



DEVI AHILYA VISHWAVIDYALAYA, INDORE

School of Computer Science and IT

1.1.1

Program outcome and course outcome



Programme Outcomes



Devi Ahilya Vishwavidyalaya

School of Computer Science & IT

“We make things happen . . .”

Producing world – class

IT Professionals

Since 1986

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MISSION OF SCS

- *To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.*
- *To produce international quality IT professionals, who can independently design, develop and implement computer applications.*
- *Professionals who dedicate themselves to mankind.*

SCHOOL OF COMPUTER SCIENCE & IT

DEVI AHILYA VISWAVIDYALAYA

Takshashila Campus, Khandwa Road, Indore – 452017

Tel. (0731) – 2470027, 2461548 Fax : (0731) – 2763618

Email: head.scs@dauniv.ac.in

School of Computer Science & IT Devi Ahilya Vishwavidyalaya, Indore

School of Computer Science & Information Technology (SCS&IT) is a university teaching department of Devi Ahilya University. Earlier it was *Institute of Computer Science and Electronics (ICSE)* was established in 1986 with funding from UGC for MCA programme. Later, the School started M.Sc.(Computer Science) in 1987 with funding from DRDO. Also, M.Tech (Computer Science) programme was started in 1992 approved by AICTE. M.Tech (Network Management & Information Security) and M.Tech (Software Engineering & Information Architecture) was started in 2009 approved by AICTE. Keeping in view the social needs in the area of information technology, the department is also running MBA (Computer Management), M.Sc. (Information Technology) and BCA programme on self supported basis. The School is running PhD (Computer Science) programme in a variety of domains.

Vision

"To achieve excellent standards of quality education by keeping pace with rapidly changing technologies & create computer professionals of global standards with capabilities of accepting new challenges."

Mission

- To produce world-class professionals who have excellent analytical skills, communication skills, team building spirit and ability to work in cross cultural environment.
- To produce international quality IT professionals, who can independently design, develop and implement computer applications.
- Professionals who dedicate themselves to mankind, who are environment conscious, follow social norms and ethics.

About the Programmes and their Outcomes

The school offers wide range of Post-Graduates programmes and Under-Graduate programme. These programmes provide appropriate specialization for students with a wide range of backgrounds and career aspirations.

Post Graduate Computer Science Programmes:

1. Master of Computer Applications- MCA (3 yr.)
2. Master of Science (Computer Science) - M.Sc. (CS) (2yr.)
3. Master of Science (Information Technology) - M.Sc. (IT) (2yr.)
4. Master of Business Administration (Computer Management) - MBA (CM) (2yr.)

M. Tech. Programmes (AICTE approved):

1. Master of Technology (Computer Science) - M.Tech. (CS) (2yr.)
2. Master of Technology (Information Architecture & Software Engineering) - M.Tech. (IA & SE) (2yr.)

3. Master of Technology (Network Management & Information Security) - M.Tech. (NM & IS) (2yr.)

Undergraduate Programme after 10+2:

1. Bachelor of Computer Application - BCA (3 Yr)

MCA

This is a Three year/ Two year master degree programme that aims to prepare professionals for the Computer industry. This post graduate course focuses on theoretical as well as practical of computer applications that enables the students to be knowledgeable in programming, networking, algorithms design, web technology, cloud computing, artificial intelligence, computational techniques, analytical ability, simulation, modeling etc. The programme also covers interdisciplinary courses for improving their communication skills, management skills and understanding accounting and finance functions.

PROGRAMME OUTCOMES (POs) : MCA

- Understand and apply programming knowledge to solve complex problems from business, scientific and other application domains using well established practices and engineering approach.
- Use and apply advanced technical concepts and practices in the core computer applications.
- Identify computer application related problems, analyze them and design the system or provide the solution for the problem considering legal, ethical and societal issues.
- Understand the impact of technology & its applications in a contemporary, global, economical, environmental, and societal context and provide solutions to the end user in a cost effective and efficient manner.
- Function in multidisciplinary teams and communicate with the team and clients in an effective manner.
- Emphasize on life-long learning considering the ever changing technological environment

PROGRAMME SPECIFIC OUTCOMES (PSO's)

At the end of this programme, MCA student will be able to:

- To apply knowledge of computer science and applications to solve real world problems
- To use modern computing tools and techniques dexterously.
- To design and implement a computing system that satisfies requirements and works within realistic constraints such as safety, security, feasibility and applicability.
- Apply data mining and analytics techniques based on analytics and interpretation of data and to derive inference to take well informed decisions.

M.Sc. (CS) / M.Sc.(IT)

This is a two year master degree programme that aims to prepare professionals for the Computer industry and educational institutes. This post graduate course focuses on theoretical as well as practicals of computer science that enables the students to be knowledgeable in programming, networking, algorithms design, web technology, theory of computer science, software engineering, compiler design, artificial intelligence, computational techniques, analytical ability etc. The programme also covers interdisciplinary courses for improving their communication skills and management skills.

PROGRAMME OUTCOMES (POs)

SCSIT has designed M.Sc.(CS) / M.Sc.(IT) programme to prepare students to attain following abilities:

- To understand both theoretical and practical concepts of computer science.
- To understand various programming languages and apply to solve real world problems from diversified domain.
- To develop better algorithms and analyze them.
- To apply software engineering principles in the development of computer software.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

At the end of this programme, M.Sc.(CS) / M.Sc.(IT) student will be able to:

- Use of numerous software systems in the wide range of areas such as Internet and Web Technology, Cloud computing, Algorithms, Networking, Compiler design, and Web design, Machine learning, Artificial Intelligence, IoT etc.
- To develop better algorithms and solutions for Computing Problems.
- Understanding of latest tools and technology to undertake further research.
- Apply the modern tools and technology to produce cost effective and maintainable software.

MBA(CM)

This is a two year master degree programme that aims to prepare students to understand the practice of solving business problem using computer science skills. This post graduate course focuses on opportunities to develop conceptual & analytical skills during their course of study. The programme focuses on the fundamentals of theory and its application in problem solving using programming, web technology, system analysis and design, software engineering, ERP etc. The programme also covers interdisciplinary courses for improving their communication skills, and understanding accounting and finance functions

PROGRAMME OUTCOMES (POs)

SCSIT has designed MBA (CM) programme to prepare students to attain following abilities:

- To understand the key concepts of Information Technology (IT) and how IT can improve organizational performance.
- To develop professionalism, self-awareness, leadership, and effective communication skills.
- To understand the computing techniques to solve business problems.
- Enhancing the skills to work on multidisciplinary managerial tasks.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

At the end of this program, MBA (CM) student will be able to:

- Possess the skills required to integrate concepts from various computing mechanism to identify and develop business strategies.
- Acquainted with the skills required to work and lead effectively in a team-based environment.
- Use of numerous software systems in the wide range of areas such as Internet and Web Technology, Cloud computing, Software Engineering, ERP etc.
- To design and develop better ERP Solutions.
- Usage of modern tools - Create, select, learn and apply appropriate techniques, resources, and modern tools of Database Applications.

M.Tech.(CS)

This is a Two year master degree programme that aims to prepare students with advanced learning and research interest in any area of computer science. This post graduate course provides the high level theoretical knowledge which enables them to tackle practical complex problems of design and development in the computer industry as well as pursue further academic achievement through research.

The programme is a 96-credit degree programme spread over 4 semesters for a full-time student. Graduates are placed in top international and national companies and some of them are faculty in leading academic institutions of the state/country. The programme includes advanced subjects related to algorithms design, databases, architecture, web technology, cloud computing, soft computing, communication networks, computational techniques, compiler design. Data mining, etc. The programme also covers internship/project of one full year divided into 2 semesters leading to a thesis that allows the student to specialize in a particular computer science field.

PROGRAMME OUTCOMES (POs)

SCSIT has designed M.Tech. programme to prepare students to attain following abilities

- Understand and apply programming knowledge to solve complex problems not just by using technology, but also to contribute in creation of new & emerging technologies.
- Build a strong foundation for research in future & emerging technological trends.
- Understand the impact of technology & its applications and provide solutions to the end user in a cost effective and efficient manner.
- Function in multidisciplinary teams and communicate with the team and clients in an effective manner.
- Emphasize on life-long learning considering the ever changing technological environment
- Train students on skill based programmes to bridge academia-industry gaps and increase employability.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

At the end of this programme, M.Tech(CS) student will be able to:

- To understand the algorithm design and the limits of computation.
- An ability to adapt existing design patterns, techniques, algorithms, data structures, etc. to solve real world problems.
- An ability to design, develop and evaluate computer based systems for novel applications which meet the requirements of customer.
- Understanding and building ability to use advanced computing techniques and tools.
- To undertake fundamental research at the cutting edge of computer science.
- To understand the impact of IT related solutions in socioeconomic context.

M.Tech. (IA & SE)

This is a Two year master degree programme that aims to prepare students with advanced learning and building research interest in any area of Information Architecture and Software Engineering.

The programme is a 96-credit degree programme spread over 4 semesters for a full-time student. Graduates are placed as software developer, tester, analyst and team leader in top international and national companies and some of them are faculty in leading academic institutions of the state/country. The programme includes advanced subjects related to Information Architecture and Software Engineering domain. The programme also includes a year-long internship/project divided into 2 semesters leading to a thesis that allows the student to specialize in area of Information Architecture and Software Engineering specifically.

PROGRAMME OUTCOMES (POs)

Students of M.Tech. (IA&SE) must attain following abilities:

- Knowledge and skills in the processes and practices adopted in software development.
- Be able to undertake need based research focus on issues related to industries.
- Be equipped with necessary skills for technical documentation and presentation.
- Design, develop and deliver complex, scalable and cost effective software systems by applying Software Engineering principles, tools and processes.
- Comprehend the role and responsibilities of the professional software engineer with importance to quality and management issues involved in software construction.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

At the end of this programme, M.Tech(IA&SE) student will be able to:

- To apply Software Engineering Principles and Practices to provide better software solutions.
- To design and Develop Information Architecture and apply best software engineering practices in the real world computer applications.
- To design efficient algorithms and develop effective code.
- Extract information pertinent to unfamiliar problems in Software Engineering domain through literature survey and experiments
- Apply appropriate research methodologies, design, techniques and tools in current scenario.
- Contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of engineering.
- Usage of modern tools - Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools of Software Engineering.

M.Tech(NM & IS)

This is a Two year master degree programme that aims to prepare students with advanced learning and building research interest in any area of Network Management and Information Security.

The programme is a 96-credit degree programme spread over 4 semesters for a full-time student. Graduates are placed as Network Programmer/Analyst, network administrator, IT officer, in top international and national companies and some of them are faculty in leading academic institutions of the state/country. A few students have chosen career in cyber security as well. The programme includes advanced subjects related to Information Architecture and Software Engineering domain. The programme also includes a year-long internship/project divided into 2 semesters leading to a thesis that allows the student to specialize in area of Network Management and Information Security.

PROGRAMME OUTCOMES (POs)

Students of M.Tech. (NM&IS) must attain following abilities:

- Acquire in-depth knowledge of Network Management with wider and global perspective.
- Synthesize existing and new knowledge for enhancement of networking solutions.
- To work upon unfamiliar problems through investigative studies and research and contribute to the development of technological knowledge and intellectual property related to computer networks.
- To design and develop Network, Mobile and Web based Computational systems under realistic constraints.

PSO: Programme Specific Outcomes

At the end of this programme, M.Tech(NM&IS) student will be able to:

- Analyze network Engineering related problems, and solve issues related to Network Management and Information Security.
- Evaluate a wide range of potential networking solutions for those problems and arrive at feasible, optimal solutions.
- Apply appropriate research methodologies, techniques and tools in domains of networking.
- Select, learn and apply appropriate techniques, resources, and modern network engineering and IT security tools.
- Acquire professional and intellectual integrity, professional code of conduct, ethics of research.

BCA

This is a three year bachelor degree programme that aims at developing Computer Skills to the students. The programme provides key concepts in computer applications and software design, development, and implementation. The curriculum and syllabus of the programme conform to Outcome Based Education (OBE). The syllabus contains subject related to programming, communication networks, system analysis and design, basics of microprocessors, database programming using Visual Basic. The programme also covers interdisciplinary courses for improving their languages (Hindi & English), communication skills, principles and practices of management, entrepreneurship and understanding of financial accounting systems.

PROGRAMME OUTCOMES (POs)

SCSIT has designed BCA programme to prepare students to attain following abilities:

- To understand the core concepts of Computer Science.
- Apply the knowledge and skills in the application of computer programming for software development.
- Understand the professional and ethical issues related with the IT profession.
- To enhance practical skills to develop software for industry, society and business.

PROGRAMME SPECIFIC OUTCOMES (PSO's)

At the end of this programme, BCA student will be able to:

- Apply knowledge of computing and science to solve real world problems.
- To use current tools and techniques required for computing practice.
- To design, develop and maintain small scale software and web projects.
- Apply computing techniques to interpret the data and design and conduct the experiments.
- To prepare students to pursue best post graduate education in the fields of Computer Science.
- To involve in professional development.

Learning Outcomes
ALL COURSES



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July 2013 onwards

Contents

CS-1003 Digital Logic Design and Computer Organization	3
CS-1019 Basic Electrical & Electronics	3
CS-1101 Mathematics-I	3
CS-1102 Mathematics-II	4
CS-1201 Fundamentals of Programming and Problem Solving through C-I	4
CS-1202 Fundamental of Programming and Problem Solving through C II	4
CS-1501 Operating Systems Basics and PC Packages	5
CS-2020 Electronic Circuits	5
CS-2021 Digital Electronics	5
CS-2023 Computer Organization and Hardware Maintenance	6
CS-2111 Mathematics-III	6
CS-2222 Data Structures using C++	6
CS -2302 System Analysis and Design	7
CS-2402 Database Management System	7
CS-2502 Fundamentals of Operating Systems	7
CS-3006 Microprocessor and Assembly Language Programming	8
CS-3026 Database Programming using Visual Basic	8
CS-3604 Data and Computer Communication	8
CS-4008 Computer Architecture	8
CS-4022 Computer Organization and Assembly Language Programming	9
CS-4116 Discrete Structures	9
CS-4121 Mathematical Foundation of Computer	10
CS-4205 Programming & Problem solving using C	10
CS-4211 Object Oriented Programming Using JAVA	11
CS-4305 Software Engineering	11
CS-4405 Database Management System	12
CS-4408 Database Applications and Tools	13
CS-4409 Enterprise Resource Planning	13
CS-4409A Introduction to Enterprise Resource Planning	14

CS-4422 ERP Applications	15
CS-4508 Computer Graphics and Multimedia	15
CS-4517 Linux/Unix Administration	16
CS-5216 Design and Analysis of Algorithms	16
CS-5309 Object-Oriented Analysis and Design	17
CS-5413 Data Mining & Data Warehousing	17
CS-5511 Operating Systems	17
CS-5512 Compiler Design	18
CS-5613 Computer Networks	18
CS-5615 Information Security	18
CS-5616 E-Commerce	19
CS-5617 Internet and Web Technology	19
CS-5713 Data Analytics Using R	19
CS-6220 Internet Programming Using Java	19
CS-6313 Software Testing	20
CS-6418 Advanced Database Management System	20
CS-6516 Advanced Operating Systems	20
CS-6518 Cloud Computing	20
CS-6622 Advance Computer Network	21
CS-6624 Network Management	21
CS-6628 Legal Aspects of Information Security	21
CS-6630 Internet of Things	22
CS-6711 Soft Computing	22
CS-6712 Data Science	22
IC-3929 Entrepreneurship	22
IC-2927 Environmental Awareness	23
IC-2928 Principles and Practices of Management	23
IC-3913 Financial Accounting	23

CS-1003 Digital Logic Design and Computer Organization

Subject Learning Outcomes

Upon completing the course:

1. Students will have knowledge of basics of Computer Organization and Architecture.
2. Students will be able to understand various components of computers and their interconnection.
3. Students will have knowledge of various types of memory and their organization
4. Students will be well aware about various external devices and their interconnection through CPU.
5. Students will have knowledge of interrupts and direct memory access technique.
6. Students will be able to understand various characteristics of instruction set.
7. They will be aware with various types of operands and operations used in an instruction set.
8. They will have knowledge of various addressing modes.
9. Students will be aware about various Processor Organization.
10. Students will have knowledge of RISC and CISC architecture.

CS-1019 Basic Electrical & Electronics

Subject Learning Outcomes

Upon completing the course:

1. Students will be familiar with semiconductor concepts.
2. Ability to identify the electrical components and explain the characteristics of electrical machines
3. Ability to identify electronics components and understand the characteristics.
4. They will acquire knowledge of various types of theorems.

CS-1101 Mathematics-I

Subject Learning Outcomes

Upon completing the course:

1. Student will understand the importance of mathematics and its application in computer science.
2. Enhance Mathematical Reasoning of students.
3. Problem solving ability of students.
4. Understand Maxima and minima of two variables.
5. Homogeneous linear differential equation, simultaneous differential equations.
6. Study of differential equations.
7. Study of Linear and Non-Linear Partial differential equation of first and second order with constant coefficients.
8. Algebra of logic Boolean algebra, principal of duality, basis theorems.
9. Graph and its applications.

CS-1102 Mathematics-II

Subject Learning Outcomes

Upon completing the course:

1. Student will understand the importance of mathematics and its application in computer science.
2. Enhance Mathematical Reasoning of students.
3. Problem solving ability of students.
4. Understand Fourier series and half range series .
5. Know Laplace transforms & Inverse Laplace transforms of simple functions, their elementary properties, applications of Laplace transforms.
6. Study of differential equations.
7. Study of Linear and Non-Linear Partial differential equation of first and second order with constant coefficients.
8. Understanding Vector calculus.

CS-1201 Fundamentals of Programming and Problem Solving through C-I

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Define key concepts: Definition of Programming language, History of C language, structured program, modular program, fundamentals of programs, low level language, high level language, assembler, linkers and loaders.
2. Introduce Programming Environment: Flow charts, data types, keywords, character set
3. Understanding control Structures: if else statements, For loop, Do while, while, break, continue
4. Understanding Basics of 1d-array, 2d-array, multi-dimensional array functions and user defined functions.

CS-1202 Fundamental of Programming and Problem Solving through C II

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understanding Basics of 1d-array, 2d-array, multi-dimensional array
2. Understanding concept of pointers, dynamic memory location
3. Understanding concept of function, library functions and user defined functions
4. Understanding concept of storage classes (static, auto, register, extern)
5. Understanding basics of file handling and operation based on it.

CS-1501 Operating Systems Basics and PC Packages

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Install, configure, and maintain the operating system.
2. Perform basic file management operations.
3. Allocate and organize primary and secondary storage.
4. Manage peripheral devices.

CS-2020 Electronic Circuits

Subject Learning Outcomes

Upon completing the course:

1. Students will be familiar with semiconductor concepts.
2. They will have knowledge of bipolar junction diode.
3. They will have knowledge of different types of rectifiers.
4. They will be aware about special purpose diodes like Zener diode, Schottky diode and light emitting diode.
5. Student will be able to understand the concept of bipolar junction transistors.
6. They will acquire knowledge of various types of transistor configuration.
7. They will have understanding of various types of amplifiers.
8. They will have knowledge about FET and MOSFET.

CS-2021 Digital Electronics

Subject Learning Outcomes

Upon completing the course:

1. Student will be able to understand the basics of digital computer.
2. They will be able to understand how the number system other than decimal are exist and what are their applications
3. They will know the various coding techniques. By which we can change our information into different form.
4. They will learn the Boolean algebra that is the requirements base for digital circuit design.
5. They will learn how to minimize the Boolean equations, so that their implementation becomes easy.
6. Student will be able to design any combinational circuit.
7. Students will be able to design combinational circuit by using MSI and LSI
8. They will learn how flip-flop and other sequential circuits work
9. Students will learn about various types of registers and their modes.
10. They will be able to design different types of counters.
11. They will be aware about various terms related with digital ICs.

CS-2023 Computer Organization and Hardware Maintenance

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Be familiar with the Von Neumann architecture
2. Be familiar with the functional units of the processor such as the register file and arithmetic-logical unit
3. Be familiar with the basics of systems topics: single-cycle (MIPS), multi-cycle (MIPS), parallel, pipelined, superscalar, and RISC/CISC architectures.
4. Be familiar with the cost-performance issues and design trade-offs in designing and constructing a computer processor including memory.
5. Be familiar with the quantitative performance evaluation of computer systems.
6. Be familiar with the cache subsystem.
7. Be familiar with the representation of data, addressing modes, instructions sets.
8. Be familiar with the basic knowledge the design of digital logic circuits and apply to computer organization
9. Indicate the names and functions of hardware ports and the parts of the motherboard.
10. Identify the names and distinguishing features of different kinds of input and output devices.
11. understand the fundamental hardware components that make up a computer's hardware and the role of each of these components
12. Apply methods to maintain and troubleshoot your computer.

CS-2111 Mathematics-III

Learning Outcomes:

Upon completing the course, students will be able to:

1. Learn that many problems where analytical methods seem to fail, like solving highly nonlinear equations, numerical methods work very well.
2. Use optimization techniques to provide a mathematical model to represent complex functional relationships.

CS-2222 Data Structures using C++

Learning Outcomes

Upon completing the course, students will be able to:

1. Understand well-known generic data structures such as stack, queue, tree, graph and related algorithms
2. Design and apply appropriate data structures for solving computing problems
3. Develop computer programs to implement different linear data structures and related algorithms
4. Demonstrate the ability to construct and analyze search tree data structure
5. Demonstrate knowledge of searching and sorting algorithms and their run-time complexity
6. Demonstrate knowledge of graph algorithms
7. Recognize the associated algorithms' operations and complexity
8. Understand the concept of time, space complexity and analyze the time and space complexities of an algorithm.
9. Think critically & Solve problems independently

CS -2302 System Analysis and Design

Learning Outcomes:

Upon completing the course, students will be able to:

1. Understand the qualifications of systems analysts and project managers to design better information systems.
2. On successful completion of this course students should: discuss the aims and objectives of information systems in the context of a human activity system for better systems development.
3. Understand analysis and design techniques and methods to meet the special needs of current information systems use variety of analysis and design methods to specify and propose information systems.
4. Be able to produce and document the key deliverable's of software development life cycle.
5. To know how to use MS Project as a CASE tool.
6. Identify current industry standards for information systems development.

CS-2402 Database Management System

Subject learning Outcomes

1. Introduction provides the general overview of the nature and purpose of database systems. We explain how the concept of the database systems. We explain how the concept of database system has developed, what the common features of the database system are, what the database system does for the user, and how a database system interfaces with operating systems.
2. Database design provides the overview of the database-design process, with major emphasis on the database design using the entity relationship data model. Entity relationship data model provides a high level view of the issues in database design.
3. Relation database introduces the relational model of data, covering basic concepts as well as the relational algebra. A brief introduction to integrity constraints and focus on the most influential of the user- oriented relational languages: SQL.
4. SQL provide how to interface between a programming language and the database supporting SQL.
5. Introduction to the theory of relational database design. The theory of functional dependencies and normalization is covered, with emphasis on the motivation and intuitive understanding of each normal form. An overview of relational design and relies on an intuitive understanding of logical implication of functional dependencies. This allows the concept of normalization to be introduced prior to full coverage of functional dependency theory.

CS-2502 Fundamentals of Operating Systems

Subject Learning Outcomes

1. An overview of the subject, future scope of the subject, evaluation criteria.
2. Student will understand the importance of operating system.
3. Understand Fourier series and half range series
4. Define key concepts: Definition of operating system, Operating System
5. History, Components of operating systems.

6. Understanding operating system concepts, operating system services.
7. Understanding Processor resource management.
8. Introduce the concept of process, Process states, multiprogramming, and
9. Scheduling theory.
10. Explain the concept of Memory management.

CS-3006 Microprocessor and Assembly Language Programming

Subject Learning Outcomes

Upon completing the course:

1. Students will be familiar with functional units of CPU.
2. They will be aware about architecture of 8085 Microprocessor.
3. They will have knowledge of Flowchart and assembly language programming.
4. They will have understanding about various types of instruction formats and addressing modes.
5. They will be able to do different operations on data using assembly language programming.
6. They will be familiar with the concept of Interfacing of I/O and Memory peripherals with microprocessor.
7. They will be able to make sample applications using 8085 assembly language programming.

CS-3026 Database Programming using Visual Basic

Subject Learning Outcomes

For each of the domains of learning shown below indicate:

1. A brief summary of the knowledge or skill the course is intended to develop.
2. A description of the teaching strategies to be used in the course to develop that knowledge or skill.
3. The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

CS-3604 Data and Computer Communication

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Identify different components and their respective roles in a computer communication system.
2. Apply the knowledge, concepts and terms related to data communication and networking.
3. Solve problems in networking by referring to problems solving steps through relevant information by choosing suitable techniques.
4. Acquaint them with networking software simulation tools, configuring of networking devices and understand their functionality.
5. know the strategies for securing network applications
6. Appreciate usefulness and importance of computer communication in today life and society.

CS-4008 Computer Architecture

Subject Learning Outcomes

Upon completing the course:

1. Students will be familiar with various measuring tools and functional units of CPU.
2. They will be aware about architecture of 8088 microprocessor.
3. They will have knowledge of assembly language programming.
4. They will be aware about computer arithmetic.
5. They will have understanding about various types of instruction formats and addressing modes.
6. They will have knowledge of various types of processor organization and about RISC and CISC features.
7. They will have understanding about the processing unit design
8. Students will be able to explore the pipelining concepts and its implementation.
9. They will have the knowledge of parallel processing and introduction to super scalar processors.
10. They will be aware about instruction level parallelism.
11. They will be well familiar with the concept of cache and their implementation
12. They will have knowledge about interrupts and input output organization.

CS-4022 Computer Organization and Assembly Language Programming

Subject Learning Outcomes

Upon completing the course:

1. Students will have knowledge of basics of Computer Organization.
2. Students will be able to understand various components of computers and their interconnection.
3. Students will be well aware about various external devices and their interconnection through CPU.
4. Students will have knowledge of assembly language programming
5. Students will be able to understand various characteristics of instruction set.
6. They will be aware with various types of operands and operations used in an instruction set.
7. They will have knowledge of various addressing modes.

CS-4116 Discrete Structures

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Define key terms, sets, set operations, fuzzy sets, and functions for computer science. Student will understand the importance of sequences and summations, fuzzy sets in computer science.
2. Student will understand terms like combinatory, Pigeon hole principle, generalized Pigeon hole principle. Students will be able to solve problems of computing internet addresses, solving recurrence relations of different sorting problems and will be able to compute time complexity of simple algorithms.
3. Students will develop an understanding about relations and their properties, nary relations and their applications, representing relations, closures of relations, equivalence relations, partial ordering and concepts of least upper bound, greatest lower bound, maximal element, minimal element, greatest element, least element of a partially ordered set.

4. Student will develop an understanding of the concepts of graph and tree, graph representation, graph terminology, graph types, graph models, and graph isomorphism, connectivity, Euler and Hamiltonian Paths, shortest path problems, planar graphs, graph colouring, chromatic number, and Euler's formula. Applications of trees, tree traversal, Spanning trees, minimum spanning trees.
5. Student will be acquainted with language theory and will categorize language types. Student will get a clear understanding of derivation trees, parsing concepts.

CS-4121 Mathematical Foundation of Computer

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Define key terms, sets, set operations, and functions for computer science. Student will understand the importance of set theory and its operation on it.
2. Students will develop an understanding about relations and their properties
3. Student will understand Algebra of Propositions- Statements, Conjunctions, Disjunctions, Negation, Conditional, Bi-conditional, Propositions and Truth Tables, tautologies and contradictions, Logical equivalence, Logical implication, Logically True and Logically equivalent statements.
4. Student will develop an understanding of the concepts Co-ordinate geometry of two dimensions, Coordinate of a point, Distance between two points, Point dividing the join of two points.
5. Definite integral application to management problems including EOO model for Inventory control.
6. Student will understand the concept of progressions and annuity – Progressions. A.P. and G.P. also depreciation by sinking fund method. Present value under Continuous compounding.

CS-4205 Programming & Problem solving using C

Subject Learning Outcomes:

Upon completing the course, students will be able to:

7. Introduce the concept of a program (i.e., a computer following a series of instructions).
8. Introduce the concept of an algorithm (that is, a series of steps that can be carried out in a mechanical way) and a few specific examples of algorithms (for example, finding an average, sorting, searching).
9. Introduce the concept of a variable holding a value, how a variable is declared and how it can be changed.
10. Introduce the concept of a loop – that is, a series of statements which is written once but executed repeatedly- and how to use it in a programming language.
11. Be able to use a conditional statement to select a choice from two or more alternatives
12. Be able to break a large problem into smaller parts, writing each part as a module or a function
13. Be able to use an array to store multiple pieces of homogeneous data, and use a structure to store multiple pieces of heterogeneous data
14. Introduce the concept of Pointers Structures, Union and File handling.

CS-4211 Object Oriented Programming Using JAVA

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understand and evaluate the essential costs and benefits of implementing Java programs, Apply basic concepts for writing, compiling and executing Java programs.
2. Develop Java programs with the standard program design principles of sequence, selection, repetition and data structures using arrays.
3. Create Java applications using basic object-oriented design techniques, Plan and develop robust Java applications using the advanced object-oriented design techniques of inheritance and polymorphism
4. Design standardized Java libraries using packages and interfaces, Design and develop user friendly graphical user interface Java applications using standard visual components, Design, and develop Java applets using effective design principles.
5. Describe and develop fault tolerant applications with basic exception handling using structured programming techniques, describe the advantages, and develop basic multiprocessing applications using multithread techniques.
6. Develop Java applications with simple and advanced input/output streams, Describe the advantages of designing organized classes in collection frameworks, Applying collection framework to various types of application.
7. Master basic JAVA library and tools at a depth that is sufficient to solve real-world programming problems.

CS-4305 Software Engineering

Subject Learning Outcomes

Upon completing the course, students will be able to:

Knowledge and Understanding of

A1) the system development lifecycle;

A2) a wide range of principles and tools available to the software developer, such as software process methodologies, choice of algorithm, language, software libraries and user interface technique; 2

A3) the principles of object-oriented software construction;

A4) the software-development process, including requirements analysis, design, programming, testing and maintenance;

A5) the range of situations in which computer systems are used, the ways in which people interact with them;

A6) professional issues to cover: social, ethical and legal aspects;

A7) communication issues in large, complex software projects;

A8) the principles and techniques of a number of application areas informed by the research directions of the subject, such as software engineering, net-centric, and distributed systems.

B- Intellectual (thinking) skills - able to

B1) model object-oriented software systems;

B2) investigate and improve the specification of a software system;

B3) design and plan software solutions to problems using an object-oriented strategy;

B4) identify a range of solutions and critically evaluate and justify proposed design solutions;

B5) write and test programs using at least one object-oriented programming language;

B6) evaluate systems in terms of general quality attributes and possible trade-offs presented within the given problem;

B7) use and evaluate appropriate tools and techniques

B8) reflect and reason concerning a given information handling problem or opportunity.

C- Practical skills - able to

- C1) specify, design and construct CASE tools and application software;
- C2) use logic and discrete mathematics to specify software elements;
- C3) develop and apply testing strategies for software applications;
- C4) develop software applications in a development environment that makes use of commonly supported tools;
- C5) identify some of the main risks of software development and use;
- C6) use network information services
- C7) Prepare and deliver coherent and structured verbal and written technical reports;
- C8) use the scientific literature effectively and make discriminating use of Web resources;
- C9) analysis of system requirements and the production of system specifications;
- C10) use appropriate computer-based design support tools.

D- Transferable skills - able to

- D1) effectively participate in team-based activities;
- D2) structure and communicate ideas effectively, both orally, in writing, and in cases involving a quantitative dimension;
- D3) use IT skills and display mature computer literacy;
- D4) work independently and with others;
- D5) manage learning and self-development, including time management and the development of organizational skills;
- D6) display personal responsibility by working to multiple deadlines in complex activities;
- D7) undertake practical training and placements in relevant organizations
- D8) appreciate the need for continuing professional development and in recognition of the need for lifelong learning In order to provide students with the “life long learning” attitude, the teaching method is essentially based on self learning (3 hours in class rooms and 6 hours out of class rooms: coursework, practical works, workshops, seminars, etc.)

CS-4405 Database Management System

Subject Learning Outcomes

1. Introduction provides the general overview of the nature and purpose of database systems. We explain how the concept of the database systems. We explain how the concept of database system has developed, what the common features of the database system are, what the database system does for the user, and how a database system interfaces with operating systems.
2. Database design provides the overview of the database-design process, with major emphasis on the database design using the entity relationship data model. Entity relationship data model provides a high level view of the issues in database design.
3. Relation database introduces the relational model of data, covering basic concepts as well as the relational algebra. A brief introduction to integrity constraints and focus on the most influential of the user- oriented relational languages: SQL.
4. SQL provide how to interface between a programming language and the database supporting SQL.
5. Introduction to the theory of relational database design. The theory of functional dependencies and normalization is covered, with emphasis on the motivation and intuitive understanding of each normal form. An overview of relational design and relies on an intuitive understanding of logical implication of functional dependencies. This allows the concept of normalization to be introduced prior to full coverage of functional dependency theory.
6. Transaction management focuses on the fundamentals of a transaction-processing system, including transaction atomicity, consistency, isolation, and durability as well as the notion of serializability. Focuses on concurrency control and presents

several techniques for ensuring serializability, including locking, timestamping, and optimistic techniques.

7. Data storage and querying deals with disk, file, and file-system structure. A variety of data access techniques including hashing and B+ tree indices. Query-evaluation algorithms and query optimization provides an understanding of the internals of the storages and retrieval components of a database.

CS-4408 Database Applications and Tools

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Define key terms, database, database management system, enterprise data model, data warehouse, user view, constraints etc. Limitations of file system, database approach and its advantages, components of database environment and evolution of database systems
2. Define terms like, information architecture, information engineering, top-down planning, SDLC, CASE, conceptual and physical schema. Understand SDLC, RAD approaches, Different schemas, and scope of database design.
3. Understand key terms: business rule, fact, entity, attribute, Entity Relationship model, degree and cardinality of relationships. Understand importance of data modeling process, Understand unary, binary, ternary relationships, draw ER model for several business situations. Modeling examples from live cases and practice.
4. Understand concepts enhanced ER model, terms like, subtype, supertype, generalization, specialization, disjoint overlap, hierarchy etc. develop a supertype and subtype hierarchy, and solve a problem showing EER model.
5. Understand conceptual terms: key, primary, secondary, composite, foreign, relation, structured relation, anomaly, functional dependency, normalization, and its different forms. Give concise definition of first, second, third normal forms, Understand transforming ER model into Relational model, create relations and normalize the relations.
6. Define and understand the conceptual terms, DDL, DML, DCL, views. Understand and write SQL commands in DDL, DML, DCL, practice queries, Relational algebra, Advanced SQL like, join, and types of joins, triggers and stored procedures. Examples on ACCESS and ORACLE environment.
7. Understand the Concept of object oriented modeling, terms like, object, class, and query operations, life cycle of object oriented model development, contrasting with ER model, use of UML diagram in modeling etc.
8. Develop any multi-phased project as a part of a team

CS-4409 Enterprise Resource Planning

Subject Learning Outcomes

A student completing course unit 1 should:

- 1) Develop an understanding of functional division of organizations.
- 2) Understand business processes.
- 3) Develop conceptual clarity of re-engineering.
- 4) Know re-engineering features.

- 5) Know about evolution of ERP applications.

A student completing course unit 2 should:

- 1) Know about success factors in re-engineering projects.
- 2) Able to compare different re-engineering approaches.
- 3) Have essential knowledge on how to select ERP vendors.
- 4) Understand ERP life cycle.

A student completing course unit 3 should:

- 1) Develop an understanding of different ERP packages.
- 2) Understand the features of sales and marketing module in ERP.
- 3) Understand integration of sales and distribution with other modules.
- 4) Understand CRM.

A student completing course unit 4 should:

- 1) Understand accounting and finance functions.
- 2) Understand management control functions of accounting.
- 3) Manage ERP projects.
- 4) Analyze different organizational cases.

A student completing course unit 5 should:

- 1) Understand advanced planning systems.
- 2) Understand production planning and manufacturing processes.
- 3) Understand SCM applications.
- 4) Understand package architecture.
- 5) Get acquainted with CRM applications.

Have detailed knowledge of ERP application.

CS-4409A Introduction to Enterprise Resource Planning

Subject Learning Outcomes

A student completing course unit 1 should:

- 6) Develop an understanding of functional division of organizations.
- 7) Understand business processes.
- 8) Develop conceptual clarity of re-engineering.
- 9) Know re-engineering features.
- 10) Know about evolution of ERP applications.

A student completing course unit 2 should:

- 5) Know about success factors in re-engineering projects.
- 6) Able to compare different re-engineering approaches.
- 7) Have essential knowledge on how to select ERP vendors.
- 8) Understand ERP life cycle.

A student completing course unit 3 should:

- 5) Develop an understanding of different ERP packages.
- 6) Understand the features of sales and marketing module in ERP.
- 7) Understand integration of sales and distribution with other modules.
- 8) Understand CRM.

A student completing course unit 4 should:

- 5) Understand accounting and finance functions.
- 6) Understand management control functions of accounting.
- 7) Manage ERP projects.
- 8) Analyze different organizational cases.

A student completing course unit 5 should:

- 6) Understand advanced planning systems.
- 7) Understand production planning and manufacturing processes.
- 8) Understand SCM applications.
- 9) Understand package architecture.
- 10) Get acquainted with CRM applications.

Have detailed knowledge of ERP application.

CS-4422 ERP Applications

Subject Learning Outcomes

A student completing course unit 1 should:

- 11) Develop an understanding of an Enterprise.
- 12) Understand small, medium and large sized enterprises.
- 13) Develop conceptual clarity of BPR.
- 14) Know re-engineering features.
- 15) Know about BPI practices.

A student completing course unit 2 should:

- 9) Know about ERP implementation projects.
- 10) Able to compare ERP methodologies and frameworks.
- 11) Have essential knowledge on ERP training – data migration.
- 12) Understand people involved in implementation.

A student completing course unit 3 should:

- 9) Develop an understanding of Open ERP, ERP next, features and components.
- 10) Understand the features of Web school ERP.
- 11) Understand executing SAP project.
- 12) Steps in pursuing SAP project.
- 13) Understand SAP project lifecycle.
- 14) Be able to organize SAP project by tasks, by roles.

A student completing course unit 4 should:

- 9) Understand SAP business suite components.
- 10) Understand SAP NetWeaver components.
- 11) Understand SAP Business by design, all in one SAP.
- 12) Have clarity of SAPGUI, SAPGUI elements and other basics.
- 13) Develop an understanding of SAP navigation basics, screen objects, using Windows clipboard, additional legacy interfaces.

A student completing course unit 5 should:

- 1) Be able to categorize types of SAP reporting users.
- 2) Be able to understand SAP business objects, SAP NetWeaver BW family.
- 3) Develop a thorough understanding of SAP operational reporting tools, legacy SAP reporting options.
- 4) Understand SAP installation preparation, locating and downloading the software.
- 5) Understand infrastructure readiness, installing the SAP trial version.

CS-4508 Computer Graphics and Multimedia

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. To learn the basic concepts used in computer graphics.

2. To implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling and clipping.
3. To describe the importance of viewing and projections.
4. To define the fundamentals of animation and its related technologies.
5. To understand a typical 2 D and 3D graphics pipeline

CS-4517 Linux/Unix Administration

Subject Learning Outcomes

Upon completing the course, students will be able to:

Developing applications in Unix environment and administrating Unix OS.

1. Understanding will be devolved about various OS and usage.
2. Basic commands to use in UNIX.
3. Understanding with file systems.
4. Learn about how to work in editors.
5. Concepts of shell programming and system call will be developed.
6. Understanding of communication facilities used in UNIX.
7. Practicing administrative commands.

CS-5216 Design and Analysis of Algorithms

Subject Learning Outcomes

Students who complete the course will have demonstrated the ability to do the following:

1. Argue the correctness of algorithms using inductive proofs and invariants.
2. Analyze worst-case running times of algorithms using asymptotic analysis.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.
5. Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
6. Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
7. Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
8. Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.
9. Explain what competitive analysis is and to which situations it applies. Perform competitive analysis.
10. Compare between different data structures. Pick an appropriate data structure for a design situation.

Explain what an approximation algorithm is, and the benefit of using approximation algorithms.

CS-5309 Object-Oriented Analysis and Design

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Analyse, design, document the requirements through use case driven approach.
2. Identify, analyse, and model structural and behavioural concepts of the system.
3. Develop, explore the conceptual model into various scenarios and applications.
4. Apply the concepts of architectural design for deploying the code for software.

CS-5413 Data Mining & Data Warehousing

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understand why there is a need for data warehouse in addition to traditional operational database systems;
2. Identify components in typical data warehouse architectures;
3. Design a data warehouse and understand the process required to construct one;
4. Understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
5. Understand the details of different algorithms made available by popular commercial data mining software;
6. Solve real data mining problems by using the right tools to find interesting patterns;
7. Understand a typical knowledge discovery process such as CRISP-DM;
8. Obtain hands on experience with some popular data mining software.
9. Solve real - world problems in business and commerce using data mining and data warehousing tools;
10. Learn independently and search for relevant information to write reports to recommend appropriate data warehousing and data mining tools.
11. Solve complex problems individually or in groups and develop group work skills directly and indirectly.

CS-5511 Operating Systems

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Student will able to understand how a computer works.
2. Students will understand various operating system services.
3. Students will able to understand the general structure and purpose of an operating system.
4. Students will able to understand process, Process states, multiprogramming, and scheduling theory.
5. To understand various memory management policies.

CS-5512 Compiler Design

Subject Learning Outcomes

Students completing this course should be able to:

1. Understand the structure of compilers.
2. Understand the basic techniques used in compiler construction such as lexical analysis, top-down, bottom-up parsing, context-sensitive analysis, and intermediate code generation.
3. Understand the basic data structures used in compiler construction such as abstract syntax trees, symbol tables, three-address code, and stack machines.
4. Design and implement a compiler using a software engineering approach.
5. Use generators (e.g. Lex and Yacc)
6. Learn the principles of Compiler designing and study how to build a compiler.
7. Understand different functions of Compilers.

CS-5613 Computer Networks

Subject learning outcomes:

Upon completing the course:

1. Familiarity with network terminologies, reference model, applications of network, design issues and how computer network works?
2. Knowledge of Data link layer design issues, Framing, Error correction and Detection techniques.
3. Meaning of flow control and its methods.
4. Problems associated with broadcast network and multiple access control protocols.
5. Knowledge of IEEE 802.3, 802.4 and 802.5, 802.11
6. Latest LAN examples.
7. Design issues related to Network layer like routing, addressing and their protocols.
8. Introductory knowledge of Transport layer protocols like TCP and UDP.
9. Idea about client server architecture and working of DNS, HTTP and E Mail.
10. Security issues in computer network and Introduction to Cryptographic algorithms and Digital Signature.

CS-5615 Information Security

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understand the challenges and scope of information security.
2. Understand such basic security concepts as confidentiality, integrity, and availability, which are used frequently in the field of information security.
3. Understand the importance of cryptographic algorithms used in information security in the context of the overall information technology (IT) industry.
4. Understand symmetric algorithms for encryption-based security of information.
5. Understand public-key based asymmetric algorithms for encryption-based security of information.
6. Describe the access control mechanism used for user authentication and authorization.

CS-5616 E-Commerce

Subject Learning Outcomes

After completing this course, students will be able to

1. To gain an understanding of the theories and concepts underlying e-commerce.
2. To apply e-commerce theory and concepts to what e-marketers are doing in "the real world"
3. To improve familiarity with current challenges and issues in e-commerce

CS-5617 Internet and Web Technology

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Identify the need of dynamic website programming.
2. Understand the concept of Web servers and Application servers and Application of configuration files. Gain the idea of various dynamic web programming technology.
3. Understand the servlet model for the dynamic web programming. Developing and deploying the basic servlet application. Understand the lifecycle of the servlet and the various classes from servlet package provided in the API.
4. Understand HTML form handling using servlets. Understand the concept of session handling. To get detail understanding of the various sessions handling techniques. Understand the idea of deployment descriptor and detail about the various elements of deployment descriptor.
5. Understand the need of database programming for dynamic website designing. Develop programmers using various JDBC driver types and the SQL package from the JDBC API. Also develop programmer to access metadata information.
6. Understand various types of Statement classes available in JDBC. Understand the concept and applicability of connection pooling.
7. Understand the basics of JSP viz. lifecycle of JSP, various scarping elements of JSP. Developing JSP program. Understand better designing concept of Web application using JavaBeans.
8. To get detail understanding of the various sessions handling techniques. Understand and use the standard tag library of JSP. Developing the custom Tag Library.
9. Understand the need and concept of Hibernate. Develop the J2EE application using the Hibernate. Understand the concept of MVC design pattern and develop the web application under the MVC design pattern using Struts.

CS-5713 Data Analytics Using R

Subject Learning Outcomes

Upon completing the course:

1. Students will develop relevant programming abilities.
2. Students will demonstrate proficiency with statistical analysis of data.
3. Students will develop the ability to build and assess data-based models.

CS-6220 Internet Programming Using Java

Subject Learning Outcomes

Upon completing the course:

1. Students will be able to solve programming problem using java concepts

2. Develop application / program in core and advance java topics
3. Identify the need of dynamic website programming. Understand the concept of Web servers and Application servers and Application of configuration files.
4. Understand the need of database programming for dynamic website designing. Develop programmers using various JDBC driver types and the SQL package from the JDBC API.

CS-6313 Software Testing

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Various test processes and continuous quality improvement
2. Types of errors and fault models
3. Methods of test generation from requirements
4. Behavior modeling using UML: Finite state machines (FSM)
5. Test generation from FSM models
6. Input space modeling using combinatorial designs
7. Combinatorial test generation
8. Test adequacy assessment using: control flow, data flow, and program mutations
9. The use of various test tools
10. Application of software testing techniques in commercial environments

CS-6418 Advanced Database Management System

Subject Learning Outcomes

Upon completion of this course, students will be able to:

1. Explain in detail DBMS architecture.
2. Explain in detail query processing and techniques involved in query optimization.
3. Explain the principles of concurrency control.
4. Explain the principles of recovery management.
5. Know recent developments and active research topics in database.

CS-6516 Advanced Operating Systems

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Study software components of distributed computing systems. Know about the communication and interconnection architecture of multiple computer systems.
2. Recognize the inherent difficulties that arise due to distributed-ness of computing resources. Understanding of networks & protocols, mobile & wireless computing and their applications to real world problems.

At the end students will be familiar with the design, implementation and security issues of distributed system.

CS-6518 Cloud Computing

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understanding the key challenge of Cloud Computing
2. Comparison of various cloud platforms available
3. Understanding the concept of distributed, virtualization etc.
4. Identify security and privacy issues in cloud computing
5. Hands on working of CloudSim
6. Hands on Hadoop

CS-6622 Advance Computer Network

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. To recognize the need for service integration and discuss how it can be accomplished;
2. To explain and exemplify current QoS architectures and mechanisms, and the QoS support challenges in future networks;
3. To understand and explain the design issues in transport services in face of applications and services requirements;
4. To understand theoretical and practical concepts behind the design of multiconstrained applications and services;
5. To discuss relevant management issues and devise adequate network management solutions;
6. To identify and assess possible research opportunities and difficulties within the course scope.

CS-6624 Network Management

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Describe network management and the network management architecture.
2. Explain the various functions of network management.
3. Gain in-depth theoretical and practical knowledge of network management, and in particular of SNMP (Simple Network Management Protocol).
4. Compare a number of variations of the network management architecture.

CS-6628 Legal Aspects of Information Security

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. A general background in concepts of privacy in Indian society.
2. Define ethics, morality, and moral system and recognize the distinction between ethical theory and professional Ethics.
3. Summarize the legal bases for the right to privacy and freedom of expression in one's own nation and how those concepts vary from country to country.
4. Distinguish among patent, copyright, and trade secret protection and explain how patent and copyright laws may vary internationally.
5. Explain the various Indian legislation and regulations that impact technology and the disadvantages and advantages of free expression in cyberspace.

CS-6630 Internet of Things

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Understand IoT concept
2. Gain knowledge of IoT Applications and Examples.
3. Understand Technologies involved in IoT.
4. Get insight of Data Modelling in IoT
5. Understand Security models in IoT
6. Explore and learn about IoT with the help of preparing projects designed with the Arduino.

CS-6711 Soft Computing

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Identify and describe soft computing techniques and their roles in building intelligent machines.
2. Apply neural networks to pattern classification and regression problems.
3. Recognize the feasibility of applying a soft computing methodology for a particular problem.
4. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
5. Apply genetic algorithms to combinatorial optimization problems.

CS-6712 Data Science

Subject Learning Outcomes

Upon completing the course:

1. Students will develop relevant **programming** abilities.
2. Students will demonstrate proficiency with statistical **analysis of data**.
3. Students will develop the ability to build and assess data-based **models**.
4. Students will execute statistical analyses with professional statistical **software**.
5. Students will demonstrate skill in **data management**.
6. Students will apply data science concepts and methods to **solve** problems in real-world contexts and will **communicate** these solutions effectively

IC-3929 Entrepreneurship

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Learn how to start an enterprise and design business plans those are suitable for funding by considering all dimensions of business.
2. Understand entrepreneurial process by way of studying different cases and performing class activities.

IC-2927 Environmental Awareness

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Students will have knowledge about controlling E-waste & business models available.
2. Students will have insight about recycling the E-waste.
3. Students will have information about the different authorized E-waste collectors and government policies.

IC-2928 Principles and Practices of Management

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. Identify the key management processes and the relevance of management in organisations.
2. Understand the key management skills required in organisations and how these might be applied.
3. Evaluate their own managerial skills and the ways in which these might be developed.
4. Understand Team members while working with people from different background.

IC-3913 Financial Accounting

Subject Learning Outcomes

Upon completing the course, students will be able to:

1. State the uses and users of accounting information;
2. Explain and apply accounting concepts, principles and conventions;
3. Record basic accounting transactions and prepare annual financial statements; and
4. Analyse, interpret and communicate the information contained in basic financial statements and explain the limitations of such statements.