PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF COMPUTER SCIENCE

B.Sc (COMPUTER SCIENCE) - SKILL-BASED COURSES, NON-MAJOR ELECTIVE COURSES, EXTRA-CREDIT COURSES & VALUE-ADDED COURSES

PSO, PO & CO STATEMENTS / 2022

PSOs	PROGRAMME SPECIFIC OUTCOMES
PSO1	Apply computational techniques and software principles for designing of software systems.
PSO2	Accomplish the ability to design and develop computer applications for real world problems
PSO3	Able to create platforms to become an entrepreneur and a relish for higher studies such as M.C.A., M.Sc., etc.,
PSO4	Apply standard Computer science practices and strategies in real-time software project development.
PSO5	An ability to apply mathematical methodologies to solve computation task, model, real world problem using appropriate data structure and suitable algorithm.
PSO6	Develop efficient and effective software systems using modern computer techniques.
B.Sc (COMPUTER SCIENCE)	
B.Sc (COMPUTER SCIENCE) / PROGRAMMES OUTCOMES	
POs	**Description of POs**
PO1	Apply acquired scientific knowledge to solve complex issues.
PO2	Able to survive in today's interconnected world with the knowledge earned through critical thinking and fundamental core concepts.
PO3	Become women entrepreneur such as web designer, database developer, programmer and multimedia designer.
PO4	Providing hands-on –training in state- of- the art technologies to design and implement software applications for social, economic, health, safety and ethical issues.
PO5	Have sufficient knowledge in hardware and software to meet the current industry requirements.

B.Sc (COMPUTER SCIENCE)/ COURSE OUTCOMES		
	Description of COs	**Bloom's Taxonomy / Cognitive Domain**
AUCSC1 / Core-I	**PROGRAMMING IN C**	
CO1.	Recall and understand the fundamentals of C programming. To acquire the programming logic, use of program instruction, syntax and programming structure.	Knowledge (Level K1)
CO2.	To acquire the programming logic, use of program instruction, syntax and programming structure.	Comprehension (Level K2)
CO3.	Understand the concepts of decision making, branching and looping	Knowledge (Level K1) Comprehension(Level K2)
CO4.	Implement different operations on arrays and functions to solve the problem	Application (Level K3)
CO5.	Execute file operations to preserve data in physical disk.	Application(Level K3)
AUCSL1/Core-II	**PRACTICAL – I PROGRAMMING IN 'C'**	
CO1.	Read and understand the execution of programs written in C language.	Knowledge (Level K1)
CO2.	Trace the execution of programs written in C language.	Comprehension (Level K2)
CO3.	Implement various concepts in C.	Application(Level K3)
CO4.	Implement programs with pointers and arrays, perform pointer arithmetic and use the pre-processor.	Application(Level K3)
CO5.	Write the C code for a given algorithm.	Analysis(Level K4) Synthesis (Level K5)
AUSCA1 / Allied-I	**DISCRETE MATHEMATICS**	
CO1.	Recall the basic concepts of Mathematics.	Knowledge (Level K1)
CO2.	Impart different kinds of Matrices, Equations, Sets, Relations and Graphs.	Knowledge (Level K1)
CO3.	Comprehend different kinds of Matrices, Equations, Sets, Relations and Graphs.	Comprehension (Level K2)
CO4.	Solve the equations to find the roots.	Comprehension (Level K2) Application (Level K3)
CO5.	Analyze the real world problems using Graph Theory.	Analysis (Level K4)
AUCSOA1/SBC-I	**OFFICE AUTOMATION LAB**	

CO1.	Understand the dynamics of an office environment.	Comprehension (Level K2)
CO2.	Use various Office Automation Tools like MS Word, MS Excel, MS Access & MS PowerPoint	Comprehension (Level K2)
CO3.	Design various Office Automation Tools like MS Word, MS Excel & MS PowerPoint	Application (Level K3)
CO4.	The ability to apply application software in an office environment	Application (Level K3)
CO5.	The ability to implement applications in an office environment	Comprehension(Level K2)
AUCSC2 / Core-III	**DATA STRUCTURES WITH C++**	
CO1.	Get an idea about object oriented paradigm with concepts of streams, classes, functions, data and objects and also recollect the concepts of files.	Knowledge (Level K1)
CO2.	Classify difference between object oriented programming and procedural oriented language and data types in C++.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Apply dynamic memory management techniques using pointers, constructors, destructors, etc	Application (Level K3)
CO4.	Recognize fundamental concepts of Data structures, space complexity and time complexity.	Application (Level K3)
CO5.	Understand linear data structures such as stacks, queues, linked list and non linear data structures such as trees and Graphs.	Analysis (Level K4) Synthesis(Level K5)
AUCSL2 / Core-IV	**DATA STRUCTURES USING C++**	
CO1.	Understand Object oriented features and C++ concepts.	Comprehension (Level K2)
CO2.	Apply Object oriented features and C++ concepts.	Application (Level K3)
CO3.	Practice to solve the real world problems.	Application (Level K3)
CO4.	Apply to solve the real world problems.	Application (Level K3)
CO5.	Experiment various data structure concepts using C++.	Analysis (Level K4)
AUCSA2 / Allied-II	**STATISTICAL METHODS**	
CO1.	Revise the formula of different Means, Median, Mode, Deviations, Correlation, Regression, Probability, Chi square test, Degree of Freedom, etc.	Knowledge (Level K1)
CO2.	Describe the formula of different Means, Median, Mode, Deviations, Correlation, Regression, Probability, Chi square test, Degree of Freedom, etc.	Comprehension (Level K2)

CO3.	Understand the concepts Central tendency, Dispersion, Correlation and regression, Probability and Sampling theory.	Comprehension (Level K2)
CO4.	Solve the problems by using formulas	Comprehension(Level K2) Application(Level K3)
CO5.	Apply the suitable techniques of statistics to solve real time problems.	Application(Level K3)
AUCSWT2 / SBC-II	**WEB TECHNOLOGY LAB**	
CO1.	Classify various HTML tags.	Comprehension (Level K2)
CO2.	Apply various HTML tags.	Applications(Level K3)
CO3.	Illustrate HTML tags in simple programs.	Applications(Level K3)
CO4.	Describe HTML tags in simple programs.	Analysis(Level K4)
CO5.	Design websites using HTML tag.	Synthesis(Level K5)
AUCSC3 / Core-V	**JAVA PROGRAMMING**	
CO1.	Recollect the OOPs concepts such as Class, Inheritance, Encapsulation and Polymorphism	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Implement programs using more advanced futures such as Interface, Packages and Multithreading.	Application (Level K3)
CO4.	Analyze differences between application program and applets, applet lifecycle and graphics programming.	Analysis(Level K4)
CO5.	Validate Java Programs using Stream Classes and files.	Synthesis(Level K5)
AUCSC4 / Core-VI	**COMPUTER ORGANIZATION**	
CO1.	Recollect the basic structure of Computer and get the idea about instructions, input-output organization, Memory system, Processing and Pipelining.	Knowledge (Level K1)
CO2.	Understand the basic structure of Computer and get the idea about instructions, input-output organization, Memory system, Processing and Pipelining.	Comprehension (Level K2)
CO3.	Classify various digital components.	Comprehension (Level K2)
CO4.	Describe arithmetic and logic operations of processing unit.	Comprehension (Level K2)

		Application (Level K3)
CO5.	Analyze various types of computers, instructions, memory system and working principles of pipelining.	Application (Level K3) Analysis (Level K4)
AUCSC5 / Core-VII	**FUNDAMENTALS OF DIGITAL PRINCIPLES**	
CO1.	Gain knowledge of input and output devices, Number systems, simplification techniques, combinational and sequential circuits.	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Understand the fundamental concepts and techniques used in digital electronics.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Apply the concepts of Boolean Algebra, Logic gates, Logic variables and Truth tables to simplify equations.	Application (Level K3)
CO4.	Analyze combinational logic in terms of Adder, Subtractor and Multiplexer circuits	Comprehend (Level K3) Analysis (Level K4)
CO5.	Comprehend the combinational logic in terms of Adder, Subtractor and Multiplexer circuits.	Comprehend (Level K3)
AUCSL3 / Core-VIII	**JAVA PROGRAMMING**	
CO1.	Sketch the Oops concepts and gain the knowledge of Java and Applet.	Application (Level K3)
CO2.	Write Java application programs using proper program structure.	Application (Level K3)
CO3.	Describe the core java concepts.	Analysis (Level K4)
CO4.	Understand about Applets.	Analysis (Level K4)
CO5.	Create simple stand alone application using Core Java and remote applications using Applet	Synthesis(Level K5)
AUCSAL4 / Allied-III	**R PROGRAMMING LAB**	
CO1.	Import and summarize data-sets in R	Knowledge (Level K1)
CO2.	Review and manipulate and summarize data-sets in R	Comprehension (Level K2)
CO3.	Identify online resources for R and import new function packages into the R workspace.	Comprehension(Level K2)
CO4.	Demonstrate use of basic functions.	Application (Level K3)

CO5.	Create and edit visualizations with R	Analysis (Level K4) Synthesis(Level K5)
AUCSID3 / SBC-III	**IMAGE DESIGNING LAB**	
CO1.	Design real world applications using Photoshop.	Application (Level K3)
CO2.	Analyze new features in Photoshop.	Analysis (Level K4)
CO3.	Develop new drawings using Photoshop.	Comprehension (Level K2)
CO4.	Expertise to work with Photoshop.	Knowledge (Level K1)
CO5.	Design skills pertaining to publication & web design.	Application (Level K3) Synthesis(Level K5)
AUCSN1 / NME-I	**BASICS OF COMPUTERS**	
CO1.	Recognize the different types of Computer.	Application (Level K3)
CO2.	Identify the components of a computer system.	Application (Level K3)
CO3.	Acquire knowledge on Communication System and Elements of Computers.	Comprehension (Level K2)
CO4.	Understand the purpose and elements of information systems and Web browsers.	Comprehension(Level K2)
CO5.	Inculcate knowledge on Internet, Intranet and E-mail.	Application (Level K3)
AUCSC6 / Core-IX	**PYTHON PROGRAMMING**	
CO1.	Get the basic knowledge about Python Programming.	Comprehension (Level K2)
CO2.	Apply essential programming concepts like strings, operators, conditional statements, functions, files and exception handling of Python in simple programs.	Application(Level K3)
CO3.	Analyze various concepts of Python.	Analysis (Level K4)
CO4.	Acquire the knowledge of problem solving and programming capability in Python.	Synthesis (Level K5)
CO5.	Evaluate applications using core concepts of Python.	Evaluation (Level K6)
AUCSC6 / Core-X	**OPERATING SYSTEM**	
CO1.	Recollect the concept of fundamental aspect of operating system	Knowledge (Level K1)
CO2.	Describe the concept of fundamental aspect of operating system	Knowledge (Level K1)

CO3.	Understand the concept of scheduling algorithms, Deadlock, process management and memory management	Knowledge (Level K1) Comprehension (Level K2)
CO4.	Sketch the Threats , Memory management and production policies	Application (Level K3)
CO5.	Acquire the knowledge about file management	Analysis(Level K4)
AUCSL5 / Core-XI	**PRACTICAL - IV PYTHON PROGRAMMING**	
CO1.	Implement various operators of Python.	Application(Level K3)
CO2.	Develop basic Python programs with I/O.	Application(Level K3)
CO3.	Apply string and lists in Python.	Analysis(Level K4)
CO4.	Analyze the Python programs with variables, loop, functions and operators.	Analysis(Level K4)
CO5.	Develop Python programs with files.	Synthesis(Level K5)
AUCSL6 / Core-XII	**PRACTICAL – V MATLAB**	
CO1.	Illustrate simple mathematical functions/equations in MATLAB	Application (Level K3)
CO2.	Interpret simple mathematical functions and operations theorem using plots or display.	Application (Level K3)
CO3.	Test the overall structure of MATLAB program to display required output.	Analysis (Level K4)
CO4.	Implement core MATLAB concepts.	Analysis (Level K4)
CO5.	Create simple stand alone application using MATLAB	Synthesis(Level K5)
AUCSA4 / Allied-IV	**OPERATION RESEARCH**	
CO1.	Understand the mathematical formulation of L.P.P	Comprehension (Level K2)
CO2.	Describe the concept of Operation Research.	Comprehension (Level K2)
CO3.	Apply transportation and assignment problem to allocate resources.	Application (Level K3)
CO4.	Acquire the knowledge about networks and graph.	Analysis (Level K4)
CO5.	Validate network scheduling by PERT and CPM.	Synthesis (Level K5)
AUCSIT4 / SBC-IV	**INTERNET OF THINGS**	
CO1.	Interpret different design challenges faced in IoT.	Comprehension (Level K2)
CO2.	Explain the components of IoT.	Knowledge (Level K1)

CO3.	Make use of IoT Circuits to obtain solutions.	Application (Level K3)
CO4.	Analyze basic protocols in wireless sensor network.	Analysis (Level K4)
CO5.	Gain and understand the concepts of Internet of Things.	Synthesis (Level K5)
AUCSIT4 / Core-XIII	**RELATIONAL DATABASE MANAGEMENT SYSTEM**	
CO1.	Remember the basic concepts and applications of database system	Knowledge(Level K1)
CO2.	Understand the basic concepts and applications of database system	Knowledge(Level K1) Comprehension (Level K2)
CO3.	Get the idea about various data models which describes the structure of database	Comprehension (Level K2)
CO4.	Design principles using ER models and Normalization approach	Comprehension (Level K2) Applications(Level K3)
CO5.	Interpret SQL interface of a RDBMS package to create, secure, maintain and query a database and PL/SQL programming using Triggers and Cursors	Comprehension (Level K2) Analysis(Level K4)
AUCSL7 / Core-XIV	**PRACTICAL – VI DOT NET PROGRAMMING**	
CO1.	Demonstrate the database connectivity with application programming.	Knowledge(Level K1)
CO2.	Design and execute different kinds of tasks in real time application.	Comprehension (Level K2)
CO3.	Analyze the Dot Net programs with variables, loop, functions and operators	Analysis(Level K4)
CO4.	Develop basic Dot Net programs with Database connectivity	Comprehension (Level K2) Applications(Level K3)
CO5.	Validate the results for the given input data.	Applications(Level K3)
AUCSL8 / Core-XV	**PRACTICAL – VII RELATIONAL DATABASE MANAGEMENT SYSTEM**	
CO1.	Explain various SQL Commands	Comprehension (Level K2) Applications(Level K3)
CO2.	Write SQL queries to user specification	Comprehension (Level K2) Applications(Level K3)

CO3.	Design database schema considering normalization and relationships within database	Comprehension (Level K2) Applications(Level K3)
CO4.	Develop PL/SQL Programs	Comprehension (Level K2) Applications(Level K3)
CO5.	Develop triggers, procedures and Cursors	Applications(Level K3) Analysis(Level K4)
AUCSE1 / Elective-I	**COMPUTER GRAPHICS**	
CO1.	List the display devices and recognize the Viewing and clipping algorithms.	Knowledge(Level K1)
CO2.	Have a broad knowledge about the overview of Graphics System.	Comprehend(Level K2)
CO3.	Describe the attributes of output primitives and geometric Transformation.	Comprehend(Level K2)
CO4.	Demonstrate the algorithms for drawing lines & circle.	Applications(Level K3) Synthesis (Level K5)
CO5.	Analyze the 2D and 3D viewing and clipping algorithms.	Analysis(Level K4)
AUCSE1 / Elective-I	**FUNDAMENTALS OF DIGITAL IMAGE PROCESSING**	
CO1.	Recollect the various types of data in Multimedia.	Knowledge (Level K1)
CO2.	Understand the fundamental elements of DIP and representation of an image in multi-dimensional aspects	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Apply arithmetic and logical operations for image enhancement process	Application (Level K3)
CO4.	Interpret the knowledge on compression techniques for security of an image.	Analysis (Level K4)
CO5.	Verify various deduction mechanisms in image segmentation.	Synthesis(Level K5)
AUCSE2 / Elective-II	**DATA MINING TECHNIQUES**	
CO1.	Understand the basic Concepts of data mining and data warehousing	Comprehension (Level K2)
CO2.	Analyze various data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	Analysis(Level K4)
CO3.	Choose appropriate data mining techniques to carry out simple data mining tasks	Application(Level K3) Analysis(Level K4)

CO4.	Develop data mining algorithms to store heterogeneous data	Synthesis(Level K5)
CO5.	Evaluate various data mining concepts and techniques.	Synthesis(Level K5)
AUCSE2 / Elective-II	**INFORMATION SECURITY**	
CO1.	Get an idea about Information Security Basis, Security Investigation, Security Analysis, Security Models and Security Physical Design	Knowledge(Level K1)
CO2.	Understand Security Investigation and Security Analysis	Comprehension (Level K2) Applications(Level K3)
CO3.	Analyze Security Models	Analysis(Level K4)
CO4.	Figure out the physical design of the security.	Analysis(Level K4)
CO5.	Understand the security threads and attacks	Synthesis(Level K5)
AUCSNA5 / SBC-V	**NUMERICAL APTITUDE**	
CO1.	Recollect and describe the basic concepts of logical reasoning	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Discuss problem solving and reasoning ability.	Comprehension (Level K2)
CO3.	Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.	Application(Level K3)
CO4.	Apply various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.	Application(Level K3)
CO5.	Critically evaluate various real life situations by resorting to analysis of key issues and factors.	Analysis (Level K4)
AUCSC9 / Core-XVI	**COMPUTER NETWORKS**	
CO1.	Recall the networking concepts, Transmission media and OSI layers of Network	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Compare OSI & TCP/IP models	Knowledge (Level K1) Comprehension (Level K2)

CO3.	Deploy the elementary Data link protocols	Application (Level K3)
CO4.	Interpret various Routing algorithms	Application (Level K3) Analysis (Level K4)
CO5.	Review transport service and Transmission control protocol like DNS, E-mail.	Synthesis(Level K5)
AUCSC10 / Core-XVII	**SOFTWARE ENGINEERING**	
CO1.	Recollect the basic terminologies and requirement for software development.	Knowledge (Level K1)
CO2.	Comprehend the core concepts of life cycle models.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Figure out the Data flow Diagram.	Application(Level K3)
CO4.	Apply the cost & size estimation Techniques and maintenance cost.	Comprehension (Level K2) Analysis (Level K4)
CO5.	Evaluate the software through various testing methods.	Synthesis (Level K5)
AUCSPR / Core-XVIII	**PROJECT WORK**	
CO1.	Understand the problem.	Comprehension (Level K2)
CO2.	Implement & execute the real time application.	Application(Level K3)
CO3.	Apply& execute the real time application.	Application(Level K3)
CO4.	Analyze various testing methods.	Analysis (Level K4)
CO5.	Verify the expected results in real time applications.	Synthesis (Level K5)
AUCSE3 / Elective-III	**BIG DATA ANALYTICS**	
CO1.	Recall and Understand the concept of Big data techniques, environment, framework and Hadoop ecosystem	Knowledge(Level K1)
CO2.	Apply Statistical data analysis and tools to manage and analyze the big data	Comprehension (Level K2) Applications(Level K3)
CO3.	Analyze Hadoop components and their uses for big data processing	Analysis(Level K4)
CO4.	Examine the impact of big data for business decisions and strategy	Analysis(Level K4)
CO5.	Manage large-scale analytics tools to solve some open big data problems	Synthesis(Level K5)

AUCSE3 / Elective-III	**CLOUD COMPUTING**	
CO1.	Define cloud computing and get the idea about cloud architecture.	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Understand and use the web services available in Cloud Computing.	Comprehension (Level K2)
CO3.	Interpret Cloud Services, security, and architecture.	Synthesis (Level K5)
CO4.	Know the available web services in cloud computing.	Analysis (Level K4)
CO5.	Get an idea of security threats in cloud.	Application(Level K3)
AUCSE3 / Elective-III	**MOOC ONLINE COURSE**	
CO1.	Understand and use the web services available in Internet	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Know the web resources in Internet.	Analysis (Level K4)
CO3.	Interpret usage of Online courses.	Synthesis (Level K5)
CO4.	Know the available course content of the new technologies.	Analysis (Level K4)
CO5.	Get an idea of New technologies.	Application(Level K3)
AUCSTI6 / SBC VI	**TRENDS IN INFORMATION TECHNOLOGY**	
CO1.	Acquire knowledge on Information Security and Multimedia.	Knowledge (Level K1)
CO2.	Understand the concept of Telecommunications.	Comprehension (Level K2)
CO3.	Develop Scripts for Information Technology applications.	Application (Level K3)
CO4.	Analyze the computing requirements for the appropriate solutions.	Analysis (Level K4)
CO5.	Evaluate multimedia based applications.	Synthesis(Level K5)
AUCSN2 / NME-II	**COMPUTER FOR DIGITAL ERA**	
CO1.	Get an idea about computer and apply the computing technology in their day to day life.	Knowledge (Level K1) Applications(Level K3)
CO2.	Acquire the knowledge about digital India initiatives to their surroundings.	Knowledge (Level K1)
CO3.	Identify the areas extend the digital computing for their benefits.	Comprehension (Level K2)

CO4.	To understand about the E- learning and Security issues.	Comprehension (Level K2) Applications(Level K3)
CO5.	To create awareness about MOOC, SWAYAM, NPTEL courses.	Analysis(Level K4) Synthesis(Level K5)
EXTRA - CREDIT PAPERS		
Semester –I / UGEGC	**GREEN COMPUTING**	
CO1.	Discuss about basic concepts of green computing.	Knowledge (Level K1)
CO2.	Describe green IT in relation to technology	Comprehension (Level K2)
CO3.	Evaluate IT use in relation to environmental perspectives.	Application (Level K3)
CO4.	Analyze the role of Electric Utilities.	Analysis (Level K4)
CO5.	Use methods and tools to measure energy consumption.	Application (Level K3) Analysis (Level K4)
Semester –III / UGET	**TALLY LAB**	
CO1.	Get idea about creation and alteration of company profile	Knowledge (Level K1)
CO2.	Understand and apply various accounting voucher entries	Application (Level K3) Knowledge (Level K1)
CO3.	Acquire the knowledge in bank reconciliation statement preparation and stock summary.	Comprehension (Level K2)
CO4.	Designed to impart knowledge regarding concepts of Financial Accounting.	Application (Level K3)
CO5.	Required skills and can also be employed as Tally data entry operator.	Analysis (Level K4)
Semester –V / UGEMA	**MULTIMEDIA AND ITS APPLICATIONS**	
CO1.	Define multimedia to potential clients.	Knowledge (Level K1)
CO2.	Identify and describe the function of the general skill sets in the multimedia industry.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Identify the basic components of multimedia building blocks.	Analysis (Level K4)
CO4.	Work with sound, Image, Animation and Video.	Application (Level K3)
CO5.	Knowledge about the applications of Multimedia.	Application (Level K3)

		Analysis (Level K4)
VALUE ADDED COURSES		
Semester –II / AUCSHT	**HARDWARE AND TROUBLESHOOTING**	
CO1.	Obtaining knowledge of troubleshoot the hardware components of a computer.	Knowledge (Level K1)
CO2.	Comprehending the troubleshooting techniques for storage devices, input and output devices.	Comprehension (Level K2)
CO3.	Applying the troubleshooting techniques for hardware failures.	Application (Level K3)
CO4.	Examining the troubleshooting techniques in Network, Printers and Mother board.	Analysis (Level K4)
CO5.	Assembling a new system with standard hardware component	Synthesis (Level K5)
Semester –IV / AUCSADPL	**APPLICATION DEVELOPMENT IN PROGRAMMING LANGUAGES**	
CO1.	Acquiring the knowledge of Application Development in Programming Languages	Knowledge (Level K1)
CO2.	Understanding the concept of interpreter and Compiler	Comprehension (Level K2)
CO3.	Illustrating categories of programming languages	Application (Level K3)
CO4.	Correlating various programming languages used in popular website	Analysis (Level K4)
CO5.	Developing simple applications in structured and object oriented Programming Languages.	Evaluation (Level K6)
Semester –VI / AUCSCDE	**COMPUTER FOR DIGITAL ERA**	
CO1.	Get an idea about computer and apply the computing technology in their day to day life.	Knowledge (Level K1) Applications(Level K3)
CO2.	Acquire the knowledge about digital India initiatives to their surroundings.	Knowledge (Level K1)
CO3.	Enhancing the digital skill-set required in workplace.	Comprehension (Level K2)
CO4.	To understand about the E- learning and Security issues.	Comprehension (Level K2) Applications(Level K3)
CO5.	To create awareness about MOOC, SWAYAM, NPTEL courses.	Analysis(Level K4) Synthesis(Level K5)

PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF COMPUTER SCIENCE

M.Sc (COMPUTER SCIENCE) COURSE

PSO, PO AND CO STATEMENTS / 2022

M.Sc (COMPUTER SCIENCE)	
M.Sc (COMPUTER SCIENCE)/ PROGRAMMES SPECIFIC OUTCOMES	
PSOs	**PROGRAMME SPECIFIC OUTCOMES**
PSO1	Apply standard Computer science practices and strategies in real-time software project development using open-source programming environment or commercial environment to deliver quality product for the organization success.
PSO2	Design and develop computer programs/computer-based systems in the areas related to algorithms, networking, web design, Grid and cloud computing.
PSO3	Able to pursue research in Data mining, Image processing and Networking areas and implement his work in MATAB and **.**Net environment.
PSO4	Ability to develop, design, implement computer programs and use knowledge in various domains to identify research gaps and hence to provide solutions to new ideas and innovations.
PSO5	Apply the acquired knowledge to develop software and innovative solutions by adopting emerging technologies.
M.Sc (COMPUTER SCIENCE)	
M.Sc (COMPUTER SCIENCE)/ PROGRAMMES OUTCOMES	
POs	**Description of Pos**
PO1	Communicate computer science concepts, designs, and solutions effectively and professionally.
PO2	Apply knowledge of computing to produce effective designs and solutions for specific problems.
PO3	Identify, analyze, and synthesize scholarly literature relating to the field of computer science.
PO4	Use software development tools, software systems, and modern computing platforms.
PO5	Attend SET/NET exams with confidence

M.Sc (COMPUTER SCIENCE)/ COURSE OUTCOMES		
	Description of COs	**Bloom's Taxonomy / Cognitive Domain**
APCSC1 / Core-I	**Discrete Structures**	
CO1.	Recognize mathematical logics to solve computational problems	Comprehension (Level K2)
CO2.	Examine the concepts of sets, relations and functions	Application(Level K3)
CO3.	Formulate problems and solve recurrence relations	Application(Level K3) Analysis (Level K4)
CO4.	Develop solutions for real world problems using graph theory	Synthesis (Level K5)
CO5.	Evaluate the real world problems using graph theory	Evaluation (Level K6)
APCSC2 / Core-II	**Advanced Java Programming**	
CO1.	Understand the logics of applets, AWT event handling, Servlet and RMI	Comprehension (Level K2)
CO2.	Write Servlets to access database using Java Data Base Connectivity (JDBC)	Application(Level K3)
CO3.	Applications of database using Java Data Base Connectivity (JDBC)	Application(Level K3)
CO4.	Demonstrate capabilities of server using the concept of Servlet	Analysis(Level K4)
CO5.	Validate remote methods in an application using Remote Method Invocation (RMI)	Synthesis(Level K5)
APCSC3/ Core-III	**Advanced Operating System**	
CO1.	Understand the concepts of distributed operating system.	Comprehension (Level K2)
CO2.	Describe the concepts of distributed operating system.	Comprehension (Level K2)
CO3.	Apply the concepts of synchronization and handle Deadlocks.	Application(Level K3)
CO4.	Examine the functionalities of distributed resource management.	Analysis(Level K4)
CO5.	Evaluate various operating systems such as multiprocessor operating system and database operating system.	Synthesis(Level K5)

APCSL1 / Core-IV	**Practical - I Advanced Java Programming**	
CO1.	Execute interactive web pages using HTML and JavaScript.	Application(Level K3)
CO2.	Apply interactive web pages using HTML and JavaScript.	Application(Level K3)
CO3.	Acquire knowledge about Servlet and RMI.	Analysis(Level K4)
CO4.	To connect java program with external database using JDBC.	Synthesis(Level K5)
CO5.	Evaluate with external database using JDBC.	Synthesis(Level K5)
APCSL2/ Core-V	**Practical – II Advanced Web Technology Lab**	
CO1.	Create web pages using HTML and CSS.	Application(Level K3)
CO2.	Describe web pages using HTML and CSS.	Application(Level K3)
CO3.	Apply JavaScript for interactive web pages.	Application(Level K3)
CO4.	Validate server side scripting using JSP.	Synthesis(Level K5)
CO5.	Evaluate server side scripting using JSP.	Synthesis(Level K5)
APCSE1 / Elective –I	**Artificial Intelligence And Machine Learning**	
CO1.	Understand the basic concepts of Artificial Intelligence and machine learning algorithms	Comprehension (Level K2)
CO2.	Classify strength and weakness of different problem solving techniques	Comprehension (Level K2)
CO3.	Apply Artificial Intelligence and Machine Learning Techniques to solve real world problems	Application(Level K3)
CO4.	Examine the different heuristic techniques for problem solving and create new solutions	Analysis(Level K4)
CO5.	Evaluate various Programming Environment used to Develop Machine Learning Algorithms	Synthesis(Level K5)
APCSE1 / Elective -I	**Data Mining And Warehousing**	
CO1.	Understand the basic Concepts of data mining and data warehousing	Comprehension (Level K2)
CO2.	Analyze various data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	Comprehension (Level K2)
CO3.	Choose appropriate data mining techniques to carry out simple data mining tasks	Application(Level K3)

CO4.	Develop data mining algorithms to store heterogeneous data	Analysis(Level K4)
CO5.	Evaluate various Data mining concepts and techniques	Synthesis(Level K5)
APCSC4 / Core-VI	**Cryptography and Network Security**	
CO1.	Describe cryptography and network security concepts and its application.	Comprehension (Level K2)
CO2.	Get the idea about encryption standards.	Comprehension (Level K2)
CO3.	Examine various cryptography algorithms.	Application(Level K3)
CO4.	Validate the authentication using digital signature and authentication protocols.	Synthesis(Level K5)
CO5.	Evaluate the authentication using digital signature and authentication protocols.	Synthesis(Level K5)
APCSC5 / Core-VII	**Internet Of Things And Its Applications**	
CO1.	Gain and understand the concepts of Internet of Things	Knowledge(Level K1)
CO2.	Analyze basic protocols in wireless sensor network	Knowledge(Level K1)
CO3.	Understand the application areas of IOT.	Comprehension (Level K2)
CO4.	Implement interfacing of various network & communication aspects	Analysis(Level K4)
CO5.	Evaluate the various state of the art methodologies	Synthesis(Level K5)
APCSC6 / Core-VIII	**Advanced Python Programming**	
CO1.	Get the basic knowledge about Python Programming	Comprehension (Level K2)
CO2.	Apply essential programming concepts like strings, operators, conditional statements, functions, files and exception handling of Python in simple programs	Application(Level K3)
CO3.	Analyze various concepts of Python	Analysis (Level K4)
CO4.	Acquire the knowledge of problem solving and programming capability in python.	Synthesis (Level K5)
CO5.	Evaluate applications using core concepts of Python	Evaluation (Level K6)
APCSL3 / Core-IX	**Practical – III Advanced Python Programming**	
CO1.	Implement various operators of Python	Application(Level K3)

CO2.	Applications of various operators of Python	Application(Level K3)
CO3.	Review the Python programs with variables, loop, functions and operators	Analysis(Level K4)
CO4.	Analyze the Python programs with variables, loop, functions and operators	Analysis(Level K4)
CO5.	Develop application with Python core concepts	Synthesis(Level K5)
APCSL4 / Core-X	**Practical – IV.Net Framework**	
CO1.	Develop simple VB.NET program using forms.	Application(Level K3)
CO2.	Apply simple VB.NET program using forms.	Application(Level K3)
CO3.	Execute VB.NET application with various controls.	Analysis(Level K4)
CO4.	Update database using SQL server.	Synthesis(Level K5)
CO5.	Evaluate database using SQL server.	Synthesis(Level K5)
APCSE2 / Elective- II	**Grid And Cloud Computing**	
CO1.	Understand the basic concepts of Grid and Cloud computing	Comprehension (Level K2)
CO2.	Describe the architecture of Grid and Cloud computing	Comprehension (Level K2) Application(Level K3)
CO3.	Acquire knowledge about Grid Scheduling and Cloud Computing services	Analysis(Level K4)
CO4.	Acquire knowledge about Grid Scheduling and Resource management	Analysis(Level K4)
CO5.	Validate Cloud services by using various cloud service providers such as Amazon, Google and Microsoft	Synthesis(Level K5)
APCSE2 / Elective- II	**Principles Of Compiler Design**	
CO1.	Examine the basic function of compiler and interpreter	Comprehension (Level K2)
CO2.	Understand the core concepts of phases of compiler	Comprehension (Level K2)
CO3.	Apply Context Free Grammar for simplify the expression using different kinds of parsers	Application(Level K3)

CO4.	Interpret the code generation and optimization process	Analysis(Level K4)
CO5.	Evaluate the code generation and optimization process	Synthesis(Level K5)
APCSC7 / Core -XI	**Big Data Science And Analytics**	
CO1.	Understand the concept of Big data techniques, environment, framework and Hadoop ecosystem	Comprehension (Level K2)
CO2.	Apply data management concepts in MYSQL database	Application(Level K3)
CO3.	Analyze Hadoop components and their uses for big data processing	Analysis(Level K4)
CO4.	Examine the impact of big data for business decisions and strategy	Analysis(Level K4)
CO5.	Manage large-scale analytics tools to solve some open big data problems	Synthesis(Level K5)
APCSC8 / Core –XII	**Advanced Software Engineering**	
CO1.	Discuss the stages of software development life cycle	Comprehension (Level K2) Application (Level K3)
CO2.	Examine various Software development life cycle models	Comprehension (Level K2)
CO3.	Analyze the role of project management including requirement gathering, planning, designing and maintenance	Analysis(Level K4)
CO4.	Apply software engineering design principles	Application (Level K3)
CO5.	Evaluate various testing principles on software project for risk management	Synthesis(Level K5)
APCSC9 / Core –XIII	**PHP AND MYSQL**	
CO1.	Understand the basic concepts of PHP and MYSQL.	Comprehension (Level K2)
CO2.	Describe the basic concepts of PHP and MYSQL.	Comprehension (Level K2)

CO3.	Illustrate String, array, mathematical, date and time functions in PHP	Application(Level K3)
CO4.	Examine the regular expressions and file system of PHP.	Analysis(Level K4)
CO5.	To validate database queries in PHP using MYSQL.	Synthesis(Level K5)
APCSL5 / Core –XIV	**Practical- V PHP and MYSQL**	
CO1.	Describe String functions and regular expressions.	Application(Level K3)
CO2.	Apply String functions and regular expressions.	Application(Level K3)
CO3.	Demonstrate the database connectivity with MYSQL database.	Analysis(Level K4)
CO4.	Develop web pages using PHP and MYSQL.	Synthesis(Level K5)
CO5.	Evaluate web pages using PHP and MYSQL.	Synthesis(Level K5)
APCSL6 / Core -XV	**Practical –VI Advanced Mat Lab**	
CO1.	Illustrate simple mathematical functions/equations in MATLAB.	Application(Level K3)
CO2.	Interpret simple mathematical functions and operations theorem using plots or display.	Analysis(Level K4)
CO3.	Visualize simple mathematical functions and operations theorem using plots or display.	Analysis(Level K4)
CO4.	Describe the overall structure of MATLAB program to display required output.	Analysis(Level K4)
CO5.	Test the overall structure of MATLAB program to display required output.	Analysis(Level K4)
APCSE3 / Elective – III	**Mobile Application Development**	
CO1.	Design and Develop User Interfaces for the Android Platform.	Comprehension (Level K2)
CO2.	Comprehend the process to making software for smart phone and Digital Assistant commonly for	Comprehension (Level K2)

	Android and IOS.	
CO3.	Analysis State information across important Operating System.	Analysis(Level K4)
CO4.	Apply Database concept to Android Application Development.	Synthesis(Level K5)
CO5.	Acquire the knowledge on social media Integration	Application(Level K3) Synthesis(Level K5)
APCSE3 / Elective - III	**System software**	
CO1.	Get the idea about components of system software	Comprehension (Level K2)
CO2.	Interpret the intermediate code generation in context of language designing.	Comprehension (Level K2)
CO3.	Analyze and implement assemblers ,loaders, linkers, Macro and Compilers	Application(Level K3)
CO4.	Collect the knowledge of process management and information management via different tools	Analysis(Level K4)
CO5.	Evaluate the concept of system programming techniques using various software tools.	Synthesis(Level K5)
APCSL7 / Core –XVI	**Practical –VII Advanced R-Programming**	
CO1.	Import and summarize data-sets in R	Knowledge (Level K1)
CO2.	Review and manipulate and summarize data-sets in R	Comprehension (Level K2)
CO3.	Identify online resources for R and import new function packages into the R workspace.	Comprehension(Level K2)
CO4.	Demonstrate use of basic functions.	Application (Level K3)
CO5.	Create and edit visualizations with R	Analysis (Level K4) Synthesis(Level K5)
APCSPR / Core –XVII	**Project Work**	
CO1.	Understand the problem.	Comprehension (Level K2)
CO2.	Implement the real time application.	Application(Level K3)

CO3.	Execute the real time application.	Application(Level K3)
CO4.	Analyze various testing methods.	Analysis (Level K4)
CO5.	Verify the expected results in real time applications.	Synthesis(Level K5)
APCSE4 / Elective - IV	**Digital Image Processing**	
CO1.	Understand the components of Digital Image Processing	Comprehension (Level K2)
CO2.	Recognize the fundamental elements of DIP and representation of an image in multi dimensional aspects	Comprehension (Level K2)
CO3.	Apply arithmetic and logical operations on image enhancement process	Application (Level K3)
CO4.	Interpret the knowledge on compression techniques for security of an image	Analysis (Level K4)
CO5.	Verify various deduction mechanisms in image segmentation	Synthesis(Level K5)
APCSE4 / Elective - IV	**Soft Computing**	
CO1.	Discuss the nature of soft computing and its applications	Comprehension (Level K2)
CO2.	Apply soft computing techniques in small applications	Comprehension (Level K2) Application(Level K3)
CO3.	Analyze various soft computing techniques to solve real life problems	Analysis(Level K4)
CO4.	Evaluate the basis of Fuzzy logic, fuzzy relations and defuzzification techniques	Analysis(Level K4)
CO5.	Develop intelligence systems leveraging the paradigm of soft computing techniques	Synthesis(Level K5)
APCSE4 / Elective - IV	**MOOC Online Educational Course**	
CO1.	Understand and use the web services available in Internet	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Know the web resources in Internet.	Analysis (Level K4)

CO3.	Interpret usage of Online courses.	Synthesis (Level K5)
CO4.	Know the available course content of the new technologies.	Analysis (Level K4)
CO5.	Get an idea of New technologies.	Application(Level K3)

PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF COMPUTER SCIENCE

BCA - SKILL-BASED COURSES, NON-MAJOR ELECTIVE COURSES, EXTRA-CREDIT COURSES & VALUE-ADDED COURSES

PSO, PO & CO STATEMENTS / 2022

PSOs	PROGRAMME SPECIFIC OUTCOMES
PSO1	Able to work as software programmer, system and network administrator, web designer faculty for computer science and computer applications
PSO2	Able to design and develop computer applications for Business problems.
PSO3	Able to create platforms to become an entrepreneur and a relish for higher studies such as M.C.A., M.Sc., etc.,
PSO4	Apply standard Computer science practices and strategies in real-time software project development.
PSO5	Work with and communicate effectively with professionals in various fields and persue life long professional development in computing.
BCA	
BCA / PROGRAMMES OUTCOMES	
Pos	**Description of POs**
PO1	Understand the Concepts of key areas of Computer Science.
PO2	Analyze and apply latest technologies to solve problems in the areas of Computer Applications.
PO3	Develop various real-time applications using latest technologies and programming languages.
PO4	Possess Strong foundation for their higher studies.
PO5	Become employable in various IT companies and Government jobs.
PO6	Develop practical skills to provide solutions to industry, society and Business.

BCA/ COURSE OUTCOMES		
	Description of COs	**Bloom's Taxonomy / Cognitive Domain**
AUBCC1 / Core - I	**PROGRAMMING IN C**	
CO1.	Recall and understand the fundamentals of C programming.	Knowledge (Level K1)
CO2.	To acquire the programming logic, use of program instruction, syntax and programming structure.	Comprehension (Level K2)
CO3.	Understand the concepts of decision making, branching and looping	Knowledge (Level K1) Comprehension(Level K2)
CO4.	Implement different operations on arrays and functions to solve the problem	Application (Level K3)
CO5.	Execute file operations to preserve data in physical disk.	Application(Level K3)
AUBCL1 / Core - II	**PRACTICAL – I PROGRAMMING IN C**	
CO1.	Read and understand the execution of programs written in C language.	Knowledge (Level K1)
CO2.	Trace the execution of programs written in C language.	Comprehension (Level K2)
CO3.	Implement various concepts in C.	Application(Level K3)
CO4.	Implement programs with pointers and arrays, perform pointer arithmetic and use the pre-processor.	Application(Level K3)
CO5.	Write the C code for a given algorithm.	Analysis(Level K4) Synthesis (Level K5)
AUBCA1 / Allied -I	**DISCRETE MATHEMATICS**	
CO1.	Recall the basic concepts of Mathematics	Knowledge (Level K1)
CO2.	Impart different kinds of Matrices, Equations, Sets, Relations and Graphs.	Knowledge (Level K1)
CO3.	Comprehend different kinds of Matrices, Equations, Sets, Relations and Graphs.	Comprehension (Level K2)
CO4.	Solve the equations to find the roots	Comprehension (Level K2) Application (Level K3)
CO5.	Analyze the real world problems using Graph Theory	Analysis (Level K4)

AUBCWT1 / SBC-I	**WEB TECHNOLOGY LAB**	
CO1.	Classify various HTML tags.	Comprehension (Level K2)
CO2.	Apply various HTML tags.	Applications(Level K3)
CO3.	Illustrate HTML tags in simple programs.	Applications(Level K3)
CO4.	Analyze a web page and identify its elements and attributes.	Analysis(Level K4)
CO5.	Design websites using HTML tag.	Synthesis(Level K5)
AUBCC2 / Core - III	**DATA STRUCTURES WITH C++**	
CO1.	Get an idea about object oriented paradigm with concepts of streams, classes, functions, data and objects and also recollect the concepts of files.	Knowledge (Level K1)
CO2.	Classify difference between object oriented programming and procedural oriented language and data types in C++.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Apply dynamic memory management techniques using pointers, constructors, destructors, etc	Application (Level K3)
CO4.	Recognize fundamental concepts of Data structures, space complexity and time complexity.	Application (Level K3)
CO5.	Understand linear data structures such as stacks, queues, linked list and non linear data structures such as trees and Graphs.	Analysis (Level K4) Synthesis(Level K5)
AUBCL2 / Core - VI	**PRACTICAL –II DATA STRUCTURES USING C++**	
CO1.	Understand Object oriented features and C++ concepts.	Comprehension (Level K2)
CO2.	Apply Object oriented features and C++ concepts.	Application (Level K3)
CO3.	Practice to solve the real world problems.	Application (Level K3)
CO4.	Apply to solve the real world problems.	Application (Level K3)
CO5.	Experiment various data structure concepts using C++.	Analysis (Level K4)
AUBCA2 / Allied - II	**DIGITAL ELECTRONICS**	
CO1.	Gain the knowledge of input and output devices, Number System, Simplification Techniques, Combinational and Sequential Circuits.	Knowledge (Level K1) Comprehension (Level K2)

CO2.	Understand the fundamental concepts and techniques used in digital electronics	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Apply the concepts of Boolean Algebra, Logic gates, Logic Variables and Truth tables to simplify equations.	Applications (Level K3)
CO4.	Analyze combinational logic in terms of Adder, Subtractor and Multiplexer circuits.	Applications (Level K3) Analysis (Level K4)
CO5.	Comprehend the combinational logic in terms of Adder, Subtractor and Multiplexer circuits	Comprehension (Level K3)
AUBCID2 / SBC- II	**IMAGE DESIGNING LAB**	
CO1.	Design real world applications using Photoshop.	Application (Level K3)
CO2.	Analyze new features in Photoshop.	Analysis (Level K4)
CO3.	Develop new drawings using Photoshop.	Comprehension (Level K2)
CO4.	Expertise to work with Flash.	Knowledge (Level K1)
CO5.	Design skills pertaining to publication and animation.	Application (Level K3) Synthesis(Level K5)
AUBCC3 / Core - V	**JAVA PROGRAMMING**	
CO1.	Recollect the OOPs concepts such as Class, Inheritance, Encapsulation and Polymorphism	Knowledge(Level K1) Comprehension (Level K2)
CO2.	Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.	Knowledge(Level K1) Comprehension (Level K2)
CO3.	Implement programs using more advanced features such as Interface, Packages and Multithreading	Applications(Level K3)
CO4.	Analyze differences between application program and applets, applet lifecycle and graphics programming	Analysis(Level K4)
CO5.	Validate Java Programs using Stream Classes and files	Synthesis(Level K5)
AUBCC4 / Core – VI	**COMPUTER ORGANIZATION**	

CO1.	Recollect the basic structure of Computer and get the idea about instructions, input-output organization, Memory system, Processing and Pipelining.	Knowledge (Level K1)
CO2.	Understand the basic structure of Computer and get the idea about instructions, input-output organization, Memory system, Processing and Pipelining.	Comprehension (Level K2)
CO3.	Classify various digital components	Comprehension (Level K2)
CO4.	Describe arithmetic and logic operations of processing unit	Comprehension (Level K2) Application (Level K3)
CO5.	Analyze various types of computers, instructions, memory system and working principles of pipelining	Application (Level K3) Analysis (Level K4)
AUBCL3 / Core - VII	**PRACTICAL -III JAVA PROGRAMMING**	
CO1.	Sketch the Oops concepts and gain the knowledge of Java and Applet	Application (Level K3)
CO2.	Write Java Application programs using proper program structure	Application (Level K3)
CO3.	Describe the core java concepts.	Analysis (Level K4)
CO4.	Understand about Applets	Analysis (Level K4)
CO5.	Create simple stand alone application using Core Java and remote applications using Applet	Synthesis(Level K5)
AUBCL4 / Core - VIII	**PRACTICAL -IV MATLAB**	
CO1.	Illustrate simple mathematical functions/equations in MATLAB	Application (Level K3)
CO2.	Interpret and visualize simple mathematical functions and operations thereon using plots or display	Application (Level K3)
CO3.	Test the overall structure of MATLAB program to display required output	Analysis (Level K4)
CO4.	Implement core MATLAB concepts.	Analysis (Level K4)
CO5.	Create simple stand alone application using MATLAB	Synthesis(Level K5)
AUBCA3 / Allied - III	**PRINCIPLES OF BUSINESS ACCOUNTING**	
CO1.	Understand the accounting concept, conversion, methods and its rules.	Knowledge(Level K1)
CO2.	Acquire knowledge for preparation of journal and Ledger.	Analysis(Level K4)

CO3.	Summarize the ledger balance and check the arithmetical accuracy of books of accounts.	Applications(Level K3)
CO4.	Demonstrate an understanding of the principles accrual accounting.	Applications(Level K3)
CO5.	Prepare Financial statement of sole trading concern with accounting principles.	Synthesis(Level K5)
AUBCBA3 / SBC III	**BUSINESS ACCOUNTING LAB**	
CO1.	Understand the accounting concept, conversion, methods and its rules.	Knowledge(Level K1)
CO2.	Acquire knowledge for preparation of journal and Ledger.	Analysis(Level K4)
CO3.	Summarize the ledger balance and check the arithmetical accuracy of books of accounts.	Applications(Level K3)
CO4.	Applications of ledger balance and check the arithmetical accuracy of books of accounts.	Applications(Level K3)
CO5.	Prepare Financial statement of sole trading concern with accounting principles.	Synthesis(Level K5)
AUBCN1 / NME - I	**COMPUTER APPLICATION FOR AUTOMATION**	
CO1.	Practice MS-Office package and do the documentation, presentation and manipulating the tables.	Applications(Level K3)
CO2.	Generate equations, sample calculations and basic diagrams in Microsoft Word.	Applications(Level K3)
CO3.	Get idea about creation of work sheet in MS-EXCEL.	Comprehension (Level K2)
CO4.	Apply various animation effects using POWERPOINT.	Applications(Level K3)
CO5.	Acquire the knowledge about the database creation in MS-ACCESS.	Analysis(Level K4)
AUBCC5 / Core -IX	**PYTHON PROGRAMMING**	
CO1.	Get the basic knowledge about Python Programming	Comprehension (Level K2)
CO2.	Apply essential programming concepts like strings, operators, conditional statements, functions, files and exception handling of Python in simple programs	Application(Level K3)
CO3.	Analyze various concepts of Python	Analysis (Level K4)
CO4.	Acquire the knowledge of problem solving and programming capability in python.	Synthesis (Level K5)
CO5.	Evaluate applications using core concepts of Python	Evaluation (Level K6)
AUBCC6 / Core -X	**OPERATING SYSTEM**	

CO1.	Recollect the concept of fundamental aspect of operating system	Knowledge (Level K1)
CO2.	Analyze important algorithms.	Knowledge (Level K1)
CO3.	Understand the concept of scheduling algorithms, Deadlock, process management and memory management	Knowledge (Level K1) Comprehension (Level K2)
CO4.	Sketch the Threats , Memory management and production policies	Application (Level K3)
CO5.	Acquire the knowledge about file management	Analysis(Level K4)
AUBCL5 / Core -XI	**PRACTICAL V R PROGRAMMING**	
CO1.	Import and summarize data-sets in R	Knowledge (Level K1)
CO2.	Review and manipulate and summarize data-sets in R	Comprehension (Level K2)
CO3.	Identify online resources for R and import new function packages into the R workspace.	Comprehension(Level K2)
CO4.	Demonstrate use of basic functions.	Application (Level K3)
CO5.	Create and edit visualizations with R	Analysis (Level K4) Synthesis(Level K5)
AUBCL6 / Core -XII	**PRACTICAL VI PYTHON PROGRAMMING**	
CO1.	Implement various operators of Python	Application(Level K3)
CO2.	Develop basic python programs with I/O operations.	Application(Level K3)
CO3.	Apply strings and lists in python.	Analysis(Level K4)
CO4.	Analyze the Python programs with variables, loop, functions and operators	Analysis(Level K4)
CO5.	Develop python programs with files.	Synthesis(Level K5)
AUBCA4 / Allied - IV	**COMPUTER BASED OPTIMIZATION TECHNIQUES**	
CO1.	Understand the mathematical formulation of L.P.P	Comprehension (Level K2)
CO2.	Describe the concept of Operation Research.	Comprehension (Level K2)
CO3.	Apply transportation and assignment problem to allocate resources.	Application (Level K3)
CO4.	Acquire the knowledge about networks and graph.	Analysis (Level K4)

CO5.	Validate network scheduling by PERT and CPM.	Synthesis (Level K5)
AUBCNA4 / SBCIV	**PRINCIPLES OF MANAGEMENT**	
CO1.	Understand the concept of levels of management, objectives of management, process of planning, types of Organization and leadership quality.	Knowledge (Level K1)
CO2.	Describe the concept of levels of management, objectives of management, process of planning, types of Organization and leadership quality.	Comprehension (Level K2)
CO3.	Summarize the characteristics and situational theories of leadership.	Knowledge (Level K1) Comprehension (Level K2)
CO4.	Discuss the important factor for types of organization and responsibility of authorities.	Comprehension(Level K2) Applications (Level K3)
CO5.	Acquire the knowledge on efficient communication in management	Analysis (Level K4)
AUBCC7 / Core -XIII	**Relational Database Management System**	
CO1.	Remember the basic concepts and applications of database system	Knowledge(Level K1)
CO2.	Understand the basic concepts and applications of database system	Knowledge(Level K1) Comprehension (Level K2)
CO3.	Get the idea about various data models which describes the structure of database	Comprehension (Level K2)
CO4.	Design principles using ER models and Normalization approach	Comprehension (Level K2) Applications(Level K3)
CO5.	Interpret SQL interface of a RDBMS package to create, secure, maintain and query a database and PL/SQL programming using Triggers and Cursors	Comprehension (Level K2) Analysis(Level K4)
AUBCL7 / Core -XIV	**PRACTICAL VII Dot Net Programming Lab**	
CO1.	Demonstrate the database connectivity with application programming.	Knowledge(Level K1)
CO2.	Design and execute different kinds of tasks in real time application.	Comprehension (Level K2)
CO3.	Analyze the Dot Net programs with variables, loop, functions and operators	Analysis(Level K4)

CO4.	Develop basic Dot Net programs with Database connectivity	Comprehension (Level K2) Applications(Level K3)
CO5.	Validate the results for the given input data.	Applications(Level K3)
AUBCL8 / Core -XV	**Relational Database Management System Lab**	
CO1.	Explain various SQL Commands	Comprehension (Level K2) Applications(Level K3)
CO2.	Write SQL queries to user specification	Comprehension (Level K2) Applications(Level K3)
CO3.	Design database schema considering normalization and relationships within database	Comprehension (Level K2) Applications(Level K3)
CO4.	Develop PL/SQL Programs	Comprehension (Level K2) Applications(Level K3)
CO5.	Develop triggers, procedures and Cursors	Applications(Level K3) Analysis(Level K4)
AUBCE1 / Elective I	**Software Engineering**	
CO1.	Recollect the basic terminologies and requirement for software development.	Knowledge (Level K1)
CO2.	Comprehend the core concepts of life cycle models.	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Figure out the Data flow Diagram.	Application(Level K3)
CO4.	Apply the cost & size estimation Techniques and maintenance cost.	Comprehension (Level K2) Analysis (Level K4)
CO5.	Evaluate the software through various testing methods.	Synthesis (Level K5)
AUBCE1 / Elective -I	**CLOUD COMPUTING**	
CO1.	Define cloud computing and get the idea about cloud architecture	Knowledge(Level K1)
CO2.	Understand different cloud services and architecture	Comprehension (Level K2)

CO3.	Applications of Cloud Services and security	Applications(Level K3) Analysis(Level K4)
CO4.	Analyze the cloud mail services	Analysis(Level K4)
CO5.	Evaluate various Cloud Services and security	Synthesis(Level K5)
AUBCE2 / Elective -II	**DATA MINING TECHNIQUES**	
CO1.	Understand the basic Concepts of data mining and data warehousing	Comprehension (Level K2)
CO2.	Analyze various data mining techniques like classifications, clustering, association rule mining, prediction and related algorithm	Analysis(Level K4)
CO3.	Choose appropriate data mining techniques to carry out simple data mining tasks	Application(Level K3) Analysis(Level K4)
CO4.	Develop data mining algorithms to store heterogeneous data	Synthesis(Level K5)
CO5.	Evaluate various data mining concepts and techniques.	Synthesis(Level K5)
AUBCE2 / Elective -II	**INFORMATION SECURITY**	
CO1.	Get an idea about Information Security Basis, Security Investigation, Security Analysis, Security Models and Security Physical Design	Knowledge(Level K1)
CO2.	Understand Security Investigation and Security Analysis	Comprehension (Level K2) Applications(Level K3)
CO3.	Analyze Security Models	Analysis(Level K4)
CO4.	Figure out the physical design of the security.	Analysis(Level K4)
CO5.	Understand the security threads and attacks	Synthesis(Level K5)
AUBCNA5 / SBC - V	**NUMERICAL APTITUDE**	
CO1.	Recollect and describe the basic concepts of logical reasoning	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Discuss problem solving and reasoning ability.	Comprehension (Level K2)

CO3.	Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.	Application(Level K3)
CO4.	Apply various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.	Application(Level K3)
CO5.	Critically evaluate various real life situations by resorting to analysis of key issues and factors.	Analysis (Level K4)
AUBCC8 / Core -XVI	**COMPUTER NETWORKS**	
CO1.	Recall the networking concepts, Transmission media and OSI layers of Network	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Compare OSI & TCP/IP models	Knowledge (Level K1) Comprehension (Level K2)
CO3.	Deploy the elementary Data link protocols	Application (Level K3)
CO4.	Interpret various Routing algorithms	Application (Level K3) Analysis (Level K4)
CO5.	Review transport service and Transmission control protocol like DNS, E-mail.	Synthesis(Level K5)
AUBCC9 / Core -XVII	**COMPUTER GRAPHICS**	
CO1.	List the display devices and recognize the Viewing and clipping algorithms.	Knowledge(Level K1)
CO2.	Have a broad knowledge about the overview of Graphics System.	Comprehend(Level K2)
CO3.	Describe the attributes of output primitives and geometric Transformation.	Comprehend(Level K2)
CO4.	Demonstrate the algorithms for drawing lines & circle.	Applications(Level K3) Synthesis (Level K5)
CO5.	Analyze the 2D and 3D viewing and clipping algorithms.	Analysis(Level K4)
AUBCSS6 / Core -XVIII	**PROJECT WORK**	
CO1.	Understand the problem.	Comprehension (Level K2)
CO2.	Implement & execute the real time application.	Application(Level K3)

CO3.	Apply& execute the real time application.	Application(Level K3)
CO4.	Analyze various testing methods.	Analysis (Level K4)
CO5.	Verify the expected results in real time applications.	Synthesis (Level K5)
AUBCE3 / Elective - III	**BIG DATA ANALYTICS**	
CO1.	Recall and Understand the concept of Big data techniques, environment, framework and Hadoop ecosystem	Knowledge(Level K1)
CO2.	Apply Statistical data analysis and tools to manage and analyze the big data	Comprehension (Level K2) Applications(Level K3)
CO3.	Analyze Hadoop components and their uses for big data processing	Analysis(Level K4)
CO4.	Examine the impact of big data for business decisions and strategy	Analysis(Level K4)
CO5.	Manage large-scale analytics tools to solve some open big data problems	Synthesis(Level K5)
AUBCE3 / Elective - III	**FUNDAMENTALS OF DIGITAL IMAGE PROCESSING**	
CO1.	Recognize the fundamental elements of DIP and representation of an image in multi dimensional aspects	Comprehension (Level K2)
CO2.	Apply arithmetic and logical operations on image enhancement process	Analysis(Level K4)
CO3.	Interpret the knowledge on compression techniques for security of an image	Application(Level K3) Analysis(Level K4)
CO4.	Verify various deduction mechanisms in image segmentation	Synthesis(Level K5)
CO5.	Evaluate different types of image transforms and image processing	Synthesis(Level K5)
AUBCE3 / Elective - III	**MOOC ONLINE COURSE**	
CO1.	Understand and use the web services available in Internet	Knowledge (Level K1) Comprehension (Level K2)
CO2.	Know the web resources in Internet.	Analysis (Level K4)
CO3.	Interpret usage of Online courses.	Synthesis (Level K5)
CO4.	Know the available course content of the new technologies.	Analysis (Level K4)

CO5.	Get an idea of New technologies.	Application(Level K3)
AUBCGC6 / SBCVI	**GREEN COMPUTING**	
CO1.	Discuss about basic concepts of green computing.	Knowledge (Level K1)
CO2.	Describe green IT in relation to technology	Comprehension (Level K2)
CO3.	Evaluate IT use in relation to environmental perspectives.	Application (Level K3)
CO4.	Analyze the role of Electric Utilities.	Analysis (Level K4)
CO5.	Use methods and tools to measure energy consumption.	Application (Level K3) Analysis (Level K4)
AUBCN2 / NME-II	**INTERNET BASICS**	
CO1.	Describe how the Internet works	Knowledge(Level K1)
CO2.	Analyze a webpage and identify its elements and attributes.	Knowledge(Level K1)
CO3.	Summarize describe connections that need to be made in order to access the internet.	Comprehension (Level K2)
CO4.	Navigate and visit blocks, social networks and online email services.	Analysis(Level K4)
CO5.	Evaluate the concept of Hypertext and Hyperlinks	Synthesis(Level K5)
EXTRA-CREDIT PAPERS		
Semester-I / UGEIT	**INTERNET OF THINGS**	
CO1.	Gain and understand the concepts of Internet of Things	Knowledge(Level K1)
CO2.	Analyze basic protocols in wireless sensor network	Knowledge(Level K1)
CO3.	Understand the application areas of IOT.	Comprehension (Level K2)
CO4.	Implement interfacing of various network & communication aspects	Analysis(Level K4)
CO5.	Evaluate the various state of the art methodologies	Synthesis(Level K5)
Semester – III / UGEIPC	**IPR, PLAGIARISM, COPYRIGHTS AND PATENTS**	
CO1.	Understand and use the basic concepts of Intellectual property Rights	Knowledge(Level K1)
CO2.	Examine the Concepts of Intellectual property Rights such as Plagiarism, Copyrights, Infringement, Patents and Licensing	Knowledge(Level K1)

CO3.	To identify the significance of practice and procedure of Patents.	Comprehension (Level K2)
CO4.	Demonstrate the procedure obtaining copyrights, Trademarks and Industrial Design.	Analysis(Level K4)
CO5.	Evaluate to enable the students to keep their IP rights alive	Synthesis(Level K5)
Semester – V / UGETI	**TRENDS IN INFORMATION TECHNOLOGY**	
CO1.	Acquire knowledge on Information Security and Multimedia.	Knowledge (Level K1)
CO2.	Understand the concept of Telecommunications.	Comprehension (Level K2)
CO3.	Develop Scripts for Information Technology applications.	Application (Level K3)
CO4.	Analyze the computing requirements for the appropriate solutions.	Analysis (Level K4)
CO5.	Evaluate multimedia based applications.	Synthesis(Level K5)
VALUE ADDED COURSES		
Semester –II / AUCSHT	**HARDWARE AND TROUBLESHOOTING**	
CO1.	Obtaining knowledge of troubleshoot the hardware components of a computer.	Knowledge (Level K1)
CO2.	Comprehending the troubleshooting techniques for storage devices, input and output devices.	Comprehension (Level K2)
CO3.	Applying the troubleshooting techniques for hardware failures.	Application (Level K3)
CO4.	Examining the troubleshooting techniques in Network, Printers and Mother board.	Analysis (Level K4)
CO5.	Assembling a new system with standard hardware component	Synthesis (Level K5)
Semester –IV / AUCSADPL	**APPLICATION DEVELOPMENT IN PROGRAMMING LANGUAGES**	
CO1.	Acquiring the knowledge of Application Development in Programming Languages	Knowledge (Level K1)
CO2.	Understanding the concept of interpreter and Compiler	Comprehension (Level K2)
CO3.	Illustrating categories of programming languages	Application (Level K3)
CO4.	Correlating various programming languages used in popular website	Analysis (Level K4)
CO5.	Developing simple applications in structured and object oriented Programming Languages.	Evaluation (Level K6)
Semester –VI / AUCSCDE	**COMPUTER FOR DIGITAL ERA**	
CO1.	Get an idea about computer and apply the computing technology in their day to day life.	Knowledge (Level K1)

		Applications(Level K3)
CO2.	Acquire the knowledge about digital India initiatives to their surroundings.	Knowledge (Level K1)
CO3.	Enhancing the digital skill-set required in workplace.	Comprehension (Level K2)
CO4.	To understand about the E- learning and Security issues.	Comprehension (Level K2) Applications(Level K3)
CO5.	To create awareness about MOOC, SWAYAM, NPTEL courses.	Analysis(Level K4) Synthesis(Level K5)