications.
CO101.5	Analyze random process through parameter-dependent variables in various random processes.

**Course Title: ASIC DESIGN**

**Course Code: 18EVE12**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO102.1	Describe the concepts of ASIC design methodology, data path elements, logical effort and FPGA architectures.
CO102.2	Analyze the design of FPGAs and ASICs suitable for specific tasks, perform design entry and explain the physical design flow.
CO102.3	Design data path elements for ASIC cell libraries and compute optimum path delay.
CO102.4	Create floor plan including partition and routing with the use of CAD algorithms
CO102.5	Analyze the CAD tools.

**Course Title: ADVANCED EMBEDDED SYSTEM**

**Course Code: 18EVE13**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO103.1	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO103.2	Explain the hardware software co-design and firmware design approaches
CO103.3	Acquire the knowledge of the architectural features of ARM CORTEX M3, a 32 bit microcontroller including memory map, interrupts and exceptions
CO103.4	Apply the knowledge gained for Programming ARM CORTEX M3 for different applications.
CO103.5	Design an embedded system for different applications

**Course Title: VLSI TESTING**

**Course Code: 18EVE14**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO104.1	Analyze the need for fault modeling and testing of digital circuits
CO104.2	Generate fault lists for digital circuits and compress the tests for efficiency
CO104.3	Create tests for digital memories and analyze failures in them
CO104.4	Apply boundary scan technique to validate the performance of digital circuits
CO104.5	Design built-in self-tests for complex digital circuits

**Course Title: Digital VLSI Design****Course Code: 18EVE15**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO105.1	Analyse issues of On-chip interconnect Modelling and Interconnect delay calculation.
CO105.2	Analyse the Switching Characteristics in Digital Integrated Circuits.
CO105.3	Use the Dynamic Logic circuits in state-of-the-art VLSI chips.
CO105.4	Study critical issues such as ESD protection, Clock distribution, Clock buffering, and Latch phenomenon
CO105.5	Use Bipolar and Bi-CMOS circuits in very high-speed design

**Course Title: VLSI & ES Lab-1****Course Code: 18EVEL16**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO106.1	Understand the features of CAD tool in VLSI design.
CO106.2	Design and verify the behavior of digital circuits using digital flow
CO106.3	Verify the design using a logic analyzer
CO106.4	Analyse physical design
CO106.5	Develop Assembly language programs and C language programs for different applications using ARMCortex M3 Kit and Keil uVision-4 tool.

**Course Title: RESEARCH METHODOLOGY AND IPR**

**Course Code: 18RMI17**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO107.1	Discuss research methodology and the technique of defining a research problem
CO107.2	Explain the functions of the literature review in research, carrying out a literature search, developing theoretical and conceptual frameworks and writing a review.
CO107.3	Explain various research designs and their characteristics.
CO107.4	Explain the art of interpretation and the art of writing research reports.
CO107.5	Discuss various forms of the intellectual property, its relevance and business impact in the changing global business environment and leading International Instruments concerning IPR

**Course Title: DESIGN OF ANALOG AND MIXED MODE VLSI CIRCUITS**

**Course Code: 18EVE21**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO201.1	: Use efficient analytical tools for quantifying the behaviour of basic circuits by inspection.
CO201.2	Design high-performance, stable operational amplifiers with the tradeoffs between speed, precision and power dissipation.
CO201.3	Design and study the behaviour of phase-locked-loops for the applications.
CO201.4	Identify the critical parameters that affect the analog and mixed-signal VLSI circuits' performance
CO201.5	Perform calculations in the digital or discrete time domain, more sophisticated data converters to translate the digital data to and from inherently analog world.

**Course Title: REAL TIME OPERATING SYSTEM****Course Code: 18EVE22**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO202.1	Develop programs for real time services, firmware and RTOS, using the fundamentals of Real Time Embedded System, real time service utilities, debugging methodologies and optimization techniques.
CO202.2	Select the appropriate system resources (CPU, I/O, Memory, Cache, ECC Memory, Microcontroller/FPGA/ASIC to improve the system performance.
CO202.3	Apply priority based static and dynamic real time scheduling techniques for the given specifications.
CO202.4	Analyze deadlock conditions, shared memory problem, critical section problem, missed deadlines, availability, reliability and QoS.
CO202.5	Develop programs for multithreaded applications using suitable techniques and data structure

**Course Title: SYSTEM VERILOG****Course Code: 18EVE23**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO203.1	Write test benches for moderately complex digital circuits
CO203.2	Use System Verilog language
CO203.3	Appreciate functional coverage
CO203.4	Apply constrained random tests benches using System Verilog
CO203.5	Analyze a verification case and apply System Verilog to verify the design

**Course Title: ADVANCES IN VLSI DESIGN**

**Course Code: 18EVE241**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO111.1	Apply design automation for complex circuits using the different implementation methodology like custom versus semi-custom, hardwired versus fixed, regular array versus ad-hoc.
CO111.2	Use the approaches to minimize the impact of interconnect parasitics on performance, power dissipation and circuit reliability
CO111.3	Impose the ordering of the switching events to meet the desired timing constraints using synchronous, clocked approach.
CO111.4	Infer the reliability of the memory
CO204.5	Understand the role of peripheral circuitry and control circuitry in the design of reliable and fast memories

**Course Title: LOW POWER VLSI DESIGN**

**Course Code: 18EVE251**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO205.1	Identify the sources of power dissipation in CMOS circuits.
CO205.2	Perform power analysis using simulation-based approaches and probabilistic analysis.
CO205.3	Use optimization and trade-off techniques that involve power dissipation of digital circuits.
CO205.4	Make the power design a reality by making power dimension an integral part of the design.
CO205.5	Use practical low power design techniques and their analysis at various levels of design abstraction and analyse how these are being captured in the latest design automation environments

**Course Title: VLSI & ES Lab-2**

**Course Code: 18EVEL26**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO206.1	Design, implement and analyse analog, digital and mixed mode circuits Implement different techniques of message passing and Inter task communication.
CO206.2	Learn the various issues in Mixed signal designs basically data converters.
CO206.3	Acquire hands-on skills of using CAD tools in VLSI design.
CO206.4	Appreciate the design process in VLSI through a mini-project on the design of a CMOS sub-system.
CO206.5	Select a suitable task switching technique in a multithreaded application.
CO206.6	Implement different techniques of message passing and Inter task communication.
CO206.7	Implement different data structures such as pipes, queues and buffers in multithreaded programming.

**Course Title: CAD OF DIGITAL SYSTEMS**

**Course Code: 18EVE31**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO301.1	Solve graph theoretic problems.
CO301.2	Evaluate the computational complexity of an algorithm
CO301.3	Write algorithms for VLSI Automation
CO301.4	Simulate and synthesize digital circuits using VLSI automation tools.
CO301.5	Give a seminar on latest solutions developed for society and environment using the CAD tools.

**Course Title: ADVANCES IN IMAGE PROCESSING****Course Code: 18EVE331**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO302.1	Understand the representation of the digital image and its properties
CO302.2	Apply pre-processing techniques required to enhance the image for its further analysis.
CO302.3	Use segmentation techniques to select the region of interest in the image for analysis
CO302.4	Represent the image based on its shape and edge information
CO302.5	Describe the objects present in the image based on its properties and structure.
CO302.6	Use morphological operations to simplify images, and quantify and preserve the main shape characteristics of the objects

**Course Title: INTERNET OF THINGS****Course Code: 18EVE333**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
CO303.1	Understand the basic concepts IOT Architecture and devices employed.
CO303.2	Analyze the sensor data generated and map it to IOT protocol stack for transport.
CO303.3	Apply communications knowledge to facilitate transport of IOT data over various available communications media.
CO303.4	Design a use case for a typical application in real life ranging from sensing devices to analyzing the data available on a server to perform tasks on the device
CO303.5	Give a seminar on latest solutions developed for society and environment using the IoT & WSN concept



# AMC ENGINEERING COLLEGE

DEPARTMENT OF MECHANICAL ENGINEERING

## PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
<b>PSO1</b>	Graduates are able to analyze, design and manufacture mechanical systems with latest available technologies
<b>PSO2</b>	Graduates are able to work on interdisciplinary projects in their research and development activities, along with the skills and adequate knowledge in managerial capability and entrepreneurship.
<b>PROGRAM EDUCATIONAL OBJECTIVES (PEO)</b>	
<b>PEO 1 (Knowledge)</b>	Graduates of Mechanical Engineering shall Develop Strong Academic Foundation in science and mechanical engineering to pursue a diverse range of careers as engineers, consultants and entrepreneurs.
<b>PEO 2 (Skills)</b>	Emerging as skilled engineers mastered in diversified interdisciplinary technologies as a concrete competent innovators in Industries and Academics.

<b>PEO 3</b> <b>(Attitude)</b>	Graduates of Mechanical Engineering will inculcate skills to identify real time needs and provide solutions based on social, environmental, ethical and cultural values through interdisciplinary team approach.
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**Course Title: Engineering Graphics****Course Code: 18EGDL15**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C115.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
C115.2	Produce computer generated drawings using CAD software.
C115.3	Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
C115.4	Develop isometric drawings of simple objects reading the orthographic projections of those objects.
C115.5	Convert pictorial and isometric views of simple objects to orthographic views.

**Course Title: Elements of Mechanical Engineering****Course Code: 18ME15**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C115.1	Identify different sources of energy and their conversion process.
C115.2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.
C115.3	Recognize various metal joining processes and power transmission elements.
C115.4	Understand the properties of common engineering materials and their applications in engineering industry.
C115.5	Discuss the working of conventional machine tools, machining processes, tools and accessories.
C115.6	Describe the advanced manufacturing systems.

**Course Title: Engineering Graphics****Course Code: 18EGDL15**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C225.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
C255.2	Produce computer generated drawings using CAD software.
C255.3	Use the knowledge of orthographic projections to represent engineering information / concepts and present the same in the form of drawings.
C255.4	Develop isometric drawings of simple objects reading the orthographic projections of those objects.
C255.5	Convert pictorial and isometric views of simple objects to orthographic views.

**Course Title: Elements of Mechanical Engineering****Course Code: 18ME25**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C225.1	Identify different sources of energy and their conversion process.
C225.2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.
C225.3	Recognize various metal joining processes and power transmission elements.
C225.4	Understand the properties of common engineering materials and their applications in engineering industry.
C225.5	Discuss the working of conventional machine tools, machining processes, tools and accessories.
C225.6	Describe the advanced manufacturing systems.

**Course Title: Engineering Mathematics-III****Course Code: 17MAT31**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C231.1	Know the use of periodic signals and Fourier series to analyse circuits and system communications.
C231.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.
C231.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
C231.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
C231.5	Determine the extremals of functional and solve the simple problems of the calculus of variations.

**Course Title: Material Science****Course Code: 17ME32**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C232.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
C232.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties.
C232.3	Explain the processes of heat treatment of various alloys.
C232.4	Understand the properties and potentialities of various materials available and material selection procedures.
C232.5	Know about composite materials and their processing as well as applications.

**Course Title: Basic Thermodynamics****Course Code: 17ME33**

<b>CO. No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
C233.1	Explain thermodynamic systems, properties, Zeroth law of thermodynamics, temperature scales and energy interactions.
C233.2	Determine heat, work, internal energy, enthalpy for flow & non-flow process using First and Second Law of Thermodynamics
C233.3	Interpret behavior of pure substances and its applications to practical problems.
C233.4	Determine change in internal energy, change in enthalpy and change in entropy using TD relations for ideal gases.
C233.5	Calculate Thermodynamics properties of real gases at all ranges of pressure, temperatures using modified equation of state including Vander Waals equation, Redlich Wong equation and Beattie-Bridgeman equation.

**Course Title: Mechanics of Materials****Course Code: 17ME34**

<b>CO. No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
C234.1	Understand simple, compound, thermal stresses and strains their relations, Poisson's ratio, Hooke's law, mechanical properties including elastic constants and their relations
C234.2	Determine stresses, strains and deformations in bars with varying circular and rectangular cross-sections subjected to normal and temperature loads
C234.3	Determine plane stress, principal stress, maximum shear stress and their orientations using analytical method and Mohr's circle
C234.4	Determine the dimensions of structural members including beams, bars and rods using Energy methods and also stress distribution in thick and thin cylinders
C234.5	Draw SFD and BMD for different beams including cantilever beams, simply supported beams and overhanging beams subjected to UDL, UVL, Point loads and couples
C234.6	Determine dimensions, bending stress, shear stress and its distribution in beams of circular, rectangular, symmetrical I and T sections subjected to point loads and UDL
C234.7	Determine slopes and deflections at various points on beams subjected to UDL, UVL, Point loads and couples
C234.8	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns using Rankin's and Euler's theory

**Course Title: Metal Casting And Welding****Course Code: 17ME35A**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C235.1	Describe the casting process, preparation of Green, Core, dry sand molds and Sweep, Shell, Investment and plaster molds.
C235.2	Explain the Pattern, Core, Gating, Riser system and Jolt, Squeeze, Sand Slinger Molding Machines.
C235.3	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces.
C235.4	Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
C235.5	Explain the Solidification process and Casting of Non-Ferrous Metals.
C235.6	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes used in manufacturing.
C235.7	Explain the Resistance spot, Seam, Butt , Projection, Friction, Explosive, Thermit, Laser and Electron Beam Special type of welding process used in manufacturing.
C235.8	Describe the Metallurgical aspects in Welding and inspection methods for the quality assurance of components made of casting and joining process.

**Course Title: Computer Aided Machine Drawing****Course Code: 17ME36A**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C236.1	Sections of pyramids, prisms, cubes, cones and cylinders resting on their bases in 2D
C236.2	Orthographic views of machine parts with and without sectioning in 2D.
C236.3	Sectional views for threads with terminologies of ISO Metric, BSW, square and acme, sellers and American standard threads in 2D.
C236.4	Hexagonal and square headed bolt and nut with washer, stud bolts with nut and lock nut, flanged nut, slotted nut, taper and split pin for locking counter sunk head screw, grub screw, Allen screw assemblies in 2D
C236.5	Parallel key, Taper key, and Woodruff Key as per the ISO standards in 2D
C236.6	Single and double riveted lap joints, butt joints with single/double cover straps, cotter and knuckle joint for two rods in 2D

C236.7	Sketch split muff, protected type flanged, pin type flexible, Oldham's and universal couplings in 2D
C236.8	Assemblies from the part drawings with limits ,fits and tolerance given for Plummer block, Ram bottom safety valve, I.C. Engine connecting rod, Screw Jack, Tailstock of lathe, Machine Vice and Lathe square tool post in 2D and 3D

**Course Title: Material Testing Lab**

**Course Code: 17MEL37A**

CO. No.	OUTCOMES
	After completing the course the student will be able to:
C237.1	Acquire experimentation skills in the field of material testing.
C237.2	Develop theoretical understanding of the mechanical properties of materials by performing experiments.
C237.3	Apply the knowledge to analyze a material failure and determine the failure inducing agent/s.
C237.4	Apply the knowledge of testing methods in related areas.
C237.5	Know how to improve structure/behavior of materials for various industrial applications.

**Course Title: Foundry And Forging Lab**

**Course Code: 17MEL38A**

CO. No.	OUTCOMES
	After completing the course the student will be able to:
C238.1	Demonstrate various skills of sand preparation, molding.
C238.2	Demonstrate various skills of forging operations.
C238.3	Work as a team keeping up ethical principles.

**Course Title: Engineering Mathematics-IV**

**Course Code: 17MAT41**

CO. No.	OUTCOMES
	After completing the course the student will be able to:
C241.1	Use appropriate numerical methods to solve first and second order ordinary differential equations.
C241.2	Use Bessel's and Legendre's function which often arises when a problem possesses axial and spherical symmetry, such as in quantum mechanics, electromagnetic theory, hydrodynamics and heat conduction.

C241.3	State and prove Cauchy's theorem and its consequences including Cauchy's integral formula, compute residues and apply the residue theorem to evaluate integrals.
C241.4	Analyze, interpret, and evaluate scientific hypotheses and theories using rigorous statistical methods.

**Course Title: Kinematics of Machines**

**Course Code: 17ME42**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C242.1	Identify mechanisms with basic understanding of motion.
C242.2	Comprehend motion analysis of planar mechanisms, gears, gear trains and cams.
C242.3	Carry out motion analysis of planar mechanisms, gears, gear trains and cams.

**Course Title: Applied Thermodynamics**

**Course Code: 17ME43**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C243.1	Apply thermodynamic concepts to analyze the performance of gas power cycles including propulsion systems.
C243.2	Evaluate the performance of steam turbine components.
C243.3	Understand combustion of fuels and combustion processes in I C engines including alternate fuels and pollution effect on environment.
C243.4	Apply thermodynamic concepts to analyze turbo machines.
C243.5	Determine performance parameters of refrigeration and air-conditioning systems.
C243.6	Understand the principles and applications of refrigeration systems.
C243.7	Analyze air-conditioning processes using the principles of psychometry and Evaluate cooling and heating loads in an air-conditioning system.
C243.8	Understand the working, applications, relevance of air and identify methods for performance improvement.

**Course Title: Fluid Mechanics****Course Code: 17ME44**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C244.1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.
C244.2	Understand and apply the principles of pressure, buoyancy and floatation
C244.3	Apply the knowledge of fluid statics, kinematics and dynamics while addressing problems of mechanical and chemical engineering.
C244.4	Understand and apply the principles of fluid kinematics and dynamics.
C244.5	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.
C244.6	Understand the basic concept of compressible flow and CFD

**Course Title: Machine Tools and Operations****Course Code: 17ME45B**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C245.1	Explain the construction & specification of various machine tools.
C245.2	Describe various machining processes pertaining to relative motions between tool & work piece.
C245.3	Discuss different cutting tool materials, tool nomenclature & surface finish.
C245.4	Apply mechanics of machining process to evaluate machining time.
C245.5	Analyze tool wear mechanisms and equations to enhance tool life and minimize machining cost.

**Course Title: Mechanical Measurements and Metrology****Course Code: 17ME46B**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C245.1	Understand the objectives of metrology, methods of measurement, selection of measuring instruments, standards of measurement and calibration of end bars.
C245.2	Describe slip gauges, wringing of slip gauges and building of slip gauges, angle measurement using sine bar, sine center, angle gauges, optical instruments and straightness measurement using Autocollimator.
C245.3	Understand the principle of Johnson Mikrokator, sigma comparator, dial indicator, LVDT, back pressure gauges, Solex comparators and Zeiss Ultra Optimeter
C245.4	Describe measurement of major diameter, minor diameter, pitch, angle and effective diameter of screw threads by 2 – wire, 3 – wire methods, screw thread gauges and tool maker’s microscope.

C245.5	Explain measurement of tooth thickness using constant chord method, addendum comparator methods and base tangent method, composite error using gear roll tester and measurement of pitch, concentricity, run out and involute profile.
C245.6	Understand laser interferometers and Coordinate measuring machines.
C245.7	Explain measurement systems, transducers, intermediate modifying devices and terminating devices.
C245.8	Describe functioning of force, torque, pressure, strain and temperature measuring devices.

**Course Title: Mechanical Measurements and Metrology Lab**

**Course Code: 17ME47B**

<b>OUTCOMES</b>	
<b>CO. No.</b>	After completing the course the student will be able to:
C247.1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
C247.2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
C247.3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats
C247.4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
C247.5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer.
C247.6	To measure surface roughness using Tally Surf/ Mechanical Comparator.

**Course Title: Machine Shop**

**Course Code: 17ME48B**

<b>OUTCOMES</b>	
<b>CO. No.</b>	After completing the course the student will be able to:
C248.1	Perform turning , facing , knurling , thread cutting, tapering , eccentric turning and allied operations
C248.2	Perform keyways / slots , grooves etc using shaper
C248.3	Perform gear tooth cutting using milling machine
C248.4	Understand the formation of cutting tool parameters of single point cutting tool using bench grinder / tool and cutter grinder
C248.5	Understand Surface Milling/Slot Milling
C248.6	Demonstrate precautions and safety norms followed in Machine Shop
C248.7	Exhibit interpersonal skills towards working in a team

**Course Title: Management and Engineering Economics****Course Code: 15ME51**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C351.1	Understand needs, functions, roles, scope and evolution of Management
C351.2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
C351.3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
C351.4	Select the best economic model from various available alternatives
C351.5	Understand various interest rate methods and implement the suitable one.
C351.6	Estimate various depreciation values of commodities
C351.7	Prepare the project reports effectively.

**Course Title: Dynamics of Machinery****Course Code: 15ME52**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C352.1	Determine the forces and couples for static and dynamic conditions of four bar and slider crank mechanisms to keep the system in equilibrium.
C352.2	Determine magnitude and angular position of balancing masses under static and dynamic condition of rotating masses in same and different planes.
C352.3	Determine unbalanced primary, secondary forces and couples in single and multi-cylinder engine.
C352.4	Determine sensitiveness, isochronism, effort and power of porter and hartnell governors.
C352.5	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aeroplanes.
C352.6	Understand types of vibration, SHM and methods of finding natural frequencies of simple mechanical systems.
C352.7	Determine equation of motion, natural frequency, damping factor, logarithmic decrement of damped free vibration (SDOF) systems.
C352.8	Determine the natural frequency, force and motion transmissibility of single degree freedom systems.
C352.9	Determine equation of motion of rotating and reciprocating unbalance systems, magnification factor, and transmissibility of forced vibration (SDOF)

**Course Title: Turbo Machines****Course Code: 15ME53**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C353.1	Able to give precise definition of turbomachinery
C353.2	Identify various types of turbo machinery
C353.3	Apply the Euler's equation for turbomachinery to analyse energy transfer in turbomachines
C353.4	Understand the principle of operation of pumps, fans, compressors and turbines.
C353.5	Perform the preliminary design of turbomachines (pumps, rotary compressors and turbines)
C353.6	Analyze the performance of turbo machinery.

**Course Title: Design of Machine Elements****Course Code: 15ME54**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C354.1	Describe the design process, choose materials.
C354.2	Apply the codes and standards in design process.
C354.3	Analyze the behavior of machine components under static, impact, fatigue loading using failure theories.
C354.4	Design shafts, joints, couplings.
C354.5	Design of riveted and welded joints.
C354.6	Design of threaded fasteners and power screws

**Course Title: Non Traditional Machining****Course Code: 15ME554**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3554.1	Understand the compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
C3554.2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
C3554.3	Identify the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
C3554.4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.

C3554.5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.
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**Course Title: Automation and Robotics**

**Course Code: 15ME563**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3563.1	Classify various types of automation & manufacturing systems
C3563.2	Discuss different robot configurations, motions, drive systems and its performance parameters.
C3563.3	Describe the basic concepts of control systems, feedback components, actuators and power transmission systems used in robots.
C3563.4	Explain the working of transducers, sensors and machine vision systems.
C3563.5	Discuss the future capabilities of sensors, mobility systems and Artificial Intelligence in the field of robotics.

**Course Title: Fluid Mechanics & Machinery Lab**

**Course Code: 15MEL57**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C357.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
C357.2	Conduct experiments on hydraulic turbines and pumps to draw characteristics.
C357.3	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
C357.4	Determine the energy flow pattern through the hydraulic turbines and pumps
C357.5	Exhibit his competency towards preventive maintenance of hydraulic machines

**Course Title: Energy Lab**

**Course Code: 15MEL58**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C358.1	Perform experiments to determine the properties of fuels and oils.
C358.2	Conduct experiments on engines and draw characteristics.
C358.3	Test basic performance parameters of I.C. Engine and implement the knowledge in industry.
C358.4	Identify exhaust emission, factors affecting them and report the remedies.
C358.5	Determine the energy flow pattern through the I C Engine
C358.6	Exhibit his competency towards preventive maintenance of IC engines.

**Course Title: Finite Element Analysis****Course Code: 15ME61**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C361.1	Understand the concepts behind formulation methods in FEM.
C361.2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
C361.3	Develop element characteristic equation and generation of global equation.
C361.4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems and solve them displacements, stress and strains induced.

**Course Title: Computer Integrated Manufacturing****Course Code: 15ME62**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C362.1	Able to define Automation, CIM, CAD, CAM and explain the differences between these concepts. Solve simple problems of transformations of entities on computer screen.
C362.2	Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines.
C362.3	Analyze the automated flow lines to reduce down time and enhance productivity
C362.4	Explain the use of different computer applications in manufacturing, and able to prepare part programs for simple jobs on CNC machine tools and robot programming.
C362.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing.

**Course Title: Heat Transfer****Course Code: 15ME63**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C363.1	Understand the basic modes of heat transfer.
C363.2	Compute temperature distribution in steady-state and unsteady-state heat conduction
C363.3	Understand and interpret heat transfer through extended surfaces.
C363.4	Interpret and compute forced and free convective heat transfer.

C363.5	Explain the principles of radiation heat transfer and understand the numerical formula for heat conduction problems.
C363.6	Design heat exchangers using LMTD and NTU methods.

**Course Title: Design of Machine Elements II**

**Course Code: 15ME64**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Apply engineering design tools to product design.
C364.2	Design mechanical systems involving springs, belts and pulleys.
C364.3	Design different types of gears and simple gear boxes for different applications.
C364.4	Design brakes and clutches.
C364.5	Design hydrodynamic bearings for different applications.
C364.6	Select Anti friction bearings for different applications using the manufacturers, catalogue.
C364.7	Develop proficiency to generate production drawings using CAD software.
C364.8	Become good design engineers through learning the art of working in a team

**Course Title: Metal Forming**

**Course Code: 15ME653**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3653.1	Able to understand the concept of different metal forming process.
C3653.2	Able to approach metal forming processes both analytically and numerically
C3653.3	Able to design metal forming processes
C3653.4	Able to develop approaches and solutions to analyze metal forming processes and the associated problems and flaws.

**Course Title: Automobile Engineering**

**Course Code: 15ME655**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3655.1	To identify the different parts of an automobile and it's working
C3655.2	To understand the working of transmission and braking systems
C3655.3	To comprehend the working of steering and suspension systems
C3655.4	To learn various types of fuels and injection systems
C3655.5	To know the cause of automobile emissions ,its effects on environment and methods to reduce the emissions.

**Course Title: Maintenance Engineering****Course Code: 15ME663**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3663.1	Understand maintenance objectives and evaluate various maintenance strategies for process plant application, Develop necessary planning and scheduling and control of preventive maintenance activities.
C3663.2	Evaluate reliability of a simple plant component and system.
C3663.3	Understand and apply the advanced concepts such as RCM and advantages for a company employing them
C3663.4	Understand and apply the advanced concepts such as TPM and advantages for a company employing
C3663.5	Apply the principles of condition monitoring systems.
C3663.6	Apply the mechanical condition monitoring techniques and analyze the data used in condition monitoring

**Course Title: Total Quality Management****Course Code: 15ME664**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C3664.1	Understand various approaches to TQM
C3664.2	Understand the characteristics of quality leader and his role.
C3664.3	Develop feedback and suggestion systems for quality management.
C3664.4	Enhance the knowledge in Tools and Techniques of quality management

**Course Title: Heat Transfer Lab****Course Code: 15MEL67**

<b>CO. No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C367.1	Perform experiments to determine the thermal conductivity of a metal rod
C367.2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
C367.3	Estimate the effective thermal resistance in composite slabs and efficiency in pin-fin
C367.4	Determine surface emissivity of a test plate
C367.5	Estimate performance of a refrigerator and effectiveness of fin
C367.6	Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

**Course Title: Modelling and Analysis Lab****Course Code: 15MEL68**

<b>CO. No.</b>	<b>OUTCOMES</b>
C368.1	After completing the course the student will be able to: To acquire basic understanding of Modelling and Analysis software
C368.2	To understand the different kinds of analysis and apply the basic principles to find out the stress and other related parameters of bars, beams loaded with loading conditions.
C368.3	To learn to apply the basic principles to carry out dynamic analysis to know the natural frequency of different kind of beams.
C368.4	Calculate temperature distribution of steady and transient heat conduction through plane wall, cylinder and fin using numerical approach.



# AMC ENGINEERING COLLEGE

DEPARTMENT Of ELECTRICAL AND ELECTRONICS  
ENGINEERING

## STATEMENTS

### **PROGRAM OUTCOMES (PO)**

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Graduate will be able to apply the knowledge acquired from strong fundamentals of Mathematics, Science and Engineering Subjects to identify, formulate, design and investigate complex Engineering Problems of Electrical Electronics to pursue successful career/higher studies.
PSO2	Be a professional to apply appropriate technique and Modern Engineering Software tools to design and develop Electrical Systems also engage in lifelong learning and successfully acquire leadership qualities, communication skills, and Ethical attitude, achieve competence to excel individually, work efficiently in team and become entrepreneur.

**Course Title: BASIC ELECTRICAL ENGINEERING      Course Code: 18ELE13/18ELE23**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C113.1	Analyse D.C and A.C circuits
C113.2	Explain the principle of operation and construction of single phase transformers
C113.3	Explain the principle of operation and construction of DC machines and synchronous machines.
C113.4	Explain the principle of operation and construction of three phase induction motors.
C113.5	Discuss concepts of electrical wiring, circuit protecting devices and earthing

**Course Title: BASIC ELECTRICAL ENGG LAB      Course Code: 18ELEL17/18ELEL27**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C117.1	To provide exposure to common electrical equipment's such as resistors, inductors and capacitors , type of wires and measuring instruments.
C117.2	To measure power and power factor measurements of different types of lamps and three phase circuits.
C117.3	To measure impedances of R-L and R-C circuits.
C117.4	To determine power consumed in three phase loads.
C117.5	To determine earth resistance and methods of controlling a lamps from different positions

**Course Title: Electric Circuit Analysis (Core)**

**Course Code: 17EE32**

<b>CO.No.</b>	<b>OUTCOMES</b>
C232.1	After completing the course the student will be able to: Apply Knowledge of mathematics, science and engineering to the analysis and design of electrical circuits.

C232.2	Identify ,formulate and solve engineering problems in the area circuits and systems
C232.3	Ability to analyze the transient response of circuits with dc and sinusoidal ac input.
C232.4	Apply the basic knowledge on network analysis using Laplace transforms.
C232.5	Analyze three phase systems and two port networks.

**Course Title: Transformers and Generators (Core)****Course Code: 17EE33**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C233.1	Explain the construction and operation and performance of single phase and threephase transformers
C233.2	Explain the use of auto transformer, tap changing and tertiary winding transformer and need of operating transformers in parallel
C233.3	Explain the armature reaction and commutation and their effects in a DC generators
C233.4	Explain the construction, operation and performance of Synchronous machines
C233.5	To explain the requirement for the parallel operation of transformers and synchronous generators

**Course Title: Analog Electronic Circuits****Course Code: 17EE34**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C234.1	Design & analyze diode circuits & various biasing circuits for transistor
C234.2	Design & analyze of transistor at low and high frequencies
C234.3	Design, analyze and test transistor circuitry as multistage & feedback amplifiers
C234.4	Design, analyze and test transistor circuitry as Power amplifiers and Oscillators
C234.5	Design & analyze various biasing circuits for MOSFET and JFET

**Course Title: Digital System Design**

**Course Code: 17EE35**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C235.1	Understand and Analyze combinational and sequential circuits
C235.2	Design circuits like adder, subtractor, code converter etc
C235.3	Design counters and sequence generator
C235.4	Construct the state diagrams
C235.5	Understand and Apply HDL

**Course Title: Electrical and Electronic Measurements    Course Code: 17EE36**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C236.1	Measure resistance, inductance and capacitance using bridges and determine earth resistance.
C236.2	Explain the working of various meters used for measurement of Power & Energy
C236.3	Understand the adjustments, calibration & errors in energy meters and measurement of magnetic devices
C236.4	Explain the working of different electronic instruments.
C236.5	Explain the working of different display devices and recording mechanisms.

**Course Title: Electrical Machines Laboratory -1**

**Course Code: 17EEL37**

<b>CO.No.</b>	<b>OUTCOMES</b>
C237.1	After completing the course the student will be able to: Evaluate the performance of transformers from the test data obtained.

C237.2	Connect and operate two single phase transformers of different KVA rating in parallel.
C237.3	Connect single phase transformers for three phase operation and phase conversion.
C237.4	Compute the voltage regulation of synchronous generator using the test data obtained in the laboratory.
C237.5	Evaluate the performance of synchronous generators from the test data

**Course Title: Electronics Laboratory**

**Course Code: 17EEL38**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C238.1	Design and test rectifier circuits with and without capacitor filters.
C238.2	Determine h-parameter models of transistor for all modes.
C238.3	Design and test BJT and FET amplifier and oscillator circuits.
C238.4	Realize Boolean expressions, adders and subtractors using gates.
C238.5	Design and test Ring counter/Johnson counter, Sequence generator and 3 bit counters.

**Course Title: Power Generation and Economics**

**Course Code: 17EE42**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C242.1	Describe the working of hydroelectric, steam, nuclear power plants and s
C242.2	Classify and explain the various substations and explain the importance of grounding.
C242.3	Understand the economic aspects of power system operation and its effects.
C242.4	Explain the importance of power factor improvement.
C242.5	Describe state functions of major equipment of the power plants

**Course Title: Transmission and Distribution****Course Code: 17EE43**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C243.1	Understand the concepts of General layout of Power System with standard voltage and effect of Corona Loss.
C243.2	Construct structures of Over Head Transmission lines & Calculate the Sag.
C243.3	Evaluate the potential distribution over a string of suspension insulators and string Efficiency.
C243.4	Calculate the parameters of the transmission line for different configurations.
C243.5	Analyze the performance of the transmission line and study the use of Underground cables and distribution systems.

**Course Title: Electric Motors Course Code: 17EE44**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C244.1	Understand the types and Constructional features of Motors, select a suitable motor for specific application
C244.2	To conduct suitable tests and control the speed of motors by suitable methods
C244.3	Solve the problems on AC and DC motors
C244.4	Analyze the performance characteristics of motors
C244.5	Evaluate the different parameters of motors with respect to variables

**Course Title: Electromagnetic Field Theory**

**Course Code: 17EE45**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C245.1	Use different coordinate systems to explain the concept of gradient, divergence and curl of a vector
C245.2	Use Coulomb's Law and Gauss Law for the evaluation of electric fields produced by different charge configurations.
C245.3	Calculate the energy and potential due to a system of charges and explain the behavior of electric field across a boundary between conductor and dielectrics.
C245.4	Explain the behavior of magnetic fields and magnetic materials.
C245.5	Assess time varying fields and propagation of waves in different media.

**Course Title: Operational Amplifiers and Linear ICs**

**Course Code: 17EE46**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C246.1	The ability to understand the basics of Linear ICs such as op amps, regulators and timers
C246.2	The ability to analyze the amplifier as filters and regulators
C246.3	The ability to determine various signal generation and analysis of comparators, converters using IC
C246.4	The ability to Analyze various circuits for signal processing and converters
C246.5	The ability to Make use of ICs in hardware project applications such as phase locked loop and Timers

**Course Title: Electrical Machines Laboratory -2    Course Code: 17EEL47**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C247.1	Test dc machines to determine their characteristics
C247.2	Pre-determine the performance characteristics of dc machines by conducting suitable tests.
C247.3	Perform load test on single phase and three phase induction motor to assess its performance.
C247.4	Conduct test on induction motor to pre-determine the performance characteristics
C247.5	Conduct test on synchronous motor to draw the performance curves

**Course Title: Op- amp and Linear ICs Laboratory                      Course Code: 17EEL48**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C248.1	Conduct experiment to determine the characteristic parameters and frequency response of OP-Amp.
C248.2	Design the OP-Amp as Amplifier, adder, subtractor, differentiator and integrator.
C248.3	Design the OP-Amp as Rectifier, Converters, oscillators and filters.
C248.4	Design the multivibrator and Voltage regulator for power supplies.
C248.5	Design the function generator.

**Course Title: Management and Entrepreneurship**

**Course Code: 15EE51**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C351.1	Explain the field of management ,task of the manager, planning and decision making
C351.2	Discuss work allocation, the structure of organization, the modes of communication and importance of managerial control in business and to explain the need of coordination between the manager and staff in exercising the authority and delegating duties.
C351.3	To explain the social responsibility of business and leadership, the concepts of entrepreneurship and the role and importance of the entrepreneur in economic development.
C351.4	An understanding of the role and importance of Small Scale Industries, business plan and its presentation..
C351.5	Discuss the concepts of project management, capitol building process, project feasibility study, project appraisal and project financing, the state /central level institutions / agencies supporting business enterprises.

**Course Title: Microcontroller**

**Course Code: 15EE52**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C352.1	Explain internal architecture of 8051, classify 8051 addressing modes, accessing data and I/O port programming and various programs
C352.2	Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and data serialization
C352.3	Classify the real-world devices such as LCDs and keyboards, ADC, DAC chips and sensors by interfacing programming
C352.4	Classify the interrupts and write interrupt handler programs
C352.5	Discuss the hardware connection of the 8051 chip, its timers, serial data

	communication, interrupts and its interfacing of 8051 to the RS232
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**Course Title: Power Electronics**

**Course Code: 15EE53**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C353.1	The ability to define, understand the characteristics and applications of power semiconductor devices and its electromagnetic compatibility.
C353.2	The ability to Classify the operation and performance of choppers.
C353.3	The ability to Distinguish the commutation techniques and AC voltage controllers operating at different loads.
C353.4	The ability to Evaluate the various types of Three phase and single phase converters.
C353.5	The ability to Design and Analyze the circuits of Power transistors and Thyristors.

**Course Title: Signals and Systems**

**Course Code: 15EE54**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C354.1	Classify and explain the signals and systems, basic operations on signals and properties of systems
C354.2	Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system.
C354.3	Evaluate response of a given linear time invariant system with block diagram representation.
C354.4	Apply continuous and discrete time Fourier transform representation to study signals and linear time invariant systems, properties and applications of DTFT, solution of differential equations.
C354.5	Use Z-transform and properties of Z transform for the analysis of discrete time systems.

**Course Title: Estimating and Costing**

**Course Code: 15EE553**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C355.1	Make use of market survey for preparation of tenders and comparative statements.
C355.2	Categorize different types of connections to adopt a suitable method of installation.
C355.3	Estimate lighting points, total load and its sub-circuits.
C355.4	Discuss the main components of a substation
C355.5	Discuss the preparation of single line diagram.

**Course Title: Renewable Energy Systems**

**Course Code: 15EE563**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C356.1	Explain Energy sources, its classification, conservation and Indian Energy Scenario(Analyze)
C356.2	Discuss Solar energy basics, Solar thermal systems and Solar electric systems energystorage(Understand)
C356.3	Discuss Wind Energy, its classification and Wind Energy Scenario(Understand)
C356.4	Discuss Biomass energy and Tidal energy and their programs in India(Understand)
C356.5	Describe the Emerging technologies (Understand)

**Course Title: Microcontroller Laboratory**

**Course Code: 15EEL57**

<b>CO.No.</b>	<b>OUTCOMES</b>
C357.1	After completing the course the student will be able to: Understand and apply the fundamentals of assembly level programming of
	microcontroller
C357.2	Write ALP for data transfer and arithmetic operations
C357.3	Identify the code conversion and debug the programs
C357.4	Perform the interfacing of stepper motor and control of D C Motor
C357.5	Generate different waveforms using DAC interface

**Course Title: Power Electronics Laboratory****Course Code: 15EEL58**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C358.1	Obtain static characteristics of semiconductor devices to discuss their performance
C358.2	Verify the performance of single phase controlled full wave rectifier and AC voltagecontroller with R and RL loads
C358.3	Verify the performance of single phase controlled full wave rectifier and AC voltagecontroller with R and RL loads.
C358.4	Control the speed of a dc motor, universal motor and stepper motors.
C358.5	Verify the performance of single phase full bridge inverter connected to resistive load.

**Course Title: Control Systems****Course Code: 15EE61**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C361.1	Discuss the effects of feedback and types of feedback control systems. Demonstrate theknowledge of mathematical modeling of control systems and components. Evaluate the transferfunction of a linear time invariant system
C361.2	Apply block diagram manipulation and signal flow graph methods to obtain transferfunction of systems.

C361.3	Evaluate the stability of linear time invariant systems. Determine transient and steadystate time response of a simple control system
C361.4	Investigate the performance of a given system in time and frequency domains. Discuss stability analysis using Root locus, Bode plots and Nyquist plots.
C361.5	Discuss stability analysis using Nyquist plots. Determine the controller or compensator configuration and parameter values relative to how it is connected to the controlled process given the design specifications

**Course Title: Power System Analysis – 1**

**Course Code: 15EE62**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C362.1	Understand the concept of per unit system, one line diagram and its implementation in problems.
C362.2	Derive the equations for short circuit analysis, stability on a synchronous machine, equal area criterion for the evaluation of stability of a simple system under different fault conditions.
C362.3	Evaluate symmetrical components of voltages and currents in un-balanced three phase circuits.
C362.4	Apply the concept of sequence impedance and sequence networks of power system in applications of power systems.
C362.5	Analyze three phase synchronous machine and simple power systems for different unsymmetrical faults using symmetrical components.

**Course Title: Digital Signal Processing**

**Course Code: 15EE63**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C363.1	Compute the DFT and FFT of various signals using properties and linear filtering.
C363.2	Apply fast and efficient algorithm for computing DFT and IDFT of a given sequence.
C363.3	Design the impulse response Butterworth and Chebyshev analog filters using impulseinvariant/bilinear transformation.
C363.4	Design of digital filter and Realizing digital IIR and FIR filter by direct, cascade, parallelmethod.
C363.5	Design of FIR filter using various windowing/frequency response technique.

**Course Title: Electrical Machine Design**

**Course Code: 15EE64**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C364.1	Analyze specifications, design factors, limitations, and materials used in electricalmachines.
C364.2	Develop the output equation of a given electrical machine to obtain the maindimensions and power rating.
C364.3	Analyze the choice of specific electric and magnetic loadings of a given electricalmachine.
C364.4	Design the requirements of the machine, data of conductors and insulation in view ofspecification.
C364.5	Construct an electrical machine and allowance required for the effective design of themachine.

**Course Title: Computer Aided Electrical Drawing****Course Code: 15EE651**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C365.1	Design and develop single line diagram of a given generating station or distribution substation using Auto cad tool.(Create)
C365.2	Design and develop the dc winding diagram for a given data,using auto cad tool.(Create)
C365.3	Design and develop the Ac winding diagram for a given data,using auto cad tool(Create)
C365.4	Design the single phase/3 phase transformer using auto cad tool.(Create)
C365.5	Develop the assembly diagram of AC/DC machines by indentifying the various parts & analyzing the data using auto cad tool.(Create)

**Course Title: Sensors and Transducers****Course Code: 15EE662**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C366.1	The ability to List the need of transducers and their classification
C366.2	The ability to Outline the working of different types of transducers and sensors
C366.3	The ability to interpret the configuration of data acquisition system and various signal conditioning equipment
C366.4	The ability to Summarize the basics of Data transmission and telemetry
C366.5	The ability to Classify measurement of various non-electrical quantities

**Course Title: Control System Laboratory**

**Course Code: 15EEL67**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C367.1	Use software package or discrete components in assessing the time and frequency domain responses of a given second order system.
C367.2	Design and analyze Lead, Lag and Lag – Lead compensators for given specifications.
C367.3	Determine the performance characteristics of ac and dc servomotors and synchro-transmitter receiver pair used in control systems.
C367.4	Simulate the DC position and feedback control system to study the effect of P, PI, PD and PID controller and Lead compensator on the step response of the system.
C367.5	Write a script files to plot root locus, Bode plot, Nyquist plots to study the stability of the system using a software package.

**Course Title: Digital Signal Processing Laboratory**

**Course Code:**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C368.1	Analyze the sampling theorem and the solution of difference equation and impulse response of a system
C368.2	Analyze the performance of convolution of a given sequences
C368.3	Analyze the computation of DFT and IDFT of a given sequence
C368.4	Design the IIR filters for the given specifications
C368.5	Design of FIR filters for the given specifications

**Course Title: Power System Analysis - 2      Course Code: 15EE71**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C471.1	Formulate network matrices and models for solving load flow problems.
C471.2	Perform steady state power flow analysis of power systems using numerical iterative techniques.
C471.3	Discuss optimal scheduling for hydro-thermal system, power system security and reliability.
C471.4	Analyze short circuit faults in power system networks using bus impedance matrix.
C471.5	Perform numerical solution of swing equation for multi-machine stability

**Course Title: Power System Protection      Course Code: 15EE72**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C472.1	Explain the basics of power system protection, construction and working principles of Relay.
C472.2	Analyze the Over Current and Distance Protection.
C472.3	Explain the pilot protection, Differential Protection and Protection for Generators, Transformers and Bus zone protection.
C472.4	Explain the principle of circuit interruption in different types of circuit breakers.
C472.5	Analyze the Over Voltage Protection and fuses and also explain about the Gas Insulated Substation (GIS).

**Course Title: High Voltage Engineering**

**Course Code: 15EE73**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C473.1	The ability to Summarize the need for generation of high voltages and classify their applications
C473.2	The ability to Obtain voltage regulation, ripple for Impulse, HVAC and HVDC generation
C473.3	The ability to Explain high voltage testing techniques of Power apparatus and Insulation coordination in Power systems
C473.4	The ability to Distinguish the breakdown phenomena in various di-electric medium
C473.5	The ability to Evaluate the methods for the measurement of High voltages

**Course Title: Utilization of Electrical Power**

**Course Code: 15EE742**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C474.1	Explain the types of heating/ welding scheme for a given application and electrolytic processes.
C474.2	Explain and discuss the maintain/ Trouble shoot of various lamps and fittings in use.
C474.3	Explain the different schemes of traction schemes and its main components.
C474.4	Discuss a suitable scheme of speed control for the traction systems.
C474.5	Discuss the concepts of braking systems and also different types of vehicles and their performance.

**Course Title: Testing and Commissioning of Power System Course Code: 15EE752**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C475.1	describe the process to plan, control and implement commissioning of electrical equipments
C475.2	differentiate the performance specifications of transformer and induction motor
C475.3	demonstrate the routine tests for synchronous machine, induction motor, transformer and switchgears
C475.4	describe corrective and preventive maintenance of electrical equipments
C475.5	explain the operation of an electrical equipment such as isolators, circuit breakers, induction motor and synchronous machine

**Course Title: Power system Simulation Laboratory**

**Course Code: 15EEL76**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C476.1	Develop a program in MATLAB to assess the performance of medium and long transmission lines.
C476.2	Develop a program in MATLAB to obtain the power angle characteristics of salient and non-salient pole alternator.
C476.3	Develop a program in MATLAB to assess the transient stability under three phase fault at different locations in a radial power systems.
C476.4	Develop programs in MATLAB to formulate bus admittance and bus impedance matrices of interconnected power systems.
C476.5	Use Mi-Power package to solve power flow problem for simple power systems & optimal generation scheduling problems for thermal power plants

**Course Title: Relay and High Voltage Laboratory**

**Course Code: 15EEL77**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C477.1	Conduct experiment to determine the characteristics of negative sequence relay
C477.2	Able to Conduct experiment to determine the characteristics of over voltage, overcurrent relay
C477.3	Able to Conduct experiment to determine the characteristics of electromagnetic and numerical relay
C477.4	Able to Conduct experiment to determine the characteristics of uniform field gap
C477.5	Able to Conduct experiment to determine the characteristics of non-uniform field gap and motor protection

**Course Title: Project Phase – I + Seminar**

**Course Code: 15EEP78**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C478.1	Able to generate ,develop idea and information to carry out project work
C478.2	Able to Identify a real-life problems and adapt skills to communicate effectively
C478.3	Able to adapt collaborative skills to work in team
C478.4	Able to Implement a tangible solution using available resources
C478.5	Able to Analyze and interpret data and suggest a solution

**Course Title: Power System Operation and Control**

**Course Code: 15EE81**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C481.1	Explain and evaluate the problems on Area control error, Tie- line and frequency deviation, Parallel operation of generators.
C481.2	Explain Automatic voltage regulator- frequency control and able to design Turbine and Automatic controller.
C481.3	Express the importance of reactive power control by solving problems and evaluate the Unit commitment problems.
C481.4	Explain the operation of thermal plant, IPC, losses in the transmission line and B-coefficients.
C481.5	Explain the power system security and Power system contingency analysis.

**Course Title: Industrial Drives and Applications**

**Course Code: 15EE82**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C482.1	Understand the basic knowledge of Industrial Drives, design, characteristics, selection and its requirements.
C482.2	Develop an electrical drive and can be able to study the transient and steady state analysis of AC & DC drives.
C482.3	Identify various converter drives based on motor power rating and thermal models.
C482.4	Analyze different methods of starting and braking mechanisms applied in electric drives.
C482.5	Judge the safety and operational requirements of Industrial mills to identify the technical requirements for a suitable drive.

**Course Title: Integration of Distributed Generation**

**Course Code: 15EE833**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C483.1	Explain energy generation by wind power and solar power and discuss the variation in production capacity at different timescales, the size of units, and the locations with respect to of wind and solar systems.
C483.2	Explain the performance of the system when distributed generation is integrated to the system.
C483.3	Discuss the impact the integration of DG on Voltage magnitude variations.
C483.4	Discuss the impact of DG on Power quality disturbances.
C483.5	Discuss the impact the integration of DG on power system stability and operation.

**Course Title: Internship / Professional Practice**

**Course Code: 15EE84**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C484.1	Able to generate ,develop idea and information to carry out work
C484.2	Able to Identify a real-life problems
C484.3	Able to adapt skills to communicate effectively
C484.4	Able to adapt collaborative skills to work in team
C484.5	Able to Analyze and Implement a tangible solution using available resources

**Course Title: Project Work Phase -II Course Code: 15EEP85**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C485.1	Able to generate ,develop idea and information to carry out project work
C485.2	Able to Identify a real-life problems and adapt skills to communicate effectively
C485.3	Able to adapt collaborative skills to work in team
C485.4	Able to Implement a tangible solution using available resources
C485.5	Able to Analyze and interpret data and suggest a solution

**Course Title: Seminar Course Code: 15EES86**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C486.1	Develop self-learning skills
C486.2	Develop communication skills and interpersonal Skills
C486.3	Develop their ethics and social awareness.
C486.4	Expose their knowledge to latest technologies and leadership abilities.
C486.5	Acquire the knowledge of modern tools.



# AMC ENGINEERING COLLEGE

## MTECH IN POWER SYSTEM ENGINEERING

### STATEMENTS

#### PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Graduate will be able to apply the knowledge acquired from strong fundamentals of mathematics, science and engineering subjects to identify, formulate, design and investigate complex engineering problems of electrical and electronics to pursue successful carrier/higher studies.
PSO2	Be a professional to apply appropriate techniques and modern engineering software tools to design and develop Electrical systems, also engage in lifelong learning and successfully acquire leadership qualities, communication skills, ethical attitudes, achieve competence excel individually, work efficiently in team and become entrepreneur.

**Course Title: MODELLING AND ANALYSIS OF ELECTRICAL MACHINES**

**Course**

**Code: 16EPS12**

<b>CO. No.</b>	<b>After completing the course the student will be able to:</b>
C112.1	Explain the basic concepts of modeling. Develop mathematical models for DC motors for transient state analysis.
C112.2	Use reference frame theory to transform three phase to two phase. Develop dynamic model for three phase induction motor in stator and rotor reference frames.
C112.3	Develop mathematical model of single phase transformers.
C112.4	Model synchronous machine using Park's transformation for the analysis of steady state operation.
C112.5	Model synchronous machine to perform dynamic analysis under different conditions.

**Course Title: POWER SYSTEM DYNAMICS (STABILITY AND CONTROL)**

**Course Code: 16EPS13**

<b>CO NO</b>	<b>After completing the course the student will be able to:</b>
C113.1	Explain states of operation, system security and dynamic problems Use model of power system to assess system stability
C113.2	Model synchronous machine transmission line and loads.
C113.3	Model excitation and prime mover's systems and static var systems. Use model to study the dynamics of a synchronous generator connected to infinite bus.
C113.4	Use models to analyze the single machine system connected to infinite bus. Discuss the use of power system stabilizers
C113.5	Use models of the multi machine system for the transient stability analysis.

**Course Title: COMPUTER RELAYING FOR POWER SYSTEMS**

**Course Code: 16EPS14**

CO NO	After completing the course the student will be able to:
C114.1	Explain advantages of computer relaying, its architecture and relaying practices used in power system.
C114.2	Provide mathematical basis for protective relaying algorithms. Explain digital filters used in computer relaying.
C114.3	Discuss transmission line relaying. Explain protection transformers, machines and buses
C114.4	Explain hardware organization for computer relaying, system relaying.
C114.5	Explain relaying applications for travelling waves. Explain adaptive relaying and WAMS based protection.

**Course Title: POWER SYSTEM HARMONICS**

**Course Code: 16EPS15**

CO NO	After completing the course the student will be able to:
C115.1	Explain the fundamental of harmonics
C115.2	Discuss the sources of harmonics in the power system
C115.3	Explain the effects of harmonic distortion on power system
C115.4	Explain the mitigation of harmonics in power system and the limits of harmonic distortion
C115.5	Model generator and transformers for harmonic studies. Model transmission system; transmission lines and cables for harmonic studies

**Course Title: POWER SYSTEMS LABORATORY-1**

**Course Code: 16EPSL16**

CO NO	After completing the course the student will be able to:
C116.1	Apply the knowledge of electrical engineering in conducting different experiment in the laboratory.
C116.2	Use suitable simulation software package for the conduction of experiments and analyze the results.

**Course Title: SEMINAR**

**Course Code: 16EPS17**

CO NO	After completing the course the student will be able to:
C117.1	The students are able to develop communication skills and interpersonal skills
C117.2	The students are able to have exposure to latest techno.
C117.3	The students are able to develop self-learning skills.
C117.4	The students are able to acquire leadership abilities, ethics and social awareness.
C117.5	The students are able to acquire the knowledge of modern tools

**Course Title: POWER ELECTRONIC CONVERTERS**

**Course Code: 16EPS21**

CO NO	After completing the course the student will be able to:
C121.1	Explain the basic topology and analysis of PWM DC/ DC in both Continuous (CCM) and Discontinuous Current Mode (DCM).Discuss on loss mechanisms in the PWM DC/ DC converters.
C121.2	Describes circuits used to control power electronic systems, and their application. Explain analysis and control techniques of single-phase and three phase bridge DC/AC Converters
C121.3	Explain the operation, analysis and control techniques of uncontrolled, phase controlled and high power factor PWM AC/DC Converters. Describes single-phase and three-phase AC/AC voltage converters, direct and indirect frequency converters and matrix converters and their applications
C121.4	Describes different topologies of Resonant Converters and some control circuits used in resonant converters.
C121.5	Explain basic topologies of DC/DC and DC/AC multilevel converters and control techniques used.

**Course Title: INSULATORS FOR POWER SYSTEM**

**Course Code: 16EPS22**

CO NO	After completing the course the student will be able to:
C122.1	Define insulator and its terminology. Explain the classification and stresses on insulators
C122.2	Explain designing, manufacturing and testing standards of insulators.
C122.3	Suggest an insulator for a particular voltage. Explain physics of contamination and pollution flashover.
C122.4	Explain terminology of ice, its electrical characteristics, flashover process and icing test methods.
C122.5	Conduct tests on insulators.

**Course Title: SWITCHING IN POWER SYSTEMS**

**Course Code: 16EPS23**

CO NO	After completing the course the student will be able to:
C123.1	Explain switching, the phenomena governing the switching process, the switching arc and the transient recovery voltage (TRV). Discuss faults in power systems and the switching of fault currents
C123.2	Explain switching of loads, overhead lines, capacitor banks and shunt reactors operated under normal condition
C123.3	Calculate the switching transients. Explain the switching processes in gaseous media.
C123.4	Discuss different circuit-breakers. Discuss the switching in vacuum circuit breaker
C123.5	Explain special switching situations, the appropriate devices used and the switching over voltages in systems and their mitigation.

**Course Title: FACTS CONTROLLERS**

**Course Code: 16EPS24**

CO NO	After completing the course the student will be able to:
C124.1	Discuss the growth of complex electrical power networks, the lack of controllability of the active- and reactive-power flows in energized networks.
C124.2	Describe the conventional controlled systems and the basic operating principles of FACTS.
C124.3	Describe the various components of a general SVC, its control system, control characteristics and the design of the SVC voltage regulator. Explain the use of SVC in stability enhancement, damping sub synchronous oscillations, improvement of HVDC link performance
C124.4	Explain the concepts of series compensation, TCSC controller and its operation, characteristics, modeling and applications.
C124.5	Explain the operation of voltage source converter based FACTS

**Course Title: POWER QUALITY PROBLEMS AND MITIGATION**

**Course Code: 16EPS25**

CO NO	After completing the course the student will be able to:
C125.1	Explain causes, effects of PQ problems and classification of mitigation techniques for PQ problems. Explain PQ standards, terminology and monitoring requirements through numerical problems. Explain passive shunt and series compensation using lossless passive components.
C125.2	Explain the design, operation and modeling of active shunt compensation equipment.
C125.3	Explain the design, operation and modeling of active series compensation equipment.
C125.4	Explain the design operation and modeling of unified power quality compensators.
C125.5	Discuss mitigation of power quality problems due to nonlinear loads.

**Course Title: POWER SYSTEM LABORATORY - 2**

**Course Code: 18EPSL26**

CO NO	After completing the course the student will be able to:
C126.1	Model a power system to perform transient stability and small signal stability studies.
C126.2	Model automatic voltage regulator and governor to study their effect on stability.
C126.3	Explain dynamic var compensation, capacitor bank switching studies, voltage control and inrush current.
C126.4	Model the transmission line, lightning impulse and surge arrestor, CT and CVT using EMTP for transient analysis
C126.5	Model the circuit breaker to study the current chopping and suppression of over voltage using surge arrestor and RC network.

**Course Title: TECHHNICAL SEMINAR**

**Course Code: 18EPS27**

CO NO	After completing the course the student will be able to:
C127.1	Choose, preferably, a recent topic of his/her interest relevant to the Course of Specialization. Carryout literature survey, organize the Course topics in a systematic order.
C127.2	Prepare the report with own sentences.
C127.3	Type the matter to acquaint with the use of Micro-soft equation and drawing tools or any such facilities.
C127.4	Present the seminar topic orally and/or through power point slides.
C127.5	Answer the queries and involve in debate/discussion. Submit two copies of the typed report with a list of references.

**Course Title: Internship / Professional Practice****Course Code: 16EPS31**

CO NO	After completing the course the student will be able to:
C231.1	Able to generate ,develop idea and information to carry out work
C231.2	Able to Identify a real-life problems
C231.3	Able to adapt skills to communicate effectively
C231.4	Able to adapt collaborative skills to work in team
C231.5	Able to Analyze and Implement a tangible solution using available resources

**Course Title: Report on Internship****Course Code: 16EPS32**

CO NO	After completing the course the student will be able to:
C232.1	Gain practical experience within industry in which the internship is done. Acquire knowledge of the industry in which the internship is done
C232.2	Apply knowledge and skills learned to classroom work. Develop a greater understanding about career options while more clearly defining personal career goals.
C232.3	Experience the activities and functions of professionals. Develop and refine oral and written communication skills.
C232.4	Identify areas for future knowledge and skill development. Expand intellectual capacity, credibility, judgment, intuition
C232.5	Acquire the knowledge of administration, marketing, finance and economics.

**Course Title: Evaluation and Viva-Voce of Internship  
16EPS33****Course Code:**

CO NO	After completing the course the student will be able to:
C233.1	To put theory into practice.
C233.2	To expand thinking and broaden the knowledge and skills acquired through course work in the field
C233.3	To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.
C233.4	To identify personal strengths and weaknesses.

C233.5	To develop the initiative and motivation to be a self-starter and work independently.
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**Course Title: Evaluation of Project phase -1**

**Course Code: 16EPS34**

CO NO	After completing the course the student will be able to:
C234.1	Able to generate ,develop idea and information to carry out project work
C234.2	Able to Identify a real-life problems and adapt skills to communicate effectively
C234.3	Able to adapt collaborative skills to work in team
C234.4	Able to Implement a tangible solution using available resources
C234.5	Able to analyze and interpret data and suggest a solution

**Course Title: HVDC POWER TRANSMISSION**

**Course Code: 16EPS41**

CO NO	After completing the course the student will be able to:
C241.1	Explain importance of DC power transmission.
C241.2	Describe the basic components of a converter, the methods for compensating the reactive power demanded by the converter
C241.3	Explain the methods for simulation of HVDC systems and its control. Describe filters for eliminating harmonics and the characteristics of the system impedance resulting from AC filter designs
C241.4	Explain the design techniques for the main components of an HVDC system.
C241.5	Explain the protection of HVDC system and other converter configurations used for the HVDC transmission. Explain the recent trends for HVDC applications

**Course Title: POWER SYSTEM RELIABILITY**

**Course Code: 16EPS42**

CO NO	After completing the course the student will be able to:
C242.1	Define terminology of reliability. Explain probability concepts for generating capacity reliability evaluation
C242.2	Explain various concepts and evaluation techniques that can be used to assess operational risk
C242.3	Evaluate composite system reliability
C242.4	Evaluate the reliability of complex distribution systems.
C242.5	Perform power system analysis including different aspects such as need, availability, adequacy

**Course Title: PROJECT WORK PHASE – 2**

**Course Code: 16EPS44**

CO NO	After completing the course the student will be able to:
C243.1	Support independent learning. Guide to select and utilize adequate information from varied resources maintaining ethics.
C243.2	Guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly. Develop interactive, communication, organization, time management, and presentation skills.
C243.3	Impart flexibility and adaptability. Inspire independent and team working
C243.4	Expand intellectual capacity, credibility, judgement, intuition. Adhere to punctuality, setting and meeting deadlines.
C243.5	Instill responsibilities to oneself and others. Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

**Course Title: Evaluation of Project and Viva-Voce**

**Course Code: 16EPS44**

CO NO	After completing the course the student will be able to:
C244.1	Present the project and be able to defend it.
C244.2	Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task. Habituated to critical thinking and use problem solving skills
C244.3	Communicate effectively and to present ideas clearly and coherently in both the written and oral forms
C244.4	Work in a team to achieve common goal.
C244.5	Learn on their own, reflect on their learning and take appropriate actions to improve it.



# AMC ENGINEERING COLLEGE

DEPARTMENT OF CIVIL ENGINEERING

## STATEMENTS

### PROGRAM OUTCOMES (PO)

PO1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
PO6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Graduates are able to analyse, design and construct Civil Engineering systems with state of the art technologies
PSO2	Graduates are able to work on interdisciplinary and multidisciplinary projects in Green Buildings Sustainable Technologies related research and development activities
PSO3	CIVIL Engineering Graduates are encouraged to hone their skills in Total Quality Management and Entrepreneurship

**Course Title: STRENGTH OF MATERIALS**

**Course Code: 17CV32**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C202.1	To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion
C202.2	To suggest suitable material from among the available in the field of construction and manufacturing.
C202.3	To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts,
C202.4	To understand the basic concept of analysis and design of members subjected to torsion
C202.5	To understand the basic concept of analysis and design of structural elements such as columns and struts.

**Course Title: FLUIDS MECHANICS**

**Course Code: 17CV33**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C203.1	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum
C203.2	Compute and solve problems on hydrostatics, including practical applications
C203.3	Apply principles of mathematics to represent kinematic concepts related to fluid flow
C203.4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications
C203.5	Compute the discharge through pipes and over notches and weirs

**Course Title: BASIC SURVEYING**

**Course Code: 17CV34**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C204.1	Posses a sound knowledge of fundamental principles Geodetics
C204.2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
C204.3	Capture geodetic data to process and perform analysis for survey problems
C204.4	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours

**Course Title: ENGINEERING GEOLOGY**

**Course Code: 17CV35**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C205.1	Students will able to apply the knowledge of geology and its role in Civil Engineering
C205.2	Students will effectively utilize earth's materials such as mineral, rocks and water in civil engineering practices.
C205.3	Analyze the natural disasters and their mitigation
C205.4	Assess various structural features and geological tools in ground water exploration, Natural resource estimation and solving civil engineering problems.
C205.5	Apply and asses use of building materials in construction and asses their properties

**Course Title: Building Materials and Construction      Course Code: 17CV36**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C206.1	Select suitable materials for buildings and adopt suitable construction techniques.
C206.2	Adopt suitable repair and maintenance work to enhance durability of buildings

**Course Title: BUILDING MATERIALS TESTING LABORATORY**

**Course Code: 17CVL37**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C207.1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
C207.2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.
C207.3	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.

**Course Title: BASIC SURVEYING PRACTICE**

**Course Code: 17CVL38**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C208.1	Apply the basic principles of engineering surveying for linear and angular measurements
C208.2	Comprehend effectively field procedures required for a professional surveyor.
C208.3	Use techniques, skills and conventional surveying instruments necessary for engineering practice.

**Course Title: Analysis of Determinate Structures**

**Course Code: 17CV42**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C210.1	Evaluate the forces in determinate trusses by method of joints and sections.
C210.2	Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods
C210.3	Understand the energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames.
C210.4	Determine the stress resultants in arches and cables.
C210.5	Understand the concept of influence lines and construct the ILD diagram for the moving loads

**Course Title: Applied Hydraulics**

**Course Code: 17CV 43**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C211.1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters
C211.2	Design the open channels of various cross sections including economical channel sections
C211.3	Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,
C211.4	Compute water surface profiles at different conditions
C211.5	Design turbines for the given data, and to know their operation characteristics under different operating conditions

**Course Title: Concrete Technology****Course Code: 17CV44**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C212.1	Relate material characteristics and their influence on microstructure of concrete.
C212.2	Distinguish concrete behaviour based on its fresh and hardened properties.
C212.3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes

**Course Title: Basic Geotechnical Engineering****Course Code: 17CV45**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C213.1	Will acquire an understanding of the procedures to determine index properties of any type of soil, classify the soil based on its index properties
C213.2	Will be able to determine compaction characteristics of soil and apply that knowledge to assess field compaction procedures
C213.3	Will be able to determine permeability property of soils and acquires conceptual knowledge about stresses due to seepage and effective stress; Also acquire ability to estimate seepage losses across hydraulic structure
C213.4	Will be able to estimate shear strength parameters of different types of soils using the data of different shear tests and comprehend Mohr-Coulomb failure theory.
C213.5	Ability to solve practical problems related to estimation of consolidation settlement of soil deposits also time required for the same

**Course Title: Advanced Surveying****Course Code: 17CV46**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C214.1	Apply the knowledge of geometric principles to arrive at surveying problems
C214.2	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems.
C214.3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;
C214.4	Design and implement the different types of curves for deviating type of alignments

**Course Title: Fluid Mechanics and Hydraulic Machines Laboratory**

**Course Code: 17 CVL47**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C215.1	Properties of fluids and the use of various instruments for fluid flow measurement.
C215.2	Working of hydraulic machines under various conditions of working and their characteristics

**Course Title: Engineering Geology Laboratory**

**Course Code: 17CVL48**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C216.1	Identifying the minerals and rocks and utilize them effectively in Civil Engineering practices
C216.2	Understanding and interpreting the geological conditions of the area for the Implementation of civil engineering projects.
C216.3	Interpreting subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods
C216.4	The techniques of drawing the curves of electrical resistivity data and its interpretation for Geotechnical and aquifer boundaries

**Course Title: Design of RC Structural Elements**

**Course Code: 15CV51**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C301.1	Understand the design philosophy and principles
C301.2	Solve engineering problems of RC elements subjected to flexure, shear and torsion
C301.3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings
C301.4	Owens professional and ethical responsibility

**Course Title: Analysis of Indeterminate Structures**

**Course Code: 15CV52**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C302.1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method
C302.2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.
C302.3	Construct the bending moment diagram for beams and frames by Kani's method.
C302.4	Construct the bending moment diagram for beams and frames using flexibility method
C302.5	Analyze the beams and indeterminate frames by system stiffness method

**Course Title: Applied Geotechnical Engineering**

**Course Code: 15CV53**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C303.1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects
C303.2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils
C303.3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
C303.4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure
C303.5	Capable of estimating load carrying capacity of single and group of piles

**Course Title: Computer Aided Building Planning and Drawing**

**Course Code: 15CV54**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C304.1	Gain a broad understanding of planning and designing of buildings
C304.2	Prepare, read and interpret the drawings in a professional set up.
C304.3	Know the procedures of submission of drawings and Develop working and submission drawings for building
C304.4	Plan and design a residential or public building as per the given requirements

**Course Title: Air Pollution and Control**

**Course Code: 15CV551**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C305.1	Identify the major sources of air pollution and understand their effects on health and environment.
C305.2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.
C305.3	Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.
C305.4	Choose and design control techniques for particulate and gaseous emissions

**Course Title: Railways, Harbo ur, Tunneling and Airports**

**Course Code: 15CV552**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C305.1	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway, taxiway.
C305.2	Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.
C305.3	Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.
C305.4	Apply the knowledge gained to conduct surveying, understand the tunneling activities

**Course Title: Remote Sensing and GIS**

**Course Code: 15CV563**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C306.1	Collect data and delineate various elements from the satellite imagery using their spectral signature.
C306.2	Analyze different features of ground information to create raster or vector data.
C306.3	Perform digital classification and create different thematic maps for solving specific problems
C306.4	Make decision based on the GIS analysis on thematic maps

**Course Title: Geotechnical Engineering Lab**

**Course Code: 15CVL57**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C307.1	Physical and index properties of the soil
C307.2	Classify based on index properties and field identification
C307.3	To determine OMC and MDD, plan and assess field compaction program
C307.4	Shear strength and consolidation parameters to assess strength and deformation characteristics
C307.5	In-situ shear strength characteristics (SPT- Demonstration)

**Course Title: Concrete and Highway Materials Laboratory      Course Code: 15CVL58**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C308.1	Conduct appropriate laboratory experiments and interpret the results
C308.2	Determine the quality and suitability of cement
C308.3	Design appropriate concrete mix
C308.4	Determine strength and quality of concrete
C308.5	Test the road aggregates and bitumen for their suitability as road material.
C308.6	Test the soil for its suitability as sub grade soil for pavements

**Course Title: CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP**

**Course Code: 15CV61**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C309.1	Understand the construction management process.
C309.2	Understand and solve variety of issues that are encountered by every professional <u>indischarging</u> professional duties.
C309.3	Fulfill the professional obligations effectively with global outlook
C309.4	Understand the construction management process.

**Course Title: DESIGN OF STEEL STRUCTURAL ELEMENTS**

**Course Code: 15CV62**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C310.1	Possess a knowledge of Steel Structures Advantages and Disadvantages of Steelstructures, steel code provisions and plastic behaviour of structural steel
C310.2	Understand the Concept of Bolted and Welded connections
C310.3	Understand the Concept of Design of compression members, built-up columnsand columns splices.
C310.4	Understand the Concept of Design of tension members, simple slab base andgusseted base.
C310.5	Understand the Concept of Design of laterally supported and un-supported steelbeams.

**Course Title: HIGHWAY ENGINEERING**

**Course Code: 15CV63**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C311.1	Acquire the capability of proposing a new alignment or re-alignment of existing roads,conduct necessary field investigation for generation of required data.
C311.2	Evaluate the engineering properties of the materials and suggest the suitability of thesame for pavement construction.
C311.3	Design road geometrics, structural components of pavement and drainage.
C311.4	Evaluate the highway economics by few select methods and also will have a basicknowledge of various highway financing concepts

**Course Title: WATER SUPPLY AND TREATMENT ENGINEERING**

**Course Code: 15CV64**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C312.1	Estimate average and peak water demand for a community.
C312.2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.
C312.3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.
C312.4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.
C312.5	Estimate average and peak water demand for a community.

**Course Title: ALTERNATIVE BUILDING MATERIALS**

**Course Code: 15CV653**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C313.1	Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;
C313.2	Suggest appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.
C313.3	Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.
C313.4	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material

**Course Title: WATER RESOURCES MANAGEMENT**

**Course Code: 15CV661**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C314.1	Assess the potential of groundwater and surface water resources.
C314.2	Address the issues related to planning and management of water resources.
C314.3	Know how to implement IWRM in different regions
C314.4	Understand the legal issues of water policy.
C314.5	Select the method for water harvesting based on the area.

**Course Title: SOFTWARE APPLICATION LAB**

**Course Code: 15CVL67**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C315.1	Use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work

**Course Title: EXTENSIVE SURVEY PROJECT /CAMP Course Code: 15CVL68**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C316.1	Apply Surveying knowledge and tools effectively for the projects
C316.2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.
C316.3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.
C316.4	Professional etiquettes at workplace, meeting and general
C316.5	Establishing trust based relationships in teams & organizational environment

**Course Title: Municipal and Industrial Waste Water Engineering**

**Course Code: 15CV71**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C401.1	Acquires capability to design sewer and Sewerage treatment plant.
C401.2	Evaluate degree of treatment and type of treatment for disposal, reuse and recycle.
C401.3	Identify waste streams and design the industrial waste water treatment plant.
C401.4	Manage sewage and industrial effluent issues.

**Course Title: Design of RCC and Steel Structures      Course Code: 15CV72**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C402.1	Students will acquire the basic knowledge in design of RCC and Steel Structures.
C402.2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at

**Course Title: Hydrology and Irrigation Engineering      Course Code: 15CV73**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C403.1	Understand the importance of hydrology and its components.
C403.2	Measure precipitation and analyze the data and analyze the losses in precipitation.
C403.3	Estimate runoff and develop unit hydrographs.
C403.4	Find the benefits and ill-effects of irrigation.
C403.5	Find the quantity of irrigation water and frequency of irrigation for various crops.
C403.6	Find the canal capacity, design the canal and compute the reservoir capacity.

**Course Title: Ground Water & Hydraulics**

**Course Code: 15CV742**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C404.1	Find the characteristics of aquifers.
C404.2	Estimate the quantity of ground water by various methods.
C404.3	Locate the zones of ground water resources.
C404.4	Select particular type of well and augment the ground water storage.

**Course Title: Urban Transportation and Planning**

**Course Code: 15CV751**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C405.1	Design, conduct and administer surveys to provide the data required for transportation planning.
C405.2	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.
C405.3	Develop and calibrate modal split, trip generation rates for specific types of land use developments.
C405.4	Adopt the steps that are necessary to complete a long-term transportation plan.

**Course Title: Rehabilitation and Retrofitting of Structures**

**Course Code: 15CV753**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C405.1	Understand the cause of deterioration of concrete structures.
C405.2	Able to assess the damage for different type of structures
C405.3	Summarize the principles of repair and rehabilitation of structures
C405.4	Recognize ideal material for different repair and retrofitting technique

**Course Title: Environmental Engineering Laboratory**

**Course Code: 15CVL76**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C406.1	To Acquire capability to conduct experiments and estimate the concentration of different parameters
C406.2	To Compare the result with standards and discuss based on the purpose of analysis.
C406.3	To Determine type of treatment, degree of treatment for water and waste water.
C406.4	To Identify the parameter to be analyzed for the student project work in environmental stream.

**Course Title: Computer Aided Detailing of Structures Course Code: 15CVL77**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C407.1	To Prepare detailed working drawings of buildings and industrial structures

**Course Title: Project phase 1**

**Course Code: 15CVP78**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C408.1	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.

**Course Title: QUANTITY SURVEYING AND CONTRACTS MANAGEMENT**

**Course Code: 15CV81**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C408.1	Prepare detailed and abstract estimates for roads and building.
C408.2	Prepare valuation reports of buildings.
C408.3	Interpret Contract document's of domestic and international construction works

**Course Title: DESIGN OF PRE STRESSED CONCRETE ELEMENTS**

**Course Code: 15CV82**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
C409.1	Understand the requirement of PSC members for present scenario.
C409.2	Analyse the stresses encountered in PSC element during transfer and at working.
C409.3	Understand the effectiveness of the design of PSC after studying losses
C409.4	Capable of analyzing the PSC element and finding its efficiency.
C409.5	Design PSC beam for different requirements

**Course Title: EARTHQUAKE ENGINEERING      Course Code: 15CV831**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C410.1	Acquire basic knowledge of engineering seismology
C410.2	Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
C410.3	Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios
C410.4	Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures.
C410.5	Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry structures through exposure to different IS-codes of practices.

**Course Title: ADVANCED FOUNDATION DESIGN  
Course Code: 15CV834**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C410.1	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.
C410.2	Estimate the load carrying capacity and settlement of single piles and pile groups including laterally loaded piles
C410.3	Understand the basics of analysis and design principles of well foundation, drilled piers and caissons
C410.4	Understand basics of analysis and design principles of machine foundations
C410.5	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.

**Course Title: INTERNSHIP /PROFESSIONAL PRACTICE  
Course Code: 15CV84**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C411.1	Commit to professional ethics and responsibilities as a member in team/individual.
C411.2	Communicate technically and general information by means of oral/written presentation skills with professionalism.

**Course Title: Project Viva Voce**

**Course Code: 15CV85**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C412.1	Construct a team, distribute the work and commit to professional ethics and responsibilities as a member in a team and individual.
C412.2	Design & Demonstrate the proposed work in module wise with proper time allocation and finance management.
C412.3	Assess the post analysis implementation and identify its future scope, issues and impact.
C412.4	Communicate technical and general information by means of oral as well as written presentation skills with professionalism.

**Course Title: Seminar**

**Course Code: 15CVS86**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course the student will be able to:
C413.1	Identify the emerging technical field by applying the engineering concepts from the research repository
C413.2	Survey the related literature for better understanding.
C413.3	Analyze the methodology used in the identified paper.
C413.4	Prepare the power point presentation and documentation by applying ethical principles with committed professional responsibilities as an individual.
C413.5	Discuss the issues and future scope for available technology.



# AMC ENGINEERING COLLEGE

DEPARTMENT OF PHYSICS 2018-19

**Course Title: Engineering Physics**

**Course Code: 18PHY12/22**

CO. No.	OUTCOMES
CO1	Understand various types of oscillations and their implications, the role of shock waves in various fields engineering applications.
CO2	Understand and recognize the elastic properties of materials for engineering applications.
CO3	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
CO4	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation. Apprehend theoretical background of laser, construction and working of different types of laser and its applications in different fields.
CO5	Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

**Course Title: Engineering Physics Lab**

**Course Code: 18PHY16/26**

<b>CO. No.</b>	<b>OUTCOMES</b>
C01	After completing the course the student will be able to: Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current
C02	Understand the principles of operations of optical fibers, capacitor and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
C03	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
C04	Recognize the resonance concept and its practical applications
C05	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results  Design and Develop innovative experiments



# AMC ENGINEERING COLLEGE

DEPARTMENT OF CHEMISTRY

Course Title: Engineering Chemistry (CBCS)

Course Code: 18CHE12/22

CO. No.	OUTCOMES
CO1	After completing the course the student will be able to: Apply the knowledge of free energy in equilibria; rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.
CO2	Explain the Causes and effects of corrosion of metals and control of corrosion. Interpret the Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc. By electroplating and electro less plating.
CO3	Explain the production & consumption of energy for industrialization of country and living standards of people and interpret the electrochemical and concentration cells. Classify the batteries and fuel cells. Apply the solar energy for different useful forms of energy.
CO4	Interpret the environmental pollution, waste management and water chemistry.
CO5	Interpret the Different techniques of instrumental methods of analysis and remember the fundamental principles of nanomaterials.

**Course Title: Engineering Chemistry Lab(CBCS)**  
**18CHE16/26**

**Course Code:**

<b>CO. No.</b>	<b>OUTCOMES</b>
CO1	After completing the course the student will be able to: Analysis of materials using small quantities of materials involved for quick and accurate results by handling different types of instruments.
CO2	Estimation of concerned in materials using comparatively more quantities of material involved for good results by Carrying out different types of titrations.



**AMC ENGINEERING COLLEGE**  
**DEPARTMENT OF MATHEMATICS**

**Calculus and Linear Algebra (18MAT11)**

On completion of this course students will be able to

CO No.	Statement
1.	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
2.	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
3.	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
4.	Solve first order linear/nonlinear differential equation analytically using standard methods
5.	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.

**Advanced Calculus and Numerical Methods (18MAT21)**

On completion of this course students will be able to

CO No.	Statement
1.	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the inter dependence of line, surface and volume integrals.
2.	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
3.	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables.
4.	Explain the applications of infinite series and obtain series solution of ordinary differential equations.
5.	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

### Engineering Mathematics-III (17MAT31)

On completion of this course students will be able to

CO No.	Statement
1.	Know the use of periodic signals and Fourier series to analyze circuits and system communications.
2.	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.
3.	Employ appropriate numerical methods to solve algebraic and transcendental equations.
4.	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
5.	Determine the extremals of functionals and solve the simple problems of the calculus of variations.

### Engineering Mathematics-IV (17MAT41)

On completion of this course students will be able to

CO No.	Statement
1.	Solve first and second order ordinary differential equation arising in flow problems using single step and multistep numerical methods.
2.	Illustrate problems of potential theory, quantum mechanics and heat conduction by employing notions and properties of Bessel's functions and Legendre's polynomials.
3.	Explain the concepts of analytic functions, residues, poles of complex potentials and describe conformal and Bilinear transformation arising in field theory and signal processing.
4.	Develop probability distribution of discrete, continuous random variables and joint probability distribution occurring in digital signal processing, information theory and design engineering.
5.	Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process.

### **ADDITIONAL MATHEMATICS – I (18MATDIP31)**

On completion of this course students will be able to

CO No.	Statement
1.	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.
2.	Use derivatives and partial derivatives to calculate rate of change of multivariate functions.
3.	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
4.	Learn techniques of integration including the evaluation of double and triple integrals.
5.	Identify and solve first order ordinary differential equations.

### **ADDITIONAL MATHEMATICS – II (18MATDIP41)**

On completion of this course students will be able to

CO No.	Statement
1.	Solve systems of linear equations using matrix algebra.
2.	Apply the knowledge of numerical methods in modelling and solving engineering problems.
3.	Make use of analytical methods to solve higher order differential equations
4.	Classify partial differential equations and solve them by exact methods.
5.	Apply elementary probability theory and solve related problems.



# AMC ENGINEERING COLLEGE

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

## STATEMENTS

### PROGRAM OUTCOMES (PO)

PO1	<b>Computational Knowledge:</b> Apply Knowledge of Computing Fundamentals, Computing Specialization, Mathematics, and Domain Knowledge appropriate for the Computing Specialization to the Abstraction and Conceptualization of Computing models from defined problems and requirements.
PO2	<b>Problem analysis:</b> Identify, Formulate, Research Literature, and solve Complex Computing problems reaching substantiated conclusions using fundamental Principles of Mathematics, Computing Sciences, and relevant Domain Disciplines.
PO3	<b>Design/development of solutions:</b> Design and Evaluate solutions for Complex Computing problems, and Design and Evaluate systems, Components, or Processes that meet specified needs with appropriate consideration for Public Health and Safety, Cultural, Societal, and Environmental considerations.
PO4	<b>Conduct investigations of complex problems:</b> Use Research-Based Knowledge and Research methods including design of Experiments, Analysis and Interpretation of data, and synthesis of the information to provide valid conclusions
PO5	<b>Modern tool usage:</b> Create, Select, Adapt and Apply Appropriate techniques, resources, and Modern Computing tools to Complex Computing activities, with an understanding of the limitations.
PO6	<b>Professional Ethics:</b> Understand and Commit to Professional Ethics and Cyber regulations, Responsibilities, and norms of Professional Computing Practices.
PO7	<b>Life-long Learning:</b> Recognize the need, and have the ability, to engage in independent Learning for Continual Development as a Computing Professional.
PO8	<b>Project management and finance:</b> Demonstrate Knowledge and understanding of the Computing and Management Principles and Apply these to one's own work, as a member and leader in a team, to manage projects and in Multidisciplinary Environments.

PO9	<b>Communication Efficacy:</b> Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO10	<b>Societal and Environmental Concern:</b> Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.
PO11	<b>Individual and Team Work:</b> Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO12	<b>Innovation and Entrepreneurship:</b> Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.
<b>PROGRAM SPECIFIC OUTCOMES (PSO)</b>	
PSO1	Graduates will be able to Analyze, Design and Implement Solutions in IT Sector using Cutting Edge Technologies.
PSO2	Graduates will be able to Design and Deploy Software in various Application Domains.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge on C++ programming concepts.
CO2:	Analyze the different concepts of C++.
CO3:	Design and Develop the solution to a problem using Object Oriented Programming Concepts.
CO4:	Apply the learning into real world problems independently

**Course Title: UNIX AND SHELL PROGRAMMING**

**Course Code: 18MCA12**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand and experience the UNIX environment, File system and hierarchy.
CO2:	Understand the mechanism of process creation and process management using commands.
CO3:	Explore special privileged commands of system administration.
CO4:	Analyze the usage of different shell commands, variables and AWK filtering.
CO5:	Use Unix commands and language constructs in building shell scripts.

**Course Title: WEB TECHNOLOGIES**

**Course Code: 18MCA13**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the fundamentals of web and thereby develop web applications using various web development languages and tools.
CO2:	Build the ability to select the essential technology needed to develop and implement web Applications.
CO3:	Use JavaScript and jQuery to develop dynamic and interactive web page.
CO4:	Write a well formed valid XML document.
CO5:	Design XML document with presentation using CSS.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Categorize problems based on their characteristics and practical importance.
CO2:	Apply the correct process models for software development.
CO3:	Apply the techniques, skills, and modern engineering tools necessary for engineering practice.
CO4:	Define, formulate and analyze a problem as per the testing techniques.
CO5:	Apply new Generation of Software Engineering Technology to Meet Current and Future Industrial Challenges of Emerging Software Trends.

**Course Title: COMPUTER ORGANIZATION**

**Course Code: 18MCA15**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the basic of Digital Systems
CO2:	Realize the concept of Computer System Organization
CO3:	Apply the concepts of Input/output Organization and Memory System
CO4:	Analyze the Performance of Memory System and Memory Management
CO5:	Analyze and Implementation of Stack Organization

**Course Title: C++ PROGRAMMING LAB**

**Course Code: 18MCA16**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Apply and implement major programming and object oriented concepts like function overloading, operator overloading, Encapsulations, and inheritance, message passing to solve real-world problems.
CO2:	Use major C++ features such as Virtual functions, Templates for data type independent designs and File I/O to deal with large data sets.
CO3:	Analyze, design and develop solutions to real-world problems applying OOP Concepts of C++.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the Unix programming environment.
CO2:	Be fluent in the use of Vi editor.
CO3:	Be able to design and implement shell scripts to manage users with different types of Permission and file based applications.
CO4:	Be fluent to write Awk scripts.

**Course Title: WEB TECHNOLOGIES LAB**

**Course Code: 18MCA18**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Develop web pages using HTML and HTML5.
CO2:	Demonstrate the usage of CSS in designing web pages.
CO3:	Execute simple programming questions using JavaScript.
CO4:	Create dynamic web pages by manipulating the DOM elements.
CO5:	Design and implement user interactive dynamic web based applications using jQuery.

**Course Title: PROGRAMMING USING JAVA**

**Course Code: 18MCA21**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the basic programming constructs of Java. Apply suitable OOP concepts to develop Java programs for a given scenario.
CO2:	Illustrate the concepts of Generalization and runtime polymorphism applications
CO3:	Exemplify the usage of Packages, Interfaces, Exceptions and Multithreading
CO4:	Demonstrate Enumerations, Wrappers, Auto boxing, Generics, collection framework and I/O operations
CO5:	Implement the concepts of Networking using Java network classes

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of Various types of data structures, operations and algorithms Sorting and searching operations
CO2:	Analyze the performance of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques
CO3:	Implement all the applications of Data structures in a high-level language
CO4:	Design and apply appropriate data structures for solving computing problems

**Course Title: DISCRETE MATHEMATICAL STRUCTURES AND STATISTICS**

**Course Code: 18MCA23**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Use the logical notation to define and reason about fundamental mathematical concepts such as sets, relations, functions and integers.
CO2:	Calculate numbers of possible out comes of elementary combinatorial processes such as permutations and combinations.
CO3:	Calculate probabilities and distributions for simple combinatorial processes; calculate expectations.
CO4:	Apply statistical methods for correlation and regression. Fitting a curve to a discrete data.

<b>CO.No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
CO1:	Understand the computer network concepts.
CO2:	Know various types of Networks & Communication media
CO3:	Identify the components required to build different types of networks
CO4:	Understand layering concepts of TCP/IP and OSI models
CO5:	Understand the working principles of various application protocols

**Course Title: OPERATING SYSTEMS**

**Course Code: 18MCA25**

<b>CO.No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
CO1:	Understand the basic of Computer and Operating System Structure
CO2:	Realize the concept of Process Management
CO3:	Analyze and Evaluation of Synchronization and Deadlock
CO4:	Understand the concepts of System Software
CO5:	Design and Implementation of Assemblers, Loaders and Linkers

**Course Title: JAVA PROGRAMMING LAB**

**Course Code: 18MCA26**

<b>CO.No.</b>	<b>OUTCOMES</b> After completing the course the student will be able to:
CO1:	Understand Java programming language fundamentals and run time environment.
CO2:	Acquire knowledge and skill necessary to write java programs.
CO3:	Learn the object oriented concepts and its implementation in Java
CO4:	Implement the multithreading and client side programming.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of Various types of data structures, operations and algorithms Sorting and searching operations
CO2:	Analyze the performance of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques
CO3:	Implement all the applications of Data structures in a high-level language
CO4:	Design and apply appropriate data structures for solving computing problems

**Course Title: COMPUTER NETWORKS LAB**

**Course Code: 18MCA28**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the basic terminologies used for computer networking.
CO2:	Understand the functions of layers in the Internet Model.
CO3:	Demonstrate application layer protocols used for process to process communication.
CO4:	Demonstrate subnetting and routing mechanisms for a given network topology. Exemplify link layer functionalities.
CO5:	Describe the components and working of wireless networks.

**Course Title: MINI PROJECT**

**Course Code: 18MCA29**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the Analysis of problem definition.
CO2:	Demonstrate Team Building.
CO3:	Understand Design and Implementation of Software.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the types of Networks & Communication medias.
CO2:	Identify the components required to build different types of networks
CO3:	Understand the functionalities needed for data communication into layers
CO4:	Choose the required functionality at each layer for given application
CO5:	Understand the working principles of various application protocols

**Course Title: Java Programming**

**Course Code: 16MCA32**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the basic programming constructs of Java. Apply suitable OOP concepts to develop Java programs for a given scenario.
CO2:	Illustrate the concepts of Generalization and run time polymorphism applications
CO3:	Exemplify the usage of Packages, Interfaces, Exceptions and Multithreading
CO4:	Demonstrate Enumerations, Wrappers, Auto boxing, Generics, collection framework and I/O operations
CO5:	Implement the concepts of Networking using Java network classes

**Course Title: Analysis and Design of Algorithms**

**Course Code: 16MCA33**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Categorize problems based on their characteristics and practical importance.
CO2:	Develop Algorithms using iterative/recursive approach
CO3:	Compute the efficiency of algorithms in terms of asymptotic notations
CO4:	Design algorithm using an appropriate design paradigm for solving a given problem
CO5:	Classify problems as P, NP or NP Complete

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Categorize problems based on their characteristics and practical importance.
CO2:	Use the correct process models for software development
CO3:	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
CO4:	Ability to define, formulate and analyze a problem as per the testing techniques.
CO5:	Apply new Generation of Software Engineering Technology to Meet Current and Future Industrial Challenges of Emerging Software Trends.

**Course Title: Computer Networks Laboratory**

**Course Code: 16MCA36**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Describe basic terminologies used for computer networking.
CO2:	Describe the functions of layers in the Internet Model.
CO3:	Demonstrate application layer protocols used for process to Process Communication.
CO4:	Demonstrate sub netting and routing mechanisms for a given network topology. Exemplify link layer functionalities.
CO5:	Describe the components and working of wireless networks.

**Course Title: Java Programming Laboratory**

**Course Code: 16MCA37**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand Java programming language fundamentals and run time environment.
CO2:	Gain knowledge and skill necessary to write java programs.
CO3:	Learn the object oriented concepts and its implementation in Java
CO4:	Implement the multithreading and client side programming.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Implement the concepts of time and space complexity, divide-and-conquer strategy, dynamic Programme greedy and approximate algorithms.
CO2:	Describe the methodologies of how to analyze an algorithm
CO3:	Choose a better algorithm to solve the problems

**Course Title: ENTERPRISE RESOURCE PLANNING**

**Course Code: 16MCA352**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of o Benefits of ERP, Process Re-engineering o Project management and Monitoring
CO2:	Analyse the performance of o Project o Quality management
CO3:	Know how ERP evolves in market place
CO4:	Develop the ERP system, ERP with E-Commerce & Internet

**Course Title: ADVANCED JAVA PROGRAMMING**

**Course Code: 16MCA41**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Learn the concept of Servlet and its life cycle
CO2:	Understand JSP tags and its services
CO3:	Create packages and interfaces, Database connection
CO4:	Develop Java Server Pages applications using JSP Tags.
CO5:	Develop Enterprise Java Bean Applications

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of Build the Web Applications using JQuery, PHP, Ruby and D3.js.Model-View-Controller (MVC) Architecture.
CO2:	Design the Web Pages using Ruby, Rails and Layouts.
CO3:	Apply the knowledge gained in the Building a web portals.
CO4	Evaluate web site performance against user acceptance testing.

**Course Title: SOFTWARE TESTING AND PRACTICES      Course Code: 16MCA43**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of basic principles and knowledge of software testing and debugging and test cases.
CO2:	Will be able to understand the perceptions on testing like levels of testing, generalized pseudo code and with related examples
CO3:	To study the various types of testing.
CO4:	Will be able to understand analyses the difference between functional testing and structural testing.
CO5:	Analyze the performance of fault based testing, planning and Monitoring the process, Documentation testing.

**Course Title: ADVANCED JAVA PROGRAMMING LAB      Course Code: 16MCA46**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Designing HTML pages to demonstrate Java Servlets, JSP, Bean and EJB programs.
CO2:	Implementing Dynamic HTML using Servlet and demonstration of sevicees methods, auto web page refresh, Session tracking using cookie and Http Session in Servlet.
CO3:	Learn the fundamental of connecting to the database
CO4:	Demonstrate JSP (page attributes, action tags and all basic tags) and types of EJB application.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand, analyse and apply the role of server side scripting languages.
CO2:	Build web application using PHP, Ruby, JQuery, XML and store values in MYSQL.
CO3:	Build web applications consisting of graphs using D3.JS.
CO4:	Analyse a web project and identify its elements and attributes In comparison to traditional projects.

**Course Title: SOFTWARE TESTING LAB**

**Course Code: 16MCA48**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Analyze the performance of fault based testing, planning and Monitoring the process, Documentation testing
CO2:	This course provides to experience on software testing projects using software testing tools.
CO3:	Understand the process to be followed in software development life cycle.
CO4:	Practical solutions to the problems
CO5:	Define, formulate and analyze a problem.

**Course Title: DATA WAREHOUSING AND DATA MINING Course Code: 16MCA442**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Learn the concept of Data warehousing and OLAP.
CO2:	Understand storage and retrieval technique of data from DATA CUBE.
CO3:	Analyze different types of data and different preprocessing techniques.
CO4:	Evaluate various Association algorithms and its applications.
CO5:	Apply different Classification technique.

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Design algorithms by employing Map Reduce technique for solving Big Data problems
CO2:	Design algorithms for Big Data by deciding on the apt Features set
CO3:	Design algorithms for handling peta bytes of datasets
CO4:	Design algorithms and propose solutions for Big Data by optimizing main memory consumption
CO5:	Design solutions for problems in Big Data by suggesting appropriate clustering technique.

**Course Title: OBJECT-ORIENTED MODELING AND DESIGN PATTERNS**

**Course Code: 16MCA51**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of <ul style="list-style-type: none"> <li>o Basic UML Concepts and terminologies</li> <li>o Life Cycle of Object oriented Development</li> <li>o Modeling Concepts</li> </ul>
CO2:	Identify the basic principles of Software modeling and apply them in real world applications
CO3:	Produce conceptual models for solving operational problems in software and IT environment using UML
CO4:	Analyze the development of Object Oriented Software models in terms of <ul style="list-style-type: none"> <li>o Static behaviour</li> <li>o Dynamic behaviour</li> </ul>
CO5:	Evaluate and implement various Design patterns.

**Course Title: PROGRAMMING USING C# & .NET**

**Course Code: 16MCA52**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand C# and client-server concepts using .Net Frame Work Components.
CO2:	Apply delegates, event and exception handling to incorporate with ASP, Win Form, ADO.NET.
CO3:	Analyze the use of .Net Components depending on the problem statement.
CO4:	Implement & develop a web based and Console based application with Database connectivity

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Illustrate effective user interfaces that leverage evolving mobile device capabilities
CO2:	Develop applications using software development kits (SDKs), frameworks and toolkits
CO3:	Establish various methods to integrate database and server-side technologies
CO4:	Design and develop open source software based mobile applications
CO5:	Build and deploy competent mobile development solutions

**Course Title: SOFTWARE DESIGN LAB**

**Course Code: 16MCA56**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the fundamental principles of Object-Oriented analysis, design, development and programming
CO2:	Demonstrate and represent the UML model elements, to enable visual representation of the system being developed
CO3:	Implement object oriented design model with the help of modern tool, Rational software Architect
CO4:	Analyze and differentiate the static and dynamic behavior of the system for achieving the intended functionalities of the system
CO5:	Evaluate Various design patterns for applicability, reasonableness, and relation to other design criteria

**Course Title: .NET LABORATORY**

**Course Code: 16MCA57**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand C# and client-server concepts using .Net Frame Work Components
CO2:	Apply delegates, event and exception handling to incorporate with ASP, Win Form, ADO.NET
CO3:	Analyze the use of .Net Components depending on the problem statement
CO4:	Implement & develop a web based and Console based application with Database connectivity

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Illustrate effective user interfaces that leverage evolving mobile device capabilities
CO2:	Develop applications using software development kits (SDKs), frameworks and toolkits
CO3:	Establish various methods to integrate database and server-side technologies
CO4:	Design and develop open source software based mobile applications
CO5:	Build and deploy competent mobile development solutions

**Course Title: CLOUD COMPUTING**

**Course Code: 16MCA542**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand the cloud computing delivery model and the enabling technologies.
CO2:	Explain and cloud computing platforms, key technology drivers and cloud programming/software environments.
CO3:	Identify the need for cloud computing model and compare various key enabling technologies.
CO4:	Analyze and choose an appropriate programming environment for building cloud applications.

**Course Title: ARTIFICIAL INTELLIGENCE**

**Course Code: 16MCA543**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Acquire knowledge of Uncertainty and Problem solving techniques♣ Symbolic knowledge representation to specify domains♣ Reasoning tasks of a situated software agent♣
CO2:	Comprehend on different logical systems for inference over formal domain representations trace on particular inference algorithm working on a given problem specification
CO3:	Apply and Analyse AI technique to any given concrete problem
CO4:	Interpret and Implement non-trivial AI techniques in a relatively large systems

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Understand constraints and opportunities of wireless and mobile networks for Internet of Things.
CO2:	Analyze the societal impact of IoT security events.
CO3:	Develop critical thinking skills.
CO4:	Analyze, design or develop parts of an Internet of Things solution and map it toward selected business model(s)
CO5:	Evaluate ethical and potential security issues related to the Internet of Things

**Course Title: Project**  
16MCA61

**Course Code:**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
CO1:	Analyse the real-time industry/research work environment with emphasis on organizational structure/job process/different departments and functions / tools /technology
CO2:	Develop applications using modern tools and technologies.
CO3:	Demonstrate self-learning capabilities with an effective report and detailed presentation.



# AMC ENGINEERING COLLEGE

DEPARTMENT OF MASTER OF BUSINESS ADMINISTRATION

## STATEMENTS

### PROGRAM OUTCOMES (PO)

PO1	Acquire sufficient theoretical knowledge and are enabled to apply them to solve practical problems in business and other organizations / Institutions of importance
PO2	Apply Effective communication skills with a high degree of lateral and critical thinking that enhances learn ability, developed for being continuously employable.
PO3	Demonstrate leadership qualities, ethically sound, enabled with decision making skills that reflect a high degree of social consciousness
PO4	Recognize the need for sustained research orientation to comprehend a growingly complex, economic, legal and ethical environment
PO5	Possess self-sustaining entrepreneurship qualities that encourages calculated risk taking.

### PROGRAM SPECIFIC OUTCOMES (PSO)

PSO1	Apply various concepts and strategies of Business Management.
PSO2	Carry out Research in the field of Management
PSO3	Demonstrate Team Management skills and to become Competitive.

**PROGRAM EDUCATIONAL OBJECTIVES (PEO)**

PEO 1	Management Graduates to gain knowledge on critical functions of business
PEO 2	Produce Skilled Management Professionals to Analyse Qualitative and Quantitative Data of Enterprise to make smart decisions
PEO 3	Management Graduates to develop Positive Attitude, Leadership Qualities, Team Work, Social, Legal and Ethical Responsibilities in Business and Society.

**Course Title: MANAGEMENT AND ORGANIGATIONAL BEHAVIOR**

**Course Code: 18MBA11**

<b>CO.No.</b>	<b>OUTCOMES</b>
1	After completing the course the student will be able to: Comprehend & correlate all the management functions which are happening around with fundamental concepts and principles of management.
2	Understand the overview of management, theory of management and practical applications of the same.
3	Effectively use their skills for self-grooming, working in groups and to achieve organizational goals.
4	Demonstrate their acumen in applying managerial and behavioral concept in real world/situation.
5	Understand and demonstrate their exposure on recent trends in management.

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	The student will understand the application of Economic Principles in Management decision making.
2	The student will learn the micro economic concepts and apply them for effective functioning of a Firm and Industry.
3	The student will apply the concepts of production and cost for Optimization of production.
4	The student will design Competitive strategies like pricing, product Differentiation etc. and marketing according to the market structure.
5	The student will be able to identify, assess profits and apply BEP for decision making.
6	The Student will be able to understand, assess and forecast Demand.

**Course Title: ACCOUNTING FOR MANAGERS**

**Course Code: 18MBA13**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Demonstrate theoretical knowledge and its application in real time accounting.
2	Demonstrate knowledge regarding accounting principles and its application.
3	Capable of preparing financial statement of sole trading concerns and companies.
4	Independently undertake financial statement analysis and take decisions.
5	Comprehend emerging trends in accounting and taxation.

**Course Title: BUSINESS STATISTICS AND ANALYTICS**

**Course Code: 18MBA14**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Facilitate objective solutions in business decision making under subjective conditions.
2	Demonstrate different statistical techniques in business/real-life situations.
3	Understand the importance of probability in decision making.
4	Understand the need and application of analytics.
5	Understand and apply various data analysis functions for business problems.

**Course Title: MARKETING MANAGEMENT**

**Course Code: 18MBA15**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Develop an ability to assess the impact of the environment on marketing function.
2	To formulate marketing strategies that incorporate psychological and sociological factors which influence buying.
3	Explain how companies identify attractive market segments, differentiate and position their products for maximum competitive advantage in the market place.
4	Build marketing strategies based on product, price, place and promotion objectives.
5	Synthesize ideas into a viable marketing plan.

**Course Title: MANAGERIAL COMMUNICATION**

**Course Code: 18MBA16**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	The students will be aware of their communication skills and know their potential to become successful managers.
2	The students will get enabled with the mechanics of writing and can compose the business letters in English precisely and effectively.
3	The students will be introduced to the managerial communication practices in business those are in vogue.
4	Students will get trained in the art of business communication with emphasis on analyzing business situations.
5	Students will get exposure in drafting business proposals to meet the challenges of competitive environment.

**Course Title: HUMAN RESOURCE MANAGEMENT**

**Course Code: 18MBA21**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Understanding of HRM functions, principles, Job analysis that facilitates students to design a job description and job specification for various levels of employees.
2	Synthesize knowledge on effectiveness of recruitment process, sources & understanding of systematic selection procedure.
3	Identify the various training methods and design a training program.
4	Understand the concept of performance appraisal process in an organization. 5. List out the regulations governing employee benefit practices.

**Course Title: FINANCIAL MANAGEMENT**

**Course Code: 18MBA22**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Understand the basic financial concepts.
2	Apply time value of money.
3	Evaluate the investment decisions.
4	Analyze the capital structure and dividend decisions.
5	Estimate working capital requirements.

**Course Title: RESEARCH METHODS**

**Course Code: 18MBA23**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Understand various research approaches, techniques and strategies in the appropriate in business.
2	Apply a range of quantitative / qualitative research techniques to business and day to day management problems.
3	Demonstrate knowledge and understanding of data analysis, interpretation and report writing.
4	Develop necessary critical thinking skills in order to evaluate different research approaches in Business.

**Course Title: LEGAL AND BUSINESS ENVIRONMENT**

**Course Code: 18MBA24**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Students should get clear idea about the concept of incorporation of company, its relevance, characteristics, types of company, lifting of corporate
2	Student to acquire knowledge about conducting meeting, duties of directors and Investigation of the company.
3	To give the students an insight on Winding up of the companies, Mode of winding up of the companies.
4	To student will have an understanding of the macro environment of Business and various macroeconomic concepts.
5	The student will understand the industrial policies of the past and the present and the evolution over time, and how Indian Industrial structure evolved over time.
6	The student will be exposed to various economic policies of the country and the state of economy.

**Course Title: STRATEGIC MANAGEMENT****Course Code: 18MBA25**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Students should get clear idea about the concept of Strategic Management, its relevance, Characteristics, process nature and purpose.
2	Student to acquire an understanding of how firms successfully institutionalize a strategy and create an organizational structure for domestic and overseas operations and gain competitive advantage.
3	To give the students an insight on strategy at different levels of an organization to gain competitive advantage.
4	To help students understand the strategic drive in multinational firms and their decisions in different markets.
5	To enable the students to gain knowledge of strategy implementation and the control measures for effective decision-making.

**Course Title: ENTREPRENEURSHIP DEVELOPMENT****Course Code: 18MBA26**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Display keen interest and orientation towards entrepreneurship, entrepreneurial opportunities in order to setup a business.
2	As an entrepreneur learn to think creatively and understand the components in developing a Business plan.
3	Become aware about various sources of funding and institutions supporting entrepreneurs.
4	Gain consciousness towards social entrepreneurship and rural entrepreneurship opportunities.

**Course Title: CONSUMER BEHAVIOUR****Course Code: 18MBAMM301**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Explain the background and concepts vital for understanding Consumer Behaviour.
2	Identify the role of variables that determines Consumer Behaviour in Social & cultural domain.
3	Identifying the psychological and behavioural practices adopted by organizations to enhance the Consumer Behaviour.

**Course Title: RETAIL MANAGEMENT****Course Code: 18MBAMM302**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Find out the contemporary retail management, issues, and strategies.
2	Evaluate the recent trends in retailing and its impact in the success of modern business.
3	Relate store management and visual merchandising practices for effective retailing.

**Course Title: SERVICE MARKETING****Course Code: 18MBAMM303**

<b>OUTCOMES</b>	
<b>CO.No.</b>	After completing the course, the student will be able to:
1	Develop an understanding about the various concepts and importance of Services Marketing.
2	Enhance knowledge about emerging issues and trends in the service sector.
3	Learn to implement service strategies to meet new challenges.

**Course Title: BANKING AND FINANCIAL SERVICES    Course Code: 18MBAFM301**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	The Student will be acquainted to various Banking and Non-Banking financial services in India.
2	The Student will understand the activities of Merchant Banking and credit rating.
3	The Student will be equipped to understand micro financing and other financial services in India.
4	The Student will understand how to evaluate and compare leasing & hire purchase.

**Course Title: INVESTMENT MANAGEMENT**

**Course Code: 18MBAFM302**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	The student will understand the capital market and various Instruments for Investment.
2	The learner will be able to assess the risk and return associated with investments and methods to value securities.
3	The student will be able to analyze the Economy, Industry and Company framework for Investment Management.
4	The student will learn the theories of Portfolio management and also the tools and techniques for efficient portfolio management.

**Course Title: DIRECT TAXATION**

**Course Code: 18MBAFM303**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Understand the basics of taxation and process of computing residential status.
2	Calculate taxable income under different heads.
3	Understand deductions and calculation of tax liability of Individuals
4	Know the corporate tax system.

**Course Title: RECRUITMENT AND SELECTION****Course Code: 18MBAHR301**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Gain the insights of various principles and practices of recruitment and selection in an industry.
2	Equip students with various selection procedure practiced in industry.
3	Develop students with latest selection tools in the corporate sector.
4	Develop students with various testing of job recruitment and selection

**Course Title: HR ANALYTICS****Course Code: 18MBAHR302**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Have an understanding of How HR function adds value and demonstrates the value in business terms
2	Measure the value of Intangibles that HR helps builds for the organization given a particular business context to facilitate decision making.
3	Convert soft factors in a people management context into measurable variables across various domains.
4	Devise, conduct and analyse a study on employees or any other related to the HR context in an organization

**Course Title: COMPENSATION AND REWARD SYSTEM Course Code:18MBAHR303**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Gain insights of various conceptual aspects of Compensation and Benefits to achieve organizational goals.
2	Determine the performance based compensation system for business excellence and solve various cases.
3	Designing the compensation strategies for attraction, motivation and retaining high quality workforce.
4	Understand the Legal & Administrative Issues in global compensation to prepare compensation plan, CTC, wage survey and calculate various bonus.

**Course Title: SALES MANAGEMENT**

**Course Code: 18MBAMM401**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Understand the apply the selling techniques in an organization.
2	Develop a plan for organizing, staffing & training sales force.
3	Organize sales territories to maximize selling effectiveness.
4	Evaluate sales management strategies.

**Course Title: INTEGRATED MARKETING COMMUNICATIONS**

**Course Code: 18MBAMM402**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Define and apply knowledge of various aspects of managerial decision making related to marketing communications strategy and tactics.
2	Ability to create an integrated marketing communications plan which includes promotional strategies.
3	Explain the role of IMC in the overall marketing & Use effectiveness measures to evaluate IMC strategies.
4	Prepare advertising copy and design other basic IMC tools.

**Course Title: DIGITAL AND SOCIAL MEDIA MARKETING**

**Course Code: 18MBAMM403**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Recognize appropriate e-marketing objectives.
2	Appreciate the e-commerce framework and technology.
3	Illustrate the use of search engine marketing, online advertising and marketing strategies.
4	Use social media & create templates.
5	Develop social media strategies to solve business problems.

**Course Code: 18MBAFM401**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Understand M & A with its different classifications, strategies, theories, synergy etc.
2	Conduct financial evaluation of M&A
3	Analyse the results after evaluation.
4	Critically evaluate different types of M&A, takeover and antitakeover strategies.

**Course Title: RISK MANAGEMENT AND INSURANCE Course Code:18MBAFM402**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Understand various types of risks.
2	Assess the process of identifying and measuring the risk.
3	Acquaint with the functioning of life Insurance in risk management.
4	Understand general insurance contract.

**Course Title: INDIRECT TAXATION****Course Code: 18MBAFM403**

<b>CO.No.</b>	<b>OUTCOMES</b>
	After completing the course the student will be able to:
1	Have clarity about GSTsystem in India.
2	Understanding of levy and collection of GST in India.
3	Have an overview of customs duty in India.
4	Understanding of valuation for customs duty

CO.No.	OUTCOMES
	After completing the course the student will be able to:
1	To demonstrate an understanding of the fundamentals tools of public relations practices.
2	To describe the various emerging trends in the field of public relations.
3	To analyze the importance of employee communication and organizational change.
4	To evaluate the importance of community relations.

Course Title: **ORGANIZATIONAL LEADERSHIP**

Course Code: **18MBAHR402**

CO.No.	OUTCOMES
	After completing the course the student will be able to:
1	Comprehend & correlate organizational leadership styles which are happening around with fundamental concepts of team leadership.
2	Understand the overview of leadership behavior and motivation in organization.
3	Effectively use their skills for self-grooming on leadership traits and ethics that influences them to effectively work in groups to achieve organizational goals.
4	Demonstrate their acumen in applying their knowledge in organizational leadership and behavioral concept in real world/situation.

Course Title: **INTERNATIONAL HUMAN RESOURCE MANAGEMENT**

Course Code: **18MBAHR403**

CO.No.	OUTCOMES
	After completing the course the student will be able to:
1	Analyse the impact of contemporary issues and global imperatives on Human Resource concepts, policies and practices.
2	Apply concepts and knowledge in deployment, expatriate on international assignments.
3	Evaluate the effects of different human resource and international industrial relations.
4	Develop students to adopt international industrial relation strategies

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