

Automobile Engineering

Program outcomes

- Apply knowledge of Mathematics, Science, Engineering fundamentals to solve complex Automobile Engineering problems.
- Identify, formulate& analyze Automobile Engineering problems in order to reach substantial conclusion using laws of engineering science.
- Able to investigate complex automobile problems and find appropriate solution leading to valid conclusion.
- Design automobile system, components, process to meet specified needs with appropriate attention to health, safety, standards, economy, environmental, social considerations.
- Create, select, apply appropriate techniques resources and advanced engineering and software tools necessary to analyze and design automobile engineering problems.
- Understand the impact of automobile engineering solution on society and environment for sustainable development.
- Understand society, health, safety, legal and cultural issues and responsibilities relevant to engineering profession.
- Apply professional ethics, accountability and equity in engineering profession.
- Able to work in multidisciplinary team and leader for common goals.
- Communicate effectively within profession and society at large.
- Able to appropriate incorporate principles of management and finance in one's own work.
- Identify educational needs and engage in life long learning in a changing world of technology.

Program specific outcomes

- Identify, Understand, Formulate, and analyze complex engineering problems in Automobile, design, thermal and manufacturing.
- Plan and execute efficient, sustainable, safe and cost-effective manufacturing of automobile components in ICE, AS, CBE through CAD/CAM/CAE tools ethically.

Civil Engineering

Program outcomes

At the end of the program, a student will be able:

- Apply the knowledge of mathematics, science and engineering fundamentals to solve complex civil engineering problems.
- Identify, formulate and analyse civil engineering problems and derive conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- Investigate complex civil engineering problems and find appropriate solution leading to valid conclusions.
- Design a civil engineering system, component, or process to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations.
- Create, select and apply appropriate techniques, resources, and advanced engineering and software tools necessary to analyse and design civil engineering problems.
- Understand the impact of Civil engineering solutions on society and environment for sustainable development.
- Understand societal, health, safety, cultural and legal issues and responsibilities relevant to engineering profession.
- Apply professional ethics, accountability and equity in engineering profession.
- Work effectively as a member and leader in multidisciplinary teams for a common goal.
- Communicate effectively with in a profession and society at large.
- Appropriately incorporate principles of management and finance to one's own work.
- Identify educational needs and engage in lifelong learning in a changing world of technology.

Program specific outcomes

- Identify, understand, formulate and analyze complex engineering problems in Civil Engineering such as Structural, Environmental and Water Resources Engineering.
- Plan, design and execute efficient safe, sustainable and cost effective high-rise structures, bridges, expressways, offshore structures and dams using modern construction tools and techniques ethically.

Computer Engineering

Program outcomes

At the end of the program, a student will be able to:

1. Apply the knowledge of Mathematics, Science and Engineering Fundamentals to solve complex Computer Engineering Problems.
2. Identify, formulate and analyze Computer Engineering Problems and derive conclusion using First Principle of Mathematics, Engineering Science and Computer Science.
3. Investigate Complex Computer Engineering problems to find appropriate solution leading to valid conclusion.
4. Design a software System, components, Process to meet specified needs with appropriate attention to health and Safety Standards, Environmental and Societal Considerations.
5. Create, select and apply appropriate techniques, resources and advance Engineering software to analyze tools and design for Computer Engineering Problems.
6. Understand the Impact of Computer Engineering solution on society and environment for Sustainable development.
7. Understand Societal, health, Safety, cultural, Legal issues and Responsibilities relevant to Engineering Profession.
8. Apply Professional ethics, accountability and equity in Engineering Profession.
9. Work effectively as a member and leader in multidisciplinary team for a common goal.
10. Communicate effectively within a Profession and Society at large.
11. Appropriately incorporate principles of Management and Finance in one's own Work.
12. Identify educational needs and engage in lifelong learning in a Changing World of Technology.

Program specific outcomes

- Formulate and analyze complex engineering problems in computer engineering (Networking/Big data/ Intelligent Systems/Cloud Computing/Real time systems)
- Plan and develop efficient, reliable and secure system and customized application software using cost effective emerging software tools ethically

Electronics and Telecommunication Engineering

Program outcomes

At the end of the program, a student will be able to:

- Apply the knowledge of Mathematics, Science and Engineering fundamentals to solve complex Electronics and telecommunication engineering Problems.
- Identify, formulate and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences.
- Investigate complex Electronics and telecommunication engineering problems and find appropriate solution leading to valid conclusion.
- Design an electronic system or process to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations.
- Create, select and apply appropriate techniques, resources, advanced engineering and software tools necessary to analyze and design telecommunication engineering problems.
- Understand the impact of Electronics and telecommunication Engineering solutions on society and environment for sustainable development.
- Understand societal, health, safety, cultural and legal issues and responsibilities relevant to engineering profession.
- Apply professional ethics, accountability and equity in engineering profession.
- Work effectively as a member and leader in multidisciplinary team for a common goal.
- Communicate effectively within a profession and society at large.
- Appropriately incorporate principles of management and finance in one's own work.
- Identify educational needs and engage in lifelong learning in a changing world of technology.

Program specific outcomes

1. Identify, understand, formulate and analyze the complex engineering problems in communication engineering, signal processing, Embedded systems and electronics engineering.
2. Plan and execute efficient, safe, sustainable and cost-effective development of Electronic circuits, Antennas, televisions, RADAR, satellite and optical fiber systems using modern tools ethically.

Information Technology

Program outcomes

At the end of the program, a student will be able to:

- Apply the knowledge of Mathematics, Science, Engineering fundamentals to solve complex Information Technology Engineering Problems.
- Identify, formulate and analyze Information Technology Engineering problems to derive conclusion using first principles of mathematics and Computer Science.
- Investigate complex Information Technology engineering problems and find appropriate solution leading to valid conclusion.
- Design IT systems, components or processes to meet specified needs with appropriate attention to health, safety, standards, environmental and societal consideration.
- To create select & apply appropriate techniques, resources advance engineering & software tools necessary to analyze & design Information Technology Problems.
- Understand the impact of IT Solutions on society and environment for sustainable development.
- Understand social, safety, culture and legal issues and responsibilities relevant to engineering profession.
- Apply professional ethics, accountability and equity in engineering profession.
- Work effectively as a member and leader in multidisciplinary team for a common goal.
- Communicate effectively within a profession and with society at large.
- Appropriately incorporate principles of Management & Finance to one's own work.
- To identity Educational needs & engage in lifelong learning in a changing word of technology.

Program specific outcomes

1. Identify, understand, formulate and analyze complex engineering problems in the field of Network system, Database management, Web communication, Computer programming and software development.
2. Plan, design, develop and manage software in the field of artificial intelligence , data mining, network management and security, cloud based services and Internet of Things applications through use of secure, reliable and cost effective state of art IT tools efficiently

Mechanical Engineering

Program outcomes

At the end of the program, a student will be able to:

- Apply Knowledge of mathematics, science and Engineering fundamentals to solve complex mechanical engineering problems
- Identity, formulate and analyze and mechanical engineering problems and derive conclusion using first principle of mathematics and engineering sciences.
- Able to investigate of complex mechanical engineering problems & find appropriate solution leading to valid conclusion
- Design Mechanical system, component and process to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations.
- Create, select, apply an appropriate techniques, resource and advance engineering software tools to analyze& design mechanical engineering problems
- Understand the input of mechanical engineering solution on socially and environment for sustainable development.
- Able to understand societal, safely, cultural and legal issues & responsibilities relevant to engineering profession.
- Apply professional ethics, accountability and equity in engineering profession.
- Work effectively as a member and leader in multi-disciplinary team for common goal
- Communicate effectively within profession and society at large
- Appropriately incorporate principals of management and finance in one's own work
- Identify educational needs and engage in lifelong learning in changing world of technology

Program specific outcomes

1. Identify, understand, formulate and analyze complex engineering problems in Design, Thermal, Management and Manufacturing of Mechanical System.
2. Plan and Execute efficient, safe, sustainable and cost effective manufacturing of IC Engines, Turbomachines, Air Conditioning systems by the use of CAD/CAM/CAE tools ethically.

Department-COMPUTER ENGINEERING

Semester-III

Scheme R-19

Subject- Engineering Mathematics-III

Subject Code-CSC301

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1,2,5 | - | 1.6 | 1.6.1 | 3 | CO1 | Apply the concept of Laplace transforms and use to solve real integrals in engineering problems |
| PO2,3 | - | 2.5 | 2.5.2 | 3,5 | CO2 | Identify the concept of inverse laplace transform and compare to various functions and its applications |
| PO3,4 | - | 3.5 | 3.5.6 | 3.6 | CO3 | Develop and determine Fourier series for real life problems and applications. |
| PO1,2 | - | 2.8 | 2.8.1 | 3,4 | CO4 | Apply the properties of Complex analysis and select the application to orthogonal trajectories. |
| PO2,3,5 | - | 5.4 | 5.4.2 | 3 | CO5 | Use the concept of statistical techniques to solve problems in data science,machine learning and AI. |
| PO1,2,12 | - | 1.2 | 1.2.2 | 3 | CO6 | Apply the concept of probability,expectation to determine the spread of data and probability distribution. |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To familiarize with the Laplace, transform and its properties. |
| 2 | To study the Inverse Laplace, transform of various functions, theorem and itsapplications. |
| 3 | To understand the concept of fourier series, its complex form and enhance theproblem. |
| 4 | To familiarize the concept of complex variables, C-R equations with applications. |
| 5 | To understand the basic techniques of statistics like correlation, regression andcurve fitting for data analysis, machine learning and AI. |
| 6 | To study some advanced topic of probability, random variables with theirdistributions and expectations. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.5 | 2.5.3 | 3-Apply | CO1 | Apply clear thinking for problem solving using laws of logic and mathematical induction. |
| PO1 | PSO1 | 1.2 | 1.2.1 | 3-Apply | CO2 | Apply the knowledge of Discrete Structure to solve complex relations and functions to find appropriate solution |
| PO2 | PSO1 | 2.7 | 2.7.1 | 4-Analyze | CO3 | Analyze complex relations and design Hasse diagram and Lattice |
| PO1 | PSO1 | 1.2 | 1.2.2 | 3-Apply | CO4 | Apply formulate and analyze permutation and combination using principle of mathematics. |
| PO1 | PSO1 | 1.7 | 1.7.1 | 3-Apply | CO5 | Apply the knowledge of mathematics to solve algebraic structure and detecting and correcting code in the transmitted data. |
| PO3 | PSO1 | 3.6 | 3.6.1 | 3-Apply | CO6 | Apply concepts of graph theory in solving real world problems. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply clear thinking and creative problem solving using laws of logic and mathematical Induction. |
| 2 | Understand the concepts of relation and functions. |
| 3 | Understand the designing of Hasse diagram and Lattice |
| 4 | Understand the permutation and combination. |
| 5 | Understand the technique for detecting and correcting code in transmitted data. |
| 6 | Understand the basic concept in graph theory and their properties. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|--|
| 2 | | 2.6 2.1 | 2.6.1 2.1.2 | | 1 1 | Identify functionalities of Data structure of a computer-based system to solve a engineering problem |
| 3 | | 3.6 | 3.6.2 | 1 | 2 | Able to produce a variety of potential design solutions suited to meet functional requirements for implementation of stack and queue |
| 5 | | 5.4 | 5.4.1 | 1 | 3 | Identify different Linked list techniques for engineering activities |
| 4 | | 4.5 | 4.4.3 | 1 | 4 | Able to choose appropriate tree traversal method to conduct the experiment. |
| 5 | | 5.4 | 5.4.2 | 6 | 5 | Adapt graph traversal techniques to solve engineering problems |
| 1 | | 1 | 1.7.1 | 3 | 6 | Apply theory and principles searching techniques of computer science and engineering to solve an engineering problem |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the basic concepts of Data Structure and efficient storage mechanism of data for an easy access. |
| 2 | Design and implementation of various Operations data structure. |
| 3 | Identify the various techniques for representation of the data in linked list. |
| 4 | Learn the different tree techniques. |
| 5 | Investigate the logical ability and understand the generic principles of graph as applied to sophisticated data structure. |
| 6 | Understand different searching techniques |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | | 1.3 | 1.3.1 | Level 1 Remember | CO 1 | Describe the basic concepts of Computer Graphics. |
| PO2 | | 2.1 | 2.1.3 | Level 2 Understand | CO 2 | Demonstrate various algorithms for basic graphics primitives. |
| PO 1 | | 1.1 | 1.1.1 | Level 3 Apply | CO 3 | Apply 2-D geometric transformations on graphical objects Matrix multiplication. |
| PO 4 | | 4.2 | 4.2.1 | Level 3 Apply | CO 4 | Use various Clipping algorithms on graphical objects |
| PO2 | | 2.3 | 2.3.2 | Level 4 Analyze | CO 5 | Explore 3-D geometric transformations, curve representation techniques and projections methods |
| PO 3 | | 3.1 | 3.1.1 | Level 2 understand | CO 6 | Explain visible surface detection techniques and Animation. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To equip students with the fundamental knowledge and basic technical competence in the field of Computer Graphics. |
| 2 | To emphasize on implementation aspect of Computer Graphics Algorithms. |
| 3 | Understand the concept of 2-D geometric transformations on graphical objects. |
| 4 | Understand the concept 3-D geometric transformations, curve representation techniques and projections methods |
| 5 | Discuss the windows and view coordinate system and Develop understanding of Clipping algorithms on graphical objects |
| 6 | To prepare the student for advance areas and professional avenues in the field of Computer Graphics |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 3 | | 3.6 | 3.6.2 | 1 | 1 | Able to produce a variety of potential design solutions suited to meet functional requirements for implementation of stack |
| 3 | | 3.6 | 3.6.2 | 6 | 2 | Design potential solutions suited to meet functional requirements for implementation of queue |
| 5 | | 5.4 | 5.4.1 | 3 | 3 | illustrate and apply different Linked list techniques for engineering activities |
| 4 | | 4.5 | 4.4.3 | 1 | 4 | Able to choose appropriate tree traversal method to conduct the experiment. |
| 5 | | 5.4 | 5.4.2 | 6 | 5 | Adapt graph traversal techniques to solve engineering problems |
| 1 | PSO1 | 1 | 1.7.1 | 3 | 6 | Apply theory and principles searching techniques of computer science and engineering to solve an engineering problem |

Course Objectives

| Sr.No. | Description |
|---------------|---|
| 1 | To implement basic data structures such as arrays, stacks |
| 2 | To implement basic data structures such as queue |
| 3 | To implement basic data structures such as linked list |
| 4 | Compute the complexity of various Tree algorithms. |
| 5 | Investigate the logical ability and understand the generic principles of graph as applied to sophisticated data structure. |
| 6 | Understand different searching techniques |

Subject: DLCOA LAB

Subject Code: CSL302

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|--------------------------------|-----------|--|
| PO2 PO3 | PSO1 | 2.8 3.6 | 2.8.1 3.6.1 | 2- Understand 5-Evaluate | CO1 | Understand the basics implementation of gates. |
| PO4 | PSO2 | 4.4 | 4.4.2 | 5-Evaluate 6-Create | CO2 | Implement arithmetic operations using Multiplexer/demultiplexer. |
| PO3 PO5 | PSO1 | 3.6 5.4 | 3.6.2 5.4.1 | 2- Understand 3-Apply | CO3 | Understand and learn about basics of counters. |
| PO2 PO5 | PSO2 | 2.8 5.4 | 2.8.1 5.4.2 | 3-Apply 5-Evaluate | CO4 | Implement arithmetic operations using various algorithms. |
| PO4 | PSO1 | 4.4 | 4.4.3 | 2- Understand 6-Evaluate | CO5 | Understand and implement the processor designing. |
| PO 5 | PSO1 | 5.4 | 5.4.1 | 3-Apply 5-Evaluate | CO6 | Implement the operation of memory and caches. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the basics implementation of gates. |
| 2 | To Implement arithmetic operations using Multiplexer/demultiplexer. |
| 3 | To understand and learn basics of counters. |
| 4 | To implement arithmetic operations using various algorithms. |
| 5 | To understand and implement the processor designing. |
| 6 | To implement the operation of memory and caches. |

Subject: Computer Graphics Lab**Subject Code: CSL303****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | | 1.3 | 1.3.1 | Level 2 Understand | CO 1 | Implement various algorithms for basic graphics primitives |
| PO2 | | 2.1 | 2.1.3 | Level 2 Understand | CO 2 | Implement various filled area primitive algorithms |
| PO 1 | | 1.1 | 1.1.1 | Level 3 Apply | CO 3 | Apply transformation on graphical objects |
| PO 4 | | 4.2 | 4.2.1 | Level 3 Apply | CO 4 | Apply clipping algorithms on graphical objects |
| PO2 | | 2.3 | 2.3.2 | Level 4 Analyze | CO 5 | Perform curve and fractal generation methods. |
| PO 3 | | 3.1 | 3.1.1 | Level 6 Create | CO 6 | Develop a Graphical application/Animation based on learned concept |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand the need of developing graphics application. |
| 2 | Learn algorithmic development of graphics primitives like line, circle, polygon etc. |
| 3 | Learn the 2-D geometric transformations on graphical objects. |
| 4 | Understand the concept 3-D geometric transformations, curve representation techniques and projections methods |
| 5 | Learn the Clipping algorithms on graphical objects |
| 6 | To prepare the student for advance areas and professional avenues in the field of Computer Graphics |

Subject: OOPM

Subject Code: CSL304

Course Outcomes

| PO | PSO | Competency Level | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.6 | 1.6.1 | Level 2 Understand | CO1 | Understanding fundamental programming constructs |
| PO3 | PSO1 | 3.6 | 3.6.2 | Level 4 Analyze | CO2 | Illustrate the concept of packages, classes and objects. |
| PO5 | PSO1 PSO2 | 5.4 | 5.4.2 | Level 3 Apply | CO3 | Extending the concept of strings, arrays and vectors. |
| PO3 | PSO2 | 3.6 | 3.6.1 | Level 4 Analyze | CO4 | Implement the concept of inheritance and interfaces |
| PO4 | PSO1 | 4.5 | 4.5.1 | Level 2 Understand | CO5 | Deep understanding of handling exceptions and threads in JAVA Programming |
| PO4 | PSO2 | 4.4 | 4.4.3 | Level 3 Apply | CO6 | Illustrating GUI based application. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand fundamental programming constructs |
| 2 | To illustrate the concept of packages, classes and objects |
| 3 | To extend the concept of strings, arrays and vectors |
| 4 | To implement the concept of inheritance and interfaces in JAVA |
| 5 | To deep understand the exception handling and threads in JAVA programming |
| 6 | To illustrate the GUI based application |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|----------------------------|------------------------------|-----------|--|
| PO1 PO2 | PSO1 | 1.7 2.5 | 1.7.1 2.5.2 | 2- Understand 3- Apply | CO1 | Understand problems and use knowledge and skills to interpret societal/research problems in a group |
| PO9 | PSO2 | 9.5 | 9.5.2 9.5.4 | 6-Create | CO2 | Build interpersonal skills to work as member of a group or leader |
| PO5 PO7 | PSO1 | 5.5 7.3 | 5.5.1 7.3.1 7.3.2 | 4-Analyze 6-Create | CO3 | Design the proper inference through theoretical/experimental/simulation and illustrate the impact of solution in social, environmental context for sustainable development |
| PO8 | PSO1 | 8.4 | 8.4.1 8.4.2 | 3-Apply | CO4 | Apply standard norms of engineering practices |
| PO10 | PSO1 | 10.4 10.5 | 10.4.1 10.4.2 10.5.2 | 6-Create | CO5 | Develop in written and oral communication |
| PO11 PO12 | PSO2 | 11.6 12.5 | 11.6.2 12.5.2 | 3 Apply | CO6 | Apply project management principles and capabilities of self-learning in a group for a lifelong learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand problems and use knowledge and skills to interpret societal/research problems in a group |
| 2 | To build interpersonal skills to work as member of a group or leader |
| 3 | To design the proper inference through theoretical/experimental/simulation and illustrate the impact of solution in social, environmental context for sustainable development |
| 4 | To apply standard norms of engineering practices |
| 5 | To develop in written and oral communication |
| 6 | To apply project management principles and capabilities of self-learning in a group for a lifelong learning |

Semester- IV

Subject: Applied Mathematics-IV

Subject Code: CSC401

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1,2,3 | - | 1.7 | 1.7.1 | 3 | CO1 | Apply the concept of eigen values and eigen vectors in engineering problems |
| PO2,4,5 | - | 2.8 | 2.8.1 | 3,5 | CO2 | Use the concepts of Complex integration for evaluating integrals, computing residues and evaluate various contour integrals. |
| PO1,5 | - | 5.4 | 5.4.2 | 3 | CO3 | Apply the concept of Z-transformation and inverse in engineering problem. |
| PO1,2,12 | - | 2.8 | 2.8.4 | 3.2 | CO4 | Illustrate understanding the concept of probability distribution and sampling theory to engineering problem. |
| PO1,2,4 | - | 4.5 | 4.5.1 | 3 | CO5 | Apply the concept of Linear programming problems to optimization. |
| PO1,2,4 | - | 2.6 | 2.6.3 | 3 | CO6 | Solve Non-linear programming problem for optimization of engineering problem. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand matrix algebra for engineering problems. |
| 2 | To study line and contour integrals and expansion of a complex valued function in a power series. |
| 3 | To understand the concept of Z-Transform and inverse Z-Transform with its properties. |
| 4 | To familiarize the concept of probability distributions and sampling theory for small samples. |
| 5 | To study the basic techniques of LPP for optimization. |
| 6 | To apply the concept of NLPP to understand the optimization of engineering problem. |

Subject: AOA

Subject Code: CSC402

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|---|-----------|---|
| PO1 PO4 | 1 | 1.2 | 1.2.1 | 2- Understand, 3-Apply 4-Analyze | CO1 | Analyze the running time and space complexity of algorithms. |
| PO2 | 1 | 2.1 | 2.5.2 | 2- Understand, 3-Apply 4-Analyze | CO2 | Describe, apply and analyze the complexity of divide and conquer strategy. |
| PO2 | 1 | 3.7 | 3.7.1 3.7.2 | 2- Understand, 3-Apply 4-Analyze | CO3 | Describe, apply and analyze the complexity of greedy strategy. |
| PO2 | 1 | 1.2 | 1.2.2 | 2- Understand, 3-Apply 4-Analyze | CO4 | Describe, apply and analyze the complexity of dynamic programming strategy. |
| PO2 PO3 | | 4.6 | 4.6.1 | 2- Understand, 3-Apply | CO5 | Explain and apply backtracking, branch and bound. |
| PO2 PO5 | | 2.6 | 2.6.5 | 2- Understand, 3-Apply | CO6 | Explain and apply string matching techniques. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To analyze the running time and space complexity of algorithms. |
| 2 | To describe, apply and analyze the complexity of divide and conquer strategy. |
| 3 | To describe, apply and analyze the complexity of greedy strategy. |
| 4 | To describe, apply and analyze the complexity of dynamic programming strategy. |
| 5 | To explain and apply backtracking, branch and bound. |
| 6 | To explain and apply the string matching techniques. |

Subject: DBMS**Subject Code: CSC403****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|---------------------------|-----------|---|
| PO2 | PSO1 | 2.6 | 2.6.3 | 4-Analyze 2-Understand | CO1 | Identify and analyze the roles and responsibilities of different types of user and investigate the different architecture to find appropriate solution. |
| PO4 | PSO1 | 4.5 | 4.5.1 | 6>Create 2-Understand | CO2 | Understand and Design data modeling using ER and Extended ER features to meet the specified needs. |
| PO3 | PSO1 | 3.6 | 3.6.2 | 3-Apply 6>Create | CO3 | Investigate and apply different relational algebra operators to find appropriate solution leading to valid conclusion. |
| PO5 | PSO1 | 5.4 | 5.4.2 | 6>Create | CO4 | Investigate and formulate SQL queries to find appropriate solution to complex problems. |
| PO4 | PSO1 | 4.6 | 4.6.4 | 4-Analyze 3-Apply | CO5 | Analyze and apply different normalization techniques to process and meet the specified needs with appropriate solution |
| PO5 | PSO1 | 5.5 | 5.5.1 | 2-Understand | CO6 | Identify the strength and limitation of tools for concept of transaction, concurrency and recovery. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the role of database management system in an organization. |
| 2 | Design data modeling using the entity-relationship and developing database designs. |
| 3 | Understand the relational algebra operators. |
| 4 | Understand the use of Structured Query Language (SQL) and learn SQL syntax. |
| 5 | Understand the normalization techniques to normalize the database. |
| 6 | Understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access. |

Subject: OS

Subject Code: CSC404

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| PO7 | PSO1 | 2.1 | 2.1.2 | Level 2 Understand | CO1 | Understand the objectives, functions and structure of Operating system. |
| PO2 | PSO1 | 2.1 2.2 | 2.1.2 2.2.4 | Level 4 Analyze | CO2 | Analyse the concept of process management and evaluate performance of process scheduling algorithms |
| PO2 | PSO1 | 2.6 | 2.6.3 2.6.4 | Level 3 Apply | CO3 | Understand and apply the concepts of synchronization and deadlocks. |
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 4 Analyze | CO4 | Evaluate performance of memory allocation and replacement policies |
| PO2 | PSO1 | 2.7 | 2.7.2 | Level 2 Understand | CO5 | Understand the concepts of file management. |
| PO1 | PSO1 | 1.7 | 1.7.1 | Level 3 Apply | CO6 | Apply concepts of I/O management and analyze techniques of disk scheduling |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the objective, structure and function of operating system |
| 2 | To analyze and evaluate the process of scheduling algorithm |
| 3 | To understand and apply the concept of synchronization and deadlock |
| 4 | To evaluate the performance of memory allocation and replacement policies |
| 5 | To understand the concept of file management |
| 6 | To apply the concepts of I/O management and analyze techniques of disk scheduling |

Subject: MP

Subject Code: CSC405

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | 3-Apply | CO-1 | Apply basic engineering fundamentals to describe the architecture of 8086 processor. Apply engineering fundamentals to describe DOS and BIOS interrupts. |
| PO2 | PSO1 | 2.4 | 2.4.1 2.4.2 | 3-Apply 4-Analyze | CO-2 | Apply the instructions of 8086 to implement the assembly language program. Analyse and interpret the result of ALP using integrated tool. |
| PO3 | PSO2 | 3.4 | 3.4.1 | 3-Apply | CO-3 | Able to refine architecture design into detailed design using processor, memory chip or different peripheral ICs within existing constraints |
| PO3 | PSO1 | 3.1 | 3.1.5 | 3-Apply | CO-4 | Explore and synthesize 80386 system requirements from larger social and professional concerns |
| PO3 | PSO1 | 3.3 | 3.3.5 | 3-Apply | CO-5 | Able to perform systematic evaluation of degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria. |
| PO1 | PSO1 | 1.3 | 1.3.1 | 3-Apply | CO-6 | Apply basic engineering fundamentals to describe the hyperthreading technology in higher processors |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand basic concepts of microprocessor & Understand the concepts of interrupts |
| 2 | Apply background knowledge and create the appropriate logic for building assembly language programs for 8086. |
| 3 | Explain various peripheral devices and their interfacing to 8086 and to apply it to design Microprocessor based system. |
| 4 | Prepare students for higher processor architecture and understand different modes of execution and extend the importance of protected mode of 80386. |
| 5 | Discuss Pentium i.e multicore processor architecture and its organization. |
| 6 | To Understand hyperthreading technology |

Subject: AOA LAB

Subject Code: CSL401

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------|------------|-------------------|-------------------------|---|-----------|---|
| PO2 PO4 | 1 | 2.8 4.6 | 2.8.2 4.6.1 | 4-Analyze | CO1 | Analyze the complexities of various problems in different domains. |
| PO2 PO1 PO4 | 1 | 2.1 1.7 4.6 | 2.5.2 1.7.1 2.8.2 | 2- Understand, 3-Apply 4-Analyze | CO2 | Describe, apply and analyze the running time of the basic algorithms for those classic problems in various domains using divide and conquer strategy. |
| PO2 PO1 | 1 | 2.1 1.7 | 2.5.2 1.7.1 | 2- Understand, 3-Apply 4-Analyze | CO3 | Define and apply the efficient algorithms for the effective problem solving with the help of different strategies like greedy method. |
| PO1 | 1 | 1.7 | 1.7.1 | 3-Apply | CO4 | Apply dynamic programming strategy to solve different problems effectively. |
| PO2 PO1 | 1 | 2.1 1.7 | 2.5.3 1.7.1 | 2- Understand, 3-Apply | CO5 | Recognize and apply backtracking, branch and bound and to deal with some hard problems. |
| PO1 PO4 | 1 | 1.7 4.6 | 1.7.1 4.6.1 | 3- Apply 4- Analyze | CO6 | Apply and analyze the string-matching algorithms to find the pattern. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To analyze the complexities of various problems in different domains. |
| 2 | To Describe, apply and analyze the running time of the basic algorithms for those classic problems in various domains using divide and conquer strategy. |
| 3 | To Define and apply the efficient algorithms for the effective problem solving with the help of different strategies like greedy method. |
| 4 | To apply dynamic programming strategy to solve different problems effectively. |
| 5 | To Recognize and apply backtracking, branch and bound and string matching techniques to deal with some hard problems. |
| 6 | To apply and analyze the string matching algorithms to find the pattern. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO3 | PSO1 | 3.5 | 3.5.1 | 4-Analyze | CO1 | Identify and investigate the reallife problem to find appropriate solution and design and draw ER and EER diagram with software tool |
| PO4 | PSO2 | 4.6 | 4.6.3 | 6-Create | CO2 | Design, Create and update database and tables with different DDL and DML statements |
| P05 | PSO2 | 5.6 | 5.6.1 | 3-Apply | CO3 | Apply appropriate integrity constraints and provide security to data. |
| P04 | PSO2 | 4.4 | 4.4.2 | 4-Analyze | CO4 | Investigate and formulate SQL queries to find appropriate solution to complex problems. |
| P04 | PSO1 | 4.5 | 4.5.1 | 4-Analyze 3-Apply | CO5 | Identify and apply triggers and procedures for specific module to meet the specified needs with appropriate solution to safety standards and societal consideration. |
| P05 | PSO2 | 5.6 | 5.6.2 | 3-Apply | CO3 | Use PL / SQL Constructs. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Develop entity relationship data model and its mapping to relational model |
| 2 | Learn relational algebra and Formulate SQL queries |
| 3 | Learn integrity Constraints |
| 4 | Apply normalization techniques to normalize the database |
| 5 | Understand concept of transaction, concurrency control and recovery techniques |
| 6 | understand concept of PL/SQL |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|---|-----------|---|
| PO1 | PSO1 | 1.7 | 1.7.1 | Level 2 Understand | CO1 | Demonstrate basic operating system commands, shell scripts, system calls and API wrt Linux. |
| PO2 | PSO1 | 2.5 | 2.5.2 | Level 5 Evaluate | CO2 | Determine various process scheduling algorithms. |
| O2 | PSO1 | 2.5 | 2.5.2 | Level 4 Analyze | CO3 | Analyze the concept of synchronization and deadlocks. |
| PO2 | PSO1 | 2.5 | 2.5.2 | Level 5 Evaluate | CO4 | Determine various memory management techniques and evaluate their performance. |
| PO2 | PSO1 | 2.6 | 2.6.2 2.6.3 | Level 4 Analyze | CO5 | Identify the concept of virtual memory. |
| PO1 PO2 | PSO1 | 1.7 2.5 | 1.7.1 2.5.2 | Level 2 Understand Level 4 Analyze | CO6 | Demonstrate and analyze concept of file management and I/O management techniques. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To demonstrate basic operating system commands, shell scripts, system calls and API wrt Linux. |
| 2 | To determine various process scheduling algorithms. |
| 3 | To analyze the concept of synchronization and deadlocks. |
| 4 | To determine various memory management techniques and evaluate their performance. |
| 5 | To identify the concept of virtual memory. |
| 6 | To demonstrate and analyze concept of file management and I/O management techniques. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|-------------------------|----------------------|-----------|--|
| PO1 | PSO1 | 1.7 | 1.7.1 | 3-Apply | CO-1 | Explain basic engineering fundamentals to describe the architecture of 8086 processor. |
| PO3 PO5 | PSO2 | 3.8 5.4 | 3.8.2 5.4.1 5.4.2 | 3-Apply 4-Analyze | CO-2 | Explain the instructions of 8086 to implement the assembly language program. Identify and interpret the result of ALP using integrated tool. |
| PO3 | PSO2 | 3.6 | 3.6.2 | 6- Create | CO-3 | Design 8086 based system using Memory and peripheral chip. |
| PO2 | PSO1 | 2.5 | 2.5.2 | 5- Evaluate | CO-4 | Appraise the architecture of 80386 DX processor. |
| PO4 | PSO1 | 4.6 | 4.6.1 | 5- Evaluate | CO-5 | Determine the degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria. |
| PO1 | PSO1 | 1.7 | 1.7.1 | 2- Understand | CO-6 | Explain the hyperthreading technology in higher processors |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To explain basic engineering fundamentals to describe the architecture of 8086 processor. |
| 2 | To explain the instructions of 8086 to implement the assembly language program. Identify and interpret the result of ALP using integrated tool. |
| 3 | To design 8086 based system using Memory and peripheral chip. |
| 4 | To appraise the architecture of 80386 DX processor. |
| 5 | To determine the degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria. |
| 6 | To Understand hyperthreading technology. |

Course Outcomes

| PO | PSO | Competency Level | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.6 | 1.6.1 | Level 2 Understand | CO1 | Understand basic concepts in python |
| PO3 | PSO1 PSO2 | 3.6 | 3.6.2 | Level 3 Analyze | CO2 | Exploring contents of files, directories and text processing with python |
| PO4 | PSO2 | 4.5 | 4.5.1 | Level 6 Create | CO3 | Develop program for data structure using built in functions in python. |
| PO5 | PSO1 | 5.4 | 5.4.2 | Level 3 Apply | CO4 | To explore django web framework for developing python-based web application. |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level 3 Analyze | CO2 | Able to explore design alternatives |
| PO1 | PSO2 | 1.6 | 1.6.1 | Level 2 Understand | CO6 | Understand the concept of numpy and pandas |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand fundamental of Python programming |
| 2 | To develop the files, directories and text processing in python |
| 3 | To explore the data structure in python using function |
| 4 | To develop the django web framework |
| 5 | To use design alternatives |
| 6 | To understand the concept of numpy and pandas |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|----------------------------|--------------------------|-----------|--|
| PO1 PO2 | PSO1 | 1.7 2.5 | 1.7.1 2.5.2 | 2-Understand 3- Apply | CO1 | Understand problems and use knowledge and skills to interpret societal/research problems in a group |
| PO9 | PSO2 | 9.5 | 9.5.2 9.5.4 | 6-Create | CO2 | Build interpersonal skills to work as member of a group or leader |
| PO5 PO7 | PSO1 | 5.5 7.3 | 5.5.1 7.3.1 7.3.2 | 4-Analyze 6-Create | CO3 | Design the proper inference through theoretical/experimental/simulation and illustrate the impact of solution in social, environmental context for sustainable development |
| PO8 | PSO1 | 8.4 | 8.4.1 8.4.2 | 3-Apply | CO4 | Apply standard norms of engineering practices |
| PO10 | PSO1 | 10.4 10.5 | 10.4.1 10.4.2 10.5.2 | 6-Create | CO5 | Develop in written and oral communication |
| PO11 PO12 | PSO2 | 11.6 12.5 | 11.6.2 12.5.2 | 3 Apply | CO6 | Apply project management principles and capabilities of self-learning in a group for a lifelong learning |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand problems and use knowledge and skills to interpret societal/research problems in a group |
| 2 | To build interpersonal skills to work as member of a group or leader |
| 3 | To design the proper inference through theoretical/experimental/simulation and illustrate the impact of solution in social, environmental context for sustainable development |
| 4 | To apply standard norms of engineering practices |
| 5 | To develop in written and oral communication |
| 6 | To apply project management principles and capabilities of self-learning in a group for a lifelong learning |

Semester- V

Subject: TCS

Subject Code: CSC501

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.3 | 1.3.1 | Level 4 Analyze | CO 1 | Identify the central concepts in theory of computation and analyse differentiate between deterministic and nondeterministic automata, apply formulate knowledge to obtain equivalence of NFA and DFA. |
| PO2 | | 2.4 | 2.4.1 | Level 4 Analyze | CO 2 | Investigate the equivalence of languages described by finite automata and regular expressions. |
| PO5 | | 5.1 | 5.1.2 | Level 6 Create | CO 3 | Create and apply regular, context free grammars while recognizing the strings and tokens. |
| PO2 | | 2.4 | 2.4.2 | Level 6 Create | CO 4 | Design pushdown automata model to recognize the language. |
| PO2 | | 2.4 | 2.4.2 | Level 6 Create | CO 5 | Develop an understanding of computation through Turing Machine |
| PO1 | | 1.3 | 1.3.1 | Level 2 understand | CO 6 | Acquire fundamental understanding of decidability and undecidability and apply the knowledge to solve computer engineering problem. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify the central concepts in theory of computation and analyse differentiate between deterministic and nondeterministic automata, apply formulate knowledge to obtain equivalence of NFA and DFA. |
| 2 | To investigate the equivalence of languages described by finite automata and regular expressions. |
| 3 | To create and apply regular, context free grammars while recognizing the strings and tokens. |
| 4 | To design pushdown automata model to recognize the language. |
| 5 | To develop an understanding of computation through Turing Machine |
| 6 | To acquire fundamental understanding of decidability and undecidability and apply the knowledge to solve computer engineering problem. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|-------------------------|------------------------------|-----------|--|
| PO1 | PSO1 | 1.7 | 1.7.1 | 2 - Understand 4- Analyze | CO1 | Understand Software Engineering and analyze Process Models. |
| PO2 PO3 | PSO1 | 2.5 3.5 | 2.5.1 3.5.2 3.5.6 | 2 - Understand 4- Analyze | CO2 | Identify, Analyze Requirements in Software and develop Software Requirement Specification (SRS) document. |
| PO4 | PSO1 | 4.4 | 4.4.2 | 2- Understand 3-Apply | CO3 | Classify and execute the process of the project using project estimation techniques and tracking and scheduling the project. |
| PO4 | PSO1 | 4.5 | 4.5.1 | 6-Create | CO4 | Design of Software Project using basic Principles and concepts. |
| PO5 | PSO1 | 5.4 5.5 | 5.4.2 5.5.1 | 5-Evaluate | CO5 | Evaluate the Software by using various Testing Approaches. |
| PO5 | PSO1 | 5.5 5.6 | 5.5.2 5.6.1 5.6.2 | 2- Understand | CO6 | Identify Risk in software to assure Quality in software project. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand Software Engineering and analyze Process Models. |
| 2 | To identify, Analyze Requirements in Software and develop Software Requirement Specification (SRS) document. |
| 3 | To classify and execute the process of the project using project estimation techniques and tracking and scheduling the project. |
| 4 | To design of Software Project using basic Principles and concepts. |
| 5 | To evaluate the Software by using various Testing Approaches. |
| 6 | To identify Risk in software to assure Quality in software project. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------|------------|-------------------|--------------------------|---|-----------|---|
| PO1 PO2 | | 1.3 2.2 | 1.3.1 2.2.4 | 2 Understand 3 Apply 4 Analyze | CO-1 | Apply the knowledge of fundamentals of data communication to identify the differences between ISO - OSI model, TCP/IP model and connection oriented and connectionless services. |
| PO1 PO2 | | 1.4 2.2, 2.4 | 1.4.1 2.2.2, 2.4.3 | 2 3 4 | CO-2 | Apply the knowledge of data communication fundamentals to identify & analyze different types of media i.e., guided media used at physical layer. |
| PO2 PO3 | PSO1 | 2.2, 2.4 3.2 | 2.2.4, 2.4.3 3.2.2 | 2 3 4 | CO-3 | Apply the knowledge of different protocols used at data link layer to investigate appropriate protocol for system. Identify and analyze the differences in protocols. |
| PO2 PO5 PO6 | | 2.3 5.2 6.2 | 2.3.1 5.2.1 6.2.1 | 2 3 4 | CO-4 | Select and apply appropriate concepts of subnetting / supernetting of IP addressing. Analyze various routing algorithms and protocols at network layer. Realize the impact of protocol on system. |
| PO2 PO3 | | 2.3 3.2, 3.3 | 2.3.1 3.2.2, 3.3.1 | 2 3 4 | CO-5 | Classify and compare transport layer protocols. Relate connection management with real time communication. Investigate congestion and apply appropriate congestion control algorithm. |
| PO2 PO6 | | 2.1, 2.2 6.1 | 2.1.2, 2.2.2 6.1.1 | 3 4 | CO-6 | Identify the protocols used at application layer. Analyze the protocols in terms of organization need, its impact. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To explain and introduce concepts and fundamentals of data communication and computer networks. |
| 2 | To interrelate the inter-working of various layers of OSI. To distinguish between different media used for communication. |
| 3 | To discuss the issues and challenges of protocols design while delivering packet in network. |
| 4 | To study different protocols used for packet delivery in network layer. To assess the strengths and weaknesses of various routing algorithms. |
| 5 | To understand how process to process communication occurs i.e. transport layer and protocols used in this layer. |
| 6 | To understand various application layer protocols. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|---------------------------------------|-----------|---|
| PO1 | PSO1 | 1.7 | 1.7.1 | 2-Understand 4-Analyze 6-Create | CO1 | Understand, design data warehouse with dimensional modelling and analyze different OLAP operations. |
| PO1 | PSO1 | 1.7 | 1.7.1 | 2-Understand 3-Apply | CO2 | Understand data mining principles and use data preprocessing and data exploration. |
| PO2 | PSO1 | 2.5 | 2.5.2 | 2-Understand 5-Evaluate | CO3 | Classify and evaluate appropriate data mining algorithm |
| PO4 | PSO1 | 4.6 | 4.6.1 | 4-Analyze 5-Evaluate | CO4 | Analyze and evaluate clustering technique |
| PO5 | PSO1 | 5.4 | 5.4.1 | 2-Understand 3-Apply | CO5 | Identify and apply associate rule mining technique for real time applications. |
| PO4 PO5 | PSO1 | 4.6 5.4 | 4.6.1 5.4.1 | 2-Understand 3-Apply | CO6 | Understand and apply the concept of web mining |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand, design data warehouse with dimensional modelling with analyzing different OLAP operations. |
| 2 | To understand data mining principles with data preprocessing and data exploration. |
| 3 | To classify and evaluate appropriate data mining algorithm |
| 4 | To analyze and evaluate clustering technique |
| 5 | To identify and apply associate rule mining technique for real time applications. |
| 6 | To understand and apply the concept of web mining |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------|------------|-------------------|-----------------|----------------------|-----------|--|
| PO1, PO4 | | 1.1, 4.5 | 1.1.2, 4.5.1 | 3,6 | CO1 | Apply the concept of web technology for solving the problem of web application & Design & develop web pages using HTML5 and CSS3 |
| PO4 | | 4.5 | 4.5.1 | 6 | CO2 | Design & Develop web pages using JavaScript |
| PO4 | | 4.6 | 4.6.1 | 4 | CO3 | Use JDBC for database connectivity to collect & analyze data |
| PO4 | | 4.5 | 4.5.1 | 6 | CO4 | Design rich internet application using AJAX |
| PO2 | | 2.6 | 2.6.4 | 4 | CO5 | Compare & contrast alternative methods of web extension to select best method. |
| PO1, PO4 | | 1.1, 4.5 | 1.1.2, 4.5.1 | 3,6 | CO6 | Apply the concept of REACT JS for solving the problem of web application & Design & develop web application using JSX |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Understand basic concept of Internet Programming |
| 2 | To acquire knowledge & skills for creation of web site considering both client & server side programming |
| 3 | To develop responsive web applications. |
| 4 | To explore different web extensions & web services standards |
| 5 | To understand characteristics of RIA |
| 6 | To learn react JS |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|-----------------------|-----------|--|
| PO2 | PSO1 | 2.7 | 2.7.2 | 4-Analyze | CO1 | Identify traditional and agile process Models. |
| PO3 | PSO2 | 3.7 | 3.7.1 | 6-Create | CO2 | Develop Software Requirement Specification (SRS) document and Data Flow Diagram (DFD). |
| PO4 | PSO1 | 4.6 | 4.6.1 | 3-Apply | CO3 | Calculate project estimation techniques and Show tracking and scheduling of the project. |
| PO3 | PSO1 | 3.6 | 3.6.1 3.6.3 | 2-Understand | CO4 | Explain and classify the design of Software Project using basic Principles and concepts. |
| PO5 | PSO1 | 5.4 | 5.4.2 | 5-Evaluate | CO5 | Test the Software by using various Testing Approaches. |
| PO4 PO5 | PSO2 | 4.5 5.6 | 4.5.1 5.6.1 | 3- Apply 6- Create | CO6 | Prepare Risk Mitigation plan and Construct Version Control. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To identify and study traditional and agile process Models. |
| 2 | To develop Software Requirement Specification (SRS) document and Data Flow Diagram (DFD). |
| 3 | To Calculate project estimation techniques and Show tracking and scheduling of the project. |
| 4 | To explain and classify the design of Software Project using Principles and concepts. |
| 5 | To test the Software by using various Testing Approaches. |
| 6 | To prepare Risk Mitigation plan and Construct Version Control. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------------------|-----------|---|
| PO1 PO2 | PSO2 | 1.3 2.2 | 1.3.1 2.2.4 | 3 Apply 4 Analyze 6 Create | CO-1 | Apply the knowledge to design a network and configure it for IP addressing, subnetting. Apply appropriate technique for routing in different network system. Analyze its results. (Using Packet Tracer) |
| PO1 PO2 | PSO1 | 1.3 2.2 | 1.3.1 2.2.4 | 2, 3 | CO-2 | Identify different network commands in Linux. Apply it to find solution for different network problems. |
| PO1 | | 1.3 | 1.3.1 | 3 | CO-3 | Apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| PO1 PO2 | PSO2 | 1.3 2.2 | 1.3.1 2.2.4 | 3, 4, 6 | CO-4 | Apply the knowledge to design chat application using TCP, UDP. Analyze the difference in working. |
| PO1 PO2 | | 1.3 2.2 | 1.3.1 2.2.4 | 2 3 | CO-5 | Demonstrate working of different application layer protocols using packet tracer. |
| PO1 PO2 | | 1.3 2.2 | 1.3.1 2.2.4 | 2 4 | CO-6 | Understand and compare working of different physical media used in Networks.L33 |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To discuss the issues and challenges of protocols design while delivering packet in network. To assess the strengths and weaknesses of various routing algorithms. |
| 2 | To identify different network commands in Linux. Apply it to find solution for different network problems. |
| 3 | To apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| 4 | To understand how process to process communication occurs i.e. transport layer and protocols used in this layer. |
| 5 | To understand various application layer protocols. |
| 6 | To Understand different types of physical media used in Networks. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------------------------|-------------------------|-----------|---|
| PO2 PO3 | PSO1 | 2.4 3.2 3.3 | 2.4.1 3.2.2 3.3.1 3.3.2 | 5-Evaluate 6-Create | CO1 | Design data warehouse with dimensional modelling and Determine different OLAP operations. |
| PO5 | PSO2 | 5.4 5.6 | 5.4.2 5.6.2 | 5- Evaluate | CO2 | Determine data preprocessing and data exploration using data mining tool (WEKA/R TOOL) |
| PO4 | PSO1 | 4.6 | 4.6.1 4.6.3 | 4- Analyze | CO3 | Classify appropriate data mining algorithm. |
| PO4 PO5 | PSO2 | 4.6 5.6 | 4.6.1 4.6.3 5.6.2 | 5-Evaluate 6-Create | CO4 | Measure and generate clustering algorithms. |
| PO5 | PSO1 | 5.4 | 5.4.2 | 3-Apply 4-Analyze | CO5 | Identify and solve associate rule mining technique for real time applications. |
| PO5 | PSO1 | 5.4 | 5.4.1 5.4.2 | 2-Understand 3-Apply | CO6 | Explain and use the concept of web mining |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To design data warehouse with dimensional modelling and Determine different OLAP operations. |
| 2 | To determine data preprocessing and data exploration using data mining tool (WEKA/R TOOL) |
| 3 | To classify appropriate data mining algorithm. |
| 4 | To measure and generate clustering algorithms. |
| 5 | To Identify and solve associate rule mining technique for real time applications. |
| 6 | To explain and use the concept of web mining |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|---------------|----------------------|-----------|--|
| 3 | | 3.5 | 3.5.1 & 3.5.2 | 6 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 3 | | 3.5 | 5.4.1 | 6 | 2 | Develop writing skills of a cover letter and a CV/resume/SOP |
| 4 | | 4.5 | 4.5.1 | 6 | 3 | Develop interpersonal skills to progress professionally by building strong relationships with peers |
| 4 | | 4.5 | 4.5.1 | 6 | 4 | Develop effective presentation skills and an impressive body language |
| 1 | | 1.5 | 1.5.1 | 3 | 5 | Apply codes of personal integrity, values, aptitudes and skills |
| 1 | | 1.5 | 1.5.1 | 2 | 6 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To discern and develop an effective style of writing important technical/business documents. |
| 2 | To investigate possible resources and plan a successful job campaign. |
| 3 | To understand the dynamics of professional communication in the form of group discussions, meetings etc. required for career enhancement. |
| 4 | To develop creative and impactful presentation skills. |
| 5 | To analyze personal traits, interests, values, aptitudes and skills. |
| 6 | To understand the importance of integrity and develop a personal code of ethics. |

Subject: Mini Project**Subject Code: CSM501****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| PO2,PO3 | | 2.1,3.5 | 2.1.2,3.5.1 | 3 | CO1 | Define problem statement with objective & scope & identify methodologies/algorithms to solve problem |
| PO3 | | 3.8 | 3.8.3 | 4 | CO2 | Verify & validate results, functionalities & design of project |
| PO7 | | 7.3 | 7.3.1,7.3.2 | 3 | CO3 | Identify impact of engineering products & understand relationship between the technical, socio-economics & environmental dimensions of sustainabilities. |
| PO9,PO11 | | 9.4,11.6 | 9.4.2,11.6.2 | 3 | CO4 | Use project management tools to schedule an engineering project, so it is completed on time & on budget & implement norms of practice. |
| PO10 | | 10.4, 10.6 | 10.4.2, 10.6.2 | 3.4 | CO5 | Produce clear, well structured & well supported written engineering document & use variety of media effectively to convey a message in a document or presentation |
| PO9 | | 9.5 | 9.5.1 | 6 | CO6 | Demonstrate effective communication, problem-solving, conflict resolution & leadership skill |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To define problem statement with objective & scope & identify methodologies/algorithms to solve problem |
| 2 | To verify & validate results, functionalities & design of project |
| 3 | To identify impact of engineering products & understand relationship between the technical, socio-economics & environmental dimensions of sustainabilities. |
| 4 | To use project management tools to schedule an engineering project, so it is completed on time & on budget & implement norms of practice |
| 5 | To produce clear, well structured & well supported written engineering document & use variety of media effectively to convey a message in a document or presentation |
| 6 | To demonstrate effective communication, problem-solving, conflict resolution & leadership skill |

Semester-III

Scheme R-16

Subject- Engineering Mathematics-III

Subject Code-CSC301

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------|-----|------------|-----------|---------------|-----|---|
| PO1,2 | - | 1.6 | 1.6. 1 | 3 | CO1 | Apply the concept of Laplace transforms and use to solve real integrals in engineering problems |
| PO1,2,3 | - | 2.5 | 2.5. 2 | 3,5 | CO2 | Identify the concept of inverse laplace transform and compare to various functions and its applications |
| PO1,2,3,4 | - | 4.5 | 4.5. 1 | 3,6 | CO3 | Develop and determine Fourier series for real life problems and applications. |
| PO1,2,4 | - | 2.8 | 2.8. 1 | 3,4 | CO4 | Apply the properties of Complex analysis and select the application to orthogonal trajectories and mapping. |
| PO1,3 | - | 1.2 | 1.2. 1 | 3 | CO5 | Apply the concept of Z-transformation and inverse in engineering problem. |
| PO1,2,3,1 2 | | 1.2 | 1.2. 2 | 3 | CO6 | Apply the concept of Correlation,Regression and Curve fitting to engineering problems on data science. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To familiarize with the Laplace, transform and its properties. |
| 2 | To study the Inverse Laplace, transform of various functions, theorem and its applications. |
| 3 | To understand the concept of Fourier series, its complex form and enhance the problem. |
| 4 | To familiarize with the concept of complex variables, C-R equations with applications and mapping. |
| 5 | To understand the concept of Z-Transform and inverse Z-Transform with its properties. |
| 6 | To acquaint with the basic techniques of statistics like correlation, regression and curve fitting for data analysis, machine learning and AI. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|-------------------------------|-----------|---|
| PO 1 | PSO 1 | 1.2 | 1.2.1 | 2-Understand 3-Demonstrate | CO 1 | Understand the conversion of different type of codes and number systems used in digital communication and computer systems. |
| PO 1 | PSO 1 | 2.1 | 2.5.3 | 2-Understand 4-Analyze | CO 2 | Identify and describe the minimization techniques of digital circuits. |
| PO 2 | PSO 2 | 2.6 | 2.6.3 2.8.1 | 3-Apply 6>Create | CO 3 | Understand the working mechanism of different combinational circuits and their role in the digital system design. |
| PO 2 | PSO 2 | 2.6 2.8 | 2.6.3 2.8.1 | 3-Apply 6>Create | CO 4 | Understand the working mechanism of different sequential circuits and their role in the digital system design. |
| PO 5 | PSO 1 | 5.4 5.5 | 5.4.1 5.6.1 | 2-Understand | CO 5 | Illustrate and describe the basic concepts of VHDL |
| PO 5 | PSO 2 | 5.4 5.6 | 5.4.2 5.5.2 | 2-Understand | CO 6 | Illustrate and describe the technology in the area of memory devices in different types of digital circuits. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the conversion of different type of codes and number systems used in digital communication and computer systems. |
| 2 | To Identify and describe the minimization techniques of digital circuits. |
| 3 | To understand the working mechanism of different combinational circuits and their role in the digital system design. |
| 4 | To understand the working mechanism of different sequential circuits and their role in the digital system design. |
| 5 | To illustrate and describe the basic concepts of VHDL |
| 6 | To illustrate and describe the technology in the area of memory devices in different types of digital circuits. |

Course Outcomes

| PO | PSO | Competency | PI | Bloo m's Level | CO | Description |
|-----------|------------|-------------------|-----------|-----------------------|-----------|--|
| PO2 | PSO 1 | 2.5 | 2.5.3 | 3- Apply | CO 1 | Apply the knowledge of Discrete Mathematics to solve complex engineering problem. |
| PO1 | PSO 1 | 1.2 | 1.2.1 | 4-Analyze 3-Apply | CO 2 | Identify, select and apply clear thinking for problem solving using laws of logic and mathematical induction. |
| PO2 | PSO 1 | 2.7 | 2.7.1 | 4-Analyze | CO 3 | Analyze complex relations and functions to find appropriate solution leading to a valid conclusion. |
| PO1 | PSO 1 | 1.2 | 1.2.2 | 4-Analyze | CO 4 | Identify formulate and analyze permutation and combination using principle of mathematics. |
| PO1 | PSO 1 | 1.7 | 1.7.1 | 3-Apply | CO 5 | Apply the background knowledge of Discrete Mathematics to identify type of graph. |
| PO3 | PSO 1 | 3.6 | 3.6.1 | 3-Apply | CO 6 | Apply the knowledge of mathematics to solve algebraic structure and detecting and correcting code in the transmitted data. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand the Discrete Mathematics Concept. |
| 2 | Apply clear thinking and creative problem-solving using laws of logic and mathematical Induction. |
| 3 | Understand the concepts of relation and functions. |
| 4 | Understand the permutation and combination. |
| 5 | Understand the basic concept in graph theory and their properties. |
| 6 | Understand the technique for detecting and correcting code in transmitted data. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1 | 2 | 1.3 | 1.3.1 | 1 | 1 | Define the use of semiconductor devices in circuits and analyze them |
| 2 | 2 | 2.2 | 2.2.2 | 2 | 2 | Express the importance of oscillators and power amplifiers in communication system. |
| 4 | 2 | 4.2 | 4.2.1 | 2 | 3 | Represent basic concepts of operational amplifier and their applications. |
| 1 | 2 | 1.3 | 1.3.1 | 2 | 4 | Summarize the fundamental concepts of electronic communication. |
| 2 | 2 | 2.2 | 2.2.3 | 3 | 5 | Apply knowledge of electronic devices and circuits to communication applications. |
| 5 | 2 | 5.1 | 5.1.1 | 5 | 6 | Evaluate basic concepts of information theory |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To develop the knowledge of semiconductor devices and circuits, and explain their use in communication applications. |
| 2 | To design different circuits using transistors. |
| 3 | To gain knowledge in electronic devices and circuits that is useful in real life applications |
| 4 | To understand the fundamental concepts of electronic communication and their use in computer applications. |
| 5 | To develop the knowledge of analog communication and explain their use in communication applications. |
| 6 | To Illustrate the information theory. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 2 | | 2.6 2.1 | 2.6.1 2.1.2 | 1 | 1 | Identify functionalities of Data structures resources Identify Data structure of a computer-based system to solve an engineering problem |
| 3 | | 3.6 | 3.6.2 | 1 | 2 | Able to produce a variety of potential design solutions suited to meet functional requirements for implementation of stack and queue |
| 5 | | 5.4 | 5.4.1 | 1 | 3 | Identify different Linked list techniques for engineering activities |
| 4 | | 4.5 | 4.4.3 | 1 | 4 | Able to choose appropriate tree traversal method to conduct the experiment. |
| 5 | | 5.4 | 5.4.2 | 6 | 5 | Adapt graph traversal techniques to solve engineering problems |
| 1 | PSO 1 | 1 | 1.7.1 | 3 | 6 | Apply theory and principles searching techniques of computer science and engineering to solve an engineering problem |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the basic concepts of Data Structure and efficient storage mechanism of data for an easy access. |
| 2 | Design and implementation of various Operations data structure. |
| 3 | Identify the various techniques for representation of the data in linked list. |
| 4 | Learn the different tree techniques. |
| 5 | Investigate the logical ability and understand the generic principles of graph as applied to sophisticated data structure. |
| 6 | Understand different sorting and searching techniques & design the miniproject based on Data Structure in a group of students. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------------|-----------|--|
| PO2 PO3 | PSO 1 | 2.8 3.6 | 2.8.1 3.6.1 | 2-Understand 5-Evaluate | CO1 | Understand the basics implementation of gates. |
| PO4 | PSO 2 | 4.4 | 4.4.2 | 5-Evaluate 6-Create | CO2 | Implement arithmetic operations using Multiplexer/demultiplexer. |
| PO3 PO5 | PSO 1 | 3.6 5.4 | 3.6.2 5.4.1 | 2-Understand 3-Apply | CO3 | Understand and learn about basics of counters. |
| PO2 PO5 | PSO 2 | 2.8 5.4 | 2.8.1 5.4.2 | 3-Apply 5-Evaluate | CO4 | Implement arithmetic operations using various algorithms. |
| PO4 | PSO 1 | 4.4 | 4.4.3 | 2-Understand 6-Evaluate | CO5 | Understand and implement the processor designing. |
| PO 5 | PSO 1 | 5.4 | 5.4.1 | 3-Apply 5-Evaluate | CO6 | Implement the operation of memory and caches. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the basics implementation of gates. |
| 2 | To Implement arithmetic operations using Multiplexer/demultiplexer. |
| 3 | To understand and learn basics of counters. |
| 4 | To implement arithmetic operations using various algorithms. |
| 5 | To understand and implement the processor designing. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 2 | 2 | 2.4.2 | 2.4 | 4 | 1 | To identify and test various electronic components |
| 2 | 2 | 2.4.2 | 2.4 | 3 | 2 | To calculate the frequency of oscillators. |
| 4 | 2 | 4.1.2 | 4.1 | 2 | 3 | To illustrate different operations of OP-AMP that is useful in real life applications |
| 4 | 2 | 4.2.1 | 4.2 | 2 | 4 | To demonstrate different modulation techniques of electronic communication and their use in computer applications. |
| 5 | 2 | 5.1.1 | 5.1 | 1 | 5 | To draw the different types of pulse modulation waveform |
| 5 | 2 | 5.2.1 | 5.2 | 6 | 6 | Construct different circuits using simulation |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Verify the theory of semiconductor devices. |
| 2 | Design of oscillators and power amplifiers in communication system. |
| 3 | Represent basic concepts of operational amplifier and their applications. |
| 4 | Summarize the fundamental concepts of electronic communication. |
| 5 | Apply knowledge of electronic devices and circuits to communication applications. |
| 6 | Study basic concepts of information theory. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 3 | | 3.6 | 3.6.2 | 1 | 1 | Able to produce a variety of potential design solutions suited to meet functional requirements for implementation of stack . |
| 3 | | 3.6 | 3.6.2 | 6 | 2 | Design potential solutions suited to meet functional requirements for implementation of queue. |
| 5 | | 5.4 | 5.4.1 | 3 | 3 | illustrate and apply different Linked list techniques for engineering activities. |
| 4 | | 4.5 | 4.4.3 | 1 | 4 | Able to choose appropriate tree traversal method to conduct the experiment. |
| 5 | | 5.4 | 5.4.2 | 6 | 5 | Adapt graph traversal techniques to solve engineering problems. |
| 1 | PSO 1 | 1 | 1.7.1 | 3 | 6 | Apply theory and principles searching techniques of computer science and engineering to solve an engineering problem. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To implement basic data structures such as arrays, stacks. |
| 2 | To implement basic data structures such as queue. |
| 3 | To implement basic data structures such as linked list. |
| 4 | Compute the complexity of various Tree algorithms. |
| 5 | Investigate the logical ability and understand the generic principles of graph as applied to sophisticated data structure. |
| 6 | Understand different sorting and searching techniques &design the miniproject based on Data Structure in a group of students. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | PSO1 | 3.6 | 3.6.1 | Level 2 Understand | CO1 | To Understand the features and concept of Object-Oriented Programming. |
| PO5 | PSO1 PSO2 | 5.5 | 5.5.2 | Level 4 Analyze | CO2 | Analyze and implement the pillars of Object-oriented programming like classes, objects, constructors, packages. |
| PO3 | PSO2 | 3.5 | 3.6.2 | Level 3 Apply | CO3 | Apply the concepts of Arrays and Strings |
| PO5 | PSO1 PSO2 | 5.4 | 5.4.2 | Level 2 Understand | CO4 | Understand the different types of inheritance and polymorphism |
| PO4 | PSO2 | 4.5 | 4.5.1 | Level 2 Understand | CO5 | Deep understand of handling exceptions and threads in JAVA Programming |
| PO3 | PSO1 | 3.7 | 3.7.1 | Level 3 Apply | CO6 | Implementation of applets, awt and JDBC in JAVA |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | Understand and develop the concept of OOPM |
| 2 | Develop the understanding of OOPM like classes, objects, constructors and packages |
| 3 | To understand the Arrays and Strings |
| 4 | To understand the different types of inheritance and polymorphism |
| 5 | To understand the exception handling and threads |
| 6 | To understand the applets, awt and JDBC in JAVA OOPM |

Semester-IV

Subject-Applied Mathematics IV

Subject Code- CSC401

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1,2 | - | 1.6 | 1.6 .1 | 3,5 | CO 1 | Use the concept of Complex integration for evaluating integrals, computing residues and evaluate various contour integrals. |
| PO1,3 | - | 1.2 | 1.2 .1 | 1,3 | CO 2 | Extend the concept of matrices to Eigen value and eigen vector and use it to solve various engineering problems. |
| PO1,2 | - | 1.2 | 1.2 .2 | 2,3 | CO 3 | Illustrate understanding the concepts of probability and expectations for getting spread of the data and probability distribution. |
| PO1,2,4 | - | 1.2 | 1.2 .2 | 3 | CO 4 | Apply the concept of sampling distribution, Test of hypothesis, LOS, one and two tailed test to determine large sample. |
| PO1,2,4 | - | 4.5 | 4.5 .1 | 3 | CO 5 | Apply the concept of students t-distribution for dependent and independent samples and Use chi-square test for goodness of fit. |
| PO1,2,1 2 | | 2.8 | 2.8 .4 | 3 | CO 6 | Apply the concept of Linear and Nonlinear programming problem to solve engineering problem. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To study Line and Contour integrals and expansion of complex valued functions in a power series. |
| 2 | To inculcate an ability to relate engineering problems to mathematical context. |
| 3 | To acquaint with the concept of probability, random variables with their distributions and expectations. |
| 4 | To explain the test of hypothesis, Level of significance for large sample using sampling theory. |
| 5 | To understand the concept students t- distribution, test of goodness of fit, contingency table for small sample. |
| 6 | To understand the basic techniques of LPP and NLPP for optimization of engineering problems. |

Subject-Analysis of Algorithm**Subject Code- CSC402****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|-----------------------------------|-----------|--|
| PO1 PO4 | 1 | 1.2 | 1.2.1 | 2-Understand, 3-Apply 4-Analyze | CO1 | Illustrate and analyze the running time and space complexity of algorithms. |
| PO2 | 1 | 2.1 | 2.5.2 | 2-Understand, 3-Apply 4-Analyze | CO2 | Describe, apply and analyze the complexity of divide and conquer strategy. |
| PO2 | 1 | 3.7 | 3.7.1 3.7.2 | 2-Understand 3-Apply 4-Analyze | CO3 | Identify, apply and analyze the complexity of greedy strategy. |
| PO2 | 1 | 1.2 | 1.2.2 | 2-Understand, 3-Apply 4-Analyze | CO4 | Determine, apply and analyze the complexity of dynamic programming strategy. |
| PO2 PO3 | 1 | 4.6 | 4.6.1 | 2-Understand, 3-Apply | CO5 | Explain, design and apply backtracking, branch and bound and string-matching techniques to deal with some hard problems. |
| PO2 PO5 | 1 | 2.6 | 2.6.5 | 4-Analyze | CO6 | Categorize the classes P, NP, and NP-Complete and be able to prove that a certain Problem is NP-Complete. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Illustrate and analyze the running time and space complexity of algorithms. |
| 2 | To determine, apply and analyze the complexity of divide and conquer strategy. |
| 3 | To identify, apply and analyze the complexity of greedy strategy. |
| 4 | To describe, apply and analyze the complexity of dynamic programming strategy. |
| 5 | To understand and apply backtracking, branch and bound and string-matching techniques to deal with some hard problems. |
| 6 | To analyse strategies for solving problems not solvable in polynomial time. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO 1 | 2.5 | 2.5. 2 | 2-Understan d | CO 1 | Understand basic structure of the computer system and demonstrate the arithmetic algorithms for solving ALU operation |
| PO2 | PSO | 2.6 | 2.6. | 2-Understan d | CO 2 | Understand instruction level parallelism and hazards in typical processor pipelines. |
| PO3 | PSO 2 | 3.6 | 3.6. 1 | 6-Create | CO 3 | Design the hardwired and microprogrammed control unit |
| PO3 | PSO 1 | 3.7 | 3.7. 1 | 4-Analyze | CO 4 | Analyze the memory mapping techniques. |
| P04 | PSO 1 | 4.6 | 4.6. 1 | 3-Apply | CO 5 | Identify various types of buses, interrupts and I/O operations in a computer system. |
| P05 | PSO 1 | 5.5 | 5.5. 1 | 2-Understan d | CO 6 | Understand superscalar architectures, multi-core architecture and their advantages |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the basic structure and operation of a digital computer. |
| 2 | To understand the parallelism and hazards in processor pipeline. |
| 3 | To understand and design control unit. |
| 4 | To understand the hierarchical memory system including cache memories and virtual memory. |
| 5 | To understand the different ways of communicating with I/O devices and standard I/O interfaces. |
| 6 | To study different architectures. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------------------|------------|-------------------|-------------------------|--------------------------------|-----------|--|
| PO 1 PO 6 | | 1.3, 6.2 | 1.3.1 6.2.1 | 2 Underst and 3 Apply | CO -1 | Realize the fundamentals or basic concepts of Computer Graphics. Apply the knowledge to identify its need in different areas. |
| PO 1 PO 2 | PSO 1 | 1.4, 2.2, 2.4 | 1.4.1 2.2.2 , | 3, 4 Analyze | CO -2 | Apply the knowledge of various algorithms for scan conversion and filling of basic objects and analyze its performance in terms of complexity and correctness. |
| PO 1 PO 2 | | 1.3, 2.2, 2.4 | 1.3.1 2.2.4 , | 2, 3, 6 | CO -3 | Identify and formulate 2D geometric transformations, viewing transformations. Apply this knowledge for viewing and clipping on graphical objects. |
| PO 2 PO 4 PO 5 | PSO 2 | 2.3, 4.1, 5.2 | 2.3.1 4.1.1 5.2.1 | 3, 6 Create | CO -4 | Select & apply appropriate projection, solid model representation techniques for 3D. Apply the knowledge of transformations. Design curve using different techniques and analyze it. |
| PO 2 PO 3 | PSO 1 | 2.3, 3.2, 3.3 | 2.3.1 3.2.2 , | 3, 4 | CO -5 | Apply different algorithms to identify visible surface or back face in 3D. Analyze different back face removal algorithms and find appropriate one. |
| PO 2 PO 6 | | 2.1, 2.2, 6.1 | 2.1.2 , | 3, 6 | CO -6 | Apply the knowledge to analyze surface rendering techniques and illumination models. Design a software system which explore concepts of subject, its use in different areas, impact on other alternatives available. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To equip students with the fundamental knowledge and basic technical competence in the field of computer graphics. |
| 2 | To emphasize on implementation aspect of Computer Graphics Algorithms. |
| 3 | To understand different transformation such as translation, scaling, rotation, clipping on 2D objects. |
| 4 | To modify different transformation algorithms of 2D for 3D. |
| 5 | To use basic algorithms studied to draw curves and fractals. |
| 6 | To operate hidden surfaces of objects e.g., removal of it. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|-----------------------|-----------|---|
| PO 7 | PSO 1 | 2.1 | 2.1.2 | Level 2 Understand | CO 1 | Understand the objectives, functions and evolution of Operating system. |
| PO 2 | PSO 1 | 2.1 2.2 | 2.1.2 2.2.4 | Level 4 Analyze | CO 2 | Analyze the concept of process management and evaluate performance of process scheduling algorithms |
| PO 2 | PSO 1 | 2.6 | 2.6.3 2.6.4 | Level 3 Apply | CO 3 | Understand and apply the concepts of synchronization and deadlocks. |
| PO 2 | PSO 1 | 2.6 | 2.6.2 | Level 4 Analyze | CO 4 | Evaluate performance of memory management. |
| PO 2 | PSO 1 | 2.7 | 2.7.2 | Level 2 Understand | CO 5 | Understand the concepts of file management. |
| PO 1 | PSO 1 | 1.7 | 1.7.1 | Level 3 Apply | CO 6 | Apply concepts of I/O management and analyze techniques of disk scheduling |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the objective, structure and evolution of operating system |
| 2 | To analyze and evaluate the process of scheduling algorithm |
| 3 | To understand and apply the concept of synchronization and deadlock. |
| 4 | To evaluate the performance of memory management. |
| 5 | To understand the concept of file management. |
| 6 | To apply the concepts of I/O management and analyze techniques of disk scheduling. |

Course Outcomes

| PO | PS O | Competency | PI | Bloom's Level | CO | Description |
|------------|-----------------|-------------------|----------------|---|-----------|---|
| PO2 PO4 | 1 | 2.8 4.6 | 2.8.2 4.6.1 | 4-Analyze | CO 1 | Analyze the complexities of various problems in different domains. |
| PO2 PO1 | 1 | 2.5 1.7 | 2.5.2 1.7.1 | 2- Understand 3-Apply 4-Analyze | CO 2 | Describe, apply and analyze the running time of the basic algorithms for those classic problems in various domains using divide and conquer strategy. |
| PO2 PO1 | 1 | 2.5 1.7 | 2.5.2 1.7.1 | 2- Understand, 3-Apply 4-Analyze | CO 3 | Define and apply the efficient algorithms for the effective problem solving with the help of different strategies like greedy method. |
| PO1 | 1 | 1.7 | 1.7.1 | 3-Apply | CO 4 | Apply dynamic programming strategy to solve different problems effectively. |
| PO2 PO1 | 1 | 2.5 1.7 | 2.5.3 1.7.1 | 2- Understand, 3-Apply | CO 5 | Recognize and apply backtracking, branch and bound and string-matching techniques to deal with some hard problems. |
| PO4 | 1 | 4.6 | 4.6.1 4.6.2 | 4-Analyze | CO 6 | Illustrate to prove that a certain problem is NP-Complete. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To analyze the complexities of various problems in different domains. |
| 2 | To Describe, apply and analyze the running time of the basic algorithms for those classic problems in various domains using divide and conquer strategy. |
| 3 | To Define and apply the efficient algorithms for the effective problem solving with the help of different strategies like greedy method. |
| 4 | To apply dynamic programming strategy to solve different problems effectively. |
| 5 | To Recognize and apply backtracking, branch and bound and string-matching techniques to deal with some hard problems. |
| 6 | To illustrate to prove that a certain problem is NP-Complete. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--|------------|---|---|---|-----------|---|
| PO1 PO2 | | 1.3, 2.2 | 1.3.1 2.2.3 2.2.4 | 2 Understand 3 Apply 4 Analyze | CO-1 | Apply the knowledge of line, circle drawing algorithms to implement it and analyze the difference in techniques. |
| PO1 PO2 PO4 PO5 | | 1.3, 2.2, 4.2, 5.2 | 1.3.1 2.2.4 4.2.1 5.2.1 | 3, 4, 6 Create | CO-2 | Apply the basic knowledge to draw 2D objects. Select and apply appropriate techniques to fill polygon, analyze results. Design a system which apply various transformation on 2D. |
| PO2 PO4 PO5 | | 2.2, 4.2, 5.2 | 2.2.4 4.2.1 5.2.1 | 2, 3, 4 | CO-3 | Identify technique or algorithms, to generate curve of various types. Analyze these algorithms result. Apply appropriate technique to design fractal. |
| PO5 | PSO1 | 5.2 | 5.2.1 | 3 | CO-4 | Select and apply techniques to project 3D on 2D plane. |
| PO1 PO6 | | 1.3, 6.1 | 1.3.1 6.1.1 | 2, 3 | CO-5 | Understand basics of OpenGL, apply the knowledge to draw different shapes and characters. |
| PO4, PO5, PO6, PO7, PO8, PO9, PO10, PO11, PO12 | PSO2 | 4.2, 5.2, 6.1, 7.2, 8.2, 9.1, 10.1, 10.3, 11.3, 12.1 | 4.2.1, 5.2.1, 6.1.1, 7.2.1, 8.2.1, 9.1.1, 10.1.3, 10.3.1, 11.3.1, 12.1.2 | 3, 5, 6 | CO-6 | Design a system or miniproject in a team, where students will work effectively as a member & leader which will use concepts of Computer Graphics to achieve common goal. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To equip students with the fundamental knowledge, To emphasize on implementation aspect of Computer Graphics Algorithms. |
| 2 | To understand different transformation such as translation, scaling, rotation, clipping on 2D objects. |
| 3 | To use basic algorithms studied to draw curves and fractals. |
| 4 | To modify different transformation algorithms of 2D for 3D. |
| 5 | To understand basics of OpenGL in Computer Graphics. |
| 6 | To design or create a system using concepts of Computer Graphics (miniproject). |

Course Outcomes

| PO | PSO | Competency | PI | Bloo m's Level | CO | Description |
|-----------|------------|-------------------|-----------|-------------------------------|-----------|--|
| PO2 | PSO 1 | 2.6 | 2.6.2 | 6- Create | CO1 | Assemble personal computer |
| PO3 | PSO 1 | 3.8 | 3.8.2 | 6- Create | CO2 | Design Full adder, Ripple carry adder, Carry look-ahead adder |
| PO3 | PSO 1 | 3.8 | 3.8.2 | 3- Apply | CO3 | Design the basic building blocks of a computer: arithmetic-logic unit, registers, central processing unit, and memory. |
| PO2 | PSO 1 | 2.1 | 2.5.2 | 6- Create | CO4 | Implement various algorithms like Booth's algorithm for arithmetic operations |
| PO3 | PSO 1 | 3.6 | 3.6.1 | 1- Remember | CO5 | Describe various I/O buses with merits and demerits. |
| PO3 | PSO 1 | 3.6 | 3.6.3 | 3- Apply | CO6 | Illustrate study of multi-core Processors |

Course Objectives

| Sr. No. | Description |
|--------------------|--|
| 1 | To study structure and working of computer |
| 2 | To understand the concept of addition and subtraction using Full adder, Ripple carry adder, Carry look-ahead adder |
| 3 | To design memory subsystem including cache memory |
| 4 | To implement the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division. |
| 5 | To study the different ways of communicating with I/O devices and standard I/O interfaces. To have thorough understanding of various computer buses |
| 6 | To study the different types of processors |

Subject-Operating System Lab**Subject Code- CSL404****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO 1 | PSO 1 | 1.7 | 1.7.1 | Level 2 Understan d | CO 1 | Explain basic operating system commands. |
| PO 2 | PSO 1 | 2.7 | 2.7.1 | Level 2 Understan d | CO 2 | Explain various system calls. |
| PO 3 | PSO 1 | 3.6 | 3.6.1 | Level 3 Apply | CO 3 | Solve shell scripts and commands using kernel API. |
| PO 3 | PSO 1 | 3.8 | 3.8.2 | Level 3 Apply | CO 4 | Illustrate different process scheduling algorithms. |
| PO 2 | PSO 1 | 2.5 | 2.5.2 | Level 4 Analyze | CO 5 | Analyze different memory management algorithms. |
| PO 1 | PSO 2 | 5.5 | 5.5.1 | Level 5 Evaluate | CO 6 | Determine process management techniques and deadlock handling using simulator. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To explain basic operating system commands. |
| 2 | To explain various system calls. |
| 3 | To solve shell scripts and commands using kernel API. |
| 4 | To Illustrate different process scheduling algorithms. |
| 5 | To analyze different memory management algorithms. |
| 6 | To determine process management techniques and deadlock handling using simulator. |

Course Outcomes

| PO | PSO | Competency Level | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.5.2 | Level 2 Understand | CO1 | Developed the understanding of basic concepts in python and Perl |
| PO3 | PSO1 PSO2 | 3.6 | 3.6.1 | Level 3 Analyze | CO2 | Implementation of contents of files, directories and text processing with python |
| PO4 | PSO2 | 4.5 | 4.5.1 | Level 6 Create | CO3 | To develop program for data structure using built in functions in python. |
| PO5 | PSO1 | 5.4 | 5.4.2 | Level 3 Apply | CO4 | To operate on Django web framework for developing python-based web application |
| PO3 | PSO1 | 3.6 | 3.6.2 | Level 3 Analyze | CO2 | To understand file handling and database handling using Perl. |
| PO5 | PSO2 | 5.4 | 5.4.2 | Level 6 Create | CO6 | To develop basics of two-way communication between client and server using python and Perl |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basic concepts in python and Perl |
| 2 | To implement the contents of files, directories and text processing with python |
| 3 | To develop and understand the DS using different functions of Python |
| 4 | To operate the Django framework for web-based applications |
| 5 | To handle files available in python and Perl also understand the dB connectivity of python and Perl. |
| 6 | To understand the coding of client server on python and Perl |

Semester-V

Subject-Microprocessor

Subject Code- CSC501

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|------------------------|-----------|---|
| PO1 | PSO 1 | 1.3 | 1.3.1 | 3- Apply | CO -1 | Apply basic engineering fundamentals to describe the architecture of 8086 processor. |
| PO2 | PSO 1 | 2.4 | 2.4.1 2.4.2 | 3- Apply 4- Analyze | CO -2 | Apply the instructions of 8086 to implement the assembly language program. analyze and interpret the result of ALP using integrated tool. |
| PO1 PO3 | PSO 2 | 1.3 3.4 | 1.3.1 3.4.2 | 3- Apply | CO -3 | Apply engineering fundamentals to describe DOS and BIOS interrupts. Apply knowledge to implement DOS and BIOS interrupt and to integrate modules with 8259 IC chip |
| PO3 | PSO 2 | 3.4 | 3.4.1 | 3- Apply | CO -4 | Able to refine architecture design into detailed design using processor, memory chip or different peripheral ICs within existing constraints |
| PO3 | PSO 1 | 3.1 | 3.1.5 | 3- Apply | CO -5 | Explore and synthesize 80386 system requirements from larger social and professional concerns. |
| PO3 | PSO 1 | 3.3 | 3.3.5 | 3- Apply | CO -6 | Able to perform systematic evaluation of degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply basic engineering fundamentals for describing the architecture of 8086 processor |
| 2 | To apply the instruction of 8086 and analyze the result of ALP using integrated tool |
| 3 | To apply engineering fundamentals and knowledge to describe and implement DOS and BIOS interrupt |
| 4 | To refine the architecture design into detailed design using processor, memory chip or different peripheral ICs |
| 5 | To explore and synthesize 80386 system requirements |
| 6 | To able to perform systematic evaluation of degree of microprocessor from 8086 to Pentium |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|---------------------------|-----------|--|
| PO2 | PSO 1 | 2.6 | 2.6.3 | 4-Analyze 2-Understand | CO 1 | Identify and analyze the roles and responsibilities of different types of users and investigate the different architecture to find appropriate solution. |
| PO4 | PSO 1 | 4.5 | 4.5.1 | 6-CREATE 2-Understand | CO 2 | Understand and Design data modeling using ER and Extended ER features to meet the specified needs. |
| PO3 | PSO 1 | 3.6 | 3.6.2 | 3-Apply 6-CREATE | CO 3 | Investigate and apply different relational algebra operators to find appropriate solution leading to valid conclusion. |
| PO5 | PSO 1 | 5.4 | 5.4.2 | 6-CREATE | CO 4 | Investigate and formulate SQL queries to find appropriate solution to complex problems. |
| PO4 | PSO 1 | 4.6 | 4.6.4 | 4-Analyze 3-Apply | CO 5 | Analyze and apply different normalization techniques to process and meet the specified needs with appropriate solution |
| PO5 | PSO 1 | 5.5 | 5.5.1 | 2-Understand | CO 6 | Identify the strength and limitation of tools for concept of transaction, concurrency and recovery. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the role of database management system in an organization. |
| 2 | To design data modeling using the entity-relationship and developing database designs. |
| 3 | To understand the relational algebra operators. |
| 4 | To understand the use of Structured Query Language (SQL) and learn SQL syntax. |
| 5 | To understand the normalization techniques to normalize the database. |
| 6 | To understand the needs of database processing and learn techniques for controlling the consequences of concurrent data access. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------------------|------------|-------------------|-------------------------|---|-----------|--|
| PO 1 PO 2 | | 1.3 2.2 | 1.3.1 2.2.4 | 2 Understan d 3 Apply 4 Analyze | CO -1 | Apply the knowledge of fundamentals of data communication to identify the differences between ISO - OSI model, TCP/IP model and connection oriented and connectionless services. |
| PO 1 PO 2 | | 1.4 2.2, 2.4 | 1.4.1 2.2.2 2.4.3 | 2 3 4 | CO -2 | Apply the knowledge of data communication fundamentals to identify & analyze different types of media i.e. guided, unguided used at physical layer. |
| PO 2 PO 3 | PSO 1 | 2.2, 2.4 3.2 | 2.2.4 2.4.3 3.2.2 | 2 3 4 | CO -3 | Apply the knowledge of different protocols used at data link layer to investigate appropriate protocol for system. Identify and analyze the differences in protocols. |
| PO 2 PO 5 PO 6 | | 2.3 5.2 6.2 | 2.3.1 5.2.1 6.2.1 | 2 3 4 | CO -4 | Select and apply appropriate concepts of subnetting / super netting of IP addressing. Analyze various routing algorithms and protocols at network layer. Realize the impact of protocol on system. |
| PO 2 PO 3 | | 2.3 3.2, 3.3 | 2.3.1 3.2.2 3.3.1 | 2 3 4 | CO -5 | Classify and compare transport layer protocols. Relate connection management with real time communication. Investigate congestion and apply appropriate congestion control algorithm. |
| PO 2 PO 6 | | 2.1, 2.2 6.1 | 2.1.2 2.2.2 6.1.1 | 3 4 | CO -6 | Identify the protocols used at application layer. Analyze the protocols in terms of organization need, its impact. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To explain and introduce concepts and fundamentals of data communication and computer networks. |
| 2 | To interrelate the inter-working of various layers of OSI. To distinguish between different media used for communication. |
| 3 | To discuss the issues and challenges of protocols design while delivering packet in network. |
| 4 | To study different protocols used for packet delivery in network layer. To assess the strengths and weaknesses of various routing algorithms. |
| 5 | To understand how process to process communication occurs i.e., transport layer and protocols used in this layer. |
| 6 | To understand various application layer protocols. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO 1 | | 1.3 | 1.3.1 | Level 4 Analyze | CO 1 | Identify the central concepts in theory of computation and analyze differentiate between deterministic and nondeterministic automata, apply formulate knowledge to obtain equivalence of NFA and DFA. |
| PO 2 | | 2.4 | 2.4.1 | Level 4 Analyze | CO 2 | Investigate the equivalence of languages described by finite automata and regular expressions. |
| PO 5 | | 5.1 | 5.1.2 | Level 6 Create | CO 3 | Create and apply regular, context free grammars while recognizing the strings and tokens. |
| PO 2 | | 2.4 | 2.4.2 | Level 6 Create | CO 4 | Design pushdown automata model to recognize the language. |
| PO 2 | | 2.4 | 2.4.2 | Level 6 Create | CO 5 | Develop an understanding of computation through Turing Machine |
| PO 1 | | 1.3 | 1.3.1 | Level 2 understand | CO 6 | Acquire fundamental understanding of decidability and undecidability and apply the knowledge to solve computer engineering problem. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To recognize concepts in theory of computation and differentiate between deterministic and nondeterministic automata |
| 2 | To build concepts of theoretical design of deterministic and non-deterministic finite automata. |
| 3 | To acquire conceptual understanding of fundamentals of grammars and languages |
| 4 | To express the concept of theoretical design of push down automata to recognize the language |
| 5 | To develop understanding of different types of Turing machines and applications |
| 6 | To discuss the concept of Undecidability. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|--|-----------|---|
| PO 1 | PSO 1 | 1.6 | 1.6.1 | 2-Understand 3-Apply | CO-1 | Understand basics of multimedia and multimedia system architecture and apply the knowledge in engineering profession |
| PO 7 | PSO 1 | 7.3 | 7.3.2 | 2-Understand | CO-2 | Understand the impact of multimedia components on society and environment for sustainable development |
| PO 5 | PSO 1 | 5.5 | 5.5.2 | 2-Understand | CO-3 | Understand file formats for different multimedia components |
| PO 2 | PSO 2 | 2.1 2.8 | 2.5.2 2.8.1 | 2-Understand 3-Apply 4-Analyze 6-Create | CO-4 | Identify, formulate and analyse different compression techniques and apply them solve complex computer engineering problems |
| PO 1 | PSO 1 | 1.7 | 1.7.1 | 3-Apply | CO-5 | Apply the knowledge of multimedia communication techniques to improve the quality of service |
| PO 2 | PSO 2 | 2.1 2.8 | 2.5.2 2.8.1 | 2-Understand 3-Apply 4-Analyze 6-Create | CO-6 | Identify, formulate and analyse different security techniques and apply these techniques of information security in multimedia environments |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To understand the basics of multimedia and multimedia architecture |
| 2 | To provide the knowledge of different components of multimedia |
| 3 | To understand different file formats for different components |
| 4 | To identify and analyze compression techniques and apply them |
| 5 | To provide the knowledge of multimedia communication techniques to improve the quality of service |
| 6 | To study different security techniques and apply these techniques of information security in multimedia environments |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|-------------------------|------------------------|-----------|--|
| PO 1 | PSO 1 | 1.7 | 1.7.1 | 3- Apply | CO-1 | Explain basic engineering fundamentals to describe the architecture of 8086 processor. |
| PO 3 PO 5 | PSO 2 | 3.8 5.4 | 3.8.2 5.4.1 5.4.2 | 3- Apply 4- Analyze | CO-2 | Explain the instructions of 8086 to implement the assembly language program. Identify and interpret the result of ALP using integrated tool. |
| PO 1 PO 3 | PSO 2 | 1.3 3.4 | 1.3.1 3.4.2 | 3- Apply | CO-3 | Apply engineering fundamentals to describe DOS and BIOS interrupts. Apply knowledge to implement DOS and BIOS interrupt and to integrate modules with 8259 IC chip |
| PO 3 | PSO 2 | 3.6 | 3.6.2 | 6- Create | CO-4 | Design 8086 based system using Memory and peripheral chip. |
| PO 2 | PSO 1 | 2.5 | 2.5.2 | 5- Evaluate | CO-5 | Appraise the architecture of 80386 DX processor. |
| PO 4 | PSO 1 | 4.6 | 4.6.1 | 5- Evaluate | CO-6 | Determine the degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To explain basic engineering fundamentals to describe the architecture of 8086 processor. |
| 2 | To explain the instructions of 8086 to implement the assembly language program. Identify and interpret the result of ALP using integrated tool. |
| 3 | To understand the concepts of interrupts and determine the services of interrupts by 8086. |
| 4 | To design 8086 based system using Memory and peripheral chip. |
| 5 | To appraise the architecture of 80386 DX processor. |
| 6 | To determine the degree of microprocessor from 8086 to Pentium to which several design concepts meet the criteria. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|----------------|---|-----------|---|
| PO 1 PO 2 | | 1.3, 2.4 | 1.3.1 2.4.2 | 2 Understand 3 Apply 4 Analyze 6 Create | CO-1 | Apply the knowledge to design a network and configure it for IP addressing, subnetting. Analyze its results. |
| PO 1 PO 2 | | 1.3, 2.2 | 1.3.1 2.2.2 | 2 3 | CO-2 | Identify different network commands in Linux. Apply it to find solution for different network problems. |
| PO 1 | PSO 1 | 1.3, 1.4 | 1.3.1 1.4.1 | 3 | CO-3 | Apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| PO 5 | | 5.2, 5.3 | 5.2.1 5.3.1 | 3 4 | CO-4 | Select and apply different error detection and correction, flow control, congestion control algorithm. Analyze the results and derive conclusion. |
| PO 1 PO 2 | PSO 2 | 1.3, 2.4 | 1.3.1 2.4.2 | 3 4 6 | CO-5 | Apply the knowledge to design network system using TCP, UDP. Analyze the difference in working. |
| PO 1 PO 2 | | 1.3, 2.4 | 1.3.1 2.4.2 | 3 4 | CO-6 | Apply appropriate technique for routing in different network system and analyze the results. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To apply the knowledge to design a network and configure it for IP addressing, subnetting. Analyze its results. |
| 2 | To identify different network commands in Linux. Apply it to find solution for different network problems. |
| 3 | To apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| 4 | To select and apply different error detection and correction, flow control, congestion control algorithm. Analyze the results and derive conclusion. |
| 5 | To apply the knowledge to design network system using TCP, UDP. Analyze the difference in working. |
| 6 | To apply appropriate technique for routing in different network system and analyze the results. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO 3 | PSO 1 | 3.5 | 3.5.1 | 4-Analyze | CO 1 | Identify and investigate the Real life problem to find appropriate solution and design and draw ER and EER diagram with software tool |
| PO 4 | PSO 2 | 4.6 | 4.6.3 | 6-Create | CO 2 | Design, Create and update database and tables with different DDL and DML statements |
| P05 | PSO 2 | 5.6 | 5.6.1 | 3-Apply | CO 3 | Apply appropriate integrity constraints and provide security to data. |
| P04 | PSO 2 | 4.4 | 4.4.2 | 4-Analyze | CO 4 | Investigate and formulate SQL queries to find appropriate solution to complex problems. |
| P04 | PSO 1 | 4.5 | 4.5.1 | 4-Analyze 3-Apply | CO 5 | Identify and apply triggers and procedures for specific module to meet the specified needs with appropriate solution to safety standards and societal consideration. |
| P05 | PSO 2 | 5.6 | 5.6.2 | 6-Create | CO 6 | Design a software system effectively as a member and leader in a team for a common goal of database processing and controlling consequences of concurrent data access |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To develop entity relationship data model and its mapping to relational model |
| 2 | To learn relational algebra and Formulate SQL queries |
| 3 | To learn integrity Constraints |
| 4 | To apply normalization techniques to normalize the database |
| 5 | To understand concept of transaction, concurrency control and recovery techniques |
| 6 | To design a software Database. |

Course Outcome

| PO | PS O | Competency | PI | Bloom's Level | CO | Description |
|-----------|-------------|-------------------|-----------|----------------------|-----------|---|
| PO 1 | | 1.1 | 1.1.2 | 3. Apply | CO 1 | Use the concept of web technology for solving the problem of web application. |
| PO 4 | | 4.5 | 4.5.1 | 6. CREATE | CO 2 | Design & develop static web pages using HTML5 and CSS3 |
| PO 4 | | 4.5 | 4.5.1 | 3,6, Apply, Create | CO 3 | Apply the concept of client-side validation and design dynamic web pages using JavaScript and JQuery. |
| PO 5 | | 5.4 | 5.4.2 | 6.CREAT E | CO 4 | create Interactive web pages using PHP, AJAX with database connectivity using MySQL to solve the problem of web application |
| PO 4 | | 4.5 | 4.5.1 | 3,6, Apply, Create | CO 5 | Apply the concept of XML, DTD & XSL and design dynamic web pages using XML and XSLT |
| PO 3 | | 3.6 | 3.6.2 | 6. CREATE | CO 6 | Create web application using appropriate web technologies and web development framework suited to meet user requirement |

Course Objective

| Sr. No. | Description |
|----------------|---|
| 1 | To use the concept of web technology for solving the problem of web application. |
| 2 | To design & develop static web pages using HTML5 and CSS3 |
| 3 | To Apply the concept of client-side validation and design dynamic web pages using JavaScript and jQuery. |
| 4 | To create Interactive web pages using PHP, AJAX with database connectivity using MySQL to solve the problem of web application |
| 5 | To apply the concept of XML, DTD & XSL and design dynamic web pages using XML and XSLT |
| 6 | To create web application using appropriate web technologies and web development framework suited to meet user requirement |

Course Outcome

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|------------------|----------------------|-----------|--|
| 3 | | 3.5 | 3.5.1 & 3.5.2 | 6 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 3 | | 3.5 | 5.4.1 | 6 | 2 | Develop writing skills of a cover letter and a CV/resume/SOP |
| 4 | | 4.5 | 4.5.1 | 6 | 3 | Develop interpersonal skills to progress professionally by building strong relationships with peers |
| 4 | | 4.5 | 4.5.1 | 6 | 4 | Develop effective presentation skills and an impressive body language |
| 1 | | 1.5 | 1.5.1 | 3 | 5 | Apply codes of personal integrity, values, aptitudes and skills |
| 1 | | 1.5 | 1.5.1 | 2 | 6 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To discern and develop an effective style of writing important technical/business documents. |
| 2 | To investigate possible resources and plan a successful job campaign. |
| 3 | To understand the dynamics of professional communication in the form of group discussions, meetings etc. required for career enhancement. |
| 4 | To develop creative and impactful presentation skills. |
| 5 | To analyze personal traits, interests, values, aptitudes and skills. |
| 6 | To understand the importance of integrity and develop a personal code of ethics. |

Semester-VI

Subject-Software Engineering

Subject Code- CSC601

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-------------------------|-------------------------------|-----------|--|
| PO 1 | PSO 1 | 1.7 | 1.7.1 | 2-Understand 3-Demonstrate | CO -1 | Understand and demonstrate basic knowledge in software engineering |
| PO 2 | PSO 1 | 2.5 3.5 | 2.5.1 3.5.2 | 2-Understand 4-Analyze | CO -2 | Identify requirements, analyze and prepare models |
| PO 4 | PSO 2 | 4.4 4.5 | 4.4.4 4.5.1 | 3-Apply 6-Create | CO -3 | Plan, schedule and track the progress of the projects |
| PO 3 | PSO 2 | 3.8 | 3.8.1 | 3-Apply 6-Create | CO -4 | Design and develop the software projects |
| PO 5 | PSO 1 | 5.5 5.6 | 5.5.2 5.6.1 5.6.2 | 2-Understand | CO -5 | Identify risks, manage the change to assure quality in software projects |
| PO 5 | PSO 2 | 5.4 5.5 | 5.4.2 5.5.1 | 5-Evaluate | CO -6 | Apply testing principles on software project and understand the maintenance concepts |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To give the knowledge of software engineering discipline |
| 2 | To apply analysis, design and testing principles to software project development |
| 3 | To demonstrate and evaluate real time projects with respect to software engineering principles |
| 4 | To identify requirements and apply process model to selected case study |
| 5 | To analyze and design models for the selected case study using UML modeling |
| 6 | To use various software engineering tools |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------|------------|-----------------------|----------------------------------|---------------------------------|-----------|--|
| PO 2 | | 2.2 | 2.2.2 | 2 Understand 4 Analyze | CO -1 | Identify and analyze the relevance of different system programs. |
| PO 1 PO 2 | PSO 1 | 1.4, 2.3 | 1.4.1 2.3.1 | 2, 3 Apply | CO -2 | Describe the various data structures and demonstrate its use in passes of assembler design. |
| PO 2 | | 2.2, 2.3 | 2.2.2 2.3.1 | 2 | CO -3 | Identify the need for different features and designing of macros. |
| PO 2 | | 2.2 | 2.2.2 2.2.4 | 2, 4 | CO -4 | Distinguish different loaders and linkers and discuss their contribution in developing efficient user applications. |
| PO 1 PO 2 PO 4 | PSO 2 | 1.3, 2.2, 2.3, 4.2 | 1.3.1 2.2.2 2.3.2 4.2.1 | 2, 3, 6 Create | CO -5 | Identify and discuss phases of compiler. Construct and demonstrate use of different parsers for given context free grammars. |
| PO 2 PO 6 | | 2.2, 2.3, 6.1 | 2.2.2 2.3.1 6.1.1 | 2, 5 Evaluate | CO -6 | Identify and justify the need synthesis phase to produce object code optimized in terms of high execution speed and less memory usage. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To identify and analyze the relevance of different system programs. |
| 2 | To describe the various data structures and demonstrate its use in passes of assembler design. |
| 3 | To identify the need for different features and designing of macros. |
| 4 | To distinguish different loaders and linkers and discuss their contribution in developing efficient user applications. |
| 5 | To identify and discuss phases of compiler. |
| 6 | To Identify and justify the need synthesis phase to produce object code optimized in terms of high execution speed and less memory usage. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|-----------------------|-----------|--|
| PO1 | | 1.7 | 1.7.1 | Level 4 Analyze | CO 1 | Understand data warehouse with dimensional modelling and analyze different OLAP operations. |
| PO1 | | 1.7 | 1.7.1 | Level 2 understand | CO 2 | Understand data mining principles and use data preprocessing and data exploration. |
| PO2 | | 2.5 | 2.5.2 | Level 4 Analyze | CO 3 | Classify and evaluate appropriate data mining algorithm |
| PO4 | | 4.6 | 4.6.1 | Level 4 Analyze | CO 4 | Compare and evaluate different data mining techniques like classification, prediction, clustering. |
| PO5 | | 5.4 | 5.4.1 | Level 3 Apply | CO 5 | Identify and apply associate rule mining technique for real time applications. |
| PO4 | | 4.6 | 4.6.1 | Level 3 Apply | CO 6 | Understand and apply the concept of web mining |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify the scope and essentiality of Data ware house |
| 2 | To understand the ETL process and data warehouse with dimensional modelling and apply OLAP operations. |
| 3 | To understand and analyze techniques of data mining for data exploration and preprocessing |
| 4 | To identify the scope of task in Data Mining such as Classification, Prediction etc., |
| 5 | To analyze the different methods of association rules and patterns |
| 6 | To understand the spatial and web data mining. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO 1 | | 1.1 | 1.1.1 | 3 | CO1 | Apply the knowledge of modular arithmetic and number theory to solve problems related to security. |
| PO 2 | | 2.6 | 2.6.4 | 4 | CO2 | Compare and contrast different encryption and decryption methods to select best methods |
| PO 2 | | 2.8 | 2.8.2 | 4 | CO3 | Analyze the performance of different message digest algorithm and interpret the integrity of messages by varying the size of messages. |
| PO 2 | | 2.6 | 2.6.4 | 4 | CO4 | Compare and contrast alternative methods of digital signature to select best methods |
| PO 2 | | 2.8 | 2.8.4 | 4 | CO5 | Analyze and interpret the performance of firewalls and security protocols like SSL, IPsec using contemporary tools. |
| PO 1 | | 1..4 | 1.4.1 | 3 | CO6 | Apply the concepts of system security to solve problems related to security. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce classical encryption techniques and concepts of modular arithmetic and number theory. |
| 2 | To create secure a message over insecure channel by various means |
| 3 | To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms |
| 4 | To explore the design issues and working principles of various authentication protocols, PKI standards and various secure communication standards including Kerberos, IPsec, and SSL/TLS & email. |
| 5 | To develop the ability to use existing cryptographic utilities to build programs for secure communication. |
| 6 | To understand various protocols for network security to protect against the threats in the networks |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.4 | 1.4.1 | 3-Apply | CO 1 | Apply theory and principles of computer science and engineering to identify the applications and steps in developing ML application. |
| PO2 | PSO1 | 1.3 | 1.3.1 | 3-Apply | CO 2 | Apply engineering fundamentals to define Neural Network and to identify various NN architecture |
| PO3 | PSO1 | 2.2 | 2.2.4 | 3-Apply | CO 3 | Compare and contrast alternative solution to select best methods |
| PO4 | PSO1 | 1.1 | 1.1.1 | 3-Apply | CO 4 | Apply the knowledge of discrete structures, Linear Algebra, Statistics, Numerical technique to solve problem |
| PO5 | PSO1 | 1.1 | 1.1.2 | 3-Apply | CO 5 | Apply the concepts of probability, Statistics for solving Machine Learning problems |
| PO6 | PSO1 | 1.1 | 1.1.1 | 3-Apply | CO 6 | Apply the knowledge of discrete structures, Linear Algebra, Statistics, Numerical technique to solve problem |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply theory and principles of computer science and engineering for identifying the applications and steps in ML application development |
| 2 | To apply engineering fundamentals to define neural network and identify NN architecture |
| 3 | To compare and contrast alternative solution to select best methods |
| 4 | To apply the knowledge of discrete structures, Linear Algebra, Statistics, Numerical technique for problem solving |
| 5 | To apply the concepts of probability, Statistics for solving Machine Learning problems |
| 6 | To apply the knowledge of discrete structure, Linear algebra, Statistics, Numerical technique for problem solving |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------|-----------|--|
| PO2 | PSO 1 | 2.7 | 2.7.2 | 4-Analyze | CO 1 | Identify traditional and agile process Models. |
| PO3 | PSO 2 | 3.7 | 3.7.1 | 6-Create | CO 2 | Develop Software Requirement Specification (SRS) document and Data Flow Diagram (DFD). |
| PO4 | PSO 1 | 4.6 | 4.6.1 | 3-Apply | CO 3 | Calculate tracking and scheduling of the project. |
| PO3 | PSO 1 | 3.6 | 3.6.1 3.6.3 | 2-Understand | CO 4 | Explain and classify the design of Software Project using basic Principles and concepts. |
| PO4 PO5 | PSO 2 | 4.5 5.6 | 4.5.1 5.6.1 | 3-Apply 6-Create | CO 5 | Prepare Risk Mitigation plan and Construct Version Control. |
| PO5 | PSO 1 | 5.4 | 5.4.2 | 5-Evaluate | CO 6 | Test the Software by using various Testing Approaches. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify and study traditional and agile process Models. |
| 2 | To develop Software Requirement Specification (SRS) document and Data Flow Diagram (DFD). |
| 3 | To Calculate project estimation techniques and Show tracking and scheduling of the project. |
| 4 | To explain and classify the design of Software Project using Principles and concepts. |
| 5 | To prepare Risk Mitigation plan and Construct Version Control. |
| 6 | To test the Software by using various Testing Approaches. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------------------|------------|-------------------|-------------------------|--------------------------------|-----------|---|
| PO 2 | PSO 1 | 2.2 | 2.2.2 | 2 Understa nd 3 Apply | CO -1 | Generate machine code by using various databases generated in pass one of two pass assembler. |
| PO 1 PO 2 | PSO 1 | 1.4, 2.3 | 1.4.1 2.3.1 | 6 Create | CO -2 | Construct different databases of single pass macro processor. |
| PO 2 | | 2.2, 2.3 | 2.2.2 2.3.1 | 2 | CO -3 | Identify and validate different tokens for given high level language code. |
| PO 2 | PSO 2 | 2.2 | 2.2.4 | 6 | CO -4 | Parse the given input string by constructing Top down /Bottom-up parser. |
| PO 1 PO 2 PO 4 | | 1.3, 2.3, 4.2 | 1.3.1 2.3.2 4.2.1 | 3 | CO -5 | Implement synthesis phase of compiler with code optimization techniques. |
| PO 2 PO 6 | | 2.2, 2.3, 6.1 | 2.2.2 2.3.1 6.1.1 | 2, 5 Evaluate | CO -6 | Explore various tools like LEX and YACC. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To understand the need for modular design, the need for well-defined data structures and their storage management. |
| 2 | To construct different databases of single pass macro processor, assembler. |
| 3 | To identify and validate different tokens for given high level language code. |
| 4 | To parse the given input string by constructing Top down /Bottom-up parser. |
| 5 | To implement synthesis phase of compiler with code optimization techniques. |
| 6 | To explore various tools like LEX and YACC. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | | 1.7 | 1.7.1 | Level 6 Create | CO 1 | Design data warehouse and perform various OLAP operations |
| PO1 | | 1.7 | 1.7.1 | Level 4 Analyze | CO 2 | Implement classification mining algorithms. |
| PO2 | | 2.5 | 2.5.2 | Level 4 Analyze | CO 3 | Classify and evaluate appropriate data mining algorithm |
| PO4 | | 4.6 | 4.6.1 | Level 4 Analyze | CO 4 | Demonstrate prediction and Implement clustering algorithms on a given set of data sample using data mining tools |
| PO5 | | 5.4 | 5.4.1 | Level 3 Apply | CO 5 | Implement Association Rule Mining algorithm |
| PO4 | | 4.6 | 4.6.1 | Level 3 Apply | CO 6 | Implement spatial and web mining algorithms |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify the scope and essentiality of Data ware house |
| 2 | To perform various OLAP operations. |
| 3 | To understand and analyze techniques of data mining for data exploration and preprocessing |
| 4 | To identify the scope of task in Data Mining such as Classification, Prediction etc |
| 5 | To analyze the different methods of association rules and patterns |
| 6 | To understand the spatial and web data mining. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO 1 | | 1.1 | 1.1.1 | 3 | CO1 | Apply the knowledge of symmetric cryptography to implement simple cipher to solve security related problems. |
| PO 3 | | 3.8 | 3.8.2 | 3 | CO2 | Implement public key algorithms like RSA & EL Gamal |
| PO 2 | | 2.8 | 2.8.2 | 4 | CO3 | Analyze & interpret the results of hashing algorithms. |
| PO 4 | | 4.6 | 4.6.1 | 3 | CO4 | Use appropriate reconnaissance tools to gather information about network& other tools for analyzing packets in network. |
| PO 2 | | 2.8 | 2.8.2 | 4 | CO5 | Analyze & interpret the results of firewall and intrusion detection system |
| PO 2 | | 2.1 | 2.1.2 | 3 | CO6 | Identify various attacks like buffer overflow & web application attacks to solve problems of security. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To apply the knowledge of symmetric cryptography to implement simple cipher to solve security related problems. |
| 2 | To implement public key algorithms like RSA & EL Gamal |
| 3 | To analyze & interpret the results of hashing algorithms. |
| 4 | To use appropriate reconnaissance tools to gather information about network& other tools for analyzing packets in network. |
| 5 | To Analyze & interpret the results of firewall and intrusion detection system |
| 6 | To Identify various attacks like buffer overflow & web application attacks to solve problems of security. |

Course Outcomes

| PO | PS O | Competency | PI | Bloom' s Level | CO | Description |
|-----------------|-----------------|-------------------|-------------------|-----------------------|-----------|---|
| PO2 PO3 | | 2.1,3.5 | 2.1.2,3.5.1 | 3 | CO 1 | Define problem statement with objective & scope & identify methodologies/algorithms to solve problem |
| PO3 | | 3.8 | 3.8.3 | 4 | CO 2 | Verify & validate results, functionalities & design of project |
| PO7 | | 7.3 | 7.3.1,7.3.2 | 3 | CO 3 | Identify impact of engineering products & understand relationship between the technical, socio-economics & environmental dimensions of sustainability's. |
| PO9 PO1 1 | | 9.4,11.6 | 9.4.2,11.6. 2 | 3 | CO 4 | Use project management tools to schedule an engineering project, so it is completed on time & on budget & implement norms of practice. |
| PO1 0 | | 10.4, 10.6 | 10.4.2, 10.6.2 | 3.4 | CO 5 | Produce clear, well structured & well supported written engineering document & use variety of media effectively to convey a message in a document or presentation |
| PO9 | | 9.5 | 9.5.1 | 6 | CO 6 | Demonstrate effective communication, problem-solving, conflict resolution & leadership skill |

Course Objectives

| Sr. No. | Course Objectives |
|----------------|--|
| 1 | To define problem statement with objective, scope & identify methodologies/algorithms to solve problem |
| 2 | To Verify & validate results. |
| 3 | To identify impact of engineering products & understand relationship between the technical, socio-economics & environmental dimensions of sustainability's. |
| 4 | To use project management tools to schedule an engineering project, so it is completed on time & on budget & implement norms of practice. |
| 5 | To produce clear, well structured & well supported written engineering document & use variety of media effectively to convey a message in a document or presentation. |
| 6 | To demonstrate effective communication, problem-solving, conflict resolution & leadership skill. |

Semester-VII

Subject-DSIP

Subject Code- CSC701

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|-----------------------|-----------|---|
| PO1 | | 1.2 | 1.2.1 | 3-Apply, 4-Analyze | CO1 | Classify and analyze discrete time signals and systems |
| PO2 | | 2.1 | 2.5.3 | 3-Apply | CO2 | Use DFT properties for the computation of DFT |
| PO2 | | 2.8 | 2.8.1 | 3-Apply | CO3 | Solve Fast Fourier Transform of signals |
| PO1 | | 1.2 | 1.2.1 | 2-Understand | CO4 | Discuss the fundamental concepts of digital image. |
| PO3 | | 3.6 | 3.6.1 | 3-Apply | CO5 | Use the enhancement techniques to explore alternative methods in Spatial domain. |
| PO2 | | 2.6 | 2.6.5 | 4-Analyze | CO6 | Differentiate between the advantages and disadvantages of different edge detection techniques |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the fundamental concepts of digital signal processing and Image processing. |
| 2 | To Compute DFT for 1-D and 2-D signals. |
| 3 | To Calculate FFT for 1-D signal |
| 4 | To explain the fundamental concepts of Digital image. |
| 5 | To apply enhancement techniques for digital Image Processing |
| 6 | To apply digital image processing techniques for edge detection. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------------------------|------------|-------------------|-------------------------|---|-----------|--|
| PO 2 PO 6 | | 2.3, 6.2 | 2.3.1 6.2.1 | 2 Under stand 4 Analy ze | CO- 1 | Identify fundamentals or basic concepts and principles in mobile communication & computing. Analyze the techniques available and understand its impact. |
| PO 1 PO 2 PO 6 | PSO1 | 1.4, 2.2, 6.2 | 1.4.1 2.2.2 6.2.1 | 2, 3 Apply 4, 5 Evalu ate | CO- 2 | Realize all generation of mobile computing i.e., GSM, GPRS, UMTS, UTRAN. Apply the knowledge to analyze its performance, its impact on society, environment for sustainable development. |
| PO 1 PO 3 PO 5 | | 1.4, 3.3, 5.2 | 1.4.1 3.3.1 5.2.1 | 3, 4 | CO- 3 | Apply appropriate techniques for communication or routing in mobile computing. Analyze it to realize fundamentals or different concepts related to it. Investigate problems in communication, discuss its solutions. |
| PO 2 | PSO1 | 2.2, 2.3, 2.4 | 2.2.2 2.3.1 2.4.3 | 2, 4 | CO- 4 | Identify the difference between WLAN, HIPERLAN1, HIPERLAN2 (802.11a, 802.11b etc.). Analyze it in terms of protocols, bandwidth used etc. |
| PO 4 PO 5 PO 6 | PSO2 | 4.1, 5.2, 6.1 | 4.1.1 5.2.1 6.1.1 | 3, 4 | CO- 5 | Realize the impact of mobility on communication. Select and apply appropriate techniques for mobility management. |
| PO 1 PO 3 | | 1.4, 3.2, 3.3 | 1.4.1 3.2.1 3.3.1 | 3 | CO- 6 | Apply the knowledge to understand Long Term Evolution (LTE) architecture, its interfaces, different types. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To define the basic concepts and principles in mobile computing. |
| 2 | To explain major techniques involved, and networks & systems issues for the design and implementation of mobile computing systems and applications i.e. GSM, GPRS. |
| 3 | To describe or explore both theoretical and practical issues of network layer, transport layer of mobile computing. |
| 4 | To distinguish between different protocols used in mobile computing and applications based on it. |
| 5 | To study main aspect of mobile computing i.e., mobility in detail. |
| 6 | To determine or provide an opportunity for students to understand the key components and technologies involved and to gain hands-on experiences in building mobile applications. |

Course Outcomes

| PO | PSO | Competency | PI | Bloo m's Level | C O | Description |
|-----------|------------|-------------------|-----------|--------------------------------------|----------------|--|
| PO2 | PSO 1 | 2.1 | 2.5.2 | 2- Under stand | CO 1 | Identify the various characteristics of Artificial Intelligence and Soft Computing techniques. |
| PO4 | PSO 1 | 4.5 | 4.5.1 | 3- Apply 2- Under stand | CO 2 | Identify and apply an appropriate problem-solving method for an agent to find a sequence of actions to reach the goal state. |
| PO3 | PSO 1 | 3.6 | 3.6.2 | 4- Analy ze | CO 3 | Analyze the strength and weakness of AI approaches to knowledge representation, reasoning and planning. |
| PO5 | PSO 1 | 5.4 | 5.4.1 | 6- Create 2- Under stand | CO 4 | Identify the applications which can use fuzzy logic. Design fuzzy controller system |
| PO5 | PSO 1 | 5.4 | 5.4.2 | 6- Create | CO 5 | Design supervised and unsupervised ANN for real world applications. |
| PO5 | PSO 1 | 5.5 | 5.5.1 | 6- Create 3- Apply | CO 6 | Apply Hybrid approach for expert system design. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To conceptualize the basic ideas and techniques of AI and SC. |
| 2 | To distinguish various search techniques and to make student understand knowledge representation and planning. |
| 3 | To provide the mathematical background for carrying out the optimization. Familiarizing genetic algorithm for seeking global optimum in self-learning situation. |
| 4 | To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience. |
| 5 | To become familiar with basics of Neural Networks that can learn from available examples and generalize to form appropriate rules for inference systems. |
| 6 | To familiarize with Hybrid systems and to build expert system. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|--------------------------|-----------|---|
| PO1 | | 1.4 | 1.4.1 | 3 Apply | CO1 | Apply the theory of access control policies & control mechanism for solving the problem of security |
| PO2 | | 2.1 | 2.1.2 | 3 Apply | CO2 | Identify the malicious, no malicious & Targeted code & use the concept of OS, file security to solve the problem of security |
| PO2 | | 2.4 | 2.4.2 | 4 Analyze | CO3 | Analyze & counter threats to web application using contemporary tool |
| PO3 | | 3.6 | 3.6.1 | 4 Analyze | CO4 | Explore different measures to secure wireless protocols, WLAN, VPN networks & mobile devices & use the different protection mechanism of networks to solve the problems of Wi-Fi network security |
| PO8 | | 8.4 | 8.4.2 | 3 Apply | CO5 | Examine and apply legal & ethical issues associated with cybercrime to known case studies |
| PO4 | | 4.6 | 4.6.1 | 3,4 Apply, Analyze | CO6 | Apply appropriate procedures, tools and techniques to acquire and duplicate data from compromised systems and analyze it |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To Understand cyberattacks and defense strategies and express underlying principles of access control mechanisms. |
| 2 | To Classify malicious code and targeted malicious code |
| 3 | To explore software vulnerabilities, attacks and protection mechanisms of web application |
| 4 | To explore vulnerabilities, attacks and protection mechanisms of wireless networks and protocols, WLAN & mobile devices |
| 5 | To Develop and mitigate security management and policies |
| 6 | To Use and explore techniques used in digital forensics |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO 1 | PSO 1 | 1.3 | 1.3.1 | 3-Apply | CO 1 | Apply theory and principles of computer science and engineering to identify different types of cybercrime and its effect on outside world. |
| PO 1 | PSO 1 | 1.3 | 1.3.1 | 3-Apply | CO 2 | Apply engineering fundamentals to identify various security challenges in mobile device for different types of attack and distinguish different aspects of cyber law |
| PO 2 | PSO 2 | 4.3 | 4.3.1 | 3-Apply | CO 3 | Use of different tools and methods in Cyber Security. |
| PO 6 | PSO 1 | 6.2 | 6.2.1 | 2-Understand | CO 4 | Interpret legislation, regulation, codes and standards relevant to cyberlaw and explain IT act 2000 and its latest amendments |
| PO 6 | PSO 1 | 6.2 | 6.2.1 | 2-Understand | CO 5 | Interpret legislation, regulation, codes and standards relevant to cyberlaw and explain IT act 2000 and its latest amendments |
| PO 3 | PSO 1 | 3.1 | 3.1.3 | 1-Remember | CO 6 | Able to choose appropriate information security standards during software design and development |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To apply theory and principles of computer science and engineering to identify different types of cybercrime and its effect on outside world |
| 2 | To apply engineering fundamentals to identify various security challenges for different types of attack |
| 3 | To use different tools and methods in Cyber Security |
| 4 | To interpret legislation, regulation, codes and standards relevant to cyberlaw with explanation of IT act 2000 and its latest amendments |
| 5 | To interpret legislation, regulation, codes and standards relevant to cyberlaw with explanation of IT act 2000 and its latest amendments |
| 6 | To choose appropriate information security standards during software design and development |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|-------------------------|----------------------|-----------|---|
| PO7 | | 7.1 | 7.1.2 | Level 4 Analyze | CO 1 | Identify the impact information systems have on an organization and society and explain how information systems transform Business. |
| PO2 | | 2.2 | 2.2.2 2.2.3 2.2.4 | Level 4 Analyze | CO 2 | Compare and contrast the principal tools and technologies for accessing information from databases to improve business performance and decision making. |
| PO2 | | 2.2 | 2.2.3 2.2.4 | Level 4 Analyze | CO 3 | Classify and compare threats to information resources and security controls used to protect the same in an organization. |
| PO1 1 | | 11.2 | 11.2. 1 | Level 1 Remembe r | CO 4 | Recognize innovative ways to use social computing for market research and business. |
| PO4 | | 4.3 | 4.3.2 | Level 4 Analyze | CO 5 | Analyze the impact of networks on a business. |
| PO3 PO7 | | 3.3, 7.1 | 3.3.1 7.1.1 | Level 3 Apply | CO 6 | Explain the significance of system development life cycle and importance of enterprise-wide knowledge management and its value for business. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify the impact information systems, have on an organization and society and explain how information systems transform Business. |
| 2 | To compare and contrast the principal tools and technologies for accessing information from databases to improve business performance and decision making. |
| 3 | To classify and compare threats to information resources and security controls used to protect the same in an organization. |
| 4 | To recognize innovative ways to use social computing for market research and business. |
| 5 | To analyze the impact of networks on a business. |
| 6 | To explain the significance of system development life cycle and importance of enterprise-wide knowledge management and its value for business. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|-------------------------|-----------|---|
| PO1 | | 2.8 | 2.8.1 | 2-Understand | CO1 | Illustrate and implement the concept sampling and reconstruction of signal. |
| PO2 | | 2.1 2.8 | 2.5.3 2.8.1 | 2-Understand 3-Apply | CO2 | Demonstrate and apply operations like Convolution, Correlation, DFT on DT signals |
| PO2 | | 2.8 | 2.8.1 | 3-Apply | CO3 | Apply Fast Fourier Transform on DT signals |
| PO1 | | 1.2 | 1.2.1 | 2-Understand 3-Apply | CO4 | Illustrate and apply the fundamental concepts of digital image. |
| PO3 | | 3.6 | 3.6.1 | 3-Apply | CO5 | Apply enhancement techniques for digital Image Processing |
| PO2 | | 2.6 2.8 | 2.6.4 2.8.1 | 3-Apply 4-Analyze | CO6 | Apply and classify the digital image processing techniques for edge detection. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the fundamental concepts of digital signal processing and Image processing. |
| 2 | To Compute DFT for 1-D and 2-D signals. |
| 3 | To Calculate FFT for 1-D signal |
| 4 | To explain the fundamental concepts of Digital image. |
| 5 | To apply enhancement techniques for digital Image Processing |
| 6 | To apply digital image processing techniques for edge detection. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--|------------|-----------------------|----------------------------------|---|-----------|--|
| PO 4 PO 6 | | 4.2, 6.2 | 4.2.1 6.2.1 | 2 Understan d 3 Apply | CO -1 | Apply the knowledge of MAC layer techniques to implement CDMA and understand its impact. |
| PO 2 PO 4 PO 5 PO 6 | PSO 1 | 2.1, 4.2, 5.1, 6.2 | 2.1.3 4.2.1 5.1.2 6.2.1 | 2, 3, 4 Analyze, 5 Evaluate, 6 Create | CO -2 | Understand GSM. Design a security system using A3/A5/A8 algorithm, Handoff system. Analyze the difference in simple system and handoff system working. Apply appropriate technique to find Mobile users' location (GPS) and design a system. |
| PO 1 PO 4 PO 6 | | 1.3, 4.2, 6.2 | 1.3.1 4.2.1 6.2.1 | 2, 3 | CO -3 | Understand Java, J2ME. Apply the knowledge to design a system which calculates income tax/EMI. |
| PO 1 PO 3 PO 5 | PSO 1 | 1.3, 3.2, 5.1 | 1.3.1 3.2.2 5.1.2 | 3 | CO -4 | Apply the knowledge of mobility. Investigate problems because of mobility. Apply appropriate technique to design mobile node discovery. |
| PO 4 PO 6 | | 4.2, 6.2 | 4.2.1 6.2.1 | 6 | CO -5 | Understand Android SDK. Design a software system or application which makes use of database, gives alert message upon receiving message. |
| PO 2 PO 5 | | 2.1, 5.1 | 2.1.3 5.1.2 | 3, 6 | CO -6 | Select and apply appropriate technique to find route from source to destination, design a system and analyze the results. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply the knowledge of MAC layer techniques to implement CDMA. |
| 2 | To understand GSM. Design a security system using A3/A5/A8 algorithm, Handoff system. |
| 3 | To understand Java, J2ME. |
| 4 | To Apply the knowledge of mobility. Investigate problems because of mobility. |
| 5 | To understand Android SDK. |
| 6 | To Select and apply appropriate technique to find route from source to destination. |

Course Outcomes

| PO | PSO | Competency | PI | Bloo m's Level | C O | Description |
|-----------|------------|-------------------|-----------|-------------------------------|----------------|---|
| PO5 | PSO1 | 5.4 | 5.4.1 | 4-Analyze | CO 1 | Identify the problem and formulate it. |
| PO4 | PSO1 | 4.4 | 4.4.3 | 2-Understand | CO 2 | Understand the basic techniques to build intelligent systems |
| PO4 | PSO1 | 4.5 | 4.5.1 | 6-Create | CO 3 | Create knowledge base and apply appropriate search techniques used in problem solving |
| PO4 | PSO1 | 4.6 | 4.6.1 | 4-Analyze 3-Apply | CO 4 | Identify and analyze Algorithm to solve the problem |
| PO5 | PSO2 | 5.4 | 5.4.1 | 6-Create | CO 5 | Design fuzzy controller system. |
| PO5 | PSO2 | 5.4 | 5.4.2 | 6-Create | CO 6 | Design the supervised/unsupervised learning algorithm. |

Course Objectives

| Sr. No. | Description |
|--------------------|--|
| 1 | Select a problem statement relevant to Artificial Intelligence |
| 2 | understand the basics of PROLOG |
| 3 | Make student understand knowledge representation and planning. |
| 4 | Study different optimization techniques and implement it |
| 5 | Introduce the ideas of fuzzy sets, fuzzy logic and generalize to form appropriate rules for inference systems. |
| 6 | Become familiar with basics of Neural Networks and supervised/unsupervised learning algorithm |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | | 2.8 | 2.8.2 | 4 | CO1 | Analyze & interpret code & program vulnerabilities using opensource tools. |
| PO2 | | 2.8 | 2.8.2 | 4 | CO2 | Analyze & interpret network vulnerabilities using opensource tools. |
| PO4 | | 4.6 | 4.6.1 | 3,4 | CO3 | Use appropriate tools to detect web application & browsers vulnerabilities & analyze it |
| PO3 | | 3.6 | 3.6.1 | 3,4 | CO4 | Explore different tools to secure wireless network, routers & mobile devices & perform penetration testing &analyze it |
| PO3 | | 3.8 | 3.8.2 | 3 | CO5 | Implement AAA using RDIOUS & TACACS |
| PO4 | | 4.6 | 4.6.1 | 3,4 | CO6 | Use appropriate forensic tools to collect, duplicate & analyze data |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To analyze & interpret code & program vulnerabilities using opensource tools. |
| 2 | To analyze & interpret network vulnerabilities using opensource tools. |
| 3 | To use appropriate tools to detect web application & browsers vulnerabilities & analyze it |
| 4 | To explore different tools to secure wireless network, routers & mobile devices & perform penetration testing &analyze it |
| 5 | To Implement AAA using RDIOUS & TACACS |
| 6 | To use appropriate forensic tools to collect, duplicate & analyze data |

Subject-Major Project-I**Subject Code- CSP705****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------|---------------|---------------------|--|--|-----------|--|
| PO6 PO7 | PSO2 | 6.1, 7.1, 7.2 | 6.1.1 7.1.1 7.2.1 | 2 Understan d 3 Apply | CO -1 | Identify societal, health and legal issues and apply practical knowledge within the chosen area of technology for project development. |
| PO8 PO1 1 | PSO1 | 8.2, 11.2, 11.3 | 8.2.2 11.2. 1 11.3. 1 | 2 Understan d 4 Analyze 6 Formulate | CO -2 | Identify, analyze and formulate problem within programming projects in a comprehensive and systematic approach. |
| PO5 | PSO1 | 5.1, 5.2 | 5.1.2 5.2.1 | 6 | CO -3 | Design and develop Engineering solutions to complex problem utilizing a systematic approach. |
| PO9 PO1 0 | | 9.3, 10.2, 10.3 | 9.3.1 10.2. 1 10.3. 1 | 5 Evaluate | CO -4 | Work effectively as an individual or in a team in development of technical projects. |
| PO1 0 PO1 2 | PSO1 ,PSO2 | 10.2, 10.3, 12.2 | 10.2. 1 10.3. 1 12.2. 1 | 5 | CO -5 | Communicate effectively with profession by presenting project related activities. |
| PO1 0 | | 10.2, 10.3 | 10.2. 1 10.3. 1 | 3 | CO -6 | Demonstrate knowledge, skills and attitude of a professional engineers and community at large. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To identify societal, health and legal issues and apply practical knowledge within the chosen area of technology for project development. |
| 2 | To identify, analyze and formulate problem within programming projects in a comprehensive and systematic approach. |
| 3 | To design and develop Engineering solutions to complex problem utilizing a systematic approach. |
| 4 | To work effectively as an individual or in a team in development of technical projects. |
| 5 | To communicate effectively with profession by presenting project related activities. |
| 6 | To demonstrate knowledge, skills and attitude of a professional engineers and community at large. |

Semester-VIII

Subject-HMI

Subject Code- CSC801

Course Outcomes

| PO | PS O | Competency | PI | Bloom's Level | CO | Description |
|-----------|-------------|-------------------|-----------|----------------------|-----------|---|
| PO 1 | | 1.4 | 1.4.1 | 3 | CO 1 | Apply User Interface (UI) design principles to solve a problem HMI |
| PO 2 | | 2.6 | 2.6.5 | 4 | CO 2 | Compare & contrast alternative processes of design & software to select best process. |
| PO 3 | | 3.8 | 3.8.2 | 3 | CO 3 | Implement & integrate graphical user interface with modern software tools. |
| PO 4 | | 4.5 | 4.5.1 | 6 | CO 4 | Design screen by using different components & develop interface using different interaction techniques. |
| PO 4 | | 4.5 | 4.5.1 | 6 | CO 5 | Design & develop mobile interface based on mobile element & tools. |
| PO 2 | | 2.6 | 2.6.5 | 4 | CO 6 | Compare & contrast interaction styles for communication to select best styles. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To learn the foundation of human machine interaction. |
| 2 | To understand the importance of human psychology in designing good interfaces. |
| 3 | To learn the graphical user interface. |
| 4 | To make aware of mobile interaction design and its usage in day – to – day activities. |
| 5 | To understand various design technologies to meet user requirements. |
| 6 | To encourage to indulge into research in Machine Interaction Design. |

Subject-Distributed Computing**Subject Code- CSC802****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------|------------|-------------------|--|----------------------------|-----------|---|
| PO 1 | | 1.3, 1.4 | 1.3.1 1.4.1 | 2 Understand 3 Apply | CO -1 | Recognize fundamentals of Distributed system. Apply or demonstrate knowledge of the basic elements and concepts related to distributed system technologies. |
| PO 2 PO 3 | PSO 1 | 2.2, 3.2, 3.3 | 2.2.2 , 2.2.4 3.2.1 , 3.3.1 | 2, 3, 4 Analyze | CO -2 | Investigate, identify and analyze the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware. |
| PO 2 | | 2.1, 2.3, 2.4 | 2.1.2 2.3.1 2.4.4 | 2, 3, 4 | CO -3 | Apply knowledge of synchronization and mutual exclusion to identify and analyze the various techniques used for clock synchronization and mutual exclusion in distributed system. |
| PO 1 PO 2 | PSO 1 | 2.1, 2.2 | 2.1.2 2.2.4 | 2, 4 | CO -4 | Elaborate the concepts of Resource and Process management and synchronization algorithms. Analyze different algorithms of it. |
| PO 2 PO 6 | | 2.1, 2.2, 6.1 | 2.1.2 , 2.2.3 6.1.1 | 2, 3 | CO -5 | Identify use of consistency, replication and demonstrate the use of Consistency and Replication Management. |
| PO 1 PO 2 PO 5 | | 1.4, 2.2, 5.2 | 1.4.1 2.2.2 5.2.1 | 3, 4 | CO -6 | Apply the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications |

Course Objectives

| Sr. No. | Description |
|--------------------|--|
| 1 | To provide students with contemporary knowledge in distributed systems |
| 2 | To equip students with skills to analyze and design distributed applications. |
| 3 | To learn master skills to measure the performance of distributed synchronization algorithm. |
| 4 | To study different resources and process management techniques in distributed environment. |
| 5 | To explain techniques to maintain data consistent in distributed computing. |
| 6 | To understand and explore knowledge of distributed file system. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|--------------------|--------------------------|----------------------|-----------|---|
| 12 2 | | 12.5 2.6 | 12.5.2 2.6.3 | 4 | 1 | Identify and Illustrate Processing of natural language to cope with change in a world of technology. |
| 2 5 | | 2.5 5.4 | 2.5.2 5.4.1 | 1 | 2 | Describe and recognize appropriate techniques for word level analysis in natural language processing |
| 4 | PSO 1 | 4.5 | 4.5.1 | 5 | 3 | Design and develop the concept of main language level: Morphology, syntax, semantic, pragmatic for a software system to meet specified needs with social cons |
| 2 5 | | 2.7 5.5 | 2.7.1 5.5.1 | 4 | 4 | Identify engineering problem and Select model for semantic analysis. |
| 5 2 | | 5.4 2.5 | 5.4.2 2.5.2 | 3 | 5 | Discover difficult issues of society and use the various language models in world of NLP. |
| 9 10 3 | PSO 2 | 9.4 10.6 3.8 | 9.4.1 10.6.2 3.8.2 | 6 | 6 | Design & Invent NLP mini projects in groups. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basic concepts of Natural Language Processing |
| 2 | To create and apply appropriate techniques for word level analysis in natural language processing. |
| 3 | To design and apply the concept of main language level: Morphology, syntax, semantic, pragmatic For a software system to meet specified needs with social consideration. |
| 4 | To investigate engineering problem and design model for semantic analysis. |
| 5 | To identify difficult issues of society and to create the various language models in world of NLP. |
| 6 | To design and present Miniproject in groups. |

Course Outcomes

| PO | PSO | PI | Bloom's Level | CO | Description |
|-----------|------------|-----------|----------------------|-----------|---|
| 7 | | 7.1.2 | 1 | 1 | To Understand and identify environmental issues relevant to India and global concerns |
| 7 | | 7.2.1 | 2 | 2 | To Study the needs for sustainable development |
| 7 | | 7.1.1 | 1 | 3 | To Learn concepts of ecology |
| 7 | | 7.2.2 | 2 | 4 | To Understand the Scope and implementation of Environment Management in corporates |
| 7 | | 7.1.1 | 3 | 5 | To Learn Total Quality Environmental Management and its certification process |
| 7 | | 7.2.2 | 2 | 6 | To Familiarize environment related legislations |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the concept of environmental management |
| 2 | To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| 3 | To explain the concept of ecosystem its interdependence & food chain etc |
| 4 | To illustrate EQM and Corporate Environmental Responsibility |
| 5 | To apply the process of ISO-14000, EMS Certification to their respective companies |
| 6 | To understand and interpret environment related legislations |

Subject-HMI Lab**Subject Code- CSL801****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO 2 | PSO 2 | 2.6 | 2.6.3 | 6- Create | CO -1 | Design user centric interfaces. |
| PO 6 | PSO 2 | 6.3 | 6.3.1 | 6- Create | CO -2 | Develop innovative and userfriendly interfaces. |
| PO 5 | PSO 2 | 5.5 | 5.5.1 | 3-Apply | CO -3 | Use HMI in their day-to-day activities |
| PO 5 | PSO 2 | 5.6 | 5.6.2 | 4-Analyze | CO -4 | Analyze existing interface designs, and improve them. |
| P06 | PSO 2 | 6.3 | 6.3.1 | 4-Analyze | CO -5 | Illustrate application for social and technical task. |
| PO 2 | PSO 1 | 2.6 | 2.6.5 | 4-Analyze | CO -6 | Distinguish input and output devices. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To demonstrate an understanding of guidelines, principles, and theories influencing human machine interaction. |
| 2 | To understand the importance of a good interface design. |
| 3 | To understand the importance of human psychology in designing good interfaces. |
| 4 | To motivate students to apply HMI in their day – to – day activities. |
| 5 | To bring out the creativity in student – build innovative applications that are user friendly. |
| 6 | To encourage students to indulge into research in Machine Interface Design. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|-------------------------|---|-----------|--|
| PO 1 PO 4 | | 1.3, 4.2 | 1.3.1 4.2.1 | 2 Understand 3 Apply 4 Analyze | CO -1 | Develop, test and debug RPC/RMI based client-server programs. |
| PO 5 | | 5.1, 5.2 | 5.1.1 5.2.1 | 2, 3, 4 | CO -2 | Implement the main underlying components of distributed systems such as IPC. |
| PO 5 | | 5.1, 5.2 | 5.1.1 5.2.1 | 2, 3, 4 | CO -3 | Implement the main underlying components of distributed systems such as name resolution. (DNS, ns lookup). |
| PO 2 PO 5 | PSO 1 | 2.2, 2.3, 5.2 | 2.2.4 2.3.2 5.2.1 | 2, 4 | CO -4 | Implement various techniques of synchronization. |
| PO 4 | | 4.2 | 4.2.1 | 3, 6 Create | CO -5 | Design and implement application programs on distributed systems. |
| PO 1 PO 2 | | 1.4, 2.2 | 1.4.1 2.2.2 | 2 | CO -6 | Explore the concepts of distributed file systems. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To develop, test and debug RPC/RMI based client-server programs. |
| 2 | To implement the main underlying components of distributed systems such as IPC. |
| 3 | To implement the main underlying components of distributed systems such as name resolution.(DNS, ns lookup). |
| 4 | To implement various techniques of synchronization. |
| 5 | To design and implement application programs on distributed systems. |
| 6 | To explore the concepts of distributed file systems. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------------|------------|-------------------|----------------|--|-----------|---|
| PO 1 PO 2 | | 1.3, 2.4 | 1.3.1 2.4.2 | 2 Understa nd 3 Apply 4 Analyze 6 Create | CO-1 | Apply the knowledge to design a network and configure it for IP addressing, subnetting. Analyze its results. |
| PO 1 PO 2 | | 1.3, 2.2 | 1.3.1 2.2.2 | 2 3 | CO-2 | Identify different network commands in Linux. Apply it to find solution for different network problems. |
| PO 1 | PSO 1 | 1.3, 1.4 | 1.3.1 1.4.1 | 3 | CO-3 | Apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| PO 5 | | 5.2, 5.3 | 5.2.1 5.3.1 | 3 4 | CO-4 | Select and apply different error detection and correction, flow control, congestion control algorithm. Analyze the results and derive conclusion. |
| PO 1 PO 2 | PSO 2 | 1.3, 2.4 | 1.3.1 2.4.2 | 3 4 6 | CO-5 | Apply the knowledge to design network system using TCP, UDP. Analyze the difference in working. |
| PO 1 PO 2 | | 1.3, 2.4 | 1.3.1 2.4.2 | 3 4 | CO-6 | Apply appropriate technique for routing in different network system and analyze the results. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To apply the knowledge to design a network and configure it for IP addressing, subnetting. Analyze its results. |
| 2 | To identify different network commands in Linux. Apply it to find solution for different network problems. |
| 3 | To apply knowledge to understand the operation of TCP/IP layers using Wireshark. |
| 4 | To select and apply different error detection and correction, flow control, congestion control algorithm. Analyze the results and derive conclusion. |
| 5 | To apply the knowledge to design network system using TCP, UDP. Analyze the difference in working. |
| 6 | To apply appropriate technique for routing in different network system and analyze the results. |

Course Outcomes

| PO | PSO | Competency | PI | Bloo m's Level | CO | Description |
|--------------|------------|--------------------|--------------------------|-------------------------------|-----------|---|
| 12 2 | | 12.5 2.6 | 12.5.2 2.6.3 | 4 | 1 | Identify and Illustrate Processing of natural language to cope with change in a world of technology. |
| 2 5 | | 2.5 5.4 | 2.5.2 5.4.1 | 1 | 2 | Describe and recognize appropriate techniques for word level analysis in natural language processing |
| 4 | PSO 1 | 4.5 | 4.5.1 | 5 | 3 | Design and develop the concept of main language level: Morphology, syntax, semantic, pragmatic for a software system to meet specified needs with social cons |
| 2 5 | | 2.7 5.5 | 2.7.1 5.5.1 | 4 | 4 | Identify engineering problem and Select model for semantic analysis. |
| 5 2 | | 5.4 2.5 | 5.4.2 2.5.2 | 3 | 5 | Discover difficult issues of society and use the various language models in world of NLP. |
| 9 10 3 | PSO 2 | 9.4 10.6 3.8 | 9.4.1 10.6.2 3.8.2 | 6 | 6 | Design & Invent NLP mini projects in groups. |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To understand the basic concepts of Natural Language Processing |
| 2 | To apply the basic algorithm in Natural Language Processing for word level analysis. |
| 3 | To understand the concept in main language level: morphology, syntax, semantics and pragmatics |
| 4 | To implement the applications based on Natural language Processing for semantic analysis. |
| 5 | To apply the knowledge of NLP to create the various language models. |
| 6 | To design the miniproject based on NLP techniques in a group of students. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------|------------|------------------------|--|--|-----------|--|
| PO6 PO7 | PSO2 | 6.1, 7.1, 7.2 | 6.1.1 7.1.1 7.2.1 | 2 Understan d 3 Apply | CO -1 | Identify societal, health and legal issues and apply practical knowledge within the chosen area of technology for project development. |
| PO8 PO1 1 | PSO1 | 8.2, 11.2, 11.3 | 8.2.2 11.2. 1 11.3. 1 | 2 Understan d 4 Analyze 6 Formulate | CO -2 | Identify, analyze and formulate problem within programming projects in a comprehensive and systematic approach. |
| PO5 | PSO1 | 5.1, 5.2 | 5.1.2 5.2.1 | 6 | CO -3 | Design and develop Engineering solutions to complex problem utilizing a systematic approach. |
| PO9 PO1 0 | | 9.3, 10.2, 10.3 | 9.3.1 10.2. 1 10.3. 1 | 5 Evaluate | CO -4 | Work effectively as an individual or in a team in development of technical projects. |
| PO1 0 PO1 2 | PSO1 , | 10.2, 10.3, 12.2 | 10.2. 1 10.3. 1 12.2. 1 | 5 | CO -5 | Communicate effectively with profession by presenting project related activities. |
| PO1 0 | | 10.2, 10.3 | 10.2. 1 10.3. 1 | 3 | CO -6 | Demonstrate knowledge, skills and attitude of a professional engineers and community at large. |

Course Objectives

| Sr. No. | Description |
|--------------------|--|
| 1 | To identify societal, health and legal issues and apply practical knowledge within the chosen area of technology for project development. |
| 2 | To identify, analyze and formulate problem within programming projects in a comprehensive and systematic approach. |
| 3 | To design and develop Engineering solutions to complex problem utilizing a systematic approach. |
| 4 | To work effectively as an individual or in a team in development of technical projects. |
| 5 | To communicate effectively with profession by presenting project related activities. |
| 6 | To demonstrate knowledge, skills and attitude of a professional engineers and community at large. |

Department: Electronics and Telecommunication Engineering

Semester-III

Scheme R-19

Subject- ENGINEERING MATHEMATICS-III

Subject Code-ECC 301

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1, | - | 1.1 | 1.1.2 | 5 | CO 1 | Apply the concept of Laplace transforms and use to solve real integrals in engineering problems |
| 2 | - | 2.1 | 2.1.2 | 3,4 | CO 2 | Identify the concept of inverse linear transform and compare to various functions and its applications |
| 3 | - | 3.1 | 3.1.6 | 3 | CO 3 | Determine and develop Fourier series for real life problems and applications. |
| 3 | - | 3.2 | 3.2.1 | 3 | CO 4 | Apply the properties of Complex analysis and select the application to orthogonal trajectories. |
| 1 | - | 1.1 | 1.1.3 | 3 | CO 5 | Use the concept of matrices to solve problems in machine learning, computer graphics and in Google page ranking |
| 12 | - | 12.1 | 12.1.1 | 3 | CO 6 | Solve gradient of spf, line integral , divergence and curl of vector and apply in Green's and Stoke's theorem. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To familiarize with the Laplace Transform and its properties. |
| 2 | To study Inverse Laplace Transform of various functions, theorems and its applications. |
| 3 | To acquaint with the concept of Fourier Series, its complex form and enhance the problem solving skills |
| 4 | To familiarize with the concept of complex variables, C-R equations with applications. |
| 5 | To study the application of concept of Eigen value and eigen vectors matrices |
| 6 | To study the application of Vectors in complex engineering problems. |

Subject-EDC**Subject Code-ECC302****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.3 | 1.3.1 | BL2 | CO1 | understand construction and working principle of all electronic devices |
| PO2 | PSO1 | 2.1 | 2.1.3 | BL3 | CO2 | Identify and apply various DC biasing technics for Bipolar junction transistor and Field effect transistor |
| PO3 | PSO2 | 3.2 | 3.2.2 | BL3 | CO3 | To built small signal model to analyse the performance parameter of Bipolar junction transistor and Field effect transistor |
| PO4 | PSO1 | 4.3 | 4.3.2 | BL4 | CO4 | Evaluate the working of small signal model of Bipolar junction transistor and Field effect transistor at various frequencies |
| PO2 | PSO1 | 2.4 | 2.4.4 | BL2 | CO5 | To understand the basic working of large signal amplifier |
| PO2 | PSO1 | 2.4 | 2.1.3 | BL2 | CO6 | To understand and apply the knowledge for designing of differential amplifiers |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To explain functionality different electronic devices. |
| 2 | To perform DC and AC analysis of small signal amplifier circuits. |
| 3 | To analyze frequency response of small signal amplifiers. |
| 4 | To understand working of small signal amplifiers. |
| 5 | To understand working of large signal amplifiers. |
| 6 | To explain working of differential amplifiers and it's applications in Operational Amplifiers |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | Understand different binary codes and apply engineering fundamentals for conversion from one no. system to another system. |
| PO2 | PSO1 | 2.1 | 2.1.3 | 2 | CO2 | Identify and solve the logic expressions by applying laws of Boolean algebra, and Demorgan's law to logic gates. |
| PO2 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | To design the various combinational circuits and implement them. |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | Design and interpretation of sequential circuits and logic circuit designs. |
| PO1 | PSO2 | 1.3 | 1.3.1 | 2 | CO5 | Understand and characterise different memories and PLDs |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | Design and debug simple digital circuits and systems with the aid of VHDL software tools. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of fundamentals digital electronics to understand different number systems and for conversion from one number system to another. |
| 2 | Ability to derive, analyze or minimize logic expressions & circuits by applying properties of Boolean laws and K map |
| 3 | Design and analyze combinational circuits like adders, MUX, encoders etc. |
| 4 | Develop a state diagram & simplify the given sequential logic. Use state machine diagram to design finite state |
| 5 | Analyze the combinational building blocks and memory elements, types of memory |
| 6 | Design, debug and verify simple digital circuits and systems with the aid of VHDL simulation tools |

Subject- Network Theory**Subject Code-ECC 304****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO2 | 1.4 | 1.4.1 | BL3 | CO1 | To apply the knowledge of basic electronics circuits to solve various engg problems |
| PO4 | PSO1 | 4.3 | 4.3.3 | BL5 | CO2 | Evaluate And analyze various basic network circuits using graphical representation |
| PO2 | PSO1 | 2.4 | 2.4.1 | BL4 | CO3 | To analyze time and frequency domain analysis of network circuits |
| PO3 | PSO1 | 3.4 | 3.4.2 | BL4 | CO4 | Analysis of NETWORKS through the application of various test inputs and generating information for improvisation in circuits |
| PO4 | PSO2 | 4.1 | 4.1.4 | BL5 | CO5 | To examine the network topologies and establish relationship between measured data |
| PO1 | PSO1 | 1.1 | 1.1.2 | BL2 | CO6 | To understand and apply advanced mathematical techniques for network synthesis |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basics of circuits theorems for solving complex engineering problems |
| 2 | To learn graphical methods of evaluation of basic network circuits |
| 3 | To analyze circuits in time and frequency domains |
| 4 | To study network topologies fucntions two port networks, ladder etc. |
| 5 | To analyze two port networks and relationship between them |
| 6 | To synthesize and apply basic electrical circuits |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-------------|------------|-------------------|-----------|-----------------------|-----------|--|
| 1,2, 3 | 1 | 1.4 | 1.4.1 | L2- Under stand | CO1 | Apply the knowledge of engineering fundamentals for measurement of electronics components and Instrument |
| 4,5, 6, | 2 | 2.1 | 2.1.2 | L3 Apply | CO2 | Understand the principle of working of various transducer used to measure temperature, displacement, level, pressure and their application in industry displacement, level, pressure and their application in industry |
| 1,2 | 1 | 2.1 | 2.1.3 | L2- Under stand | CO3 | Apply, the knowledge of Engineering Fundamentals to determine the models of physical systems in forms suitable for use in the analysis and design of control systems. |
| 3,4 | 1 | 2.2 | 2.2.4 | L3- Apply | CO4 | Apply the knowledge of Engineering Fundamentals to find transfer functions for given system |
| 4,6, 7 | 2 | 3.2 | 3.2.3 | L4- Analyze | CO5 | Analyze and design a system and calculate its time domain and frequency domain parameter and understand its impact for development and understand its impact for development |
| 9,10 ,11 | 2 | 4.3 | 4.3.3 | L5- Evaluate | CO6 | To effectively apply appropriate techniques to predict stability of given system using appropriate criteria and engage in learning process |

Course outcomes

| Sr. No. | Description |
|----------------|--|
| 1 | To Identify various sensors, transducers and their brief performance specification |
| 2 | To Understand the principle of working of various transducer used to measure temperature, displacement, level, pressure . |
| 3 | To Determine the models of physical systems in forms suitable for use in the analysis and design of control systems. |
| 4 | To find transfer functions for given system |
| 5 | To Understand the analysis of systems in time domain and frequency domain.response |
| 6 | To develop concepts of stability and its assessment criteria. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | Understand different binary codes and apply engineering fundamentals for conversion from one no. system to another system. |
| PO2 | PSO1 | 2.1 | 2.1.3 | 2 | CO2 | Identify and solve the logic expressions by applying laws of Boolean algebra, and Demorgan's law to logic gates. |
| PO2 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | To design the various combinational circuits and implement them. |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | Design and interpretation of sequential circuits and logic circuit designs. |
| PO1 | PSO2 | 1.3 | 1.3.1 | 2 | CO5 | Understand and characterise different memories and PLDs |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | Design and debug simple digital circuits and systems with the aid of VHDL software tools. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of basic principles of digital circuits and different systems, basic gates and various engineering applications involving digital electronics and circuits |
| 2 | Understand and analyze the logic expressions (POS &SOP) and circuits using boolean laws, K- maps, De- morgan's laws and their applications in digital design. |
| 3 | Construct basic combinational circuits like Adders,/ Subtractors/ MUX/ DEMUX/ Encoders/ PLA / ROM etc |
| 4 | Construct basic combinational circuits like FFs and their conversion. |
| 5 | Ability to understand the different shift registers and ability to design various counter circuits. |
| 6 | Ability to understand the different shift registers and ability to design various counter circuits. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|--------------|----------------------|-----------|--|
| 1 | 2 | 1.1 | 1.1.1 | 5 | 1 | Plot and validate the performance characteristics of transducers. |
| 2 | 2 | 2.1 | 2.1.2 | 4 | 2 | Validate the characteristics of various temperature, pressure and level transducers. |
| 2 | 2 | 2.2 | 2.2.2 | 4 | 3 | Plot frequency response of first-order electrical system |
| 4 | 2 | 4.2 | 4.2.1 | 5 | 4 | Plot time response of second-order electrical system and calculate the steady-state error. . |
| 5 | 2 | 5.1 | 5.1.1 | 2 | 5 | Validate the effect of damping factor on the response of second order system. |
| 5 | 2 | 5.3 | 5.3.2 | 2 | 6 | Inspect the frequency response specifications of systems by using bode-plot, Polar plot, Nyquist-plot techniques, and comment on the stability of system |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To make students understand the construction and the working principle of various transducers used for Displacement measurement, Temperature measurement and Level measurement. |
| 2 | To examine steady-state and frequency response of the diff Types |
| 3 | To examine steady-state and frequency response of the Type 0, 1, and 2 systems. |
| 4 | To examine steady-state and frequency response of first and second order electrical systems. |
| 5 | To inspect stability analysis of system using Root locus, Bode plot, polar plot and Nyquist plot. |
| 6 | To study basic electronic components |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.1 | 1.3.1 | BL1 | CO1 | To learn fundamentals of OOPs Programming |
| PO2 | PSO2 | 2.1 | 2.1.3 | BL2 | CO2 | To understand OOPs concept for effective programming |
| PO3 | PSO2 | 3.4 | 3.4.1 | BL6 | CO3 | To design and apply concepts of OOPs programming |
| PO4 | PSO1 | 4.2 | 4.2.1 | BL6 | CO4 | To develop programming applications using OOPs language |
| PO5 | PSO2 | 5.2 | 5.2.1 | BL4 | CO5 | To analyze strengths of OOPs programming in perceptability and applicability of OOPs |
| PO6 | PSO1 | 12.2 | 12.2.2 | BL6 | CO6 | To create a step for new upcoming programming paradigms |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand the basics of Object oriented programming |
| 2 | To study and apply OOPs concepts in programming |
| 3 | To apply the concepts of OOPs in problem solving |
| 4 | To understand fundamentals of JAVA programming |
| 5 | To analyze the strength of OOPs programming |
| 6 | To set a foundation for advanced programming |

Semester-IV

Subject- Engineering Mathematics IV

Subject Code-ECC 401

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,2, 4 | - | 2.2 | 2.2.1 | 5 | CO 1 | Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. |
| 1,2, 3,12 | - | 3.1 | 3.1.6 | 3 | CO 2 | Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. |
| 1,2, 4,12 | - | 4.2 | 4.2.2 | 4 | CO 3 | Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. |
| 1,2 | - | 1.1 | 1.1.3 | 3 | CO 4 | Use the concept of matrices to solve problems in machine learning, computer graphics and in Google page ranking |
| 1,2, 3,12 | - | 3.3 | 3.3.1 | 3 | CO 5 | Apply the concept of Quadratic forms and Singular value decomposition which are very useful tools in various Engineering applications |
| 1,2, 3,4 | - | 2.4 | 2,4.1 | 2 | CO 6 | Find the extremals of the functional using the concept of Calculus of variation. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To study Line and Contour integrals and expansion of complex valued function in a power series |
| 2 | To familiarize with the concepts of statistics for data analysis |
| 3 | To acquaint with the concepts of probability, random variables with their distributions and expectations |
| 4 | To familiarize with the concepts of probability distributions. |
| 5 | To understand the concepts of Quadratic forms and Singular value decomposition. |
| 6 | To understand the concepts of Calculus of Variations. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------------------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO1 | 2.1 | 2.1.1 | BL2 | CO1 | Describe memory systems with design and analysis of mapping technics for catche and virtual memory |
| PO4 | PSO1 | 4.1 | 4.1.3 | BL2 | Co2 | Understand Architecture Also Classify/Illustrate different types of algorithm for microcontroller and it's application. |
| PO5, PO3, PO6, PO1 2 | PSO2 | 3.4 | 3.4.1 | BL3 | CO3 | Use/Apply the knowledge to interface various peripheral devices with microcontroller. |
| PO2 | PSO1 | 2.1 | 2.1.2 | BL2 | CO4 | Understand and describe detailed architecture of ARM 7. |
| PO4 | PSO1 | 4.2 | 4.2.1 | BL2 | CO5 | Classify/Illustrate different types of algorithm for ARM 7. |
| PO3 | PSO2 | 3.4 | 3.4.1 | BL6 | CO6 | Develope programmes in ARM 7 using embedded C. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To Describe memory systems with design and analysis of mapping technics for catche and virtual memory |
| 2 | To Classify/Illustrate different types of algorithm for microcontroller and it's application. |
| 3 | To Apply the knowledge to interface various peripheral devices with microcontroller. |
| 4 | To understand and describe detailed architecture of ARM 7. |
| 5 | To classify/Illustrate different types of algorithm for ARM 7. |
| 6 | To develop programmes in ARM 7 using embedded C. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|------------|----------------------|-----------|---|
| 1 | 1 | 1.6.1 | 1.6 | 3 | 1 | Apply the knowledge of Engineering fundamentals to design simple circuits using OP-AMP |
| 2 | 1 | 2.5.1 | 2.1 | 6 | 2 | Identify, formulate and analyze complex engineering problems reaching substantiated conclusions using the oscillators and active filters circuits |
| 3 | 1 | 3.5.1 | 3.5 | 6 | 3 | Design an electronic system or process like various Comparators, waveform generator and Precision rectifier to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations. |
| 3 | 1 | 3.7.2 | 3.7 | 2 | 4 | Explain and compare the working of multivibrators using special application IC 555 and general purpose opamp. |
| 5 | 1 | 5.4.2 | 5.4 | 6 | 5 | Create, select and apply appropriate techniques, resources, advanced engineering tools necessary to analyze and design telecommunication engineering problems like waveform generators, timers and voltage regulators |
| 5 | 1 | 5.5.1 | 5.5 | 2 | 6 | Illustrate the function of application specific ICs such as VCO, PLL and its application in communication. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basic building blocks of linear integrated circuits |
| 2 | To perform analysis of circuits like oscillators, Filters based on linear integrated circuits. |
| 3 | To introduce the concepts of waveform generation, comparators, precision rectifier for particular applications using linear integrated circuits. |
| 4 | To introduce some special function ICs |
| 5 | To understand and implement the working of different circuits using OP-AMP |
| 6 | To introduce the theory and applications of PLL |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | L2 | CO1 | Understand the concept & types of signals, classification of signals. |
| PO2 | 1 | 2.5 | 2.5.3 | L4 | CO2 | Analysis of signals& systems, classification of systems with examples. |
| PO2 | 1 | 2.8 | 2.8.1 | L3 | CO3 | Illustrate the time domain analysis of continuous & discrete time system |
| PO2 | 1 | 2.8 | 2.8.1 | L3 | CO4 | Apply the knowledge of frequency domain analysis of continuous & discrete time system |
| PO3 | 1 | 3.6 | 3.6.3 | L4 | CO5 | Analyze the discrete time LTI system using Z transform |
| PO1 | 1 | 1.7 | 1.7.1 | L2 L3 | CO6 | Understand & solve the concept of state, state variables & application of signals& system |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the concept & theory of signals and systems in engineering field |
| 2 | Classification & analysis of signals& systems |
| 3 | Apply the knowledge of time domain analysis of continuous & discrete time system |
| 4 | Apply the knowledge of frequency domain analysis of continuous & discrete time system |
| 5 | Use of transform in analysis of system |
| 6 | Apply the concept of state,state variables & application of signals& system |

Course Outcomes

| PO | PS O | Competency | PI | Bloom's Level | CO | Description |
|-----------|-------------|-------------------|-----------|----------------------|-----------|---|
| 1,5 | 1 | 1.3 | 1.3.1 | L2-Understand | CO1 | Understand the basic components and types of noises in communication Engineering system |
| 2,4, 6 | 1 | 2.4 | 2.4.4 | L3-Apply | CO2 | Analyze the concepts of amplitude modulation for basic communication problems to meet environment and societal considerations |
| 3,5, 6 | 1 | 2.4 | 2.4.4 | L3-Apply | CO3 | Analyze the concepts of angle modulation in telecommunication system to meet specified needs of society and environment |
| 4,7, 8 | 2 | 2.2 | 2.2.4 | L4-Analyze | CO4 | Compare the performance of AM and FM receivers for analog communication system with attention to health,safety and legal issues and accountability in engineering profession |
| 12 | 2 | 3.2 | 3.2.3 | L4-Analyze | CO5 | Describe analog and digital pulse modulation techniques in adaptation to the changing world of technology |
| 9,10 ,11, | 2 | 3.3 | 3.3.1 | L4-Analyze | CO6 | Illustrate the principles of multiplexing techniques and design an electronic system to communicate effectively by working in a team ,managing finance and engaging in life long learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To illustrate the fundamentals of basic communication system. |
| 2 | To understand various analog modulation and demodulation techniques. |
| 3 | To Investigate and analyze transmitter and receiver circuits |
| 4 | To focus on applications of analog modulation and demodulation techniques. |
| 5 | To explain the key concepts of analog and digital pulse modulation and demodulation techniques. |
| 6 | To Illustrate the principles of multiplexing and demultiplexing techniques. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------------|------------|--------------------|------------------------------|----------------------|-----------|---|
| PO2 PO6 | | 2.1 6.3 | 2.5.1 6.3.1 | 1 | 1 | Identify problems based on societal /research needs. |
| PO1 PO5 | | 1.6 5.4 | 1.6.1 5.4.1 | 3 | 2 | Apply Knowledge of Arduino board using the IDE for utilizing the onboard resources to solve societal /technical problem |
| PO4 PO5 | | 4.4 5.4 | 4.4.1 5.4.1 | 4 | 3 | outline the proper inferences from available results through theoretical / experimental/simulations. |
| PO10 | | 10.4 | 10.4. 1 | 3 | 4 | Demonstrate an ability to comprehend technical literature and document project work |
| PO6 | | 6.3 | 6.3.1 | 3 | 5 | Demonstrate project management principles during project work |
| PO5 PO9 PO10 | PSO1 | 5.4 9.1 10.1 | 5.4.1 9.1.1 10.1. 3 | 6 | 6 | Design Arduino based and raspberry Pi mini project and Develop interpersonal skills to work as member of a group or leader. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To acquaint with the process of identifying the needs and converting it into the problem. |
| 2 | To familiarize and use of Arduino board using the IDE for utilizing the onboard resources to solve societal /technical problem |
| 3 | To acquaint with the process of applying basic engineering fundamentals to attempt solutions to the problems. |
| 4 | Students will able to present their project work |
| 5 | To inculcate the process of self-learning and research |
| 6 | Identify the appropriate integrated circuits,Arduino board and raspberry Pi board for designing engineering application in group |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------------------------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.1.1 | BL2 | CO1 | Understand and describe detailed architecture of 8051 Microcontroller. |
| PO4 | PSO1 | 4.1 | 4.1.3 | BL2 | CO2 | Use of different algorithm for microcontroller . |
| PO5, PO3, PO6, PO1 2 | PSO2 | 3.4 | 3.4.1 | BL3 | CO3 | To interface various peripheral devices with microcontroller. |
| PO2 | PSO1 | 2.1 | 2.1.2 | BL2 | CO4 | Use of different algorithm for ARM 7. |
| PO4 | PSO1 | 4.2 | 4.2.1 | BL2 | CO5 | Classify/Illustrate different types of algorithm for ARM 7. |
| PO3 | PSO2 | 3.4 | 3.4.1 | BL6 | CO6 | Develope programmes in ARM 7 using embedded C. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand and describe detailed architecture of 8051 Microcontroller. |
| 2 | To Classify/Illustrate different types of algorithm for microcontroller and it's application. |
| 3 | To Apply the knowledge to interface various peripheral devices with microcontroller. |
| 4 | To understand and describe detailed architecture of ARM 7. |
| 5 | To classify/Illustrate different types of algorithm for ARM 7. |
| 6 | To develop programmes in ARM 7 using embedded C. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|--------------|----------------------|-----------|--|
| 1 | 1 | 1.1 | 1.1.1 | 3 | 1 | Apply the knowledge to do simple mathematical operations |
| 2 | 1 | 2.1 | 2.1.3 | 3 | 2 | Calculate the frequency of Oscillator using OP-AMP |
| 3 | 1 | 3.3 | 3.3.1 | 5 | 3 | Evaluate different electronic systems like various Comparators, waveform generator and Precision rectifier to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations. |
| 3 | 1 | 3.4 | 3.4.1 | 6 | 4 | Construct multivibrators using special application IC 555 and general purpose opamp. |
| 5 | 1 | 5.1 | 5.5.2 | 6 | 5 | Develop voltage regulator ICs to design simple applications. |
| 5 | 1 | 5.3 | 5.3.2 | 2 | 6 | Understand the differences between theoretical, practical and simulated results in integrated circuits and construct mini project |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To revise the basic building blocks of linear integrated circuits |
| 2 | To perform operation of circuits like oscillators, Filters based on linear integrated circuits. |
| 3 | To design the waveform generation , comparators, precision rectifier for particular applications using linear integrated circuits. |
| 4 | To introduce some special function Ics |
| 5 | To understand and implement the working of different circuits using OP-AMP |
| 6 | Design mini project based on linear integrated circuits. |

Course Outcomes

| PO | PS O | Compet ency | PI | Bloom's Level | CO | Description |
|-------------|-------------|--------------------|-----------|----------------------|-----------|---|
| 1 | 1 | 1.3 | 1.3.1 | L2-Understand | C01 | Understand and analyze analog modulation and demodulation techniques to solve Engineering Problems |
| 2,4, 7 | 1 | 2.1 | 2.1.3 | L3-Apply | C02 | Identify and solve basic communication problems to meet environment and societal considerations |
| 3,5, 6 | 1 | 2.4 | 2.4.4 | L4-Analyze | C03 | Analyze the waveforms of Radio receivers to meet specified needs of society and environment |
| 4,7, 8 | 2 | 2.4 | 2.4.4 | L3-Apply | C04 | Implement analog pulse modulation and demodulation circuits in attention to health,safety and accountability in engineering profession |
| 12 | 2 | 3.2 | 3.2.3 | L4-Analyze | C05 | To Demonstrate digital pulse modulation and demodulation techniques. in adaptation to the changing world of technology |
| 9,10 ,11 | 2 | 3.3 | 3.3.1 | L4-Analyze | C06 | To Verify the concepts of multiplexing and design an electronic system to communicate effectively by working in a team ,managing finance and engaging in life long learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To give an understanding of Time and Frequency domain representation of signals |
| 2 | To demonstrate continuous wave modulation and demodulation. To demonstrate continuous wave modulation and demodulation. |
| 3 | To Investigate and analyze transmitter and receiver circuits |
| 4 | To demonstrate analog and digital pulse communication. |
| 5 | To verify concepts of Multiplexing and to design an electronic system to communicate effectively |
| 6 | To use simulation software to build communication circuits. |

Subject- Skill Lab Python Programming**Subject Code-ECL404****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.1 | 1.3.1 | BL2 | CO1 | To understand syntax and semantics of python programming |
| PO4 | PSO2 | 4.2 | 4.2.2 | BL3 | CO2 | To demonstrate file handling operations in python |
| PO2 | PSO2 | 2.2 | 2.4.2 | BL3 | CO3 | To use Object oriented programming in python programming |
| PO4 | PSO1 | 4.3 | 4.3.3 | BL6 | CO4 | To create and apply GUI based applications using python |
| PO5 | PSO2 | 5.2 | 5.2.2 | BL3 | CO5 | To implement database operations using python |
| PO4 | PSO2 | 4.2 | 4.2.1 | BL6 | CO6 | To design and develop machine learning applications using python |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To learn core programming aspects of python. |
| 2 | To illustrate various file handling operations using python |
| 3 | To interpret OOPs programming with python programming |
| 4 | To apply GUI applications using python |
| 5 | To design and apply database operations using python |
| 6 | To apply machine learning applications using python programming |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 2 | | 1.4 | 1.4.1 | Level 3 | 1 | Apply the concepts of information theory in source coding |
| 3 | | 2.2 | 2.2.4 | Level 5 | 2 | Compare different error control systems and apply various error detection codes |
| 2,3 | | 1.4 | 1.4.1 | Level 4 | 3 | Analyze different error correction codes |
| 4 | | 2.2 | 2.2.4 | Level 5 | 4 | Compare various baseband transmission methods for digital signals |
| 3 | | 1.4 | 1.4.1 | Level 5 | 5 | Evaluate the performance of optimum baseband detection in the presence of white noise. |
| 3 | | 2.2 | 2.2.4 | Level 5 | 6 | Compare the performance of different digital modulation techniques. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply the concepts of information theory in source coding |
| 2 | To compare different error control systems and apply various error detection codes |
| 3 | To analyze different error correction codes |
| 4 | To compare various baseband transmission methods for digital signals |
| 5 | To evaluate the performance of optimum baseband detection in the presence of white noise. |
| 6 | To compare the performance of different digital modulation techniques. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,2 | | 1.1 | 1.1.2 | Level 3 | 1 | Use concepts of trigonometry, complex algebra, Fourier transform, z-transform to analyze the operations on signals and acquire knowledge about Systems |
| 4 | | 1.4 | 1.4.1 | Level 4 | 2 | Select proper tools for analog-to-digital and digital-to-analog conversion. Also select proper tools for time domain and frequency domain implementation. |
| 1,2 | | 2.1 | 2.1.3 | Level 5 | 3 | Design, implementation, analysis and comparison of digital filters for processing of discrete time signals |
| 2 | | 1.4 | 1.4.1 | Level 2 | 4 | Understand the concept of multirate signal processing. |
| 5,6 | | 3.2 | 3.2.1 | Level 4 | 5 | Illustrate signal processing strategies at multidisciplinary team activities. |
| 5 | | 4.2 | 4.2.2 | Level 6 | 6 | Integrate computer-based tools for engineering applications |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To use concepts of trigonometry, complex algebra, Fourier transform, z-transform to analyze the operations on signals and acquire knowledge about Systems |
| 2 | To select proper tools for analog-to-digital and digital-to-analog conversion. Also select proper tools for time domain and frequency domain implementation. |
| 3 | To design, implementation, analysis and comparison of digital filters for processing of discrete time signals |
| 4 | To understand the concept of multirate signal processing. |
| 5 | To Illustrate signal processing strategies at multidisciplinary team activities. |
| 6 | To integrate computer-based tools for engineering applications |

Subject-DVLSI**Subject Code-ECC 503****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.7 | 1.7.1 | 1 | CO1 | Demonstrate a clear understanding of choice of technology, Explain the process of fabrication and list down the MLD rules and draw the MLD |
| PO2 | 1 | 2.6 | 2.6.1 | 2 | CO2 | List different parameters, Concept of static and dynamic analysis, compare different types of Inverters. |
| PO3 | 1 | 2.8 | 2.8.2 | 2 | CO3 | Explain different design styles used in digital design like PTL, Transmission gates etc. Implement concept of sizing. Implementation of various circuits using different design styles. |
| PO4 | 1 | 5.5 | 5.5.1 | 3 | CO4 | Explain different memory structures; explain working of memory units, its modes of operation and its peripheral circuitry. |
| PO5 | 1 | 4.4 | 4.4.3 | 6 | CO5 | Explain different types of adder circuits, Compare it's performance. Explain multiplier circuits and allied circuitry. |
| PO6 | 1 | 5.6 | 5.6.1 | 1 | CO6 | Understand importance of Low power design and implement protection circuitry, Explain Interconnect model and scaling. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To impart the knowledge about VLSI design trends, methodologies and allied systems used in digital design. |
| 2 | To introduce fabrication process flow of VLSI Design. |
| 3 | To understand MOSFET operation from VLSI design perspective. |
| 4 | To learn VLSI design performance metric and various tradeoffs. |
| 5 | To design, implement and verify combinational and sequential logic circuits using various MOS design styles. |
| 6 | To provides an exposure to RTL design and programming |

Subject- RSA**Subject Code-ECC 504****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | To understand how random signal theory is applicable in communication field, Familiarization with probability, BAYE'S Theorem and conditional probability |
| PO2 | PSO2 | 2.1 | 2.1.3 | 2 | CO2 | Development of the mathematical skills to analyze random variables, density function, distribution function etc. |
| PO3 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | To Study the use of Characteristic Function of Random variable to obtain the Moments of Random Variable. |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | Study Joint density and distribution function, concept of correlation and covariance for pair of Random variables |
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO5 | Describe the concept of random process which is essential for random signals and systems encountered in communication and statistical learning, study of Markov Processes with suitable Examples. |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | Study concepts of linear regression algorithms and apply for predictive applications . |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Study, axiomatic definition of probability, Communication Engineering Application of BAYE'S Theorem, Total probability theorem and conditional probability |
| 2 | Deal with the random variables, probability distribution function, probability mass function of Discrete Random variables (Binomial, Poisson RVs), continuous Random variables (Uniform and Gaussian). |
| 3 | To Study the use of mean, variance, characteristic Function of Random variable to obtain the Moments of Random Variable, Markov inequality and Chebyshev inequality |
| 4 | Study and the concept of correlation and covariance for pair of Random variables, understand importance of central limit theorem with suitable Applications. |
| 5 | Understand the definition of SSS and WSS random process, study of Markov Processes with suitable Examples and Ergodic random process |
| 6 | Study concepts of linear regression algorithms and apply for predictive applications . |

Subject- DCC**Subject Code-ECCDLO 5012****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------------|------------|-------------------|-----------|----------------------|-----------|--|
| 1,2, 5 | 1 | 1.4 | 1.4. 1 | L2- Understand | CO1 | Apply and select various compression techniques for text and understand image compression and its standards for Telecommunication engineering purpose |
| 3,4 | 1 | 2.1 | 2.1. 3 | L3-Apply | CO2 | Select and investigate suitable compression techniques for specified lossless and lossy audio and video applications and find solutions to meet specified needs |
| 6,7, 8 | 2 | 2.2 | 2.2. 4 | L4- Analyze | CO3 | Compare between symmetric and asymmetric cryptography and also describe different symmetric cryptographic techniques and standards relevant to engineering development . |
| 5 | 1 | 1.1 | 1.1. 2 | L3-Apply | CO4 | Apply number theory concepts to solve the cryptographic problems. |
| 6,7 | 2 | 4.3 | 4.3. 2 | L4- Analyze | CO5 | Analyze different public key cryptography algorithms and also describe and understand methods that provide the goals for integrity, confidentiality and authentication. |
| ,910 ,11, 12 | 2 | 8.1 | 8.1. 1 | L5- Evaluate | CO6 | Describe and assess system security facilities and appreciate ethical issues and work effectively to incorporate educational needs related to system security |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Gain a fundamental understanding of data compression methods for text, images, video and audio |
| 2 | To Select suitable compression techniques for specified lossless and lossy audio and video applications |
| 3 | To Compare between symmetric and asymmetric cryptography |
| 4 | To Apply number theory concepts to solve the cryptographic problems. |
| 5 | To Understand the concepts of cryptography and different algorithms to provide system security. |
| 6 | Describe system security facilities designed to protect a computer system from security threats and also appreciate ethical issues related to system security. |

Semester-V**Subject- DCOM Lab****Subject Code-ECL 501****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 5 | | 1.3 | 1.3.1 | Level 4 | 1 | Compare various source coding schemes. |
| 1,5 | | 1.4 | 1.4.1 | Level 5 | 2 | Design and implement different error detection codes. |
| 2,5 | | 1.3 | 1.3.1 | Level 4 | 3 | Compare various line coding techniques. |
| 5 | | 2.1 | 2.1.2 | Level 2 | 4 | Illustrate the impulse response of a matched filter for optimum detection. |
| 5 | | 2.4 | 2.4.1 | Level 2 | 5 | Demonstrate various digital modulation techniques. |
| 4,5 | | 4.1 | 4.1.3 | Level 3 | 6 | Use different simulation tools for digital communication applications. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To compare various source coding schemes. |
| 2 | To design and implement different error detection codes. |
| 3 | To compare various line coding techniques. |
| 4 | To illustrate the impulse response of a matched filter for optimum detection. |
| 5 | To demonstrate various digital modulation techniques. |
| 6 | To use different simulation tools for digital communication applications. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | | 1.4 | 1.4.1 | Level 4 | 1 | Illustrate basic discrete time signal processing operations. |
| 2 | | 4.1 | 4.1.3 | Level 4 | 2 | Illustrate Linear convolution, circular convolution , autucorrelation and interpret the results |
| 2,3 | | 5.1 | 5.1.1 | Level 2 | 3 | Demonstrate frequency analysis of different discrete time sequences and systems |
| 2 | | 4.1 | 4.1.3 | Level 2 | 4 | Demonstrate difference between DFT and DTFT |
| 5 | | 4.2 | 4.2.1 | Level 6 | 5 | Design and implement FIR and IIR filters for given specifications |
| 3,4 | | 5.1 | 5.1.1 | Level 6 | 6 | Implement and analyze applications related to the field of biomedical signal processing and audio signal processing. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To carryout basic discrete time signal processing operations. |
| 2 | To perform Linear convolution, circular convolution , autucorrelation and interpret the results |
| 3 | To demonstrate frequency analysis of different discrete time sequences and systems |
| 4 | To demonstrate difference between DFT and DTFT |
| 5 | To design and implement FIR and IIR filters for given specifications |
| 6 | To implement and analyze applications related to the field of biomedical signal processing and audio signal processing. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | | 1.4 | 1.4.1 | Level 4 | 1 | Illustrate basic discrete time signal processing operations. |
| 2 | | 4.1 | 4.1.3 | Level 4 | 2 | Illustrate Linear convolution, circular convolution , autucorrelation and interpret the results |
| 2,3 | | 5.1 | 5.1.1 | Level 2 | 3 | Demonstrate frequency analysis of different discrete time sequences and systems |
| 2 | | 4.1 | 4.1.3 | Level 2 | 4 | Demonstrate difference between DFT and DTFT |
| 5 | | 4.2 | 4.2.1 | Level 6 | 5 | Design and implement FIR and IIR filters for given specifications |
| 3,4 | | 5.1 | 5.1.1 | Level 6 | 6 | Implement and analyze applications related to the field of biomedical signal processing and audio signal processing. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To carryout basic discrete time signal processing operations. |
| 2 | To perform Linear convolution, circular convolution , autucorrelation and interpret the results |
| 3 | To demonstrate frequency analysis of different discrete time sequences and systems |
| 4 | To demonstrate difference between DFT and DTFT |
| 5 | To design and implement FIR and IIR filters for given specifications |
| 6 | To implement and analyze applications related to the field of biomedical signal processing and audio signal processing. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | 1 | 1.7 | 1.7.1 | 1 | CO1 | Describe the spice code for given combinational and sequential CMOS circuits. |
| PO2 | 1 | 2.6 | 2.6.3 | 2 | CO2 | Apply various analysis like operating point, dc, transient etc of given CMOS circuits. |
| PO3 | 1 | 3.8 | 3.8.3 | 2 | CO3 | Explain the performance of given CMOS circuits. |
| PO4 | 1 | 4.6 | 4.6.1 | 3 | CO4 | Diagram the layout of given CMOS circuit and also able extract various parasitic using open source layout tool like Magic. |
| PO5 | 1 | 4.4 | 4.4.3 | 6 | CO5 | Design, simulate, and verify CMOS circuit for given specifications. |
| PO6 | 1 | 5.6 | 5.6.2 | 1 | CO6 | Understand importance of Low power design and implement protection circuitry, Explain Interconnect model and scaling. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To impart the knowledge about VLSI design trends, methodologies and allied systems used in digital design. |
| 2 | To become familiar with open source circuit simulation tools like Ngspice, Magic etc. |
| 3 | To perform various type of analysis of combinational and sequential CMOS circuits |
| 4 | To evaluate performance of given combinational and sequential CMOS circuits |
| 5 | To design, implement and verify combinational and sequential CMOS circuits using open source VLSI design tools |
| 6 | To provides an exposure to RTL design and programming |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 4 | 1 | 4.5 | 4.5.1 | 6 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 5 | 2 | 5.5. | 5.5.1 | 6 | 2 | Develop writing skills of a cover letter and a CV/resume/SOP |
| 5 | 2 | 55 | 5.5.1 | 6 | 3 | Develop interpersonal skills to progress professionally by building strong relationships with peers |
| 5 | 2 | 5.5 | 5.5.1 | 6 | 4 | Develop effective presentation skills and an impressive body language |
| 1 | 2 | 1.5 | 1.5.1 | 3 | 5 | Apply codes of personal integrity, values, aptitudes and skills |
| 6 | 1 | 6.1 | 6.1.1 | 2 | 6 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To discern and develop an effective style of writing important technical/business documents. |
| 2 | To investigate possible resources and plan a successful job campaign. |
| 3 | To understand the dynamics of professional communication in the form of group discussions, meetings etc. required for career enhancement. |
| 4 | To develop creative and impactful presentation skills. |
| 5 | To analyze personal traits, interests, values, aptitudes and skills. |
| 6 | To understand the importance of integrity and develop a personal code of ethics. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.5 | 1.5.2 | 2 | CO1 | Understand the embedded systems with design metrics. |
| PO2 | 1 | 2.6 | 2.6.2 | 2 | CO2 | Understand microcontrollers and programming in Embedded C. |
| PO3 | 1 | 3.5 | 3.5.2 | 3 | CO3 | Implementation of Embedded systems with different sensors and peripherals as IoT. |
| PO4 | 1 | 4.4 | 4.4.2 | 3 | CO4 | Implementation of Embedded systems with different communication protocols as IoT. |
| PO5 | 1 | 3.8 | 3.8.2 | 4 | CO5 | Analyze concepts of Real time operating systems. |
| PO6 | 1 | 5.4 | 5.4.2 | 6 | CO6 | Design embedded system applications using sensors, peripherals and RTOS |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To develop background knowledge Embedded Systems. |
| 2 | To understand designing of embedded systems. |
| 3 | To choose proper microcontroller for Embedded systems |
| 4 | To understand use of wireless sensors/communications with Embedded systems |
| 5 | To understand communication techniques. |
| 6 | To write programs for embedded systems and real time operating systems /IoT |

**Semester-III
Scheme (R-16)**

Subject- Applied Mathematics -III

Subject Code- ECC 301

Course Outcomes

| P O | PS O | Compete ncty | PI | Bloom 's Level | CO | Description |
|----------------|-----------------|-------------------------|------------|-------------------------------|-----------|--|
| 1, | - | 1.1 | 1.1. 2 | 5 | CO 1 | Apply the concept of Laplace transforms and use to solve real integrals in engineering problems |
| 2 | - | 2.1 | 2.1. 2 | 3,4 | CO 2 | Identify the concept of inverse linear transform and compare to various functions and its applications |
| 3 | - | 3.1 | 3.1. 6 | 3 | CO 3 | Determine and develop Fourier series for real life problems and applications. |
| 2, 3 | - | 3.2 | 3.2. 1 | 3 | CO 4 | Solve gradient of spf, line integral , divergence and curl of vector |
| 12 | - | 12.1 | 12.1 .1 | 3 | CO 5 | Apply the concept of vector differentiation in Green's Stoke's and divergence theorem. |
| 3 | - | 3.2 | 3.2. 1 | 3 | CO 6 | Apply the properties of Complex analysis and Bessel function to model the problems of the electronics and telecommunication engineering and solve it |

Course Objectives

| Sr. No. | Description |
|--------------------|---|
| 1 | To familiarize with the Laplace Transform and its properties. |
| 2 | To study Inverse Laplace Transform of various functions, theorems and its applications. |
| 3 | To acquaint with the concept of Fourier Series, its complex form and enhance the problem solving skills |
| 4 | To study the application of Vectors in complex engineering problems. |
| 5 | To study the application of concept of Divergence and curl. |
| 6 | To familiarize with the concept of complex variables, C-R equations with applications and Bessel function. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | C O | Description |
|-----------|------------|-------------------|-----------|----------------------|------------|--|
| PO 1 | PSO 1 | 1.2 | 1.2. 1 | L3 | 1 A | Apply the current voltage characteristics of semiconductor devices |
| PO 2 | PSO 1 | 2.2 | 2.2. 4 | L4 | 1 B | Analyze dc circuits and relate ac models of semiconductor devices. |
| PO 1 | PSO 1 | 1.3 | 1.3. 1 | L2 | 2 A | Understand the concepts for Regulators and Amplifiers. |
| PO 3 | PSO 1 | 3.2 | 3.2. 2 | L3 | 2 B | Apply the concepts for the design of Regulators and Amplifiers. |
| PO 1 | PSO 1 | 2.2 | 2.2. 2 | L1 | 3 A | Identify different transistor biasing techniques |
| PO 3 | PSO 2 | 3.2 | 3.2. 1 | L4, L6 | 3 B | Analyse and design transistor biasing techniques |
| PO 2 | PSO 2 | 2.2 | 2.2. 3 | L4 | 4 | Analyze transistor modelling and small signal analysis of amplifier. |
| PO 2 | PSO 1 | 2.2 | 2.2. 2 | L5 | 5 | Evaluate frequency response to understand behaviour of Electronics circuits. |
| PO 3 | PSO 2 | 3.2 | 3.2. 2 | L6 | 6 | Design small signal amplifiers. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To describes operation, DC analysis and AC models of semiconductor devices. |
| 2 | To study the concepts for the design of Regulators and Amplifiers. |
| 3 | To Understand transistor biasing techniques and designing. |
| 4 | Use transistor modeling and small signal analysis of amplifier. |
| 5 | Analyze high frequency response for BJT and FET amplifiers. |
| 6 | Implement mini projects based on concept of electronics circuit concepts. |

Course Outcomes

| PO | PS O | Competency | PI | Bloom's Level | CO | Description |
|-----------|-------------|-------------------|-----------|----------------------|-----------|--|
| P O1 | PS O1 | 1.3 | 1.3. 1 | 2 | CO1 | Understand different binary codes and apply engineering fundamentals for conversion from one no. system to another system. |
| P O2 | PS O1 | 2.1 | 2.1. 3 | 2 | CO2 | Identify and solve the logic expressions by applying law of Boolean algebra, and Demorgan's law to logic gates. |
| P O2 | PS O2 | 3.2 | 3.2. 3 | 3 | CO3 | To design the various combinational circuits and implement them. |
| P O4 | PS O2 | 4.1 | 4.1. 2 | 3 | CO4 | Design and interpretation of sequential circuits and logic circuit designs. |
| P O1 | PS O2 | 1.3 | 1.3. 1 | 2 | CO5 | Understand and characterise different memories and PLDs |
| P O4 | PS O1 | 4.1 | 4.1. 3 | 3 | CO6 | Design and debug simple digital circuits and systems with the aid of VHDL software tools. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of fundamentals digital electronics to understand different number systems and for conversion from one number system to another. |
| 2 | Ability to derive, analyze or minimize logic expressions & circuits by applying properties of Boolean laws and K map |
| 3 | Analyze logic operations using combinational circuits like adders, MUX, encoders etc. |
| 4 | Develop a state diagram & simplify the given sequential logic. Use state machine diagram to design finite state |
| 5 | Understand concept of Programmable devices like PLA, PAL, CPLD etc and memory elements, types of memories. |
| 6 | Design, debug and verify simple digital circuits and systems with the aid of VHDL simulation tools |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | 1 | 1.6 | 1.6.1 | L3 | CO1 | Apply their knowledge in analyzing Circuits by using network theorems. |
| PO2 | 1 | 2.8 | 2.8.2 | L4 | CO2 | Analyze magnetic circuits. |
| PO3 | 1 | 3.6 | 3.6.3 | L3 | CO3 | Apply/Use the time and frequency method analysis to circuits |
| PO2 | 1 | 2.8 | 2.8.1 | L2 L3 | CO4 | Understand & solve network topology &network functions for one port and two port networks. |
| PO2 | 1 | 2.5 | 2.5.2 | L5 | CO5 | Evaluate the various parameters of two port networks inter relationship among various circuit parameters, solve more complex network using these parameters. |
| PO4 | 1 | 4.6 | 4.6.4 | L4 | CO6 | Synthesize the network using passive elements |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Analyze the Circuits with independent and dependent sources. |
| 2 | Analyze magnetic circuits. |
| 3 | Apply time and frequency domain analysis to circuits |
| 4 | Compute network Topology, network Functions. |
| 5 | Apply/Compute two port networks, inter relationship among various circuit parameters, solve more complex network using these parameters. |
| 6 | Synthesize the network using passive elements |

Course Outcomes

| PO | PSO | Competency | PI | Bloom'sLevel | CO | Description |
|-----------|------------|-------------------|--------------|---------------------|-----------|---|
| 1 | 2 | 1.6 | 1.6.1 | 3 | CO1 | Apply the knowledge of engineering fundamentals for measurement of electronics components and Instrument. |
| 4 | 2 | 4.6 | 4.6.1 | 4 | CO2 | Design an electronic system or process using different sensors to meet specified needs with appropriate attention to health, safety, standards, environmental and societal considerations. |
| 5 | 2 | 5.4 | 5.4.2 | 6 | CO3 | Create, select and apply appropriate techniques, resources, advanced engineering and software tools like Design Data Acquisitions and Telemetry system to analyze and design telecommunication engineering problems |
| 1 | 2 | 1.3 | 1.3.1 | 2 | CO4 | Apply, the knowledge of Engineering Fundamentals to find transfer functions for given system |
| 3 | 2 | 3.3 | 3.3.2 | 3 | CO5 | To design a system and calculate its time domain and frequency domain parameter and understand its impact for development |
| 4 | 2 | 4.3 | 4.3.1 | 4 | CO6 | To Analyze and effectively apply appropriate techniques to predict stability of given system using appropriate criteria and engage in learning process |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Generate basic concepts and definitions in measurement. |
| 2 | Classify and explain Principles of working of sensors and component used in electronics measurement |
| 3 | Discover the basic knowledge of advanced electronics instruments and dataacquisition systems applied in Wireless sensor network. |
| 4 | Use fundamental concepts of control system such as transfer function,mathematical modelling, |
| 5 | Make system's time and frequency-domain analysis with response to test inputs.Analysis includes the determination of the system stability |
| 6 | Develop concepts of stability and its assessment criteria and engage in learning process |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|--------------|----------------------|-----------|--|
| 1 | 2 | 1.1 | 1.1.1 | 5 | 1 | Measure voltage, frequency and phase of any waveform using CRO |
| 2 | 2 | 2.1 | 2.1.2 | 4 | 2 | Design voltage regulator using Zener diode. |
| 2 | 2 | 2.2 | 2.2.2 | 4 | 3 | Analyze the characteristics of different electronic devices such as diodes, transistors, FET etc., and simple circuits like rectifiers, amplifiers etc., |
| 4 | 2 | 4.2 | 4.2.1 | 5 | 4 | Analyze output in different operating modes of different semiconductor devices. |
| 5 | 2 | 5.1 | 5.1.1 | 2 | 5 | To understand the concepts of simulation by using Spice too |
| 5 | 2 | 5.3 | 5.3.2 | 2 | 6 | Understand the differences between theoretical, practical and simulated results in electronic circuits and construct mini project |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To study basic electronic components |
| 2 | To observe characteristics of electronic devices |
| 3 | Develop the voltage regulator using Zener Diode |
| 4 | To study different biasing techniques to operate transistor , FET , in different modes |
| 5 | Model the electronic circuits using tools such as PSPICE |
| 6 | Design mini project based on electronic circuits. |

Subject- DSD Lab**Subject Code- ECL 302****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | Understand different binary codes and apply engineering fundamentals for conversion from one no. system to another system. |
| PO2 | PSO1 | 2.1 | 2.1.3 | 2 | CO2 | Identify and solve the logic expressions by applying laws of Boolean algebra, and Demorgan's law to logic gates. |
| PO2 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | To design the various combinational circuits and implement them. |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | Design and interpretation of sequential circuits and logic circuit designs. |
| PO1 | PSO2 | 1.3 | 1.3.1 | 2 | CO5 | Understand and characterise different memories and PLDs |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | Design and debug simple digital circuits and systems with the aid of VHDL software tools. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of basic principles of digital circuits and different systems, basic gates and various engineering applications involving digital electronics and circuits |
| 2 | Understand and analyze the logic expressions (POS &SOP) and circuits using Boolean laws, K- maps, De- Morgan's laws and their applications in digital design. |
| 3 | Construct basic combinational circuits like Adders,/ Subtractors/ MUX/ DEMUX/ Encoders/ PLA/ ROM etc |
| 4 | Construct basic combinational circuits like FFs and their conversion. |
| 5 | Ability to understand the different shift registers and ability to design various counter circuits. |
| 6 | Ability to understand the different shift registers and ability to design various counter circuits. |

Semester-IV

Subject- Applied Mathematics-IV

Subject Code- ECC 401

| PO | PSO | Competency | PI | Course Outcomes | | Description |
|-----------|------------|-------------------|-----------|------------------------|-----------|---|
| | | | | Bloom's Level | CO | |
| 1,2,3,4 | - | 2.4 | 2,4.1 | 2 | CO 1 | Find the extremals of the functional using the concept of Calculus of variation. |
| 1,2,3,12 | - | 3.3 | 3.3.1 | 3 | CO 2 | Use the concept of vector space to solve problems in machine learning, computer graphics and in Google page ranking |
| 1,2 | - | 1.1 | 1.1.3 | 3 | CO 3 | Demonstrate basic knowledge of Matrix Theory which are very useful tools in various Engineering applications |
| 1,2,4,12 | - | 4.2 | 4.2.2 | 4 | CO 4 | Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. |
| 1,2,3,12 | - | 3.1 | 3.1.6 | 3 | CO 5 | Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. |
| 1,2,4 | - | 2.2 | 2.2.1 | 5 | CO 6 | Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the concepts of Calculus of Variations. |
| 2 | To understand the concepts of vector space and its properties |
| 3 | To familiarize with the concepts of matrices and function of linear transformation |
| 4 | To familiarize with the concepts of probability distributions. |
| 5 | To acquaint with the concepts of correlation, regression and curve fitting. |
| 6 | To study Line and Contour integrals and expansion of complex valued function in a power series |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|--------------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | L2 | 1 | Understand the operation of bias circuit of MOSFET. |
| PO2 & PO3 | PSO1 | 2.2 & 3.2 | 2.2.3 &3.2.2 | L3 & L4 | 2 | Apply design and analyze the operation of MOSFET. |
| PO2 | PSO1 | 2.2 | 2.2.3 | L1 &L3 | 3 | Identify and use the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain. |
| PO3 | PSO2 | 3.3 | 3.3.1 | L3 | 4 | Illustrate different power amplifier circuits, their design and use in electronics and communication circuits. |
| PO2 | PSO1 | 2.2 | 2.2.4 | L4 | 5 | Categorize the concept of negative feedback amplifier and their characteristics. |
| PO3 | PSO2 | 3.2 | 3.2.2 | L6 | 6 | Design the different oscillator circuits for various frequencies. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To describe the operation of the various bias circuits of MOSFET. |
| 2 | To Analyze and Design MOSFET bias circuits. |
| 3 | To Apply the operation and design of multistage amplifier for a given specification. |
| 4 | To understand the operation and design of transformer coupled various types of power amplifier circuits. |
| 5 | Classify and describe the effects of negative feedback on amplifier circuits. |
| 6 | Compare the different RC and LC oscillator circuits and to determine the frequency of oscillation. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2,4 | | 1.3 | 1.3.1 | level 3 | 1 | Explain various current mirror circuits and illustrate differential amplifier with active load. |
| 1,2 | | 1.4 | 1.4.1 | Level 1 | 2 | Describe characteristics as well as linear and non linear applications of Op-amps. |
| 5 | | 4.1 | 4.1.3 | Level 6 | 3 | Construct and compare different circuits for mathematical operations using op amp 741. |
| 1,4 | | 4.2 | 4.2.1 | Level 4 | 4 | Analyze different comparators and waveform generators. |
| 2,5 | | 4.1 | 4.1.3 | level 3 | 5 | Show use of special purpose IC555 in monostable and astable modes and their applications. |
| 5 | | 4.1 | 4.1.3 | Level 6 | 6 | Construct voltage regulator circuits using IC78XX, IC 79XX, IC 723 , LM317 and ADC/DAC. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To analyze and design differential amplifier, current sources and describe basics of Op-amp. |
| 2 | To enable students to analyze AC and DC characteristics of Op-Amp. |
| 3 | To design and explain different linear, non-linear and mathematical application circuits using op-amps. |
| 4 | To analyze different comparators and waveform generators. |
| 5 | To illustrate use of special purpose IC555 in monostable and a stable modes and their applications. |
| 6 | To construct voltage regulator circuits using IC78XX, IC 79XX, IC 723 , LM317 and ADC/DAC. |

Subject- SS**Subject Code- ECC404****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | L2 | CO1 | Understand the concept & types of signals, classification of signals. |
| PO2 | 1 | 2.5 | 2.5.3 | L4 | CO2 | Analysis of signals& systems, classification of systems with examples. |
| PO2 | 1 | 2.8 | 2.8.1 | L3 | CO3 | Illustrate the time domain analysis of continuous & discrete time system |
| PO2 | 1 | 2.8 | 2.8.1 | L3 | CO4 | Apply the knowledge of frequency domain analysis of continuous & discrete time system |
| PO3 | 1 | 3.6 | 3.6.3 | L4 | CO5 | Analyze the discrete time LTI system using Z transform |
| PO1 | 1 | 1.7 | 1.7.1 | L2 L3 | CO6 | Understand & solve the concept of state, state variables & application of signals& system |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the concept & theory of signals and systems in engineering field |
| 2 | Classification & analysis of signals& systems |
| 3 | Apply the knowledge of time domain analysis of continuous & discrete time system |
| 4 | Apply the knowledge of frequency domain analysis of continuous & discrete time system |
| 5 | Use of transform in analysis of system |
| 6 | Apply the concept of state, state variables & application of signals& system |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,5 | 1 | 1.3 | 1.3.1 | L2-Understand | CO1 | Understand different fundamental concept of modulation and demodulation techniques used in analog communication to solve Engineering Problems |
| 2,4,7 | 1 | 2.4 | 2.4.4 | L3-Apply | CO2 | Identify and solve basic communication problems to meet environment and societal considerations |
| 3,5,6 | 1 | 2.4 | 2.4.4 | L3-Apply | CO3 | Investigate and analyze transmitter and receiver circuits to meet specified needs of society and environment |
| 4,8 | 2 | 2.2 | 2.2.4 | L4-Analyze | CO4 | Compare and contrast design issues, advantages, disadvantages and limitations of analog communication system with attention to health, safety and legal issues and accountability in engineering profession |
| 12 | 2 | 3.2 | 3.2.3 | L4-Analyze | C05 | To study pulse modulation and demodulation techniques in adaptation to the changing world of technology |
| 9,10,11 | 2 | 3.3 | 3.3.1 | L4-Analyze | C06 | To design an electronic system to communicate effectively by working in a team ,managing finance and engaging in life long learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce students to various modulation and demodulation techniques of analog communication |
| 2 | To analyze different parameters of analog communication techniques |
| 3 | To Investigate and analyze transmitter and receiver circuits |
| 4 | To Compare and contrast design issues, advantages, disadvantages and limitations of analog communication system |
| 5 | To study pulse modulation and demodulation techniques |
| 6 | To Illustrate the principles of multiplexing and demultiplexing techniques. |

Subject- EDC II (LAB)
Course Code : ECL 401
Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|--------------|----------------------|-----------|---|
| 1 | 2 | 1.1 | 1.1.2 | 5 | 1 | Know about different power amplifier circuits, their design and use in electronics and communication circuits. |
| 2 | 2 | 2.3 | 2.3.2 | 6 | 2 | Able to design amplifier circuits using BJT's And FET's. and observe the amplitude and frequency responses of common amplifier circuits |
| 2 | 2 | 2.4 | 2.4.2 | 5 | 3 | Measure the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies. |
| 4 | 2 | 4.3 | 4.3.1 | 5 | 4 | Measure the effect of positive feedback and able to design and working of different Oscillators using BJTS. |
| 5 | 2 | 5.1 | 5.1.1 | 2 | 5 | To understand the concepts of simulation by using Spice too |
| 5 | | 5.3 | 5.3.2 | 2 | 6 | Understand the differences between theoretical, practical and simulated results in electronic circuits and construct mini project |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the working of transistor at high frequency |
| 2 | Observe the effect of negative feedback on different parameters of an Amplifier and different types of negative feedback topologies. |
| 3 | To design and implement feedback amplifier circuits |
| 4 | To measure the frequency of oscillators. |
| 5 | Model the electronic circuits using tools such as PSPICE |
| 6 | Design mini project based on electronic circuits. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2,4 | | 1.3 | 1.3.1 | level 3 | 1 | Explain and illustrate various applications of Op amp such as integrator and differentiator. |
| 1,2 | | 1.4 | 1.4.1 | Level 1 | 2 | Describe characteristics as well as linear and non linear applications of Op-amps. |
| 5 | | 4.1 | 4.1.3 | Level 6 | 3 | Construct and compare different circuits for mathematical operations using op amp 741. |
| 1,4 | | 4.2 | 4.2.1 | Level 4 | 4 | Analyze different comparators and waveform generators. |
| 2,5 | | 4.1 | 4.1.3 | level 3 | 5 | Show use of special purpose IC555 in monostable and astable modes and their applications. |
| 5 | | 4.1 | 4.1.3 | Level 6 | 6 | Construct voltage regulator circuits using IC78XX, IC 79XX, IC 723 , LM 317 |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To analyze and design differential amplifier, current sources and describe basics of Op-amp. |
| 2 | To enable students to analyze AC and DC characteristics of Op-Amp. |
| 3 | To design and explain different linear, non linear and mathematical application circuits using op-amps. |
| 4 | To analyze different comparators and waveform generators. |
| 5 | To illustrate use of special purpose IC555 in monostable and astable modes and their applications. |
| 6 | To construct voltage regulator circuits using IC78XX, IC 79XX, IC 723 , LM317 and ADC/DAC. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 1.3 | 1.3.1 | L2-Understand | CO 1 | Understand and analyze analog modulation and demodulation techniques to solve Engineering Problems |
| 2,4,7 | 1 | 2.1 | 2.1.3 | L3-Apply | CO 2 | Identify and solve basic communication problems to meet environment and societal considerations |
| 3,5,6 | 1 | 2.4 | 2.4.4 | L4-Analyze | CO 3 | Analyze the waveforms of Radio receivers to meet specified needs of society and environment |
| 4,7,8 | 2 | 2.4 | 2.4.4 | L3-Apply | CO 4 | Implement analog pulse modulation and demodulation circuits in attention to health,safety and accountability in engineering profession |
| 12 | 2 | 3.2 | 3.2.3 | L4-Analyze | C05 | To Demonstrate digital pulse modulation and demodulation techniques. in adaptation to the changing world of technology |
| 9,10,11 | 2 | 3.3 | 3.3.1 | L4-Analyze | C06 | To Verify the concepts of multiplexing and design an electronic system to communicate effectively by working in a team ,managing finance and engaging in life long learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce students to various modulation and demodulation techniques of analog communication |
| 2 | To analyze different parameters of analog communication techniques |
| 3 | To Investigate and analyze transmitter and receiver circuits |
| 4 | To Compare and contrast design issues, advantages, disadvantages and limitations of analog communication system |
| 5 | To study pulse modulation and demodulation techniques |
| 6 | to verify concepts of TDM and FDM and to design an electronic system to communicate effectively |

SEMESTER V

Subject-MPP

Subject Code-ECC 501

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | C O | Description | |
|---|-------------|-----------------------------|-----------------------------------|----------------------|------------|--------------------|---|
| PO1 | | 1.3 | 1.3.1 | | 2 | 1 | Understand the components of microcomputer systems, like I/O devices ,Memory ,Buses etc and concept of HLL & LLL |
| PO2 | | 2.2 | 2.2.2 | | 2 | 2 | Understand the architecture and write software of microprocessor 8086 |
| PO3 PO4 | | 3.1 4.1 | 3.1.6 4.1.1 | | 6 | 3 | To investigate engg problems and Design electronic System to solve real time problems |
| PO4 PO5 | | 4.2 5.1 | 4.2.1 5.2.1 | | 6 | 4 | Design multiprocessor electronic system to meet society needs |
| PO5 | PSO1 | 5.1 | 5.1.1 | | 4 | 5 | Identify difficult issues of society & Create Data Acquisition system |
| PO8 PO9 PO10 | PSO2 | 8.1 9.1 10.1 | 8.1.1 9.1.1 10.1.3 | | 6 | 6 | Design & present mini projects in groups. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basic concepts of microcomputer systems. |
| 2 | To develop background knowledge and core expertise in 8086 microprocessor ,co-processor 8087 and write ALP for 8086. |
| 3 | To explain peripheral devices and their interfacing to 8086 and to apply it to design microprocessor-based system. |
| 4 | To understand 8087 Math Co-Processor and Design of Memory devices and their interfacing to 8086 . |
| 5 | Apply knowledge of 8086 & interfacing devices to Create data Acquisition System |
| 6 | Design miniproject based on 8086 Microprocessor in group of Students |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.1 | 1.1.1 | BL2 | CO1 | Apply Mathematical techniques such as statastics and random variables to solve engineering problems. |
| PO2 | 1 | 2.1 | 2.1.3 | BL3 | CO2 | To identify and formulate various source coding techniques to attain errorless communication. |
| PO2 | 1 | 2.4 | 2.4.3 | BL4 | CO3 | Identify the sources of error in the system and rectify it by using different channel coding methods. |
| PO4 | 2 | 4.1 | 4.1.2 | BL5 | CO4 | Examine the relevant modulation techniques and apply it for optimum data communication. |
| PO4 | 2 | 4.3 | 4.3.2 | BL4 | CO5 | Analyze and interprit various baseband modulation techniques and apply it for errorless reception. |
| PO2 | 1 | 2.2 | 2.2.3 | BL2 | CO6 | Identify and demonstrate a solution using various techniques for errorfree communication. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand probability and random variable theory. |
| 2 | Classify source encoder and finding out codewords using Shannon Fano and Huffman coding algorithm |
| 3 | Estimate information,average information(Entropy) and Interpret channel encoder. |
| 4 | Understand impact of different modulation techniques. |
| 5 | Detection and correction of error to produce optimum receiver. |
| 6 | Classify various digital modulation techniques. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----|-----|-------------|----------------|---------------|----|---|
| 1,5 | | 1.3, 1.4 | 1.3.1 1.4.1 | Level 3 | 1 | Apply the knowledge of vector calculus and basic mathematics to determine fields in free space and materials. |
| 2,3 | | 2.1 | 2.1.2 | Level 4 | 2 | Identify the difference between static fields and time varying fields and derive boundary conditions for different interfaces. |
| 3,5 | | 2.4 | 2.4.1 | Level 4 | 3 | Analyze and derive Maxwell's Equations in differential and integral forms and apply them to diverse engineering problems. |
| 3,6 | | 1.4 | 1.4.1 | Level 3 | 4 | Examine the phenomena of radio wave propagation in different media and its interfaces and its applications in microwave engineering. |
| 4,5 | | 5.1 | 5.1.2 | Level 5 | 5 | Measure different transmission line parameters using Smith Chart and understand its significance in impedance matching. |
| 7,9 | | 2.4 | 2.4.1 | Level 4 | 6 | Identify and utilize different electromagnetic phenomena in appropriate applications such as EMI, EMC, Metamaterials, Optical nanocircuits and ESDs |

Course Objectives

| Sr. No. | Description |
|---------|---|
| 1 | To apply the knowledge of vector calculus and basic mathematics to determine fields in free space and materials. |
| 2 | To identify the difference between static fields and time varying fields and derive boundary conditions for different interfaces. |
| 3 | To analyze and derive Maxwell's Equations in differential and integral forms and apply them to diverse engineering problems. |
| 4 | To examine the phenomena of radio wave propagation in different media and its interfaces and its applications in microwave engineering. |
| 5 | To measure different transmission line parameters using Smith Chart and understand its significance in impedance matching. |
| 6 | To correlate and utilize different electromagnetic phenomena in appropriate applications such as EMI, EMC, Metamaterials, Optical nanocircuits and ESDs |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|-------------|-------------------|--------------|----------------------|------------|--|
| PO1 | PSO1 | 1.1 | 1.1.1 | Level2 | CO1 | Describe concept of DFT and FFT. |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO2 | Apply the knowledge of design of digital IIR filter with arbitrary specification. |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO3 | Apply the knowledge of design of digital FIR filter with arbitrary specification. |
| PO2 | PSO1 | 2.6 | 2.6.4 | Level4 | CO4 | Analyze the effect of hardware limitation on performance of digital filter. |
| PO2 | PSO1 | 2.8 | 2.8.1 | Level5 | CO5 | Explain finite word length effect of digital filters. |
| PO5 | PSO1 | 5.4 | 5.4.2 | Level6 | CO6 | Implement DSP Processor for real time application. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Develop through understanding of DFT and FFT their application. |
| 2 | Teach different design technique of digital IIR filters. |
| 3 | Teach different design technique of digital FIR filters. |
| 4 | Analyze performance of digital filters. |
| 5 | Understand finite world length effect of Digital filters. |
| 6 | Introduce the DSP processor and it's application. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO1 | 2.3 | 2.2. 4 | BL2 | CO1 | To understand and formulate the best method for text compression |
| PO4 | PSO1 | 4.3 | 3.3. 1 | BL3 | CO2 | To Analyze and compare various image compression techniques |
| PO3 | PSO2 | 3.2 | 3.2. 2 | BL4 | CO3 | To model and demonstrate different audio and video compression algorithms |
| PO3 | PSO2 | 3.1 | 3.1. 5 | BL2 | CO4 | To explore various methods of data security using ciphering |
| PO3 | PSO1 | 3.1 | 3.2. 1 | BL5 | CO5 | To design and develop cryptography algorithms in the field of data security |
| PO5 | PSO2 | 5.3 | 5.1. 1 | BL5 | CO6 | To apply and Evaluate Modern Security Systems Against Cyber Crime |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To learn the basic methods of text compressions |
| 2 | To study and understand various image compression techniques |
| 3 | To implement audio and video compression algorithms with efficient solutions |
| 4 | To understand different data security ciphering techniques |
| 5 | To learn and apply cryptography algorithms in the field of data security |
| 6 | To study modern security techniques against cyber security |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.3 | 1.3.1 | 2 | 1 | Understand the basic concepts of microcomputer systems |
| PO2 | | 2.2 | 2.2.2 | 2 | 2 | Understand the architecture and software aspects of microprocessor 8086. |
| PO5 | | 5.1 | 5.1.1 | 4 | 5 | Write Assembly language program in 8086. |
| PO3 | | 3.1 | 3.1.6 | 6 | 3 | Know the Co-processor configurations. |
| PO2 | | 2.2 | 2.2.2 | 2 | 5 | Interface peripherals for 8086 |
| PO8 | | 8.1 | 8.1.1 | | | Design elementary aspect of microprocessor based system for creating application types devices. |
| PO9 | | 9.1 | 9.1.1 | | | |
| PO10 | PSO1 | 10.1 | 10.1.3 | 6 | 6 | |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the basic concepts of microcomputer systems. |
| 2 | To develop background knowledge and core expertise in 8086 microprocessor and co-processor 8087 |
| 3 | To write assembly language programs for 8086 microprocessors |
| 4 | To Understand the Data Acquisition System and Different Conversion ICs. |
| 5 | To understand peripheral devices and their interfacing to 8086 and to study the design aspects of basic microprocessor based system |
| 6 | To understand 8087 Math Co Processor and Design of Memory devices and their interfacing to 8086 |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.1 | 1.1.1 | BL1 | CO1 | understand various digital modulation techniques |
| PO2 | 1 | 2.1 | 2.1.3 | BL3 | CO2 | Identify and formulate various source coding techniques to attain errorless communication. |
| PO2 | 1 | 1.1 | 1.1.2 | BL4 | CO3 | Estimate information, average information(Entropy) and Interpret channel encoder. |
| PO4 | 2 | 4.1 | 4.1.2 | BL4 | CO4 | To identify and formulate various source coding techniques to attain errorless communication. |
| PO4 | 2 | 4.3 | 4.3.2 | BL4 | CO5 | Identify the sources of error in the system and rectify it by using different channel coding methods. |
| PO2 | 1 | 2.2 | 2.2.3 | BL2 | CO6 | Apply various digital modulation techniques for bandwidth reduction |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand various digital modulation techniques |
| 2 | Analyse source encoder and finding out codewords using Shannon Fano and Huffman coding algorithm |
| 3 | Estimate information, average information (Entropy) and Interpret channel encoder. |
| 4 | Analyze and interpret various baseband modulation techniques and apply it for errorless reception. |
| 5 | Detection and correction of error to produce optimum receiver. |
| 6 | Apply various digital modulation techniques for bandwidth reduction |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|---------------|----------------------|-----------|--|
| 5 | 1 | 1.1 | 10.1.1 | 1 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 7 | 1 | 9.2 | 9.2.1 & 9.2.2 | 3 | 2 | Develop writing skills of business and technical proposals and documents |
| 11 | 2 | 8.1 | 8.1.1 & 8.2.2 | 3, 5 | 3 | Develop the life skills/interpersonal skills to progress professionally by building strong relationships |
| 9 | 1 | 10.2 | 10.2.2 | 1,3 | 4 | Represent them as team members and leaders with well groomed, organized, social etiquettes in professional and social environment. |
| 8 | 2 | 10.1 | 10.1.1 | 2,3 | 5 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |
| 12 | 2 | 9.1 & 9.2 | 9.1.1 & 9.2.2 | 2,3 | 6 | Apply the traits of suitable candidate for a job/ higher education upon being trained in the techniques of holding a group discussion, facing interview and writing resume/ SOP. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To inculcate professional and ethical attitude at the workplace |
| 2 | To enhance effective communication and interpersonal skills |
| 3 | To build multidisciplinary approach towards all life tasks |
| 4 | To hone analytical and logical skills |
| 5 | To understand and demonstrate professional and personal values and work ethics |
| 6 | To understand the techniques of writing resumes, perform in group discussion, facing interviews and develop job related skills |

Subject- OSTCL LAB**Subject Code-ECL504****Course Outcomes**

| PO | PS O | Competenc y | PI | Bloom's Level | CO | Description |
|-----------|-------------|--------------------|-----------|----------------------|-----------|--|
| 1,2 | 1 | 1.4 | 1.4.1 | L2-Understan d | 1 | Understand different open source programming tools for use in communication engineering technology |
| 1,3,5 | 2 | 2.1 | 2.1.2 | L3 Apply | 2 | Simulate using software tools and analyze the performance of communication system and find appropriate solution to Engineering problems |
| 4,5 | 2 | 3.1 | 3.1.6 | L2-Understan d | 3 | Design and Implement the communication system/subsystem by applying appropriate techniques |
| 5,6,7 | 1 | 4.3 | 4.3.4 | L3-Apply | 4 | Understand and Analyze and the signals in time domain and frequency domain for sustainable developments |
| 8,9,10 | 2 | 5.1 | 5.1.2 | L4-Analyze | 5 | Design and Simulate Digital Circuits and use effectively for use in Engineering profession |
| 4,5,11,12 | 2 | 5.3 | 5.3.1 | L5-Evaluate | 6 | Design and Simulate various Circuits of Operational Amplifiers, BJT, MOSFETs etc by incorporating principles of management in a changing world of technology (1,2,3,5,6,7,8,9,10,11,12) |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Introduction to open source tools for communication lab. |
| 2 | To simulate and analyze the various parameters of communication systems. |
| 3 | To understand and implement the communication system/sub system. |
| 4 | To Understand and Analyze and the signals in time domain and frequency domain |
| 5 | To Simulate various digital Circuits |
| 6 | To Simulate various Circuits of operational Amplifiers, BJT, MOSFETs etc |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO1 | 2.3 | 2.2.4 | BL2 | CO1 | To formulate text compression techniques |
| PO4 | PSO1 | 4.3 | 3.3.1 | BL3 | CO2 | To design image compression technique |
| PO3 | PSO2 | 3.2 | 3.2.2 | BL4 | CO3 | To model and demonstrate different audio and video compression algorithms |
| PO3 | PSO2 | 3.1 | 3.1.5 | BL2 | CO4 | To design ciphering methods for encryption |
| PO3 | PSO1 | 3.1 | 3.2.1 | BL5 | CO5 | To design and develop cryptography algorithms in the field of data security |
| PO9 | PSO2 | 9.1 | 9.2.1 | BL5 | CO6 | To demonstrate project on real life case study using modern ciphers |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To design basic methods of text compressions |
| 2 | To study and understand various image compression techniques |
| 3 | To implement audio and video compression algorithms with efficient solutions |
| 4 | To understand different data security ciphering techniques |
| 5 | To learn and apply cryptography algorithms in the field of data security |
| 6 | To demonstrate modern ciphering security techniques for product development |

SEMESTER VI

Subject-MCA

Subject Code-ECC 601

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.1.1 | BL2 | CO1 | Understand and describe detailed architecture of 8051 Microcontroller. |
| PO4 | PSO1 | 4.1 | 4.1.3 | BL2 | CO2 | Classify/Illustrate different types of algorithms for microcontroller and its application. |
| PO5,PO3,PO6,PO12 | PSO2 | 3.4 | 3.4.1 | BL3 | CO3 | Use/Apply the knowledge to interface various peripheral devices with microcontroller. |
| PO2 | PSO1 | 2.1 | 2.1.2 | BL2 | CO4 | Understand and describe detailed architecture of ARM 7. |
| PO4 | PSO1 | 4.2 | 4.2.1 | BL2 | CO5 | Classify/Illustrate different types of algorithms for ARM 7. |
| PO3 | PSO2 | 3.4 | 3.4.1 | BL6 | CO6 | Develop programmes in ARM 7 using embedded C. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand and describe detailed architecture of 8051 Microcontroller. |
| 2 | To Classify/Illustrate different types of algorithm for microcontroller and it's application. |
| 3 | To Apply the knowledge to interface various peripheral devices with microcontroller. |
| 4 | To understand and describe detailed architecture of ARM 7. |
| 5 | To classify/Illustrate different types of algorithm for ARM 7. |
| 6 | To develop programmes in ARM 7 using embedded C. |

Subject- CCN**Subject Code-ETC602****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1,2,7 | 1 | 1.4 | 1.4.1 | L2-Understand | CO1 | To identify and apply the knowledge of Engineering fundamentals to design a small or medium sized computer network including media types, end devices, and interconnecting devices that meets a customer specific need |
| 3 | 1 | 2.1 | 2.1.2 | L3-Apply | CO2 | Investigate and perform basic configurations on routers and Ethernet switches |
| 4,6 | 2 | 2.4 | 2.4.2 | L3-Apply | CO3 | Demonstrate knowledge of programming for network communications to understand and find appropriate standard solution to meet society needs |
| 4,5 | 1 | 3.3 | 3.3.1 | L4-Apply | CO4 | Learn to design and simulate computer networks by appropriate software tools and analyse the simulation results |
| 8,9 | 2 | 4.1 | 4.1.3 | L5-Evaluate | CO5 | Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model |
| 10,11,12 | 2 | 4.3 | 4.3.4 | L5-Evaluate | CO6 | Develop knowledge and skills necessary to gain employment in Engineering Profession and work effectively as computer network engineer and network Management administrator engaging in lifelong learning |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Conceptual understanding and functional aspects of computer communication and telecom networks. |
| 2 | To Design and configure small/medium sized computer network that meets a specific need for communications. |
| 3 | To Investigate and Perform basic configurations on routers and Ethernet switches |
| 4 | To Demonstrate knowledge of programming for network communications |
| 5 | To Simulate computer networks and analyse the simulation results including troubleshoot connectivity problem occurring at layers of TCP/IP model. |
| 6 | To Develop knowledge and skills necessary to gain employment in Engineering Profession |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,2 | | 1.4 | 1.4.1 | Level 3 | 1 | Apply the knowledge of fundamental parameters of antenna to design wireless transmit and receive system. |
| 2 | | 1.4 | 1.4.1 | Level 4 | 2 | Identify different antennas and analyze dipole, monopole, loop helical and other wired antennas. |
| 5 | | 4.1 | 4.1.2 | Level 6 | 3 | Design linear arrays for efficient and complex transmit and receive system |
| 2,3 | | 4.1 | 4.1.2 | level 2 | 4 | Understand current antenna requirements and develop cost effective and compact antennas such as patch antennas accordingly. |
| 4 | | 4.2 | 4.2.1 | Level 5 | 5 | Measure different antenna parameters and understand characteristics of radio wave propagation for analyzing wireless systems. |
| 4 | | 4.2 | 4.2.1 | Level 4 | 6 | Select type of antenna and provide appropriate design solution according to specified parameters. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To apply the knowledge of fundamental parameters of antenna to design wireless transmit and receive system. |
| 2 | To identify different antennas and analyze dipole, monopole, loop helical and other wired antennas. |
| 3 | To design linear arrays for efficient and complex transmit and receive system |
| 4 | To understand current antenna requirements and develop cost effective and compact antennas such as patch antennas accordingly. |
| 5 | To measure different antenna parameters and understand characteristics of radio wave propagation for analyzing wireless systems. |
| 6 | To effectively select type of antenna and provide appropriate design solution according to specified parameters. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.1 | 1.1.1 | BI3 | CO1 | Use concept of matrices to solve image processing problems |
| PO2 | PSO1 | 2.5 | 2.5.3 | BI3 | CO2 | Apply theory and concept of DFT, DCT, Walsh Transform to solve image processing problems |
| PO2 | PSO1 | 2.6 | 2.6.4 | BI4 | CO3 | Compare and contrast alternative methods of image enhancement to select best method |
| PO2 | PSO1 | 2.8 | 2.8.1 | BI4 | CO4 | Apply morphological operations on image for image restoration |
| PO3 | PSO1 | 3.6 | 3.6.1 | BI5 | CO5 | To explore alternative methods of image segmentation |
| PO5 | PSO2 | 5.4 | 5.4.2 | BI6 | CO6 | Create machine learning tools for image analysis |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Describe mathematical models of digital image processing. |
| 2 | Classify and explain different types of image transforms. |
| 3 | Apply time and frequency domain techniques for image enhancement. |
| 4 | Use Image morphological and restoration techniques for image correction. |
| 5 | Analyse image segmentation techniques to recognize various shapes/ objects in an image. |
| 6 | Formulate classification techniques in machine vision to classify objects. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.7 | 1.7.1 | BL2 | CO1 | 1) Gain knowledge about basics of database management i.e. Relational database management system in electronics and computer related applications. |
| PO3 | PSO2 | 3.5 | 3.5.3 | BL5 | CO2 | 2) compare existing data modelling techniques & get advantage of RDBMS over them |
| PO5 | PSO1 | 5.5 | 5.5.1 | BL6 | CO3 | 3) To implement basic programming of SQL syntax. |
| PO2 | PSO1 | 2.7 | 2.7.1 | BL6 | CO4 | 4) To design and analyze ERD (entity relationship diagram) modelling technique for database designing. |
| PO1 | PSO1 | 1.2 | 1.2.1 | BL3 | CO5 | 5) To apply transaction management properties [ACID] in DBMS. |
| PO5 | PSO2 | 5.4 | 5.4.2 | BL2 | CO6 | 6) TO understand and apply efficient concurrency control in order to develop sustainable DBMS benefiting towards the betterment of social and security applications. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To teach students basics of database management i.e. Relational database management system |
| 2 | To learn the advantages of RDBMS over existing data modelling techniques |
| 3 | To learn and program SQL syntax and understand the structure query language |
| 4 | To design and analyze ERD (entity relationship diagram) modelling technique for database designing |
| 5 | To study and understand database designs in DBMS and transaction management properties |
| 6 | To learn the techniques of efficient concurrency control in order to develop sustainable DBMS benefiting towards the betterment of social and security applications. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO4 | 1 | 4.5 | 4.5.1 | Level -6 | CO1 | Realize logic circuits with different design styles. |
| PO4 | 1 | 4.4 | | Level-1,2,3,5,6 | CO2 | Understand operation of memory, storage circuits and data path elements. |
| PO6 | 1 | 6.4 | 6.4.1 | Level-1 | CO3 | Interpret Adders, Multipliers and shifters using logic design styles. |
| PO1 | 1 | 1.6 | 1.6.1 | Level-3 | CO4 | Demonstrate an understanding of system level design issues such as protection, clocking and routing. |
| PO5 | 1 | 5.4 | 5.4.2 | Level-5 | CO5 | Simulate & synthesize digital circuits using HDL Language. |
| PO3 | 1 | 3.8 | 3.8.2 | Level-6 | CO6 | Implement RTL designing for Practical Applications like High level state machine and FIR filter design. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Implement MOS circuit logic design using various design styles with layouts. |
| 2 | Study fundamental of memory and storage circuits. |
| 3 | Understand designing of Adders, Multipliers and Shifters with their circuit design issues. |
| 4 | Highlight circuit design issues in the context of VLSI technology. |
| 5 | Illustrate HDL for system based and data path design. |
| 6 | Acquire knowledge of RTL designing. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.1.1 | BL2 | CO1 | Understand and describe detailed architecture of 8051 Microcontroller. |
| PO4 | PSO1 | 4.1 | 4.1.3 | BL2 | CO2 | Use of different algorithm for microcontroller . |
| PO5,PO3,PO6,PO12 | PSO2 | 3.4 | 3.4.1 | BL3 | CO3 | To interface various peripheral devices with microcontroller. |
| PO2 | PSO1 | 2.1 | 2.1.2 | BL2 | CO4 | Use of different algorithm for ARM 7. |
| PO4 | PSO1 | 4.2 | 4.2.1 | BL2 | CO5 | Classify/Illustrate different types of algorithm for ARM 7. |
| PO3 | PSO2 | 3.4 | 3.4.1 | BL6 | CO6 | Develop programmes in ARM 7 using embedded C. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand and describe detailed architecture of 8051 Microcontroller. |
| 2 | To Classify/Illustrate different types of algorithm for microcontroller and it's application. |
| 3 | To Apply the knowledge to interface various peripheral devices with microcontroller. |
| 4 | To understand and describe detailed architecture of ARM 7. |
| 5 | To classify/Illustrate different types of algorithm for ARM 7. |
| 6 | To develop programmes in ARM 7 using embedded C. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | 1 | 1.7 | 1.7.1 | 1 | CO1 | Identify a computer network including media types, end devices that meets a customer's specific needs. |
| PO2 | 1 | 2.6 | 2.6.1 | 3 | CO2 | Illustrate basic network configuration on routers and Ethernet switches. |
| PO3 | 1 | 2.8 | 2.8.2 | 2 | CO3 | Describe the knowledge of programming for network communications. |
| PO4 | 1 | 5.5 | 5.5.1 | 4 | CO4 | Illustrate and analyze the simulation for computer networks. |
| PO5 | 1 | 4.4 | 4.4.3 | 6 | CO5 | Modify the connectivity problems in a host occurring at multiple layers of the OSI model. |
| PO6 | 1 | 5.6 | 5.6.1 | 1 | CO6 | Describe knowledge and skills necessary to gain employment as computer network engineer and network administrator. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce analysis and design of computer communication networks. |
| 2 | To design and configure a network for an organization. |
| 3 | To implement client-server socket programs. |
| 4 | To analyse the traffic flow and the contents of protocol frames. |
| 5 | To study working process for Protocols and analysing packets. |
| 6 | To study requirements and scope of Subnetting and Network Translation |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,2 | | 1.4 | 1.4.1 | Level 3 | 1 | Apply the knowledge of fundamental parameters of antenna to measure radiation pattern of dipole antennas. |
| 2 | | 1.4 | 1.4.1 | Level 4 | 2 | Identify different antennas and analyze dipole, monopole, loop helical and other wired antennas. |
| 5 | | 4.1 | 4.1.2 | Level 6 | 3 | Design linear arrays for efficient and complex transmit and receive system |
| 2,3 | | 4.1 | 4.1.2 | level 2 | 4 | Understand current antenna requirements and design cost effective rectangular patch antenna. |
| 4 | | 4.2 | 4.2.1 | Level 5 | 5 | Measure different antenna parameters and understand characteristics of radio wave propagation for analyzing wireless systems. |
| 4 | | 4.2 | 4.2.1 | Level 4 | 6 | Select type of antenna and provide appropriate design solution according to specified parameters. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To apply the knowledge of fundamental parameters of antenna to design wireless transmit and receive system. |
| 2 | To identify different antennas and analyze dipole, monopole, loop helical and other wired antennas. |
| 3 | To design linear arrays for efficient and complex transmit and receive system |
| 4 | To understand current antenna requirements and develop cost effective and compact antennas such as patch antennas accordingly. |
| 5 | To measure different antenna parameters and understand characteristics of radio wave propagation for analyzing wireless systems. |
| 6 | To effectively select type of antenna and provide appropriate design solution according to specified parameters. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| P01 | 2 | 1.3 | 1.3.1 | BI3 | CO1 | Convert original image into different color models |
| P02 | 2 | 2.2 | 2.2.4 | BI3 | CO2 | Use various image transforms on an image. |
| P02 | 2 | 2.3 | 2.3.1 | BI4 | CO3 | Perform point operations and filtering in spatial domain |
| P02 | 2 | 2.4 | 2.4.1 | BI4 | CO4 | Apply various morphology techniques on an image |
| P03 | 2 | 3.3 | 3.3.1 | BI5 | CO5 | Segment image into regions. |
| P05 | 2 | 5.1 | 5.1.1 | BI6 | CO6 | Construct mini project based on anyone of the image process |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Describe mathematical models of digital image processing. |
| 2 | Design different types of images transforms for different application. |
| 3 | Apply time and frequency domain techniques for image enhancement. |
| 4 | Use Image morphological and restoration techniques for image correction. |
| 5 | Analyse image segmentation techniques to recognize various shapes/ objects in an image. |
| 6 | Identify Mini project for Specific application |

Subject- DATABASE MANAGEMENT SYSTEMS LAB Subject Code- ECCDLO6023**Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.7 | 1.7.1 | BL2 | CO1 | To understand basic SQL programming for DBMS implementations |
| PO3 | PSO2 | 3.5 | 3.5.3 | BL5 | CO2 | To design data definition (DDL) commands using SQL |
| PO5 | PSO1 | 5.5 | 5.5.1 | BL6 | CO3 | To implement basic programming of SQL syntax using DML,DRL commands |
| PO4 | PSO1 | 4.3 | 4.3.3 | BL6 | CO4 | To design and analyze ERD (entity relationship diagram) modelling technique for database designing. |
| PO1 | PSO1 | 1.2 | 1.2.1 | BL3 | CO5 | To apply transaction management properties [ACID] in DBMS. |
| PO9 | PSO2 | 9.2 | 9.2.1 | BL2 | CO6 | To develop project based on case study as a result of product development |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To teach students basics of database management i.e. Relational database management system |
| 2 | To implement DDL commands using SQL |
| 3 | To implement DML,DRL,DCL commands using SQL |
| 4 | To design and analyze ERD (entity relationship diagram) modelling technique for database designing |
| 5 | To study and understand database designs in DBMS and transaction management properties |
| 6 | To design a project based case study for real life scenario involving database applications |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.5 | 1.5.1 | 1 | CO1 | Identify various tools and processes used in VLSI Design. |
| PO2 | 1 | 2.6 | 2.6.2 | 2 | CO2 | Describe working of various CMOS combinational and sequential circuits used in VLSI Design |
| PO3 | 1 | 3.5 | 3.5.4 | 2 | CO3 | Derive expressions for performance parameters of basic building blocks like CMOS inverter. |
| PO4 | 1 | 4.4 | 4.4.2 | 3 | CO4 | Demonstrate different design styles used in digital design like RTL, Transmission gates etc. Implement concept of sizing. Implementation of various circuits using different design styles. |
| PO5 | 1 | 3.8 | 3.8.2 | 4 | CO5 | Outline suitable circuit and design style for given application. |
| PO6 | 1 | 5.4 | 5.4.2 | 1 | CO6 | Analyze various combinational and sequential circuits for given specifications. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To impart the knowledge about VLSI design trends, methodologies and allied systems used in digital design. |
| 2 | To introduce fabrication process flow of VLSI Design. |
| 3 | To understand MOSFET operation from VLSI design perspective. |
| 4 | To learn VLSI design performance metric and various tradeoffs. |
| 5 | To design, implement and verify combinational and sequential logic circuits using various MOS design styles. |
| 6 | To provides an exposure to RTL design and programming |

Semester VII

Subject-Microwave Engineering

Subject Code- ECC701

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | | 2.1 | 2.1.3 | L3 | 1A | Find the scattering parameters of various microwave circuits. |
| 2 | | 2.3 | 2.3.2 | L6 | 1B | Design and draw impedance matching networks. |
| 1 | | 1.1 | 1.1.1 | L2 | 2A | Analyze the waveguide's operation mathematically for transmission of microwave signal. |
| 1 | | 1.3 | 1.3.1 | L4 | 2B | Demonstrate the working of waveguide microwave devices to solve microwave engineering problems. |
| 3 | | 3.3 | 3.3.1 | L5 | 3 | Compare all microwave solid state devices for generation and amplification of microwave signals. |
| 4 | | 4.2 | 4.2.1 | L2 | 4A | Explain electronics circuits using Microwave semiconductor devices. |
| 4 | | 4.3 | 4.3.2 | L1 | 4B | Describe that how microwave semiconductor devices meet specified needs at microwave frequencies |
| 5 | | 5.2 | 5.2.1 | L4 | 5A | Select appropriate microwave measurement techniques as per the requirement. |
| | | 5.3 | 5.3.2 | L4 | 5B | Analyze microwave measurement techniques with various microwave parameters based on its accuracy and limitations. |
| 4 | | 4.1 | 4.1.2 | L4 | 6 | Identify complex microwave circuit designing problems and its solutions by discussing MMICs and HMICs in detail. |

Course Objectives

| Sr. No. | Description |
|------------|---|
| 1 | To illustrate basic concepts of microwave communication and to focus on microwave designing using smith charts and microwave signal generation scattering parameters. |
| 2 | To understand fundamentals of waveguide modes and working of waveguide devices |
| 3 | To express the working of solid-state amplifiers and oscillators at microwave frequencies. |
| 4 | To explain the characteristics of microwave semiconductor devices. |
| 5 | To demonstrate measurement methods of microwave parameters. |
| 6 | To compare MMIC and HMIC and their constructions. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | BL2 | CO1 | To Understand, identify & describe various multiple access techniques to cope with change in world of technology |
| PO3 | PSO2 | 3.2 | 3.2.2 | BL6 | CO2 | To Design Various Cellular system design to meet Specific need. |
| po5 | PSO2 | 5.1 | 5.1.2 | BL3 | CO3 | To investigate engineering problems and Design electronic communication System to solve real time problems |
| PO1 | PSO1 | 1.2 | 1.2.1 | BL6 | CO4 | To Know and Design GSM, LTE Communication system to meet society needs |
| po2 | PSO2 | 2.1 | 2.1.2 | BL3 | CO5 | To Identify difficult issues of society & Create Cellular system using different propagation models. |
| po3 | PSO2 | 3.2 | 3.2.1 | BL3 | CO6 | To apply the concept of mobile communication for modern applications like cognitive radio |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | To learn various multiple acces technologies in Mobile communications |
| 2 | To design cellular systems aspects for mobile commuincations |
| 3 | To solve enginnering problems for real time |
| 4 | To design and analyze GSM, LTE and other cellular standards |
| 5 | To learn different propagation models |
| 6 | To model and apply concepts to modern mobile technology |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | Understand construction of optical fiber, its transmission characteristics, types of fibers etc. |
| PO2 | PSO1 | 2.1 | 2.1.3 | 2 | CO2 | Identify and analyse the various causes of signal degradation and loss mechanism in fibers, also understand the different types of attenuation and dispersion phenomenon. |
| PO3 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | Learn the optical sources of coherent and incoherent signal like LED and LASER to be studied and understand their working principle, types. |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | Optical receivers and detectors like PIN, APD etc should be understood including their working and noise performance. |
| PO1 | PSO2 | 1.3 | 1.3.1 | 2 | CO5 | Different important optics components like fibre joints, connectors, splices, couplers, optical amplifiers etc. to be analysed and understood. |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | Study the theoretical concepts of designing an optical fibre link with different system components using Link Budget design. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of Science and Engineering fundamentals for understanding of optical fibre communication link Ray propagation and transmission properties of optical fibres. |
| 2 | Understand the estimation of losses and analyse the propagation characteristics of an optical signal in different types of fibres. |
| 3 | Describe the principles and characteristics of optical sources like LED and LASER. |
| 4 | To learn the characteristics of fibre optic receivers and noise performance in photo detectors |
| 5 | To learn the different fibre optics components like fibre joints connectors splices couplers optical amplifiers and filters etc. |
| 6 | Design of an optical fibre link based on Link budget Design. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------|-----------|---|
| PO2 | | 2.1 | 2.1.2 | 2 | 1 | Understand and illustrate artificial neural networks solve complex Electronics and telecommunication engineering Problems. |
| PO5 | | 5.1 | 5.1.1 | 4 | 2 | Identify and apply supervised neural networks to solve telecommunication engineering problem |
| PO1 | | 1.1 | 1.1.2 | 2 | 3 | Interrelate supervised neural networks to find appropriate solution leading to valid conclusion |
| PO2 | | 2.1 | 2.1.2 | 4 | 4 | Identify and detect neural networks-based methods to solve the complex computer engineering problems. |
| po5 | | 5.1 | 5.1.2 | 5 | 5 | Determine the concept of fuzziness involved in various systems and provide adequate knowledge about fuzzy set theory, and fuzzy logic |
| PO5 PO3 | | 5.1 3.2 | 5.1.1 3.2,2 | 6 | 6 | design the real-world fuzzy systems. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the artificial neural networks |
| 2 | Learn about supervised neural networks |
| 3 | Identify unsupervised neural network design concepts |
| 4 | Learn neural networks based methods to solve real world complex problems |
| 5 | Understand the concept of fuzziness involved in various systems and provide adequate knowledge about fuzzy set theory, and fuzzy logic |
| 6 | Learn fuzzy logic to design the real world fuzzy systems |

Subject- Cyber Security & Laws**Subject Code- ILO7016****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.7 | 1.7.1 | L3 | CO1 | Apply theory and principles of computer science and engineering to identify different types of cyber crime and its effect on outside world. |
| PO1 | PSO2 | 1.6 | 1.6.1 | L3 | CO2 | Apply engineering fundamentals to identify various security challenges in mobile device for different types of attack and Distinguish different aspects of cyber law |
| PO4 | PSO2 | 4.6 | 4.6.1 | L3 | CO3 | Use of Different tools and methods in Cyber Security |
| PO6 | PSO1 | 6.4 | 6.4.1 | L2 | CO4 | Interpret legislation ,regulation, codes and standards relevant to E-Commerce , The Contract Aspects ,The Security Aspect ,The Intellectual Property Aspect in Cyber Law |
| PO6 | PSO1 | 6.4 | 6.4.1 | L2 | CO5 | Interpret legislation ,regulation, codes and standards relevant to cyber law and explain IT act 2000 and its latest amendments . |
| PO3 | PSO2 | 3.5 | 3.5.4 | L3 | CO6 | Able to choose appropriate information security standards during software design and development |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand and identify different types cybercrime and cyber law |
| 2 | To understand how criminal plan the attacks in system and mobile devices |
| 3 | To recognize various security challenges in mobile device for different types of attack. |
| 4 | To understand different tools and methods in Cyber Security. |
| 5 | To recognized Indian IT Act 2008 and its latest amendments |
| 6 | To learn various types of security standards compliances |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1,2 | | 1.4 | 1.4.1 | Level 3 | 1 | Apply the knowledge of fundamental parameters of waveguide to measure wavelength |
| 2 | | 1.4 | 1.4.1 | Level 4 | 2 | Identify different microwave components active and passive. |
| 5 | | 4.1 | 4.1.2 | Level 6 | 3 | Design stub matching circuit for impedance matching |
| 2,3 | | 4.1 | 4.1.2 | level 2 | 4 | Understand working mechanism of klystron power amplifier. |
| 4 | | 4.2 | 4.2.1 | Level 5 | 5 | Measure different parameters of TWTA and understand its working mechanism |
| 4 | | 4.2 | 4.2.1 | Level 4 | 6 | Measure VSWR, frequency of a signal in rectangular waveguide. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply the knowledge of fundamental parameters of waveguide to measure wavelength |
| 2 | To Identify different microwave components active and passive. |
| 3 | To design stub matching circuit for impedance matching |
| 4 | To understand working mechanism of klystron power amplifier. |
| 5 | To measure different parameters of TWTA and understand its working mechanism |
| 6 | To measure VSWR, frequency of a signal in rectangular waveguide. |

Subject-MCS**Course Code: ECL702****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 1 | 1 | 1.1 | 1.1.1 | 2 | 1 | Illustrate the cellular fundamentals and estimate the coverage and capacity of cellular systems |
| 2,3 | 1 | 2.1 | 2.1.2 | 4 | 2 | Analyze different types of propagation models and analyze the link budget |
| 2,3,4 | 2 | 2.2 | 2.2.2 | 2 | 3 | Summarize the fundamentals and system architecture of GSM system |
| 3,4,5 | 2 | 4.2 | 4.2.1 | 4 | 4 | analyze the design parameters of 3G technologies and CDMA |
| 3,4,5 | 2 | 5.1 | 5.1.1 | 4 | 5 | Identify the emerging technologies for upcoming mobile communication systems. |
| 4,5,9 | 2 | 5.3 | 5.3.2 | 6 | 6 | construct mini project based on different mobile communication technology. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the cellular system and fundamentals |
| 2 | To study and design different types of propagation models |
| 3 | To study the system architecture of 2G, 2.5 G and 3G |
| 4 | understanding the operation of mobile communications systems and their generation divisions |
| 5 | To develop the concepts of emerging technologies for 4 G standards and beyond. |
| 6 | Design mini project based on different mobile communication technology. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | L3 | CO1 | Calculate the numerical aperture. |
| PO2 | 1 | 2.1 | 2.1.3 | L4 | CO2 | Illustrate the dispersion for given fiber. |
| PO4 | 1 | 4.3 | 4.3.1 | L4 | CO3 | Analyze the link Loss for given link. |
| PO3 | 1 | 3.2 | 3.2.3 | L2 | CO4 | Understand the performance analysis of Optical Link with Different Sources. |
| PO4 | 1 | 4.1 | 4.1.2 | L1 | CO5 | Remember the performance analysis of optical link with different detectors. |
| PO2 | 1 | 2.7 | 2.7.2 | L2 | CO6 | Summarize the Normalized frequency (V Number) and Number of modes in fiber. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Apply the knowledge of mathematics and Science to analyse the concept of light propagation inside optical fibres and understand its transmission properties |
| 2 | Comprehend the basic elements of optical fibre link and optical fibre structure. |
| 3 | Identify the optical loss characteristics and distortion of signal in optical waveguide that affect the performance of fibres. |
| 4 | Understand and demonstrate the important basic parameters related to performance of optical fibre by using simulation tools. |
| 5 | Design an optical fibre link with different system components and analyse its performance. |
| 6 | Design and develop innovative optical devices for practical applications in groups and present. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------|------------|-------------------|----------------|----------------------|-----------|---|
| PO1 | | 1.3 | 1.3.1 | 2 | 1 | Understand, the impact of neural network on society and environment for sustainable development. |
| PO2 | | 2.2 | 2.2.3 | 4 | 2 | Identify, formulate and analyze the principles of artificial neural network to conceptualize the working of human brain |
| PO1 | | 1.3 | 1.3.1 | 5 | 3 | determine and apply appropriate basic neural network rule to analyze engineering rules |
| PO5 | | 5.1 | 5.1.2 | 3 | 4 | Apply the knowledge of supervised and unsupervised learning algorithms to solve complex engineering problem |
| PO2 | | 2.2 | 2.2.2 | 4 | 5 | Identify and select other Fuzzy logic techniques to meet specified needs. |
| PO4 PO 5 | PSO1 | 4.1 5.1 | 4.1.1 5.1.2 | 6 | 6 | Investigate the impact of fuzzy logic and fuzzy system to lead to valid conclusion. |

Course Objectives

| Sr. No. | Description | |
|----------------|---|--|
| 1 | Understand the impact of neural network. | |
| 2 | Understand the basic concepts of working of human brain. | |
| 3 | Identify the various neural network rules. | |
| 4 | Apply the knowledge of supervised and unsupervised learning rule algorithms. | |
| 5 | To become familiar with fuzzy logic. | |
| 6 | Understand the fuzzy system. | |

SEMESTER VIII

Subject- RF Design

Subject Code- ECC801

Course Outcome

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.6 | 1.6.1 | Level2 | CO1 | Implement matching networks using passive elements |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO2 | Apply the knowledge of design and appraise RF amplifiers. |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO3 | Apply the knowledge of design of oscillator & Mixer |
| PO2 | PSO1 | 2.6 | 2.6.4 | Level4 | CO4 | Analyze the Frequency Synthesizers. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level2 | CO5 | Explain the concept of EMI in RF Circuit. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level2 | CO6 | Analyze EMC in RF circuits. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Provide basic information on the RF circuit design |
| 2 | An ability to design single stage and power amplifiers for RF applications |
| 3 | An ability to design RF subsystems such as mixers, oscillators. |
| 4 | Analyze performance of Frequency Synthesizers. |
| 5 | Understand Electromagnetic Interference in RF circuits. |
| 6 | learn importance of Electromagnetic Compatibility |

Subject-WN**Subject Code- ECC 802****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.3 | 1.3.1 | 2 | CO1 | Basics of wireless network architectures, Classification of various wireless networks, WBAN architecture and applications in medical field. |
| PO2 | PSO1 | 2.1 | 2.1.3 | 2 | CO2 | To study the various emerging technologies like Zigbee, Bluetooth etc. |
| PO2 | PSO2 | 3.2 | 3.2.3 | 3 | CO3 | Concepts of WLAN equipment, topologies, BSS and main features of IEEE 802.11 standard |
| PO4 | PSO2 | 4.1 | 4.1.2 | 3 | CO4 | To understand architecture, planning and design of wireless networks. |
| PO1 | PSO2 | 1.3 | 1.3.1 | 2 | CO5 | To develop the concepts of wireless adhoc network architecture. |
| PO4 | PSO1 | 4.1 | 4.1.3 | 3 | CO6 | To understand the WSN applications and IOT working, advantages in modern world. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Introduction to fundamentals, architecture, and classification of various wireless networks, network architecture of Body area Networks. |
| 2 | Study emerging wireless Personal area network (PAN) technologies like ZigBee, Bluetooth, RFID, NFC and UWB. |
| 3 | Classify various LAN topologies and technologies and study the features of 802.11 standard |
| 4 | Illustrate the architecture of WMAN- WiMAX, Wi-Fi and describe the phases of planning and Design of wireless networks. |
| 5 | Discuss various wireless adhoc networks architecture and protocols like VANET |
| 6 | Understand the Sensor network architecture, WSN applications, basic architecture and working of IOT. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | 1 | 1.2 | 1.2.2 | 1 | CO1 | Identify the issues related to signal degradation and multiplexing. |
| PO2 | 1 | 2.5 | 2.5.2 | 3 | CO2 | Demonstrate a comprehensive overview of optical network evolution and analyze basic nonlinearities phenomenon in optical fiber systems. |
| PO3 | 1 | 3.8 | 3.8.1 | 3 | CO3 | Apply the knowledge developed in-class to contemporary optical fiber communication research and industrial areas. |
| PO4 | 1 | 3.7 | 3.7.1 | 4 | CO4 | Illustrate the concepts of designing and operating principles of modern optical communication systems and networks. |
| PO5 | 1 | 4.6 | 4.6.1 | 4 | CO5 | Analyze, comprehend and model the functioning of passive components essential for optical networks |
| PO6 | 1 | 3.6 | 3.6.1 | 3 | CO6 | Demonstrate an ability to model and design WDM optical networks and access networks with respect to routing, dimensioning and configurations |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Investigate different issues related to signal degradation due to linear impairment |
| 2 | High data rate WDM optical transport network performance. |
| 3 | Optical Network architecture and operating principles. |
| 4 | Understand the concepts of Packet switching and access optical networks |
| 5 | Provide the design of optical network |
| 6 | Network Management functions and standards. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 2 | 2 | 2.1 | 2.1.3 | L3 | 1A | Find the antenna look angles for an Earth station antenna. |
| 2 | 2 | 2.2 | 2.2.2 | L3 | 1B | Identify and assemble the basic satellite communication concepts to find the values of different orbital parameters like eccentricity and apogee and perigee height of a satellite orbit, rate of regression of nodes and rotation of line of apsides. |
| 1 | 2 | 1.3 | 1.3.1 | L4 | 2 | Demonstrate the working of all subsystems of space segment |
| 4 | 2 | 4.2 | 4.2.2 | L1 | 3A | Understand the importance of types of Earth station antennas. |
| 4 | 2 | 4.3 | 4.2.3 | L1 | 3B | Describe the various sub systems of earth stations, transmit –receive type earth station. |
| 1 | 2 | 1.1 | 1.1.1 | L5 | 4A | Determine various losses of satellite link. |
| 1 | 2 | 1.2 | 1.2.1 | L3 | 4B | Calculate carrier to noise ratios and other parameters for satellite link by applying the knowledge of basic communication and antenna concepts. |
| 4 | 2 | 4.3 | 4.3.2 | L4 | 5 | Analyze the different satellite access techniques according to its applications and compare their performance. |
| 5 | 2 | 5.2 | 5.2.2 | L4 | 5A | Survey of various applications of Satellite Communication, its advantages and limitations. |
| 4 | 2 | 4.2 | 4.2.2 | L2 | 5B | Illustrate the working of Laser Satellite Communication. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To illustrate basic concepts of satellite communication and to calculate the look angles of an earth station antenna and various satellite orbital parameters. |
| 2 | To understand fundamentals of working of space segment. |
| 3 | To express the aspects and functioning of earth station and different types of earth stations. |
| 4 | To design link power budget for satellite communication system. |
| 5 | To summarize modern satellite multiple access techniques, modulation and coding techniques. |
| 6 | To explain different applications of satellite communication. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|---------------------|------------|---------------------|---------------------------|----------------------|-----------|--|
| PO2 | | 2.6 | 2.6.3 | 1 | 1 | Identify and define Project life cycles and Role of project manager |
| PO1 PO11 | | 1.5 11.5 | 1.5.1 11.5.1 | 3 | 2 | Apply selection criteria and select an appropriate project from different options |
| PO3 PO10 PO11 | | 3.7 10.4 11.6 | 3.7.1 10.4.1 11.6.2 | 6 | 3 | Develop a schedule for a project , based on work break down structure |
| PO7 | | 7.3 | 7.3.1 | 3 | 4 | predict opportunities and threats to the project and determine an approach to deal with them strategically |
| PO1 PO8 | | 1.5 8.3 | 1.5.1 8.3.1 | 3 | 5 | Use Earned value technique and determine status of the project. |
| PO5 PO9 PO10 | | 5.4 9.5 10.6 | 5.4.1 9.5.1 10.6.1 | 4 | 6 | analyze lessons learned during project phases and document them for future reference |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Understand the students with utilizing project management concepts, project management life cycle ,tools and techniques. |
| 2 | Gain knowledge about the selection criteria and select an appropriate project from different options |
| 3 | To familiarize the students with the use of a structured methodology/WBS/approach for each and every unique project . |
| 4 | To appraise the students with the opportunities and threats to the project and select an approach to deal with them strategically . |
| 5 | To acquaint the student with the importance of Executing Project phase, Planning monitoring and controlling cycle |
| 6 | To recognized lessons learned about Project Leadership ,Ethics and document them for future reference |

Subject-Environmental Management**Course Code: ILOC8029****Course Outcomes**

| PO | PSO | PI | Bloom's Level | CO | Description |
|-----------|------------|-----------|----------------------|-----------|---|
| PO7 | | 7.1.2 | LEVEL 1 | CO1 | To Understand and identify environmental issues relevant to India and global concerns |
| PO7 | | 7.2.1 | LEVEL 2 | CO2 | To Study the needs for sustainable development |
| PO7 | | 7.1.1 | LEVEL 1 | CO3 | To Learn concepts of ecology |
| PO7 | | 7.2.2 | LEVEL 2 | CO4 | To Understand the Scope and implementation of Environment Management in corporates |
| PO7 | | 7.1.1 | LEVEL 3 | CO5 | To Learn Total Quality Environmental Management and its certification process |
| PO7 | | 7.2.2 | LEVEL 2 | CO6 | To Familiarize environment related legislations |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand the concept of environmental management |
| 2 | Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| 3 | Explain the concept of ecosystem its interdependence & food chain etc |
| 4 | Illustrate EQM and Corporate Environmental Responsibility |
| 5 | Apply the process of ISO-14000, EMS Certification to their respective companies |
| 6 | Understand and interpret environment related legislations |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.6 | 1.6.1 | Level2 | CO1 | Implement matching networks using passive elements |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO2 | Apply the knowledge of design and appraise RF amplifiers. |
| PO3 | PSO1 | 3.6 | 3.6.1 | Level3 | CO3 | Apply the knowledge of design of oscillator & Mixer |
| PO2 | PSO1 | 2.6 | 2.6.4 | Level4 | CO4 | Analyze the Frequency Synthesizers. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level2 | CO5 | Explain the concept of EMI in RF Circuit. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level2 | CO6 | Analyze EMC in RF circuits. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Provide basic information on the RF circuit design |
| 2 | An ability to design single stage and power amplifiers for RF applications |
| 3 | An ability to design RF subsystems such as mixers, oscillators. |
| 4 | Analyze performance of Frequency Synthesizers. |
| 5 | Understand Electromagnetic Interference in RF circuits. |
| 6 | learn importance of Electromagnetic Compatibility |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO1 | 1.6 | 1.6.1 | L2 | CO1 | Understand the basics of wireless network architectures, Classification of various wireless networks. |
| PO4 | PSO1 | 4.5 | 4.5.1 | L6 | CO2 | Design the various emerging technologies like Zigbee, Bluetooth etc. |
| PO3 | PSO1 | 3.6 | 3.6.1 | L4 | CO3 | Analyze the of WLAN equipment, topologies, BSS and main features of IEEE 802.11 standard |
| PO3 | PSO2 | 3.6 | 3.6.1 | L3 | CO4 | Demonstrate & design of wireless networks. |
| PO4 | PSO2 | 4.5 | 4.5.1 | L4 | CO5 | Analyze the performance of a MANET with increasing node mobility. |
| PO3 | PSO1 | 3.6 | 3.6.2 | L6 | CO6 | Design a wireless sensor network |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Study of fundamentals, architecture, and classification of various wireless networks, network architecture of Body area Networks. |
| 2 | Simulation of emerging wireless Personal area network (PAN) technologies like ZigBee, Bluetooth, RFID, NFC and UWB. |
| 3 | Design various LAN topologies and technologies and study the features of 802.11 standard |
| 4 | Develop the architecture of WMAN- WiMax, WiFi and describe the phases of planning and Design of wireless networks. |
| 5 | Create various wireless adhoc networks architecture and protocols like VANET |
| 6 | Design the Sensor network architecture, WSN applications, basic architecture and working of IOT. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.2 | 1.2.2 | 1 | CO1 | Demonstrate the working principle of optical components. |
| PO2 | 1 | 2.5 | 2.5.2 | 3 | CO2 | Design of optical amplifier |
| PO3 | 1 | 3.8 | 3.8.1 | 3 | CO3 | Implement working principle of SONET |
| PO4 | 1 | 3.7 | 3.7.1 | 4 | CO4 | Analyze the DDWM traffic |
| PO5 | 1 | 4.6 | 4.6.1 | 4 | CO5 | Illustrate the SDN optical network/Intelligent optical network. |
| PO6 | 1 | 3.6 | 3.6.1 | 3 | CO6 | Demonstrate the model for WDM optical networks. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Investigate different issues related to signal degradation due to linear impairment |
| 2 | High data rate WDM optical transport network performance. |
| 3 | Optical Network architecture and operating principles. |
| 4 | Understand the concepts of Packet switching and access optical networks |
| 5 | Provide the design of optical network |
| 6 | Network Management functions and standards. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.3 | 2.2.4 | BL2 | CO1 | To understand basics of Satellite communications |
| PO4 | PSO1 | 4.3 | 3.3.1 | BL3 | CO2 | To evaluate carrier to noise ratio using satellite designing concepts |
| PO3 | PSO2 | 3.2 | 3.2.2 | BL4 | CO3 | To model and demonstrate telemetry and tracking command subsystem of satellite systems |
| PO3 | PSO2 | 3.1 | 3.1.5 | BL2 | CO4 | To Study various subsystems of earth stations and transmit receive earth stations |
| PO3 | PSO1 | 3.1 | 3.2.1 | BL5 | CO5 | To design and develop programming approach for finding link budget analysis of satellite |
| PO3 | PSO2 | 3.1 | 3.1.5 | BL2 | CO6 | To Study communications and networking concepts in satellite systems |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To learn fundamentals of Satellite communications in relation with physics |
| 2 | To evaluate carrier to noise ratio for uplink and downlink of satellite |
| 3 | To demonstrate telemetry and tracking command subsystem of satellite systems |
| 4 | To adhere different subsystems of earth stations and transmit receive earth stations |
| 5 | To calculate and design link budget analysis of satellite using basic given parameters |
| 6 | To compare and understand communications and networking concepts in satellite systems |

Department: INFORMATION TECHNOLOGY

Semester-III

Scheme R-19

Subject-Engineering Mathematics-III

Subject Code-ITC301

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|-----|------------|-------|---------------|-----|--|
| PO1. 2,5 | - | 1.6 | 1.6.1 | 3 | CO1 | Apply the concept of Laplace transforms and use to solve real integrals in engineering problems |
| PO2, 3 | - | 2.5 | 2.5.2 | 3,5 | CO2 | Identify the concept of inverse laplace transform and compare to various functions and its applications |
| PO3, 4 | - | 3.5 | 3.5.6 | 3,6 | CO3 | Develop and determine Fourier series for real life problems and applications. |
| PO1, 2 | - | 2.8 | 2.8.1 | 3,4 | CO4 | Apply the properties of Complex analysis and select the application to orthogonal trajectories. |
| PO2. 3,5 | - | 5.4 | 5.4.2 | 3 | CO5 | Use the concept of statistical techniques to solve problems in data science,machine learning and AI. |
| PO1, 2,12 | | 1.2 | 1.2.2 | 3 | CO6 | Apply the concept of probability,expectation to determine the spread of data and probability distribution. |

Course Objectives

| Sr. No | Description |
|--------|--|
| 1 | To familiarize with the Laplace transform and its properties. |
| 2 | To study the Inverse Laplace transform of various functions , theorem and its applications. |
| 3 | To understand the concept of fourier series , its complex form and enhance the problem. |
| 4 | To familiarize the concept of complex variables , C-R equations with applications. |
| 5 | To understand the basic techniques of statistics like correlation , regression and curve fitting for data analysis, machine learning and AI. |
| 6 | To study some advanced topic of probability , random variables with their distributions and expectations. |

| Course Outcomes | | | | | | |
|-----------------|-----|------------|-------|---------------|----|---|
| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
| 5 | 1 | 5.6 | 5.6.1 | 2 | | Discuss the data structure principles such stacks, queues and linked list, Static-Dynamic Implementation. |
| 2 | 1 | 2.1 | 2.5.2 | 4 | | Identify algorithms with parameters in tackling problems using various data structures. |
| 5 | 2 | 5.6 | 5.6.1 | 2,4 | | Discuss and Categorize the concept of nonlinear data Structure such as trees with advanced data structure often including threaded binary tree, AVL Trees. |
| 2 | | 2.1 | 2.5.2 | 4 | | Identify process with parameters to perform numerous operations on nonlinear data structure |
| 1 | 2 | 1.7 | 1.7.1 | 4 | | Apply and assess nonlinear data structure with their real life problem needed to solve. |
| 5 | 1 | 5.6 | 5.6.1 | 2 | | Discuss the concepts of graph. |
| 2 | | 2.1 | 2.5.2 | 4 | | Illustrate Graph with its various operations. |
| 1 | 1 | 1.7 | 1.7.1 | 4 | | Apply Graph traversal with their inputs for resolution of problems in real life. |
| 5 | 1 | 5.6 | 5.6.1 | 2,3 | | Discuss Use and interpret the core values of recursion |
| 2 | 1 | 2.1 | 2.5.2 | 2 | | Discuss and identify a need for storage management process with its techniques of handling fragmentation and garbage collection, and its comprehensiveness in solving problems in real life. |
| 3 | 2 | 3.6 | 3.6.1 | 1, 2 | | List, investigate and explore the principles behind the concepts of sorting, searching and hashing with its collision handling methods |
| 2 | 2 | 2.7 | 2.7.1 | 4 | | Analyze its adequacy in real life problem solving. |
| 4 | 1 | 3.6 | 3.6.2 | 4 | 6 | ata structure viz. stack, queue, linked list, trees and graph |

Course Objectives

| Sr. No. | Description |
|---------|---|
| 1 | To learn the basics and understand the need of data structure & algorithm analysis. |
| 2 | The programming knowledge which can be applied to sophisticated data structures. |
| 3 | The fundamental knowledge of stacks queue, linked list etc. |
| 4 | The fundamental knowledge of Trees, Graphs etc. |
| 5 | The fundamental knowledge of different sorting, searching, hashing and recursion techniques |
| 6 | The real time applications for stacks, queue, linked list, trees, graphs etc. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------|-----------|--|
| | | 2.5 2.6 | 2.5.2 2.6.6 | L4 L4 | | Identify the need of Database Management System. |
| PO1 PO3 | 2 | 1.7 3.8 | 1.7.1 3.8.2 | L3 L5 | 2 | Apply the theory of database systems. Able to design a database/solve a real time database problem |
| | | 2.7 2.8 | 2.7.2 2.8.1 | L4 L3 | | Identify relational model constraints for the database |
| PO2 | 1 | 2.7 | 2.7.2 | L3 | 4 | Apply the knowledge SQL to formulate queries |
| PO2 PO1 | 1 | 2.7 1.7 | 2.7.2 1.7.1 | L4 L3 | 5 | Identify design constraints. Apply the principles of normalization to normalize the database to the highest normalization level |
| PO2 | 1 | 2.5 | 2.5.2 | L2 | 6 | Demonstrate and identify the concept of transaction, concurrency and recovery |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To learn the basics and understand the need of database management system. |
| 2 | To construct conceptual data model for real world applications |
| 3 | To Build Relational Model from ER/EER. |
| 4 | To introduce the concept of SQL to store and retrieve data efficiently. |
| 5 | To demonstrate notions of normalization for database design |
| 6 | To understand the concepts of transaction processing- concurrency control & recovery procedures |

Subject- Principle of Communications**Subject Code: ITC304****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.6 | 1.6.1 | L3 | CO1 | Apply basic engineering fundamentals to explain the basic of Analog and Digital Communication Systems. |
| PO2 | | 2.6 | 2.6.4 | L2 | CO1 | Compare and contrast between Analog and Digital Communication Systems to select best communication system as per application. |
| PO1 | | 1.6 | 1.6.1 | L2 | CO2 | Apply engineering fundamentals to differentiate types of noise. |
| PO1 | | 1.2 | 1.2.1 | L3 | CO2 | Apply the knowledge of Friiss formula to solve problems. |
| PO2 | | 2.8 | 2.8.2 | 4 | CO2 | Analyses the Fourier transform of time and frequency domain and interpret the result. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO3 | Apply engineering fundamentals to explain Amplitude and Frequency modulation techniques. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO3 | Apply engineering fundamentals to sketch Transmitter and receiver of AM, DSB, SSB and FM. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO4 | Apply engineering fundamentals to explain Pulse analog and digital modulation techniques. |
| PO2 | | 2.6 | 2.6.4 | L2 | CO4 | Compare and contrast between Pulse digital modulation techniques to select best modulation technique. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO5 | Apply engineering fundamentals to explain ASK, FSK, PSK modulation techniques. |
| PO2 | | 2.6 | 2.6.4 | L2 | CO5 | Compare and contrast between ASK, FSK, PSK modulation techniques to select best modulation technique. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO6 | Apply engineering fundamentals to explain Electromagnetic radiation and propagation. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Study the basic of Analog and Digital Communication Systems. |
| 2 | Describe the concept of Noise and Fourier Transform for analysing communication systems. |
| 3 | Acquire the knowledge of different modulation techniques such as AM, FM and study the block diagram of transmitter and receiver. |
| 4 | Study the Sampling theorem and Pulse Analog and digital modulation techniques. |
| 5 | Learn the concept of multiplexing and digital band pass modulation techniques. |
| 6 | Gain the core idea of electromagnetic radiation and propagation of waves. |

Course Outcomes

| PO | PSO | Competency | PI | Blooms Level | CO | Description |
|-----------|------------|-------------------|-----------|---------------------|-----------|--|
| PO1 | 1 | 1.6 | 1.6.1 | Level 4 Analyze | CO1 | able to apply knowledge to compare different programming paradigm |
| PO1 | 1 | 1.6 | 1.6.1 | Level 1 Remembrer | CO2 | able to apply knowledge understand the basic concept of object oriented |
| PO1 | 1 | 1.6 | 1.6.1 | Level 1 Remembrer | CO3 | apply knowledge to understand the concepts of declarative programming paradigms through functional and logic programming |
| PO3 | 1 | 3.8 | 3.8.2 | Level 6 Creating | CO4 | able to implement programs based on declarative programming paradigm using functional and/or logic programming. |
| PO2 | 1 | 2.5 | 2.5.2 | Level 3 Apply | CO5 | Apply the knowledge to identify programming for developing application |
| PO2 | 1 | 2.6 | 2.6.1 | Level 6 Creating | CO6 | Develop and reframe website for client-server |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | introduce various programming paradigms and understand the basic concept of programming language |
| 2 | understand data abstraction and object orientation |
| 3 | introduce the basic concepts of declarative programming paradigms |
| 4 | design solutions using declarative programming paradigms |
| 5 | Learn the concept of parallel and distributed programming |
| 6 | understand use of scripting language |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|--|
| 1 | 1 | 4.5 | 4.5.1 | L1 L6 | 1 | Understand and use the basic concepts and principles of various linked lists, stacks and queues. |
| 4 | 1 | 4.3 | 4.3. | L6 | 2 | Understand the concepts and apply the methods in basic trees. |
| 4 | 2 | 4.6 2.7 | 4.6.1 2.7.1 | L2 L3 | 3 | Use and identify the methods in advanced trees. |
| 2 | 2 | 2.7 2.8 | 2.7.2 2.8.1 | L3 L2 | 4 | Understand the concepts and apply the methods in graphs. |
| 3 | 1 | 4.5 | 4.5.1 | L2 | 5 | Understand the concepts and apply the techniques of searching, hashing and sorting |
| 2 | 1 | 4.5 | 4.5.3 | L2 | 6 | Illustrate and examine the methods of linked lists, stacks, queues, trees and graphs to various real time problems |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To use data structures as the introductory foundation for computer automation to engineering problems. |
| 2 | To use the basic principles of programming as applied to complex data structures. |
| 3 | To learn the principles of stack, queue, linked lists and its various operations. |
| 4 | To learn fundamentals of binary search tree, implementation and use of advanced tree like AVL, B trees and graphs. |
| 5 | To learn about searching, hashing and sorting. |
| 6 | To learn the applications of linked lists, stacks, queues, trees and graphs. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 3 4 | 2 | 3.5 4.5 | 3.5.1 4.5.1 | L1 L6 | 1 | Able to define a precise problem statement for real life applications. Design and |
| 4 | 2 | 4.5 | 4.5.1 | L6 | 2 | Design and develop RDBMS using SQL |
| 4 2 | 1 | 4.6 2.7 | 4.6.1 2.7.1 | L2 L3 | 3 | Demonstrate an ability to retrieve data and analyze data Apply SQL concepts to formulate SQL queries |
| 2 2 | 2 | 2.7 2.8 | 2.7.1 2.8.1 | L3 L2 | 4 | Able to apply view triggers and procedures Demonstrate specific event handling |
| 4 | 1 | 4.5 | 4.5.1 | L2 | 5 | Demonstrate database connectivity using JDBC. |
| 4 | 1 | 4.5 | 4.5.1 | L2 | 6 | Demonstrate the concept of concurrent transactions |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To identify and define problem statements for real life applications |
| 2 | To construct conceptual data model for real life applications |
| 3 | To Apply SQL to store and retrieve data efficiently |
| 4 | To apply view ,triggers and event handling |
| 5 | To implement database connectivity using JDBC |
| 6 | To understand the concepts of transaction processing- concurrency control & recovery procedures |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | L3 | CO1 | understand and apply different loops in c++ |
| PO1 | 1 | 1.6 | 1.6.1 | L3 | CO2 | Aply knowldge of Object Oriented concepts in C++ program |
| PO2 | 1 | 2.6 | 2.6.2 | L1 | CO3 | Understand the multithreaded programs in Java and C++ and implement solution for concurrency as solution |
| PO1 | 1 | 1.6.1 | 1.6.1 | L3 | CO4 | Aply knowldge use of exception handling and garbage collection in C++ and JAVA |
| Po3 | 1 | 3.7 | 3.7.1 | L6 | CO5 | Design solution based on declarative programming paradigm using functional and logic programming using Haskell. |
| PO2 | 1 | 2.6 | 2.6.4 | L5 | CO6 | Compare the implementations in multiple paradigms at coding and execution level teams |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the basic concept of different loops in C++ |
| 2 | Understand the basic concept of object oriented programming |
| 3 | learn concepts of concurrent program execution |
| 4 | Understand run time program management |
| 5 | Understand the declarative programs in functional and logic programming languages |
| 6 | understand the different programming paradigms. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO1 | Understand and explain Basic programming concepts |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO2 | Use the basic concepts like class,Objects,methods,Array,String for finding solution to problems. |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO3 | Demonstrate how to use inheritance,interface and packages for development. |
| 3 | 1 | 3.8.1 | 3.8 | 3 | CO4 | Use multithreading, exceptional handling and IOstreams concepts for better development. |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO5 | Design and Develop GUI using Swing and AWT. |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO6 | Design and Develop GUI using JavaFX. |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To understand the concept of Object-oriented paradigm in the Java programming Language |
| 2 | To understand the importance of classes & Objects along with Constructors, Arrays, String and vectors. |
| 3 | To learn the principles of Inheritance, Interface and packages and demonstrate the concept of reusability for faster development. |
| 4 | To recognize usage of Exception Handling, Multithreading, Input Output streams in various applications |
| 5 | To learn designing, implementing, testing, and debugging graphical user interfaces in Java using Swings and AWT components that can react to different user events. |
| 6 | To develop graphical user interfaces using JavaFX controls. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO2 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problems based on societal /research needs and apply Knowledge and skill to solve it in a group |
| PO9 | PSO1 | 9.5 | 9.5.1 | L2 | CO2 | Demonstrate effective communication, problem-solving, conflict resolution and leadership skills to work as member of a group or leader. |
| PO4 | PSO1 | 4.6 | 4.6.2 | L4 | CO3 | Critically analyze results through theoretical/experimental/simulations for trends and correlations, stating possible errors and limitations |
| PO7 | PSO1 | 7.3 | 7.3.1 | L4 | CO4 | Identify and analyse the impacts of solutions in societal and environmental context for sustainable development. |
| PO10 | PSO2 | 10.5 | 10.5.2 | L3 | CO5 | Deliver effective oral presentations and use standard norms of engineering practices to technical and non-technical audiences |
| PO12 | PSO1 | 12.5 | 12.5.2 | L2 | | Recognize the need and demonstrate capabilities of self-learning in a group to keep current regarding new developments in IT field for life long learning |
| PO11 | PSO1 PSO2 | 11.5 | 11.5.1 | L5 | | Analyze, evaluate and select the most appropriate proposal based on economic and financial considerations and thus demonstrate project management principles during project work. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To acquaint with the process of identifying the needs and converting it into the problem. |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges in the field of IT |
| 4 | To familiarize the process of solving the problem in a group. |
| 5 | To acquaint with the process of applying basic engineering fundamentals to attempt solutions to The problems. |
| 6 | To inculcate the process of self-learning and research. |

Semester- IV

Subject-Engineering Mathematics-IV

Subject Code-ITC401

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|--------------|-----|------------|-------|---------------|-----|--|
| PO1, 2,3 | - | 1.7 | 1.7.1 | 3 | CO1 | Apply the concept of eigen values and eigen vectors in engineering problems |
| PO2, 4,5 | - | 2.8 | 2.8.1 | 3,5 | CO2 | Use the concepts of Complex integration for evaluating integrals ,computing residues and evaluate various contour integrals. |
| PO1, 5 | - | 5.4 | 5.4.2 | 3 | CO3 | Apply the concept of Z-transformation and inverse in engineering problem. |
| PO1, 2,12 | - | 2.8 | 2.8.4 | 3,2 | CO4 | Illustrate understanding the concept of probability distribution and sampling theory to engineering problem. |
| PO1, 2,4 | - | 4.5 | 4.5.1 | 3 | CO5 | Apply the concept of Linear programming problems to optimization. |
| PO1, 2.4 | - | 2.6 | 2.6.3 | 3 | CO6 | Solve Non linear programming problem for optimization of engineering problem. |

Course Objectives

| Sr. No | Description |
|--------|---|
| 1 | To understand matrix algebra for engineering problems. |
| 2 | To study line and contour integrals and expansion of a complex valued function in a power series. |
| 3 | To understand the concept of Z-Transform and iverse Z-Transform with its properties.. |
| 4 | To familiarize the concept of probability distributions and sampling theory for small samples. |
| 5 | To study the basic techniques of LPP for optimization. |
| 6 | To apply the concept of NLPP to understand the optimization of engineering problem. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | 1 | 2.6 | 2.6.2 | L2 | | Understand the functionality of each layer of communication model |
| 2 | 1 | 2.6 | 2.6.4 | L5 | | Compare the OSI & TCP/IP Communication Models |
| 1 | 1 | 1.6 | 1.6.1 | L4 | | Categorize the type of Transmission Media |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Describes Switching techniques |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Understand Responsibilities and Protocols of data link layer |
| 2 | 1 | 2.8 | 2.8.2 | L4 | | Analyze the routing protocols |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Understand IPv4 and IPv6 header Formats |
| 4 | 1 | 4.4 | 4.2.2 | L3 | | Apply knowledge of IPV4 Addressing to choose a block of IP Address for a Network |
| 1 | 1 | 1.7 | 1.7.1 | L2 | CO4 | Explain data transportation issues and related protocols used for end-to-end data transmission |
| 1 | 1 | 1.6 | 1.6.1 | L1 | | List the data presentation techniques |
| 1 | 1 | 1.7 | 1.7.1 | L4 | | Illustrate the client server model in application layer protocols |
| 4 | 2 | 4.4 | 4.2.2 | L3 | CO6 | apply the concepts of IP address, Routing and Application service to design a network for an organization |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Study basics of Computer Network Hardware, Software and Communication Models. |
| 2 | Describe data link layer concepts, design issues and protocols and Learn the fundamentals and basics of Physical layer . |
| 3 | Gain core knowledge of Network layer routing protocols and IP addressing. |
| 4 | Study session layer design issues, transport layer services and protocols. |
| 5 | Acquire knowledge of Application layer and presentation layer paradigm and protocols. |
| 6 | Design of a small network |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO1 | 2.6 | 2.6.2 | Level L2 Understand | CO1 | Understand the basic concepts related to Operating System. |
| PO4 | PSO1 | 4.4 | 4.4.1 | Level L2 Understand | CO2 | Describe the process management policies and illustrate scheduling of processes by CPU. |
| PO3 | PSO2 | 3.6 | 3.62 | Level 3 Apply | CO3 | Explain and apply synchronization primitives and evaluate deadlock conditions as handled by Operating System. |
| PO4 | PSO2 | 4.5 | 4.5.1 | level 4 Analyze | CO4 | Describe and analyze the memory allocation and management functions of Operating System. |
| PO4 | PSO2 | 4.4 | 4.4.3 | level 4 Analyze | CO5 | Analyze and evaluate the services provided by Operating System for storage management. |
| PO5 | PSO1 | 5.4 | 5.4.1 | level 4 Analyze | CO6 | Compare the functions of various special-purpose Operating Systems. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To understand the major components of Operating System & its functions. |
| 2 | To introduce the concept of a process and its management like transition, scheduling, etc. |
| 3 | To understand basic concepts related to Inter-process Communication (IPC) like mutual exclusion, deadlock, etc. and role of an Operating System in IPC |
| 4 | To understand the concepts and implementation of memory management policies and virtual memory. |
| 5 | To understand functions of Operating System for storage management and device management. |
| 6 | To study the need and fundamentals of special-purpose operating system with the advent of new emerging technologies. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | 1 | 3.6 | 3.6.1 | 2,4,6 | 1 | Explain, analyze and design Regular languages, Expression and Grammars. |
| 1 | 2 | 2.1 | 2.5.3 | 6 | 2 | Design and Apply different types of Finite Automata and Machines as Acceptor, Verifier and Translator. |
| 2 | 1 | 3.6 | 3.6.1 | 4, 6 | 3 | Analyze and design Context Free languages and Grammars. |
| 4 | 1 | 2.1 | 2.5.2 | 6 | 4 | Design different types of Push down Automata as Simple Parser. |
| 4 | 1 | 1.7 | 1.7.1 | 6 | 5 | Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine. |
| 3 | 2 | 3.6 | 3.6.2 | 6 | 6 | Investigate and Develop understanding of applications of various Automata. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Learn fundamentals of Regular and Context Free Grammars and Languages |
| 2 | Summarize the relation between Regular Language and Finite Automata and machines. |
| 3 | Design Automata's and machines as Acceptors, Verifiers and Translators. |
| 4 | Represent the relation between Contexts free Languages, PDA and TM. |
| 5 | Make PDA as acceptor and TM as Calculators. |
| 6 | Co-relate Automata's with Programs and Functions. |

Subject- Computer Organization and Architecture

Subject Code: ITC405

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.2 | 1.2.1 | L1 | CO1 | Apply the knowledge of Number system conversion techniques to solve problems |
| PO1 | | 1.6 | 1.6.1 | L2 | CO1 | Apply basic engineering fundamentals to Demonstrate the fundamentals of Digital Logic Design |
| PO1 | | 1.6 | 1.6.1 | L1 | CO2 | Apply basic engineering fundamentals to describe and differentiate basic organization of computer, the architecture of 8086 microprocessor and to implement assembly language programming for 8086 microprocessors. |
| PO2 | | 2.6 | 2.6.4 | L2 | CO2 | Compare and contrast the instructions of 8086 to select appropriate instructions as per given task. |
| PO2 | | 2.8 | 2.8.2 | L4 | CO2 | Analyse and interpret the result of ALP using integrated tool. |
| PO1 | | 1.6 | 1.6.1 | L2 | CO3 | Apply engineering fundamentals to demonstrate control unit operations and conceptualize instruction level parallelism. |
| PO1 | | 1.6 | 1.6.1 | L1 | CO3 | Apply engineering fundamentals to Describe Soft wired (Microprogrammed) and hardwired control unit design methods. Microinstruction sequencing and execution |
| PO2 | | 2.1 | 2.5.2 | L4 | CO4 | List and Identify integers and real numbers and perform computer arithmetic operations on integers. |
| PO2 | | 2.1 | 2.5.3 | L3 | CO4 | Identify mathematical algorithmic knowledge that applies to solve a given problem |
| PO1 | | 1.6 | 1.6.1 | L4 | CO5 | Apply basic engineering fundamentals to Categorize memory organization. |
| PO2 | | 2.6 | 2.6.2 | L4 | CO5 | Identify basic functionalities of each element of a memory hierarchy. |

| | | | | | | |
|-----|--|-----|-------|----|-----|---|
| PO1 | | 1.6 | 1.6.1 | L3 | CO6 | Apply basic engineering fundamentals to examine the different methods for computer I/O mechanism. |
| PO2 | | 2.6 | 2.6.4 | L2 | CO6 | Compare and contrast alternative methods of data transfer to select the best methods. |

Course Objectives

| Sr. No. | Description |
|---------|---|
| 1 | Learn the fundamentals of Digital Logic Design. |
| 2 | Conceptualize the basics of organizational and features of a digital computer. |
| 3 | Study microprocessor architecture and assembly language programming. |
| 4 | Study processor organization and parameters influencing performance of a processor. |
| 5 | Analyse various algorithms used for arithmetic operations. |
| 6 | Study the function of each element of memory hierarchy and various data transfer techniques used in digital computer. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 4 | 1 | 4.6 | 4.6.1 | L3 | CO1 | Demonstrate Basic network administration commands to Investigate network. |
| 3 | 1 | 3.6 | 3.6.2 | L2 | CO2 | Installation and Implementation of network simulator (NS) and Implementations of TCL |
| 4 | 1 | 4.4 | 4.4.1 | L3 | CO3 | Understand the network simulator environment. Investigate and examine Network performance |
| 3 | 2 | 3.6 | 3.6.1 | L3 | CO4 | Design and Implement client-server socket Architecture. |
| 1 | 1 | 1.7 | 1.7.1 | L4 | CO5 | Analyse the traffic flow and the contents of protocol frames. |
| 3 | 2 | 3.7 | 3.7.1 | L6 | CO6 | Design and configure a network for an organization. |

Course Objective

| Sr. No. | Description |
|----------------|---|
| 1 | Execute and evaluate network administration commands and demonstrate their use in different network scenarios |
| 2 | Demonstrate the installation and configuration of network simulator |
| 3 | Demonstrate and measure different network scenarios and their performance behaviour. |
| 4 | Implement the socket programming for client server architecture. |
| 5 | Analyze the traffic flow of different protocols. |
| 6 | Design a network for an organization using a network design tool |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 2 Understand | CO1 | Understand the architecture and functioning of Unix |
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 4 Identify | CO2 | Identify the Unix general purpose commands |
| PO4 | PSO1 | 4.6 | 4.6.1 | Level 3 Apply | CO3 | Apply Unix commands for system administrative tasks such as file system management and user management. |
| PO5 | PSO2 | 5.5 | 5.5.1 | Level 3 Apply | CO4 | Compute Unix commands for system administrative tasks such as process management and memory management |
| PO2 | PSO2 | 2.6 | 2.6.2 | Level 2 Understand | CO5 | Demonstrate basic shell scripts for different applications. |
| PO5 | PSO2 | 5.6 | 5.6.1 | Level 6 Create | CO6 | Develop advanced scripts using awk & perl languages and grep, sed, etc. commands for performing various tasks. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To understand architecture and installation of Unix Operating System |
| 2 | To learn Unix general purpose commands and programming in Unix editor environment |
| 3 | To understand file system management and user management commands in Unix. |
| 4 | To understand process management and memory management commands in Unix |
| 5 | To learn basic shell scripting. |
| 6 | To learn scripting using awk and perl languages. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.7 | 1.7.1 | L3 | CO1 | Demonstrate various components and peripheral of computer system |
| PO1 | 1 | 1.2 | 1.2.1 | L4 L6 | CO2 | Analyze and design combinational circuits |
| PO4 | 1 | 4.5 | 4.5.1 | L3 | CO3 | Simulate a program on a microprocessor using arithmetic & logical instruction |
| PO4 | 1 | 4.5 | 4.5.1 | L6 | CO4 | Develop the assembly level programming using 8086 loop instruction set |
| PO4 | 1 | 4.5 | 4.5.1 | L1 | CO5 | Implement programs based on string and procedure for 8086 microprocessor. |
| PO5 | 1 | 5.4 | 5.4.1 | L6 | CO6 | Design interfacing of peripheral devices with 8086 microprocessor. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Learn assembling and disassembling of PC |
| 2 | Design, simulate and implement different digital circuits |
| 3 | Get hands on experience with Assembly Language Programming. |
| 4 | Study interfacing of peripheral devices with 8086 microprocessor. |
| 5 | Realize techniques for faster execution of instructions and improve speed of operation and performance of microprocessors. |
| 6 | Write and debug programs in TASM/MASM/hardware kits |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO1 | Understand and explain Basic programming concepts |
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO2 | Understand and explain Advance data types and function. |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO3 | Use the OOPS concepts for finding solution to problems. |
| 3 | 1 | 3.8.1 | 3.8 | 3 | CO4 | Use multithreading,exceptional handling ,modules and packages concepts for better |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO5 | Design and develop GUI using tkinter. |
| 4 | 2 | 4.6.3 | 4.6 | 6 | CO6 | Design and develop application using matplotlib,pandas and flask. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Basics of python including data types, operator, conditional statements, looping statements, input and output functions in Python |
| 2 | List, tuple, set, dictionary, string, array and functions |
| 3 | Object Oriented Programming concepts in python |
| 4 | Concepts of modules, packages, multithreading and exception handling |
| 5 | File handling, GUI & database programming |
| 6 | Data visualization using Matplotlib, Data analysis using Pandas and Web programming using Flask |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO2 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problems based on societal /research needs and apply Knowledge and skill to solve it in a group |
| PO9 | PSO1 | 9.5 | 9.5.1 | L2 | CO2 | Demonstrate effective communication, problem-solving, conflict resolution and leadership skills to work as member of a group or leader. |
| PO4 | PSO1 | 4.6 | 4.6.2 | L4 | CO3 | Critically analyze results through theoretical/experimental/simulations for trends and correlations, stating possible errors and limitations |
| PO7 | PSO1 | 7.3 | 7.3.1 | L4 | CO4 | Identify and analyse the impacts of solutions in societal and environmental context for sustainable development. |
| PO10 | PSO2 | 10.5 | 10.5.2 | L3 | CO5 | Deliver effective oral presentations and use standard norms of engineering practices to technical and non-technical audiences |
| PO12 | PSO1 | 12.5 | 12.5.2 | L2 | | Recognize the need and demonstrate capabilities of self-learning in a group to keep current regarding new developments in IT field for life long learning |
| PO11 | PSO1 PSO2 | 11.5 | 11.5.1 | L5 | | Analyze, evaluate and select the most appropriate proposal based on economic and financial considerations and thus demonstrate project management principles during project work. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To acquaint with the process of identifying the needs and converting it into the problem. |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges in the field of IT |
| 4 | To familiarize the process of solving the problem in a group. |
| 5 | To acquaint with the process of applying basic engineering fundamentals to attempt solutions to the problems. |
| 6 | To inculcate the process of self-learning and research. |

Semester- V

Subject- Internet Programming

Subject Code- ITC501

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO5 | PSO1 | 5.4 | 5.4.1 | L4 | CO1 | Identify modern engineering technologies or protocols required for various web applications. |
| PO4 | PSO2 | 4.4 | 4.4.3 | L3 | CO2 | Able to choose and apply appropriate JavaScript to add functionality to web pages. |
| PO2 | PSO1 | 2.6 | 2.6.4 | L5 | | Compare, contrast and analyze ES6 and ES5 standards |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | CO3 | Design and develop appropriate front end application using methodologies of basic React |
| PO3 | PSO2 | 3.6 | 3.6.2 | L6 | CO4 | Able to produce or design a variety of potential front end application using functional components of React. |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | CO5 | Design and develop appropriate back-end applications using Node.js |
| PO3 | PSO2 | 3.8 | 3.8.2 | L6 | CO6 | Able to implement and integrate web based Node.js applications using Express |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To orient students to Web Programming fundamental. |
| 2 | To expose students to JavaScript to develop interactive web page development |
| 3 | To orient students to Basics of REACT along with installation |
| 4 | To expose students to Advanced concepts in REACT |
| 5 | To orient students to Fundamentals of node.js |
| 6 | To expose students to node.js applications using express framework. |

Subject- Computer and Network Security
Subject Code: ITC502
Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 2.5 | 2.5.1 | L2 | | Understand security objectives. |
| 2 | 1 | 1.2 | 1.2.1 | L3 | | Apply the knowledge of mathematical concepts, matrix and numerical techniques |
| 3 | 1 | 3.6 | 3.6.1 | L4 | | Analyse various encryption techniques. |
| 1 | 1 | 1.7 | 1.7.1 | L2 L3 | | Understand and Apply theory and principles of computer science and engineering. |
| 3 | 2 | 3.6 | 3.6.2 | L6 | | Design various secure cryptographic applications. |
| 5 | 2 | 5.4 | 5.4.2 | L2 L6 | | Create, modify and extend techniques to provide security |
| 6 | 1 | 6.3 | 6.3.1 | L5 | | Evaluate various techniques to provide protection of the public. |
| 8 | 1 | 8.3 | 8.1 | L1 | CO3 | Identify Different types of malicious Software and its effect on the security. |
| 3 | 1 | 3.5 | 3.5.5 | L3 L6 | CO4 | Explore design issues and working principles of various secure communication standards including IPsec, and SSL/TLS and email and apply them to provide security for professional concern. |
| 5 | 2 | 5.4 | 5.4.2 | L3 | CO5 | Design Network management security architecture and Apply Network Access Control techniques to provide Computer Security. |
| 2 | 1 | 2.7 | 2.7.1 | L5 | CO6 | Evaluate the performance and application of firewall and IDS in network security. |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | Classical encryption techniques and concepts of finite fields and number theory |
| 2 | Various cryptographic algorithms including secret key management and different authentication techniques. |
| 3 | Different types of malicious Software and its effect on the security |
| 4 | Various secure communication standards including IPsec, SSL/TLS and email. |
| 5 | Network management Security and Network Access Control techniques in Computer Security. |
| 6 | Different attacks on networks and infer the use of firewalls and security protocols. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | | 1.6 | 1.6.1 | L1, L2 | CO1 | Apply engineering fundamentals to understand the concept of entrepreneurship and its close relationship with enterprise and owner-management |
| PO 7 | | 7.3 | 7.3.2 | L2 | CO1 | Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability |
| PO1 | | 1.6 | 1.6.1 | L1, L2 | CO2 | Apply engineering fundamentals to Understand the nature of business development in the context of existing organizations and of new business start-ups. |
| PO 10 | | 10.4 | 10.4.1 | L1, L2 | CO3 | Comprehended important factors for starting a new venture and business development. |
| PO11 | | 11.4 | 11.4.1 | L1 | CO4 | Describe various economic and financial costs/benefits of a business start-up |
| PO11 | | 11.4 | 11.4.2 | L2 | CO4 | Analyze different forms of financial statements to evaluate the financial status of a business start-up and Know issues and decisions involved in financing and resourcing a business start-up |
| PO5 | | 2.5 | 2.5.2 | L1,L4 | CO5 | Identify processes/modules/Models of a E-business and Describe various E-business Models and parameters. |
| PO5 | | 5.4 | 5.4.1 | L1 | CO6 | Identify modern E-business tools, techniques and resources for various E-business |
| PO5 | | 5.4 | 5.4.2 | L2 | CO6 | Discuss various E-business Strategies and Create/adapt/modify/extend tools and techniques to solve E-business problems. |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | To distinguish Entrepreneur and Entrepreneurship starting and feasibility study. |
| 2 | To realize the skills required to be an entrepreneur |
| 3 | To acquaint the students with challenges of starting new ventures |
| 4 | To identify the right sources of fund for starting a new business |
| 5 | To be familiarized with concept of E-business Models. |
| 6 | To understand various E-business Strategies. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | Level 1 Remember | CO1 | Understand the nature of software development life cycle |
| PO3 | 1 | 3.5 | 3.5.1 | Level 3 Apply | | Select methods of capturing, specifying, visualizing and analyzing software requirements |
| PO3 | 1 | 3.5 | 3.5.6 | Level 6 Creating | | develop software requirement specifications (SRS) |
| PO7 | 1 | 7.3 | 7.3.1 | Level 6 Creating | CO3 | Plan, schedule and track the progress of the projects. |
| PO3 | 1 | 3.7 | 3.7.1 | Level 6 Creating | CO4 | Design software solution and user-centric approach and principles of effective user interfaces. |
| P07 | 1 | 7.3 | 7.3.1 | Level 6 Creating | CO5 | Prepare the RMMM sheet |
| PO3 | 1 | 3.5 | 3.5.1 | Level 3 Apply | CO6 | choose testing methods and understanding concept of software quality assurance |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | provide the knowledge of software engineering discipline and understand to process model |
| 2 | understand the importance of Requirement gathering and analyze it |
| 3 | introduce the basic concepts of scheduling and its importance |
| 4 | learn design concept and develop UI |
| 5 | Understand the software risk and learn SCM process |
| 6 | understand need of teststing and its various tyapes |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 3 | | 3.5 | .1 & 3. | 6 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 3 | | 3.5 | 5.4.1 | 6 | 2 | Develop writing skills of a cover letter and a CV/resume/SOP |
| 4 | | 4.5 | 4.5.1 | 6 | 3 | Develop interpersonal skills to progress professionally by building strong relationships with peers |
| 4 | | 4.5 | 4.5.1 | 6 | 4 | Develop effective presentation skills and an impressive body language |
| 1 | | 1.5 | 1.5.1 | 3 | 5 | Apply codes of personal integrity, values, aptitudes and skills |
| 1 | | 1.5 | 1.5.1 | 2 | 6 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To discern and develop an effective style of writing important technical/business documents. |
| 2 | To investigate possible resources and plan a successful job campaign. |
| 3 | To understand the dynamics of professional communication in the form of group discussions, meetings etc. required for career enhancement. |
| 4 | To develop creative and impactful presentation skills. |
| 5 | To analyze personal traits, interests, values, aptitudes and skills. |
| 6 | To understand the importance of integrity and develop a personal code of ethics. |

Subject- Advanced database management technologies

Subject Code: ITDLO5012

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | 1 | 2.5 | 2.5.2 | L4 | | Analyze query processing and optimization techniques. |
| 1 | 1 | 1.7 | 1.7.1 | L3 | | Apply algorithm to measure its cost and working to select best query execution plan |
| 6 | 1 | 6.3 | 6.3.1 | L2 | | Identify sophisticated access control protocols |
| 5 | 1 | 5.4 | 5.4.1 | L3 | | Apply different access control protocols to the database |
| 7 | 1 | 7.3 | 7.3.2 | L2 | | understand different applications using advanced models |
| 2 | 1 | 2.5 | 2.5.2 | L2 | | identify different models of distributed database system |
| 4 | 1 | 4.6 | 4.6.1 | L4 | | Analyze different architectures of distributed system |
| 5 | 1 | 5.5 | 5.5.1 | L4 | | analyze enterprise data and use OLAP tools to take strategic decisions |
| 3 | 2 | 3.8 | 3.8.1 | L6 | | design datawarehouse system using different OLAP operations |
| 5 | 1 | 5.4 | 5.4.1 | L2 | | identify ETL process techniques to extract data from datawarehouse |
| 12 | 1 | 12.6 | 12.6.2 | L4 | | Analyze historical data from DW to take decisions |
| 2 | 1 | 2.1 | 2.5.2 | L2 | | understand the concept of big data and no sql databases |
| 4 | 1 | 4.6 | 4.6.1 | L4 | | Analyze their different characteristics |

Course Objective

| Sr. No. | Description |
|----------------|---|
| 1 | To impart knowledge related to query processing and query optimization phases of a database management system |
| 2 | To learn advanced techniques for data management and to overview emerging data models like Temporal, Mobile, and Spatial database |
| 3 | To introduce advanced database models like distributed databases |
| 4 | To create awareness of how enterprise can organize and analyze large amounts of data by creating a Data Warehouse |
| 5 | To understand the process of data extraction, transformation and loading. |
| 6 | To understand the concept of Big data and NoSQL databases. |

Subject: ADS Advanced Data structure and Analysis

Subject Code:ITDO6014

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|----|---|
| 2 | 1 | 3.6 | 3.6.1 | 2,3 | | Understand explore and analyze Analysis of Algorithm principles with their mathematical aspect. |
| 5 | 1 | 2.1 | 2.5.3 | 3 | | Identify, Select and apply various methods of algorithmic designing in tackling engineering problems. |
| 5 | 2 | 5.6 | 5.6.1 | 2,4 | | Discuss and Categorize the core values of advanced data Structure often including RBT Trees, B/B+ Tree, Heaps etc. |
| 2 | 2 | 2.1 | 2.5.2 | 4 | | Identify process with parameters to perform numerous operations on advanced data structure |
| 1 | 2 | 1.7 | 1.7.1 | 4 | | Apply and assess advanced data structure with their real life problem needed to solve. |
| 5 | 1 | 5.6 | 5.6.1 | 2 | | Discuss the principles behind Divide and Conquer and Greedy Algorithmic design |
| 2 | 1 | 2.1 | 2.5.2 | 4 | | Illustrate various methods uses Divide and Conquer and Greedy Strategy. |
| 1 | 1 | 1.7 | 1.7.1 | 4 | | Apply Divide and Conquer and Greedy Algorithmic design strategy with their inputs for resolution of problems in real life. |
| 5 | 2 | 5.6 | 5.6.1 | 2 | | Discuss Represent the concept of Dynamic Algorithmic design strategy. |
| 2 | 2 | 2.1 | 2.5.2 | 4 | | Illustrate various methods uses Dynamic Algorithmic Strategy. |
| 1 | 2 | 2.1 | 2.5.2 | 4 | | Apply comprehensiveness of Dynamic Algorithmic design strategy in solving various problems in real life. |
| 4 | 2 | 3.6 | 3.6.2 | 4 | 5 | Scrutinize, recognise and use the appropriate string matching methods viz. the naïve string matching, Rabin Karp to design various pattern matching applications/ process . |
| 3 | 2 | 3.6 | 3.6.1 | 2 | | Investigate and explore the principles behind the concepts of Optimization, Approximation, Parallel Computing algorithms and NP-Hard and NP-Complete. |

| | | | | | | |
|---|---|-----|-------|---|---|--|
| 2 | 2 | 2.1 | 2.5.2 | 4 | 6 | Illustrate various methods uses Optimization, Approximation and Parallel Computing algorithms Strategy. |
| 1 | 2 | 1.7 | 1.7.1 | 4 | | Apply adequacy of Optimization, Approximation and Parallel Computing algorithms in real life problem solving. |

| Sr. No | Description |
|--------|--|
| 1 | To learn mathematical background for analysis of algorithm |
| 2 | To learn various advanced data structures. |
| 3 | To understand the different design approaches of algorithm. |
| 4 | To learn dynamic programming methods. |
| 5 | To understand the concept of pattern matching |
| 6 | To learn advanced algorithms. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.6 | 2.6.2 | L4 | CO1 | Identify functionalities and apply appropriate HTML tags to develop a webpage |
| PO2 | PSO1 | 2.6 | 2.6.2 | L3 | CO2 | Identify functionalities and apply CSS tags to format data on webpage |
| PO3 | PSO1 | 3.6 | 3.6.2 | L2 | CO3 | Able to understand and produce responsive websites using Bootstrap suited to meet functional requirements. |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | CO4 | Design and develop interactive web pages using JavaScript |
| PO3 | PSO2 | 3.8 | 3.8.2 | L6 | CO5 | Able to construct and implement front end applications using React |
| PO3 | PSO2 | 3.8 | 3.8.2 | L6 | CO6 | Able to implement and integrate back end applications using Node.js/Express |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To orient students to HTML for making webpages |
| 2 | To expose students to CSS for formatting web pages |
| 3 | To expose students to developing responsive layout |
| 4 | To expose students to JavaScript to make web pages interactive |
| 5 | To orient students to React for developing front end applications |
| 6 | To orient students to Node.js for developing backend applications |

LAB Outcomes

| PO | PSO | Competancy | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO 2 | 1.6 | 1.6.1 | L1,L2 | LO1 | Apply engineering fundamentals to apply the knowledge of symmetric cryptography to implement classical ciphers. |
| PO2 | PSO 2 | 2.5 | 2.5.3 | L1,L2 | LO2 | Identify mathematical algorithmic knowledge that applies to a given problem to analyze and implement public key encryption algorithms, hashing and digital signature algorithms. |
| PO5 | PSO 2 | 5.4 | 5.4.2 | L1,L2, L3 | LO3 | Create/adapt/modify/extend tools and techniques to solve engineering problems by exploring the different network reconnaissance tools to gather information about networks |
| PO5 | PSO 2 | 5.4 | 5.4.2 | L1,L2,L3 | LO4 | Create/adapt/modify/extend tools and techniques to solve engineering problems by Using tools like sniffers, port scanners and other related tools for analyzing packets in a network |
| PO5 | PSO 2 | 5.4 | 5.4.1 | L1,L2,L3 | LO5 | Identify modern engineering tools, techniques and resources for engineering activities by Using open-source tools to scan the network for vulnerabilities and simulate attacks |
| PO5 | PSO 2 | 5.5 | 5.5.2 | L1,L2 | LO6 | Demonstrate proficiency in using discipline-specific tools by Demonstrating the network security system using open source tools |

LAB Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply the knowledge of symmetric cryptography to implement classical ciphers. |
| 2 | To analyze and implement public key encryption algorithms, hashing and digital signature algorithms. |
| 3 | To explore the different network reconnaissance tools to gather information about networks. |
| 4 | To explore the tools like sniffers, port scanners and other related tools for analyzing. |
| 5 | To Scan the network for vulnerabilities and simulate attacks. |
| 6 | To set up intrusion detection systems using open-source technologies and to explore email security. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO4 | PSO2 | 4.4 | 4.4.3 | L1 | CO1 | Able to choose appropriate devops tools used in software development life cycle |
| PO3 | PSO2 | 3.8 | 3.8.2 | L2 | CO2 | Able to select, implement and integrate Git Version Control strategies in the modules. |
| PO5 | PSO1 | 5.5 | 5.5.1 | L4 | CO3 | Identify the strengths and limitations of Jenkins tools to Build, Deploy and Test Software Applications |
| PO2 | PSO1 | 2.6 | 2.6.3 | L4 | CO4 | Identify and understand the importance of Selenium and Jenkins to test Software Applications |
| PO2 | PSO1 | 2.8 | 2.8.2 | L4 | CO5 | Analyze & Illustrate the Containerization of images and deployment of applications over Docker |
| PO5 | PSO2 | 5.4 | 5.4.2 | L6 | CO6 | Adapt and integrate Software Configuration Management tool Ansible for provisioning |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand DevOps practices which aims to simplify Software Development Life Cycle |
| 2 | To be aware of different Version Control tools like GIT, CVS or Mercurial |
| 3 | To Integrate and deploy tools like Jenkins and Maven, which is used to build, test and deploy applications in DevOps environment |
| 4 | To be familiarized with selenium tool, which is used for continuous testing of applications deployed. |
| 5 | To use Docker to Build, ship and manage applications using containerization |
| 6 | To understand the concept of Infrastructure as a code and install and configure Ansible tool. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|-----------------------|-----------|--|
| PO2 | PSO1 | 2.6 | 2.6.3 | Level 2 Understand | CO1 | To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements |
| PO2 | PSO2 | 2.7 | 2.7.1 | Level 6 Create | CO2 | To create single and multiple container applications and manage application deployments with rollouts in Kubernetes |
| PO3 | PSO2 | 3.6 | 3.6.2 | Level 3 Apply | CO3 | infrastructure as code environments and use terraform to define and deploy cloud infrastructure. |
| PO4 | PSO2 | 4.4 | 4.4.1 | Level 4 Analyze | CO4 | To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques. |
| PO4 | PSO2 | 4.6 | 4.6.4 | Level 3 Apply | CO5 | To use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level 4 Analyze | CO6 | To identify a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To understand DevOps practices and cloud native environments to achieve continuous software delivery pipelines and automated operations that address the gap between IT resources and growing cloud complexity. |
| 2 | To Use Kubernetes services to structure N-tier applications. |
| 3 | To be familiarized with Infrastructure as code for provisioning, compliance, and management of any cloud infrastructure, and service. |
| 4 | To understand that security and speed in software development are not inversely-related objectives Internalizing the contribution of tools and automation in DevSecOps |
| 5 | To understand various troubleshooting techniques by monitoring your entire infrastructure and business processes |
| 6 | To understand how software and software-defined hardware are provisioned dynamically. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO2 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problems based on societal /research needs and apply Knowledge and skill to solve it in a group |
| PO9 | PSO1 | 9.5 | 9.5.1 | L2 | CO2 | Demonstrate effective communication, problem-solving, conflict resolution and leadership skills to work as member of a group or leader. |
| PO4 | PSO1 | 4.6 | 4.6.2 | L4 | CO3 | Critically analyze results through theoretical/experimental/simulations for trends and correlations, stating possible errors and limitations |
| PO7 | PSO1 | 7.3 | 7.3.1 | L4 | CO4 | Identify and analyse the impacts of solutions in societal and environmental context for sustainable development. |
| PO10 | PSO2 | 10.5 | 10.5.2 | L3 | CO5 | Deliver effective oral presentations and use standard norms of engineering practices to technical and non-technical audiences |
| PO12 | PSO1 | 12.5 | 12.5.2 | L2 | | Recognize the need and demonstrate capabilities of self-learning in a group to keep current regarding new developments in IT field for life long learning |
| PO11 | PSO1 PSO2 | 11.5 | 11.5.1 | L5 | | Analyze, evaluate and select the most appropriate proposal based on economic and financial considerations and thus demonstrate project management principles during project work. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To acquaint with the process of identifying the needs and converting it into the problem. |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges in the field of IT |
| 4 | To familiarize the process of solving the problem in a group. |
| 5 | To acquaint with the process of applying basic engineering fundamentals to attempt solutions to The problems. |
| 6 | To inculcate the process of self-learning and research. |

**Semester- III
Scheme (R-16)**

Subject- AMIII

Subject Code- ITC301

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------------------------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1, PO2 | | 1.1 | 1.1.2 | 1, 2 | 1 | Use the knowledge of set theory to define and identify the different programs in the field of Engg. Problems related with information technology. |
| PO3, PO4, PO5 | | 3.1 | 3.1.6 | 2,3 | 2 | Select & choose appropriate relation and function to design the technology program & investigate the proper solution to recursive fun. |
| PO1, PO2, PO3, PO5 | | 1.1 | 1.1.2 | 1,2 | 3 | Classify formulate investigate & select the appropriate technique of Laplace transformation the solve information technology problems. |
| PO3, PO4, PO5, PO12 | | 3.1 | 3.1.6 | 2,3 | 4 | Select & apply the concept of inverse L.T. to design & generate the solution of boundary value problems. Identify the need of L.T. in day to day life as well as educational needs. |
| PO1, PO2, PO12 | | 12.1 | 12.1.1 | 1, 2 | 5 | Use the basic knowledge of maths formulate express & identify the solution of permutation combination problems, leads to valid conclusion & apply the knowledge in engineering as well as day to day life problems. |
| PO2, PO3, PO4 | | 3.1 | 3.1.1 | 5,6 | 6 | Analyze the complex function & use the concept of analytic function & conformal mapping to design the information technology problem as well as problem in changing world of technology. |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | To Describe and distinguish between different type of sets by using definition & venn diagram. |
| 2 | To Express the concept of relation & function for defining the recursive function. |
| 3 | To Understand the concept of Laplace transformation |
| 4 | To Select & apply different methods of universe L.T. for solving the boundary value problems involving ODE. |
| 5 | To Analyze permutation combination and basic probability approach for solving examples |
| 6 | To familiarize with the concept of complex variables, C-R equations and conformal mapping with applications. |

Subject- Logic Design**Subject Code: ITC302**
Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----|-----|------------|-------|---------------|-----|--|
| PO1 | | 1.6 | 1.6.1 | L3 | | Understand the concepts of various components to design stable analog circuits. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast between all biasing circuits. |
| PO1 | | 1.2 | 1.2.1 | L2 | | Apply the knowledge of Number system conversion techniques to solve problems |
| PO1 | | 1.6 | 1.6.1 | L2 | | Apply basic engineering fundamentals to Demonstrate the fundamentals of Digital Logic Design |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply basic engineering fundamentals to Minimize the Boolean expression using Boolean algebra |
| PO1 | | 1.6 | 1.6.1 | L3 | | Design Boolean expression using logic gates |
| PO3 | | 3.8 | 3.8.2 | L4 | | Analyze combinational circuit to Able to implement and integrate the modules by designing combinational circuit. |
| PO3 | | 3.8 | 3.8.2 | L4 | | Analyze combinational circuit to Able to implement and integrate the modules by designing. |
| PO3 | | 3.8 | 3.8.3 | L6 | | Able to verify the functionalities and validate the design of sequential circuits by designing and developing it. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO6 | Apply engineering fundamentals to explain Hardware description language to Translate real world problems into digital logic formulations using VHDL. |

Course Objectives

| Sr. No | Description |
|--------|--|
| 1 | Understand the concept of various components. |
| 2 | Understand the concepts that underpin the disciplines of Analog and digital electronic logic circuits. |
| 3 | Various Number system and Boolean algebra. |
| 4 | Design and implementation of combinational circuits |
| 5 | Design and implementation of Sequential circuits |
| 6 | Hardware description language |

Subject: Data Structure & Analysis

Course Outcomes

Subject Code: ITC304

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|----|--|
| 5 | 1 | 5.6 | 5.6.1 | 2 | | Discuss the data structure principles, ADT & classification of Data Structures such as Linear-Non Linear DS. |
| 2 | 1 | 2.1 | 2.5.2 | 4 | | Identify algorithms with parameters in tackling problems using various data structures. |
| 5 | 2 | 5.6 | 5.6.1 | 2,4 | | Identify & Discuss the concept of Stack Linear Data Structure with parameters to perform numerous operations Push Pop on it. |
| 1 | 2 | 1.7 | 1.7.1 | 4 | | Apply and assess Stack data structure with their application like reversing string, Polish notations needed to solve. |
| 5 | 1 | 5.6 | 5.6.1 | 2,4 | | Identify & Discuss the concept of Queue with various types Linear , Circular Queue, Priority Queue, De-queue Data Structure with parameters to perform numerous operations EnQueue and DeQueue on it. |
| 1 | 1 | 1.7 | 1.7.1 | 4 | | Apply and assess Queue data structure with their real life problem of scheduling of jobs for resource utilization needed to solve. |
| 5 | 1 | 5.6 | 5.6.1 | 2,4 | | Identify & Discuss the need of Linked List Data Structure, concept of memory allocation, types of LL with parameters to perform numerous operations such as Insertion Deletion on it. |
| 1 | 1 | 1.7 | 1.7.1 | 4 | | Apply and assess Linked List with their application like Addition of Polynomial Equation needed to solve |
| 3 | 2 | 3.6 | 3.6.1 | 1, 2 | | List, investigate and explore the principles behind the concepts of sorting, searching and hashing with its collision handling methods |
| 2 | 2 | 2.7 | 2.7.1 | 4 | | Analyze its adequacy in real life problem solving. |

| | | | | | | |
|---|---|-----|-------|-----|---|--|
| 5 | 1 | 5.6 | 5.6.1 | 2,4 | | Discuss and Categorize the concept of nonlinear data Structure such as trees&Graphs with advanced data structure often including threaded binary tree, expression Trees. |
| 2 | 1 | 2.1 | 2.5.2 | 4 | 6 | Identify process with parameters to perform numerous operations like creation, traversal deletion on Binary Tree and like traversal:Depth first search(DFS)&Breadth First search(BFS) on graph. |
| 1 | 1 | 1.7 | 1.7.1 | 4 | | Apply and assess nonlinear data structure with their real life problem needed to solve are Searching from Tree, finding MinimumSpanning Tree from Graph. |

Course Objectives

| Sr. No | Description |
|--------|---|
| 1 | Understand and remember algorithms and its analysis procedure. |
| 2 | Introduce the concept of data structures through ADT including List, Stack, Queues . |
| 3 | Implement various data structure algorithms. |
| 4 | Summarize various techniques for representation of the data in the real world |
| 5 | Develop application using data structure algorithms. |
| 6 | Compute the complexity of various algorithms. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|------------|------------|-------------------|----------------|----------------------|-----------|--|
| | | 2.5 2.6 | 2.5.2 2.6.6 | L4 L4 | | Identify the need of Database Management System. |
| PO1 PO3 | 2 | 1.7 3.8 | 1.7.1 3.8.2 | L3 L5 | 2 | Apply the theory of database systems. Able to design a database/solve a real time database problem |
| | | 2.7 2.8 | 2.7.2 2.8.1 | L4 L3 | | Identify relational model constraints for the database |
| PO2 | 1 | 2.7 | 2.7.2 | L3 | 4 | Apply the knowledge SQL to formulate queries |
| PO2 PO1 | 1 | 2.7 1.7 | 2.7.2 1.7.1 | L4 L3 | 5 | Identify design constraints. Apply the principles of normalization to normalize the database to the highest normalization level |
| PO5 | 2 | 5.4 5.5 | 5.4.2 5.5.2 | L6 L2 | 6 | Create indexing mechanism for efficient retrieval of information from a database. Demonstrate physical design of a database system by implementing Database indexing techniques and storage techniques. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To describe a sound introduction to the discipline of database management systems |
| 2 | To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques. |
| 3 | To introduce the concepts of basic SQL as a universal Database language |
| 4 | To enhance knowledge to advanced SQL topics like embedded SQL, procedures connectivity through JDBC |
| 5 | To demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization |
| 6 | To provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques. |

Subject- Principle of Communications**Subject Code: ITC305****Course Outcomes**

| PO | PSO | Competancy | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply basic engineering fundamentals to explain the basic of Analog and Digital Communication Systems. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast between Analog and Digital Communication Systems to select best communication system as per application. |
| PO1 | | 1.6 | 1.6.1 | L2 | | Apply engineering fundamentals to differentiate types of noise. |
| PO1 | | 1.2 | 1.2.1 | L3 | | Apply the knowledge of friis formula to solve problems. |
| PO2 | | 2.8 | 2.8.2 | L4 | | Analyses the Fourier transform of time and frequency domain and interpret the result. |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply engineering fundamentals to explain Amplitude and Frequency modulation techniques. |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply engineering fundamentals to sketch Transmitter and receiver of AM, DSB, SSB and FM. |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply engineering fundamentals to explain Pulse analog and digital modulation techniques. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast between Pulse digital modulation techniques to select best modulation technique. |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply engineering fundamentals to explain ASK, FSK, PSK modulation techniques. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast between ASK, FSK, PSK modulation techniques to select best modulation technique. |
| PO1 | | 1.6 | 1.6.1 | L3 | CO6 | Apply engineering fundamentals to explain Electromagnetic radiation and propagation. |

Course Objectives

| Sr. No. | Description |
|---------|---|
| 1 | Understand the basic principles and techniques used in analog and digital communications |
| 2 | Understand the concept of noise and Fourier transform for designing and analyzing communication system |
| 3 | Acquire the knowledge of different modulation techniques such as AM, FM and study the block diagrams of transmitter and receiver |
| 4 | Study the Sampling theorem and Pulse Analog Modulation techniques |
| 5 | Learn the concepts of Digital modulation techniques such as PCM, DM, ADM and multiplexing techniques |
| 6 | Gain the core idea of Electromagnetic Radiation and propagation of waves |

Subject-Digital Design Lab**Subject Code: ITL301****LAB Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | | 1.6 | 1.6.1 | L3 | LO1 | Apply engineering fundamentals to Minimize the Boolean algebra and design it using logic gates by verifying the truth table of logic gates and Realization of Boolean algebra . |
| PO3 | | 3.6 | 3.6.2 | L4,L6 | LO2 | Able to produce a variety of potential design solutions suited to meet functional requirements by Analysing and designing combinational circuit. |
| PO3 | | 3.8 | 3.8.2 | L6 | LO3 | Able to implement and integrate the modules/ given function using combinational circuit. |
| PO3 | | 3.8 | 3.8.2 | L6 | LO4 | Able to implement and integrate the design of sequential circuits |
| PO3 | | 3.8 | 3.8.2 | L6 | LO5 | Able to Implement digital systems using programmable logic devices & evaluate and observe Boolean expression using PALs and PLAs.. |
| PO5 | | 5.4 | 5.4.2 | L2,L3 | LO6 | Create/adapt/modify/extend tools and techniques for Implementation of Logic Gates ,combinational circuits using VHDL tool to translate real world problems into digital logic formulations |

LAB Objectives

| Sr. No | Description |
|---------------|---|
| 1 | Learn to minimize and design combinational logic |
| 2 | Understand the relationships between combination logic and Boolean algebra, and between sequential logic and finite state machines |
| 3 | Appreciate tradeoffs in complexity and speed of combinational designs |
| 4 | Understand how state can be stored in a digital logic circuit |
| 5 | Study how to design a simple finite state machine from a specification and be able to implement this in gates and edge triggered flip-flops |
| 6 | Learn to translate real world problems into digital logic formulations |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 1 | 1 | 4.5 | 4.5.1 | L1 L6 | 1 | Understand and use the basic concepts and principles of stacks to implement real time problem of Polish Notation, recursion etc. |
| 4 | 1 | 4.3 | 4.3. | L6 | 2 | Understand the concepts and apply the methods of Queue, Circular, Priority Queue Linear Data structure to implement real time application of scheduling. |
| 4 | 2 | 4.6 2.7 | 4.6.1 2.7.1 | L2 L3 | 3 | Use and identify the methods in Linked List to implement various operations like Creation, Insertion, Deletion etc. on it. |
| 2 | 2 | 2.7 2.8 | 2.7.2 2.8.1 | L3 L2 | 4 | Understand the concepts and apply the methods of Binary Tree and demonstration of Binary Search Tree with various operation such as creation, different traversal and deletion. |
| 3 | 1 | 4.5 | 4.5.1 | L2 | 5 | Understand the concepts and apply the methods of Graph Non Linear DS and demonstration of it with various operation such as creation, different traversal DFS & BFS. |
| 2 | 2 | 4.5 | 4.5.3 | L2 | 6 | Understand the concepts and apply the techniques of searching, hashing and sorting |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand and remember algorithms and its analysis procedure. |
| 2 | Introduce the concept of data structures through ADT including List, Stack, Queues . |
| 3 | To design and implement various data structure algorithms. |
| 4 | To introduce various techniques for representation of the data in the real world. |
| 5 | To develop application using data structure algorithms. |
| 6 | Compute the complexity of various algorithms. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 3 4 | 2 | 3.5 4.5 | 3.5.1 4.5.1 | L1 L6 | 1 | Able to define a precise problem statement for real life applications. Design and create appropriate model on the problem statement |
| 4 | 2 | 4.5 | 4.5.1 | L6 | 2 | Design and develop RDBMS using SQL |
| 4 2 | | 4.6 2.7 | 4.6.1 2.7.1 | L2 L3 | | Demonstrate an ability to retrieve data and analyze data |
| 2 2 | | 2.7 2.8 | 2.7.1 2.8.1 | L3 L2 | | Able to apply view triggers and procedures Demonstrate specific event handling |
| 4 | 1 | 4.5 | 4.5.1 | L2 | 5 | Demonstrate database connectivity using JDBC. |
| 4 | 1 | 2.7 | 2.7.1 | L3 | 6 | Able to apply indexes for a database using indexing techniques |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To identify and define problem statements for real life applications |
| 2 | To construct conceptual data model for real life applications |
| 3 | To Apply SQL to store and retrieve data efficiently |
| 4 | To apply view ,triggers and event handling |
| 5 | To implement database connectivity using JDBC |
| 6 | To enable students to be create indexes for databases for efficient retrieval. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO1 | Understand and explain Basic programming concepts |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO2 | Use the basic concepts like class,Objects,methods,Array,String for finding solution to problems. |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO3 | Demonstrate how to use inheritance,interface and packages for development. |
| 3 | 1 | 3.8.1 | 3.8 | 3 | CO4 | Use multithreading,exceptional handling and IO streams concepts for better development. |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO5 | Design and Develop GUI using AWT. |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO6 | Design and Develop GUI using swing. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions. |
| 2 | To understand the importance of Classes & objects along with constructors, Arrays and Vectors. |
| 3 | Discuss the principles of inheritance, interface and packages and demonstrate through problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages. |
| 4 | To understand importance of Multi-threading & different exception handling mechanisms |
| 5 | To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events. |
| 6 | To understand Java Swings for designing GUI applications based on MVC architecture. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----------------|------------|-------------------|-----------|----------------------|-----------|---|
| 1,2 | | 1.1 | 1.1.3 | 3 | 1 | define and identify the different programs in the field of Engg. Problems related with information technology |
| 1,2,4 | | 1.3 | 1.3.1 | 3 | 2 | Select & choose appropriate congruence relation theorem to design the technology program & investigate the proper solution of congruences. |
| 1,2,3,4. 12 | | 2.1 | 2.1.2 | 3,4 | 3 | Cassify and select the probability distribution to analyze & solve real time problem, in data srtucture and Artificial intelligence |
| 1,2,12 | | 2.1 | 2.1.2 | 2 | 4 | Select the test of hypothesis for small & large samples by using various test like t-test, z- test & chi- square test. |
| 1,2,3,5 | | 3.3 | 3.3.1 | 3 | 5 | Develop the basic knowledge of graph theoryand group concept to express & identify the solution of planer graph, graph coloring, trees ,isomorphism & apply the knowledge in engineering as well as day to day life problems. |
| 1,2,4,12 | | 4.3 | 4.3.1 | 4 | 6 | Analyze the Lattices & use the concept of Boolean Algebra & coding theory in error detection problems,also apply the knowledge to design the information technology problem as well as problem in changing world of technology. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To inculcate an ability to relate engineering problems to mathematical context using the concept of Number theory. |
| 2 | To provide a solid foundation in mathematical fundamentals required to solve engineering problem. |
| 3 | Apply probability distribution theory for solving engineering problems. |
| 4 | To identify significance of sampling theory. |
| 5 | To study the concept of graph theory and trees. |
| 6 | To identify significance of group and lattice theory. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 2 | 1 | 2.6 | 2.6.2 | L2 | | Understand the functionality of each layer of communication model |
| 2 | 1 | 2.6 | 2.6.4 | L5 | | Compare the OSI & TCP/IP Communication Models |
| 1 | 1 | 1.6 | 1.6.1 | L1 | | List the data presentation techniques |
| 1 | 1 | 1.7 | 1.7.1 | L4 | | Illustrate the client server model in application layer protocols |
| 1 | 1 | 1.7 | 1.7.1 | L2 | CO3 | Explain data transportation issues and related protocols used for end-to-end data transmission |
| 2 | 1 | 2.8 | 2.8.2 | L4 | | Analyze the routing protocols |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Understand IPv4 , IPv6 header Formats and IPV4 addressing scheme |
| 3 | 2 | 3.8 | 3.8.1 | L6 | | Designing sub-nettings including detailed IPV4 addressing for an small netwroks |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Describes Switching techniques |
| 1 | 1 | 1.7 | 1.7.2 | L3 | | Understand Responsibilities and Protocols of data link layer |
| 1 | 1 | 1.6 | 1.6.1 | L4 | | Categorize the type of Transmission Media |
| 1 | 1 | 1.7 | 1.7.1 | L2 | | Undestand Multiplexing and Modulation Techniques |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Study basics of Computer Network Hradware, Software and Communication Models. |
| 2 | Acquire knowledge of Application layer and presentation layer paradigm and protocols. |
| 3 | Study session layer design issues, transport layer services and protocols. |
| 4 | Gain core knowledge of Network layer routing protocols and IP addressing. |
| 5 | Describe data link layer concepts, design issues and protocols . |
| 6 | Learn the fundamentals and basics of Physical layer |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 2 Understand | CO1 | Understand the basic concepts and components related to Operating System |
| PO4 | PSO1 | 4.4 | 4.4.1 | Level 2 Understand | CO2 | Describe the Process Management Policies and Illustrate scheduling of processes by CPU using Algorithms |
| PO3 | PSO2 | 3.6 | 3.62 | Level 5 Evaluate | CO3 | Evaluate Deadlock Conditions as handled by Operating System. |
| PO4 | PSO2 | 4.5 | 4.5.1 | Level 4 Analyze | CO4 | Explain and Analyze the memory allocation and management functions and techniques of Operating System. |
| PO4 | PSO2 | 4.4 | 4.4.3 | Level 4 Analyze | CO5 | Analyze and Evaluate the services provided by Operating System for Storage Management. |
| PO5 | PSO1 | 5.4 | 5.4.1 | Level 2 Understand | CO6 | Compare the functions of various special-purpose Operating Systems |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To understand the main components of an OS & their functions |
| 2 | To study the process management and scheduling |
| 3 | To understand various issues in Inter Process Communication (IPC) and the role of OS in IPC. |
| 4 | To understand the concepts and implementation Memory management policies and virtual memory |
| 5 | To understand the working of an OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to implement the different parts of OS |
| 6 | To study the need for special purpose operating system with the advent of new emerging technologies |

Subject- Computer Organization and Architecture

Subject Code: ITC404

Course Outcomes

| PO | PSO | Competancy | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | | 1.6 | 1.6.1 | L1 | | Apply basic engineering fundamentals to describe basic organization of computer, |
| PO2 | | 2.6 | 2.6.4 | L2 | | Differentiate basic organization and architecture of computer. |
| PO1 | | 1.6 | 1.6.1 | L1 | | describe the architecture of 8086 |
| PO1 | | 1.6 | 1.6.1 | L1 | | Apply basic engineering fundamentals to describe and differentiate basic organization of computer, the architecture of 8086 microprocessor and to implement assembly language programming for 8086 microprocessors. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast the instructions of 8086 to select appropriate instructions as per given task. |
| PO2 | | 2.8 | 2.8.2 | L4 | | Analyze and interpret the result of ALP using integrated tool. |
| PO1 | | 1.6 | 1.6.1 | L2 | | demonstrate control unit operations and conceptualize instruction level |
| PO1 | | 1.6 | 1.6.1 | L1 | | Apply engineering fundamentals to Describe Soft wired (Microprogrammed) and hardwired control unit design methods. Microinstruction sequencing and execution |
| PO2 | | 2.1 | 2.5.2 | L4 | | List and Identify integers and real numbers and perform computer arithmetic operations on integers. |
| PO2 | | 2.1 | 2.5.3 | L3 | | Identify mathematical algorithmic knowledge that applies to solve a given problem |
| PO1 | | 1.6 | 1.6.1 | L4 | | Apply basic engineering fundamentals to Categorize memory organization. |
| PO2 | | 2.6 | 2.6.2 | L4 | | Identify basic functionalities of each element of a memory hierarchy |

| | | | | | | |
|-----|--|-----|-------|----|-----|---|
| PO1 | | 1.6 | 1.6.1 | L3 | CO6 | Apply basic engineering fundamentals to examine the different methods for computer I/O mechanism. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast alternative methods of data transfer to select the best methods. |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | Conceptualize the basics of organizational and architectural issues of a digital computer. |
| 2 | Analyze processor performance improvement using instruction level parallelism. |
| 3 | Learn the function of each element of a memory hierarchy. |
| 4 | Study various data transfer techniques in digital computer. |
| 5 | Articulate design issues in the development of processor or other components that satisfy design requirements and objectives. |
| 6 | Learn microprocessor architecture and study assembly language programming. |

Subject-Automata Theory

Course Outcomes

Subject Code: ITC405

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|----|--|
| 2 | 1 | 3.6 | 3.6.1 | 2,4,6 | 1 | Explain, analyze and design Regular languages, Expression and Grammars, Closure Properties. |
| 1 | 2 | 2.1 | 2.5.3 | 6 | 2 | Design and Apply different types of Finite Automata and Machines as Acceptor, Verifier and Translator. |
| 2 | 1 | 3.6 | 3.6.1 | 4, 6 | 3 | Analyze and design Context Free languages and Grammars. |
| 4 | 1 | 2.1 | 2.5.2 | 6 | 4 | Design different types of Push down Automata as Simple Parser. |
| 4 | 1 | 1.7 | 1.7.1 | 6 | 5 | Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine. |
| 3 | 2 | 3.6 | 3.6.2 | 6 | 6 | Investigate and Develop understanding of applications of various Automata and designing functions FA, FSM, PDA, TM. |

Course Objectives

| Sr. No | Description |
|---|--|
| At the end of course, student should be able to: | |
| 1 | Learn fundamentals of Regular and Context Free Grammars and Languages |
| 2 | Summarize the relation between Regular Language and Finite Automata and machines. |
| 3 | Design Automata's and machines as Acceptors, Verifiers and Translators. |
| 4 | Represent the relation between Contexts free Languages, PDA and TM. |
| 5 | Make PDA as acceptor and TM as Calculators. |
| 6 | Co-relate Automata's with Programs and Functions. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 4 | 1 | 4.6 | 4.6.1 | L3 | LO1 | Demonstrate Basic network administration commands to Investigate network. |
| 3 | 1 | 3.6 | 3.6.2 | L2 | LO2 | Installation and Implementation of network simulator (NS) and Implementations of TCL scripting. |
| 4 | 1 | 4.4 | 4.4.1 | L3 | LO3 | Understand the network simulator environment. Investigate and examine Network performance |
| 1 | 1 | 1.7 | 1.7.1 | L4 | LO4 | Analyse the traffic flow and the contents of protocol frames. |
| 3 | 2 | 3.6 | 3.6.1 | L3 | LO4 | Design and Implement client-server socket Architecture |
| 3 | 2 | 3.7 | 3.7.1 | L6 | LO6 | Design and configure a network for an organization. |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | Execute and evaluate network administration commands and demonstrate their use in different network scenarios |
| 2 | Demonstrate the installation and configuration of network simulator |
| 3 | Demonstrate and measure different network scenarios and their performance behaviour. |
| 4 | Analyze the traffic flow of different protocols. |
| 5 | Implement the socket programming for client server architecture |
| 6 | Design a network for an organization using a network design tool |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 4 Identify | CO1 | Identify the Unix general purpose commands |
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 2 Understand | CO2 | Understand the architecture and functioning of Unix |
| PO4 | PSO1 | 4.6 | 4.6.1 | Level 3 Apply | CO3 | Apply Unix commands for system administrative tasks such as file system management and user management. |
| PO2 | PSO2 | 2.6 | 2.6.2 | Level 2 Understand | CO4 | Demonstrate basic shell scripts for different applications. |
| PO5 | PSO2 | 5.5 | 5.5.1 | Level 3 Apply | CO5 | Compute Unix commands for system administrative tasks such as process management and memory management |
| PO5 | PSO2 | 5.6 | 5.6.1 | Level 6 Create | CO6 | Develop advanced scripts using awk & perl languages and grep, sed, etc. commands for performing various tasks. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To learn Unix general purpose commands and programming in Unix editor environment |
| 2 | To understand architecture and installation of Unix Operating System |
| 3 | To understand file system management and user management commands in Unix. |
| 4 | To learn basic shell scripting. |
| 5 | To understand process management and memory management commands in Unix |
| 6 | To learn scripting using awk and perl languages. |

Subject- MPL (Lab)**Subject Code- ITL403****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.7 | 1.7.1 | L3 | CO1 | Apply the fundamentals of assembly level programming of microprocessors. |
| PO1 | 1 | 1.2 | 1.2.1 | L4 L6 | CO2 | Simulate a program on a microprocessor using arithmetic & logical instruction set of 8086. |
| PO4 | 1 | 4.5 | 4.5.1 | L6 | CO3 | Develop the assembly level programming using 8086 loop instruction set. |
| PO4 | 1 | 4.5 | 4.5.1 | L1 | CO4 | Implement programs based on string and procedure for 8086 microprocessor. |
| PO4 | 1 | 4.5 | 4.5.1 | L4 | CO5 | Analyze abstract problems and apply a combination of hardware and software to address the problem |
| PO5 | 1 | 5.4 | 5.4.1 | L3 | CO6 | Use of standard test and measurement equipment to evaluate digital interfaces. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | Learn assembling and disassembling of PC |
| 2 | Understand hands on experience with Assembly Language Programming. |
| 3 | Study interfacing of peripheral devices with 8086 microprocessor. |
| 4 | Understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors. |
| 5 | Provide fundamentals of designing embedded systems |
| 6 | Write and debug programs in TASM/MASM/hardware kits |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-----|---------------|-----|--|
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO1 | Understand and explain Basic programming concepts |
| 1 | 1 | 1.6.1 | 1.6 | 2 | CO2 | Understand and explain decision making statement and functions. |
| 3 | 1 | 3.7.1 | 3.7 | 3 | CO3 | Use the OOPS concepts for finding solution to problems. |
| 4 | 1 | 4.6.4 | 4.6 | 3 | CO4 | Understanding different file operations. |
| 3 | 2 | 3.6.2 | 3.6 | 6 | CO5 | Design and develop GUI using tkinter. |
| 1 | 2 | 1.2.2 | 1.2 | 3 | CO6 | Applying networking concepts for network programm. |

Course Objectives

| Sr. No | Description |
|--------|---|
| 1 | Basics of Python programming |
| 2 | Decision Making and Functions in Python |
| 3 | Object Oriented Programming using Python |
| 4 | Files Handling in Python |
| 5 | GUI Programming and Databases operations in Python |
| 6 | Network Programming in Python |

Semester V
Subject- Microcontroller and Embedded Programming
Subject Code:ITC501

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----|-------|------------|-------|---------------|----|---|
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply basic engineering fundamentals to explain the architecture and design metrics of Embedded System. |
| PO1 | | 1.6 | 1.6.1 | L2 | | Apply basic engineering fundamentals to Classify the embedded systems. |
| PO1 | | 1.6 | 1.6.1 | L3 | | Apply basic engineering fundamentals to explain the architecture of 8051 microcontroller and the instructions of 8051 to implement the assembly language program. |
| PO2 | | 2.6 | 2.6.4 | L2 | | Compare and contrast the instructions of 8051 to select appropriate instructions as per given task. |
| PO2 | | 2.8 | 2.8.2 | L4 | | Analyse and interpret the result of ALP using integrated tool. |
| PO1 | | 1.6 | 1.6.1 | L6 | | Apply engineering fundamentals to design interfacing of 8051 with various Input/Output devices. |
| PO3 | | 3.8 | 3.8.1 | L3 | | Able to refine architecture design into detailed design using microcontroller, memory chip or different peripheral ICs within existing constraints. |
| PO1 | | 1.6 | 1.6.1 | L2 | | Apply basic engineering fundamentals to explain the architecture of ARM processor. |
| PO1 | | 2.8 | 2.8.1 | L3 | | Apply the instructions of ARM to implement the assembly language program. |
| PO2 | | 2.8 | 2.8.2 | L4 | | Analyse and interpret the result of ALP using integrated tool. |
| PO1 | | 1.6 | 1.6.1 | L2 | | Apply basic engineering fundamentals to explain the architecture of RTOS. |
| PO2 | | 2.6 | 2.6.2 | L4 | | Identify basic functionalities of RTOS and computing resources. |
| PO1 | PSO 2 | 1.6 | 1.6.1 | L3 | | Apply basic engineering fundamentals to explain various target boards of Embedded System. |
| PO2 | PSO 2 | 2.6 | 2.6.4 | L2 | | Compare and contrast the various target boards to select appropriate target board as per given application |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | To learn different types of sensors from Motes families |
| 2 | To design the problem solution as per the requirement analysis done using Motes sensors |
| 3 | To study the basic concepts of programming/sensors/ emulator like cooja etc |
| 4 | To design and implement the mini project intended solution for project based learning |
| 5 | To build and test the mini project successfully |
| 6 | To improve the team building, communication and management skills of the students |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO5 | PSO1 | 5.6 | 5.6.1 | L2 | CO1 | Discuss basic web designing concept for creating web pages using HTML and CSS and validate web pages using Javascript |
| PO5 | PSO1 | 5.6 | 5.6.1 | L2 | | Discuss programming concepts of HTML5 and CSS3. |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | | Design responsive web pages |
| | PSO1 | 5.5 | 5.5.1 | L4 | | Identify the characteristics of rich internet applications . |
| | PSO2 | 5.4 | 5.4.2 | L6 | | Create website using rich internet applications |
| PO4 | PSO1 | 4.6 | 4.6.1 | L4 | | Analyze and access the dynamic web site data using server side PHP programming. |
| PO5 | PSO2 | 5.4 | 5.4.2 | L6 | | Create database connectivity for data |
| | PSO1 | 2.6 | 2.6.4 | L5 | | Explore, understand and compare different web services and extensions. |
| | PSO2 | 2.7 | 2.7.1 | L3 | | Apply a web service as per website |
| PO3 | PSO2 | 3.8 | 3.8.2 | L6 | CO6 | Integrate web designing modules using python web framework Django |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To get familiar with basics of the Internet Programming. |
| 2 | To gain ability to develop responsive web applications |
| 3 | To learn characteristics of RIA –Web Mashup Eco System |
| 4 | To acquire knowledge and skills for creation of web site considering both client and server side programming |
| 5 | To explore different web extensions and web services standards |
| 6 | To be familiar with Python web framework-Django. |

Subject- Advanced database management technology

Subject Code: ITC503

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | P1 | 2.5 | 2.5.2 | L4 | | Analyze query processing and optimization techniques. |
| 1 | P1 | 1.7 | 1.7.1 | L3 | | Apply algorithm to measure its cost and working to select best query execution plan |
| 2 | P1 | 2.1 | 2.5.2 | L2 | CO2 | identify transaction processing and its properties |
| 6 | P1 | 6.3 | 6.3.1 | L2 | | Identify sophisticated access control protocols |
| 5 | P1 | 5.4 | 5.4.1 | L3 | | Apply different access control protocols to the database |
| 7 | P1 | 7.3 | 7.3.2 | L2 | | understand different applications using advanced models |
| 2 | P1 | 2.5 | 2.5.2 | L2 | | identify different models of distributed database system |
| 4 | P1 | 4.6 | 4.6.1 | L4 | | Analyze different architectures of distributed system |
| 5 | P1 | 5.5 | 5.5.1 | L4 | | analyze enterprise data and use OLAP tools to take strategic decisions |
| 3 | P1 | 3.8 | 3.8.1 | L6 | | design datawarehouse system using different OLAP operations |
| 5 | | 5.4 | 5.4.1 | L2 | | identify ETL process techniques to extract data from datawarehouse |
| 12 | | 12.6 | 12.6.2 | L4 | | Analyze historical data from DW to take decisions |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | To impart knowledge related to query processing and query optimizer phases of a database management system |
| 2 | To introduce advanced concepts of transaction management and recovery technique |
| 3 | To introduce concepts of advanced access control techniques like role based and discretionary methods |
| 4 | To introduce advanced database models like distributed databases. |
| 5 | To create awareness of how enterprise can organize and analyze large amounts of data by creating a Data Warehouse. |
| 6 | To introduced concept of ETL process used for Dataware housing |

Subject- Cryptography and Network Security Subject Code: ITC504

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|-----|--|
| 1 | 1 | 2.5 | 2.5.1 | L2 | | Understand security objectives. |
| 2 | 1 | 1.2 | 1.2.1 | L3 | | Apply the knowledge of mathematical concepts, matrix and numerical techniques |
| 3 | 1 | 3.6 | 3.6.1 | L4 | | Analyse various encryption techniques. |
| 1 | 1 | 1.7 | 1.7.1 | L2 L3 | | Understand and Apply theory and principles of computer science and engineering. |
| 3 | 2 | 3.6 | 3.6.2 | L6 | | Design various secure cryptographic applications. |
| 5 | 2 | 5.4 | 5.4.2 | L2 L6 | | Create, modify and extend techniques to provide security. |
| 6 | 2 | 6.3 | 6.3.1 | L5 | | Evaluate various techniques to provide protection of the public |
| 4 | 1 | 4.6 | 4.6.1 | L3 L4 | | Use appropriate procedures and techniques to analyse data authentication. |
| 6 | 1 | 6.4 | 6.4.1 | L6 | | Apply authentication schemes for protection of public. |
| 7 | 1 | 7.4 | 7.4.2 | L3 | | Apply principles of preventive engineering to prevent from various type of attacks in OSI model. |
| 2 | 1 | 2.7 | 2.7.1 | L5 | | Evaluate the performance and application of firewall and IDS in network security |
| 3 | 2 | 3.5 | 3.5.5 | L3 L6 | CO6 | Explore design issues and working principles of various secure communication standards including Kerberos, IPsec, and SSL/TLS and email and apply them to provide security for professional concern. |

Course Objective

| Sr. No. | Description |
|---------|--|
| 1 | Classical encryption techniques and concepts of finite fields and number theory |
| 2 | Explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key |
| 3 | Explore the design issues and working principles of various authentication protocols, PKI standards. |
| 4 | Explore various secure communication standards including Kerberos, IPsec, and SSL/TLS and email. |
| 5 | To use existing cryptographic utilities to build programs for secure communication |
| 6 | Concepts of cryptographic utilities and authentication mechanisms to design secure applications |

Course Outcomes

| PO | PSO | Competency | PI | Blooms Level | CO | Description |
|-----------|------------|-------------------|-----------|---------------------|-----------|--|
| PO1 | 1 | 1.6 | 1.6.1 | Level 3 Apply | CO1 | Apply the knowledge of ecommerce concept to identify and analyse different ecommerce types |
| PO2 | 1 | 2.1 | 2.5.1 | Level 4 analyze | CO2 | Identify and analyze ecommerce website and select Hardware and Software Technologies |
| PO2 | 1 | 2.8 | 2.8.3 | Level 4 analyze | CO3 | Investigate complex ecommerce website and design payment system |
| PO5 | 1 | 5.5 | 5.5.1 | Level 1 Remember | CO4 | Understand the process of Selling and Marketing on web and create appropriate marketing strategy |
| P02 | 1 | 2.8 | 2.8.4 | Level 6 Creating | CO5 | Models, identify and analyse different ebusiness model, create appropriate plan |
| PO3 | 1 | 3.8 | 3.8.2 | understan | CO6 | Understand Strategic planning process , create SCM , CRM ,ERP for ebusiness website |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand concept of Ecommerce and its types |
| 2 | Learn different technologies for ecommerce |
| 3 | understand different mode of online payment system and Learn SET protocol |
| 4 | Understand basic concept of Selling and marketing on web |
| 5 | Understand concept of E-business and its various Models |
| 6 | Understand various E-business Strategies |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------------|----------------------|-----------|--|
| 10 | 1 | 10.1 | 10.1.1 | 6 | 1 | Design a technical document using precise language, suitable vocabulary and apt style |
| 10 | 1 | 10.2 | 10.2.1 & 10.2.2 | 1 | 2 | Develop writing skills of business and technical proposals and documents |
| 9 | 1 | 9.2 | 9.2.1 & 9.2.2 | 6 | 3 | Develop the lifeskills/interpersonal skills to progress professionally by building strong relationships |
| 9 | 2 | 9.3 | 9.3.1 | 3 | 4 | Represent them as team members and leaders with well groomed, organized, social etiquettes in professional and social environment. |
| 8 | 2 | 8.1 | 8.1.1 | 5 | 5 | Demonstrate awareness of contemporary issues, knowledge of professional and ethical responsibilities |
| 12 | 2 | 9.1 & 9.2 | 12.1 | 3 | 6 | Apply the traits of suitable candidate for a job/ higher education upon being trained in the techniques of holding a group discussion, facing interview and writing resume/ SOP. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To inculcate professional and ethical attitude at the workplace |
| 2 | To enhance effective communication and interpersonal skills |
| 3 | To build multidisciplinary approach towards all life tasks |
| 4 | To hone analytical and logical skills |
| 5 | To understand understand and demonstrate professional and personal values and work ethics |
| 6 | To understand the techniques of writing resumes, perform in group discussion, facing interviews and develop job related skills |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO3 | PSO1 | 3.6 | 3.6.2 | L2 | CO1 | Able to understand and produce a variety of potential responsive web design solutions using HTML5 and CSS3 |
| PO3 | PSO2 | 3.8 | 3.8.2 | L3 | CO2 | Able to implement and integrate dynamic web pages with validation using JavaScript objects by applying different event handling mechanism |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | CO3 | Design and develop Rich Internet Applications (API) based on the study objectives using AJAX programming |
| PO4 | PSO2 | 4.5 | 4.5.1 | L6 | CO4 | Design and develop simple web application using server side PHP programing and Database Connectivity using MySQL. |
| PO3 | PSO1 | 3.5 | 3.5.2 | L4 | CO5 | Able to identify and build well-formed XML document and implement Web Service using Java as per system requirements from stakeholders |
| PO2 | PSO2 | 2.7 | 2.7.1 | L3 | CO6 | Able to apply computer engineering principles to demonstrate simple web application using Python Django Framework with required applicability and performance. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Acquire knowledge and Skills for creation of Web Site considering both client- and server-side Programming. |
| 2 | To create Web application using tools and techniques used in industry. |
| 3 | To learn the characteristics of RIA |
| 4 | To Demonstrate Amazon/Google or Yahoo mashup |
| 5 | To be well versed with XML and web services Technologies. |
| 6 | To be familiarized with open source Frameworks for web development. |

Subject- Security lab**Subject Code: ITL502****Lab Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 1 | 1 | 1.6 | 1.6.1 | L3 | LO1 | Apply Engineering Knowledge in symmetric cryptography to implement classical ciphers. |
| 2 | 1 | 2.5 | 2.5.2 | L6 | LO2 | Formulate public key algorithms like RSA and El Gamal |
| 2 | 1 | 2.8 | 2.8.2 | L4 L6 | LO3 | Formulate Hashing Algorithm like SHA, MD5 and analyse their performance. |
| 5 | 1 | 5.4 | 5.4.1 | L3 | LO4 | Apply appropriate techniques to explore the different network reconnaissance tools to gather information about networks. |
| 5 | 1 | 5.4 | 5.4.2 | L3 L4 L5 | LO5 | Select and apply appropriate tools like sniffers, port scanners and other related tools for analyzing packets in a network. |
| 3 | 2 | 3.6 | 3.6.2 | L1,L2 | LO6 | Design solution of complex engineering problem by set up firewalls and intrusion detection systems using open source technologies and to explore email security. |

Lab Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To apply the knowledge of symmetric cryptography to implement classical ciphers. |
| 2 | To be able to analyze and implement public key algorithms like RSA and El Gamal |
| 3 | To analyze and evaluate performance of hashing algorithms |
| 4 | To explore the different network reconnaissance tools to gather information about networks |
| 5 | To explore and use tools like sniffers, port scanners and other related tools for analyzing packets in a network. |
| 6 | To be able to set up firewalls and intrusion detection systems using open source technologies and to explore email security. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 3 | P1 | 3.6 | 3.6.2 | L6 | CO1 | Implement simple query optimizers and design alternate efficient paths for query execution |
| 4 | P1 | 4.5 | 4.5.1 | L6 | CO2 | Simulate the working of concurrency protocols, recovery mechanisms in a database |
| 4 | P1 | 4.5 | 4.5.1 | L6 | CO3 | Design applications using advanced models like mobile, spatial databases. |
| 2 | P1 | 2.5 | 2.5.2 | L3, L2 | CO4 | Implement a distributed database and understand its query processing and transaction processing mechanism |
| 3,4 | P2 | 3.5 4.5 | 3.5.1 4.5.1 | L6 | CO5 | Able to define a precise problem statement for real life applications. Design and create appropriate model on the problem statement |
| 5 | P2 | 5.5 | 5.5.1 | L4 | CO6 | Analyze data using OLAP operations so as to take strategic decisions using ETL tool |

Course Objective

| Sr. No. | Description |
|----------------|---|
| 1 | To impart knowledge related to query processing and query optimizer phases of a database management system |
| 2 | To introduce advanced concepts of transaction management and recovery techniques |
| 3 | To impart an overview of emerging data models like temporal, mobile and spatial databases |
| 4 | To introduce advanced database models like distributed databases |
| 5 | To create awareness of how enterprise can organize and analyze large amounts of data by creating a Data Warehouse |
| 6 | To impart an overview of ETL tools use for dataware housing |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | PSO1 | 3.5 | 3.5.2 | L4 | CO1 | Able to identify and document system requirements from stake-holders for the real world problem |
| PO12 | PSO2 | 12.6 | 12.6.1 | L3 | CO2 | Source and comprehend technical literature and other credible sources of information used in the preferred field of study |
| PO4 | PSO1 | 4.4 | 4.4.3 | L1 | CO3 | Able to study, understand and enhance software/ hardware skills and choose appropriate hardware/software tools to conduct the experiment |
| PO3 | PSO2 | 3.8 | 3.8.2 | L6 | CO4 | Able to implement and integrate the modules and build the project successfully by hardware requirements, coding, emulating and testing |
| PO2 | PSO1 | 2.8 | 2.8.4 | L2 | CO5 | Arrive at conclusions with respect to the objectives and represent the findings of the study conducted in the preferred domain |
| PO9 | PSO2 | 9.6 | 9.6.1 | L6 | CO6 | Present results as a team and manage the conduct of the research study with smooth integration of contributions from all individual efforts |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Address the real world problems and find the required solution |
| 2 | Design the problem solution as per the requirement analysis done. |
| 3 | Study the basic concepts of programming/ hardware/ emulator for Raspberry pi/Arduino/ ARM Cortex/ Intel Galileo etc. |
| 4 | Fabricate and implement the mini project intended solution for project based learning. |
| 5 | Build and test the mini project successfully. |
| 6 | Improve the team building, communication and management skills of the students. |

Semester-VI

Subject-SEMP

Subject Code-ITC601

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | 1 | 1.6 | 1.6.1 | L1 | CO1 | Apply the knowlgde to understand the nature of software development process model |
| PO3 | 1 | 3.5 | 3.5.2 | L3 | CO2 | able to identify,capture,document software requirements |
| PO2 | 1 | 2.6 | 3.7.1 | L6 | co3 | Able to produce user centric design solutions suited to meet functional requirements. |
| PO5 | 1 | 5.5 | 5.5.1 | L1 | Co4 | choose testing methods and understanding concept of software quality assurance and software configuration management process. |
| Po9 | 1 | 9.6 | 9.6.1 | L6 | CO5 | play role in project management life cycle and demonstrate effective communication skill |
| PO7 | 1 | 7.3 | 7.3.1 | L6 | CO6 | Develop project scheduling concept and identify risk in software development life cycle |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand the different process model |
| 2 | Explain methods of capturing, specifying, visualizing and analyzing software requirements |
| 3 | Understand the basic concept of design |
| 4 | Understand the need to testing and its different types |
| 5 | understand need of project management and project management life cycle |
| 6 | understand the concept of project scheduling and RMMM sheet |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|-----|---|
| 2 | 2 | 2.6 | 2.6.3 | L2 | CO1 | Understand and identify importance of data mining and the principles of business intelligence |
| | | | | L2 | | Understand and Analyze the data needed for data mining using preprocessing techniques |
| | | | | L4 | | Perform exploratory analysis of the data to be used for mining |
| | | 2.1 | 2.5.2 | L2 | | Understand classification methods and identify algorithm for large data set to predict label |
| | | 2.7 | 2.7.1 | L1 | | Define and apply metrics to measure the performance of data mining algorithms |
| 2 | | 2.1 | 2.5.2 | L2 | CO4 | Understand and apply appropriate clustering method on data set to find different patterns |
| 2 | | 2.7 | 2.7.1 | L3 | CO5 | Apply frequent patterns mining technique and identify its use in market basket analysis |
| 4 | | 4.6 | 4.6.1 | L3 | | Apply BI tools to solve practical problems and analyze the problem domain. |
| 5 | | 5.4 | 5.4.2 | L4 | | Apply the appropriate data mining techniques and provide decision support |

Course Objective

| Sr. No. | Description |
|---------|--|
| 1 | To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage. |
| 2 | To enable students to effectively identify sources of data and process it for data mining |
| 3 | To make students well versed in concept of classification algorithms, methods of evaluation |
| 4 | To make students well versed in concept of clustering algorithms and concept of outliers |
| 5 | To make students understand the concept of market basket analysis and its multivalued association rules |
| 6 | To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business value from data |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| | PSO1 | 2.6 | 2.6.3 | Level 2 Understand | | Understanding concept of cloud and its similar architecture with its different uses and advantages |
| | PSO2 | 2.6 | 2.6.2 | Level 4 Analyze | | Identify different services and deployment models used for implementation of cloud computing. |
| PO2 | PSO1 | 2.6 | 2.6.4 | Level 5 Evaluate | CO2 | Compare and contrast different solutions available for virtualization. |
| PO5 | PSO1 | 5.5 | 5.5.1 | Level 4 Analyze | CO3 | Analyze different cloud services and techniques required to work on cloud for application |
| PO3 | PSO2 | 3.6 | 3.6.2 | Level 6 Creating | CO4 | Define different components of openstack and Design own cloud rules and policies using available cloud platforms. |
| PSO2 | PSO2 | 2.6 | 2.6.3 | Level 4 Analyze | CO5 | Select different existing solutions and methods to work on AWS |
| PO5 | PSO2 | 5.4 | 5.4.2 | Level 6 Creating | CO6 | Design & develop backup strategies for cloud data based on features. |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To understand basics of cloud computing including different architecture service models and deployment model. |
| 2 | To learn different solutions of virtualization. |
| 3 | To analyse different services available in cloud for different purposes and applications. |
| 4 | To define Cloud Implementation, Programming and Mobile cloud computing. |
| 5 | To understand different solutions and applications available on AWS. |
| 6 | To learn design different methods to provide backup solitions for cloud data. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 2 | 1 | 2.6 | 2.6.2 | L2 L3 | | Understand and Apply wireless Technology fundamentals as means of communication |
| 2 | 1 | 2.6 | 2.6.4 | L5 | | Comparison of Wireless generation |
| 3 | 1 | 3.6 | 3.6.2 | L2 | | Understand different Medium Access Techniques |
| 5 | 1 | 5.4 | 5.4.1 | L4 | | Analyse evolution of Different wireless Technologies |
| 3 | 2 | 3.6 | 3.6.2 | L2 L3 L6 | CO3 | Understand And Apply The knowledge of Ad-Hoc N/w in designing a wireless Sensor N/w |
| 4 | 1 | 4.5 | 4.5.1 | L2 L5 | | Understand and Evaluate Emerging wireless Technology |
| 4 | 1 | 4.6 | 4.6.3 | L5 | | Comparison of different Wireless Standard |
| 3 | 2 | 3.8 | 3.8.1 | L6 | CO5 | Designing of Unified Wireless Network using LAP, WLC, LWAPP |
| 3 | 1 | 3.5 | 3.5.5 | L3 L6 | | Analyse working principles of various secure communication standards including IPsec, and SSL/TLS and email |
| 6 | 1 | 6.3 | 6.3.1 | L3 | | Apply concept of Firewall and IDs provide security for professional concern. |

Course Objective

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the fundamentals of wireless networks. |
| 2 | analyze the different wireless technologies |
| 3 | Evaluate Ad-hoc networks and wireless sensor networks. |
| 4 | evaluate emerging wireless technologies and standards |
| 5 | Understand design considerations for wireless networks |
| 6 | analyze and evaluate the security threats and related security standards |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO1 | PSO2 | 1.7 | 1.7.1 | L3 | CO1 | Understand and apply theory and principles of computer science and engineering for techniques associated with the digital forensic practices and cyber crime |
| PO4 | PSO1 | 4.4 | 4.4.1 | L1 | CO2 | Define and analyze a problem for purposes of investigation, its scope and importance of evidence handling and storage for various devices |
| PO6 | PSO1 | 6.3 | 6.3.1 | L4 | CO3 | Identify and describe various engineering roles in understanding of current cyber security incident response and analyzing ways that exploits in securities. |
| PO4 | PSO1 | 4.6 | 4.6.2 | L4 | CO4 | Critically analyzing forensic duplicated data and investigating it for trends and correlations limitations |
| PO4 | PSO2 | 4.6 | 4.6.1 | L3 | CO5 | Use appropriate procedures, tools and techniques to collect data and investigate attacks, IDS .technical exploits , router attacks and “Trap and Trace” computer networks. |
| PO5 | PSO1 | 5.5 | 5.5.1 | L4 | CO6 | Identify the strengths and limitations of computer forensic tools and acquiring information for report writing |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand underlying principles and many of the techniques associated with the digital forensic practices and cyber crime |
| 2 | To explore practical knowledge about ethical hacking Methodology |
| 3 | To learn the importance of evidence handling and storage for various devices |
| 4 | To develop an excellent understanding of current cyber security issues (Computer Security Incident) and analyzed the ways that exploits in securities. |
| 5 | To investigate attacks, IDS .technical exploits and router attacks and “Trap and Trace” computer networks. |
| 6 | To apply digital forensic knowledge to use computer forensic tools and investigation report writing. |

Subject-Multimedia System**Subject Code-ITDLO6024****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 5 | 1 | 5.5 | 5.5.1 | 1 | CO1 | Identify and understand technical aspect of MS. |
| 2 | 1 | 2.6 | 2.6.2 | 1 | CO2 | Identify and understand various file formats. |
| 3 | 2 | 3.8 | 3.8.2 | 6 | CO3 | Develop various multimedia systems modules,implement and integrate it |
| 3 | 1 | 3.8 | 3.8.3 | 6 | CO4 | Design and validate interactive multimedia software. |
| 1 | 1 | 1.2 | 1.2.2 | 3 | CO5 | Apply various networking protocols for multimedia applications. |
| 4 | 1 | 4.6 | 4.6.1 | 3 | CO6 | Use and evaluate multimedia application for its optimum preference. |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To learn and understand technical aspect of Multimedia Systems |
| 2 | To understand the standards available for different audio, video and text applications |
| 3 | To Design and develop various Multimedia Systems applicable in real time. |
| 4 | To learn various multimedia authoring systems. |
| 5 | To understand various networking aspects used for multimedia applications. |
| 6 | To develop multimedia application and analyze the performance of the same. |

Subject-Software Design lab**Subject Code-ITL601****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | 1 | 3.6 | 3.6.2 | L3 | CO1 | Sketch UML daigram for system and produce prototypy |
| PO3 | 1 | 3.5 | 3.5.2 | L6 | CO2 | Plan and document timeline with the of Gnattchart |
| PO3 | 1 | 3.5 | 3.5.6 | L6 | co3 | develop software requirement specifications (SRS) |
| PO4 | 1 | 4.6 | 4.6.3 | L3 | Co4 | sketch DFD daigram and E-R daigram for representation of data |
| Po4 | 1 | 4.2 | 4.4.2 | L6 | CO5 | able to choose appropriate testing method andd design backbox test cases for system |
| PO1 | 1 | 1.6 | 1.6.1 | L1 | CO6 | able to choose software development process using tool. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Learn basic concepts of UML with example |
| 2 | Understand concept of scheduling and tracking |
| 3 | understand and define SRS |
| 4 | Understand the basis concept of class and relationship |
| 5 | Learn the basic software testing methods |
| 6 | Select project development tool. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 3,4 | 2 | 3.5 4.5 | 3.5.1 4.5.1 | L2 | CO1 | Identify sources of Data for mining and perform data exploration for real life applications |
| 4 | 1 | 4.6 | 4.6.1 | L2 | CO2 | Understand the need of data mining algorithms in terms of attributes and class inputs, training, validating, and testing files. |
| 2 , 5 | 1 | 2.1 , 5.4 | 2.5.2 5.4.1 | L3 | CO3 | Demonstrate classification method using open source tools like WEKA. Implement appropriate classification algorithm to solve define problem. |
| 2 , 5 | 1 | 2.1 , 5.4 | 2.5.2 5.4.1 | L2 L3 | CO4 | Understand Clustering method using open source tools like WEKA. Implement appropriate clustering algorithm to solve for any application |
| 2 , 5 | 1 | 2.1 , 5.4 | 2.5.2 5.4.1 | L3 L6 | CO5 | Implement association mining on large data sets using open source tools like WEKA. Design any market basket problem |
| 3 | 2 | 3.6 | 3.6.2 | L3 L4 | CO6 | Apply BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage. |
| 2 | To enable students to effectively identify sources of data and process it for data mining |
| 3 | To make students well versed in all data mining algorithms, methods, and tools. |
| 4 | To learn how to gather and analyze large sets of data to gain useful business understanding |
| 5 | To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business value from data. |
| 6 | To identify and compare the performance of business. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | | 3.6 | 3.6.2 | Level 2 Understand | CO1 | Define & demonstrate Virtualization using different types of Hypervisors |
| PO2 | | 2.6 | 2.6.2 | Level 1 Remember | CO2 | Describe steps to perform on demand Application delivery using Ulteo . |
| PO3 | | 3.8 | 3.8.2 | Level 3 Apply | CO3 | Examine the installation and configuration of Open stack cloud |
| PO4 | | 4.4 | 4.4.3 | Level 4 Analyze | CO4 | Analyze and understand the functioning of different components involved in Amazon web |
| PO5 | | 5.4 | 5.4.1 | Level 1 Remember | CO5 | Describe the functioning of Platform as a Service |
| PO6 | | 6.4 | 6.4.1 | Level 6 Create | CO6 | Design & Synthesize Storage as a service using own Cloud |

Course Objectives

| Sr. No | Description |
|---------------|---|
| 1 | To understand key concepts of virtualization & different types of Hypervisors used in virtualization along with implementation |
| 2 | To learn concept of On demand Application Delivery like SaaS using Ulteo |
| 3 | To understand Open source cloud implementation and administration using Open Stack |
| 4 | To study various Cloud services provided by Amazon Web Services |
| 5 | To understand programming on Platform as a Service cloud |
| 6 | To study implementation of Storage as a service using Own Cloud. |

Subject-Sensor Network lab**Subject Code: ITL604****LAB Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO2 | | 2.6 | 2.6.2 | L4 | LO1 | Identify functionalities and computing resources requirements for the real world problems. |
| P10 | | 10.4 | 10.4.2 | L6 | LO2 | Produce clear, well-constructed, and well-supported written engineering & conduct a survey of several available literatures in the preferred field of study. |
| PO4 | PSO 1 | 4.4 | 4.4.3 | L3 | LO3 | Able to choose appropriate hardware/software tools to conduct the experiment by Studying and enhancing software/ hardware skills. |
| PO3 | | 3.7 | 3.7.1 | L6 | LO4 | Able to perform systematic evaluation of the degree to which several design concepts meet the criteria by Demonstrating and building the project successfully by hardware/sensor requirements, coding, emulating and testing. |
| PO10 | | 10.5 | 10.5.2 | L1 | LO5 | Deliver effective oral presentations to technical and non-technical audiences by reporting the findings of the study conducted in the preferred domain |
| PO9 | | 9.5 | 9.5.1 | L2 | LO6 | Demonstrate effective communication, problem-solving, conflict resolution and leadership skills. |
| PO9 | | 9.6 | 9.6.1 | L2 | LO6 | Present results as a team, with smooth integration of contributions from all individual efforts &demonstrate an ability to work in teams and manage the conduct of the research study |

LAB Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To learn different types of sensors from Motes families |
| 2 | To design the problem solution as per the requirement analysis done using Motes sensors |
| 3 | To study the basic concepts of programming/sensors/ emulator like cooja etc |
| 4 | To design and implement the mini project intended solution for project based learning |
| 5 | To build and test the mini project successfully |
| 6 | To improve the team building, communication and management skills of the students |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problem statements and identifies potential research areas in the field of IT. |
| PO10 | PSO1 | 10.4 | 10.4.1 | L2 | CO2 | Read, understand and interpret technical and non-technical information from several available literature in the preferred field of study. |
| PO4 | PSO1 PSO2 | 4.6 | 4.6.2 | L6 | CO3 | Critically plan, select, investigate and analyze several existing solutions for trends and correlations, stating possible errors and limitations for research challenge |
| PO9 | PSO2 | 9.5 | 9.5.1 | L2 | CO4 | Demonstrate an ability to work and communicate effectively in teams , apply professional ethics in problem-solving, conflict resolution and manage the conduct of the research study. |
| PO2 | PSO1 PSO2 | 2.7 | 2.7.1 | L3 | CO5 | Able to apply computer engineering principles to formulate and propose a plan of a system with required applicability and performance and appropriately incorporate a solution for the research plan identified. |
| PO12 | PSO1 | 12.6 | 12.6.1 | L4 | CO6 | Source , identify and comprehend technical literature and other credible sources of information and communicate effectively the findings of the study conducted in the preferred domain. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To offer students a glimpse into real world problems and challenges that need IT based |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges in the field of IT |
| 4 | To create awareness among the students of the characteristics of several domain areas where IT can be effectively used |
| 5 | To enable students to use all concepts of IT in creating a solution for a problem |
| 6 | To improve the team building, communication and management skills of the students. |

Semester-VII

Subject- Enterprise Network Design

Subject Code-ITC701

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|-----|---|
| 3 | 1 | 3.5 | 3.5.2 | L4 | CO1 | Identify customer requirements for designing an enterprise network |
| 2 | 1 | 2.6 | 2.6.3 | L2 | | Understand methodology to design an Enterprise network. |
| 2 | 1 | 2.1 | 2.5.2 | L1 | | Recognize modules (functional areas) of Cisco Enterprise architecture |
| 2 | 1 | 2.6 | 2.6.2 | L2 | | Understand network services withing modular Enterprise network design. |
| 5 | 1 | 3.8 | 3.8.2 | L4 | | Identify network management tool to configure and monitor performance of an Enterprise Network |
| 2 | 1 | 2.6 | 2.6.3 | L2 | | Select transmission technologies and internet-working devices as per design requirements of Enterprise Campus module and an Enterprise data center module |
| 3 | 2 | 3.8 | 3.8.2 | L3 | | Apply the three hierarchical network layers in designing Enterprise Campus and data center |
| 3 | 1 | 3.6 | 3.6.1 | L4 | | Identify WAN transport technologies for designing remote connectivity between enterprise edge and enterprise branch /teleworker modules as per WAN application and technical requirements |
| 3 | 2 | 3.8 | 3.8.1 | L6 | | Designing sub-nets including detailed IP addressing for an enterprise network |
| 2 | 1 | 2.1 | 2.5.2 | L2 | | Selects Routing protocols for Enterprise networks. |
| 2 | 1 | 2.6 | 2.6.2 | L2 | CO6 | Understand software defined network architecture |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | Understand the customer requirement and Apply a Methodology to Network Design. |
| 2 | Understand the structure of modularized network. |
| 3 | Understand and identify requirements and design of the campus and the data center networks |
| 4 | Understand enterprise edge WAN technologies and using it design remote connectivity. |
| 5 | Design IP addressing for enterprise network , identify and apply suitable routing protocol for data delivery across the enterprise networks. |
| 6 | Analyze and select open flow controller and switches for designing enterprise network. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| | PSO1 | 1.6 | 1.6.1 | Level 1 Remember | | Explain security fundamentals like goals, vulnerabilities, attacks on Infrastructure. |
| | PSO2 | 1.7 | 1.7.1 | Level 3 Apply | | Use different security policies , methods and principles to provide infrastructure |
| | PSO1 | 2.5 | 2.5.2 | Level 4 Analyze | | Identify software vulnerabilities and attacks and protection mechanisms to avoid problem |
| | PSO2 | 2.6 | 2.6.4 | Level 5 Evaluate | | Compare and contrast different solutions available for security of Operating System and Database Management. |
| PO5 | PSO1 | 5.5 | 5.5.1 | Level 4 Analyze | CO3 | Analyze different tools and techniques to detect security issues in wireless network. |
| PO3 | PSO1 | 3.6 | 3.6.2 | Level 6 Creating | CO4 | Define security risks to cloud and Design rules and policies for cloud data security |
| | PSO1 | 2.6 | 2.6.3 | Level 4 Analyze | | Select different existing solutions and methods to provide security to web. |
| | PSO2 | 2.7 | 2.7.2 | Level 4 Analyze | | Detect different constraints in design of web application to increase performance. |
| PO7 | PSO2 | 7.4 | 7.4.2 | Level 3 Apply | CO6 | Calculate preventive solutions ,plans and proposals based on financial |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To understand underlying principles of infrastructure security |
| 2 | To explore software vulnerabilities, attacks and protection mechanisms To learn security aspects of wireless network infrastructure and protocols |
| 3 | To investigate web server vulnerabilities and their countermeasures |
| 4 | To develop policies for security management and mitigate security related risks in the organization |
| 5 | To Learn the different attacks on Open Web Applications and Web services |
| 6 | To Learn the different security policies. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 2 | 1 | 2.5 | 2.5.1 | L2 | CO1 | To identify the impact of AI and its achievements |
| 5 | 1 | 5.4 | 5.4.1 | L3 L6 | CO2 | Identify different types of agent and rational agent designed to solve problems |
| 2 | 1 | 2.5 | 2.5.2 | L6 | CO3 | Identify different stages of development of AI field from human like behavior to rational agent |
| 5 | 2 | 5.6 | 5.6.1 | L5 L6 | CO4 | select appropriate real life problems to design state space representation |
| 4 | 1 | 4.5 | 4.5.1 | L2 L6 | CO5 | To understand the impact of various knowledge representation techniques to formulate Real time AI problems |
| 5 | 1 | 5.4 | 5.4.2 | L2 | CO6 | Identify advance techniques of AI like belief network, NLP and cognitive computing |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | achievements of AI and the theory underlying those achievements. |
| 2 | the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems |
| 3 | To review the different stages of development of the AI field from human like behavior to Rational Agents. |
| 4 | impart basic proficiency in representing difficult real life problems in a state space representation so as to solve them using AI techniques like searching and game playing |
| 5 | To create an understanding of the basic issues of knowledge representation and Logic and blind and heuristic search, as well as an understanding of other topics such as minimal, resolution, etc. that play an important role in AI programs. |
| 6 | introduce advanced topics of AI such as planning, Bayes networks, natural language processing and Cognitive Computing. |

Subject-Management Information System**Subject Code-ILO7013****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 6 | 1 | 6.3 | 6.3.1 | 1 | CO1 | Identify how information system transforms business, gives its importance to Society. |
| 4 | 1 | 4.6 | 4.6.4 | 5 | CO2 | Evaluate given information from databases to improve business performance . |
| 8 | 1 | 8.4 | 8.4.2 | 3 | CO3 | Examining and applying Ethical issues and its security controls. |
| 7 | 2 | 7.4 | 7.4.1 | 2 | CO4 | Understand the social computing using different forms of business. |
| 5 | 1 | 5.4 | 5.4.1 | 1 | CO5 | Indifying different technology like cloud computing,wired and wireless technology |
| 7 | 1 | 7.3 | 7.3.1 | 1 | CO6 | Identify pros/cons of life cycle of various system development. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | The course is blend of Management and Technical field. |
| 2 | Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making |
| 3 | Define and analyze typical functional information systems and identify how they meet the needs of the firm to deliver efficiency and competitive advantage |
| 4 | Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses |
| 5 | Describe IT infrastructure and its components and its current trends |
| 6 | Identify the basic steps in systems development |

Subject-Software Testing and quality assurance Subject Code: ITDLO7034

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| | 1 | 2.6 | 2.6.3 | L2 | | Understand software testing terminology and software life cycle |
| | 1 | 2.7 | 2.7.1 | L3 | | apply software testing methodology to prevent and remove bugs |
| | 1 | 3.6 | 3.6.2 | L2 | | understand different testing techniques |
| | 2 | 4.5 | 4.5.1 | L6 | | design and develop test plan and testcases based on different objectives |
| 6 | 1 | 6.3 | 6.3.1 | L4 | | Analyze test process management structure |
| 2 | 1 | 2.7 | 2.7.1 | L3 | | Apply testing metrics for monitoring and controlling test process |
| 5 | 1 | 5.4 | 5.4.1 | L4 | CO4 | select different automation tools and techniques for testing |
| | 1 | 7.3 | 7.3.1 | L4 | | |
| | 1 | 7.4 | 7.4.2 | L3 | | |
| 3 | 1 | 3.5 | 3.5.4 | | | Apply knowledge to test software in different environments |
| 2 | 1 | 2.7 | 2.7.1 | | | select different measures to improve software quality |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | To introduced Basic software debugging methods and software testing life cycle |
| 2 | To impart knowledge of White box testing methods and techniques |
| 3 | To introduced knowledge of Black box testing methods and techniques |
| 4 | To Design test plans and test organization |
| 5 | To introduced Different testing tools |
| 6 | To introduced concept of Quality assurance models |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO1 | PSO1 | 1.7 | 1.7.1 | L3 | CO1 | Apply theory and principles of computer science and engineering to identify different types of cyber crime and its effect on outside world. |
| PO1 | PSO2 | 1.6 | 1.6.1 | L3 | CO2 | Apply engineering fundamentals to identify various security challenges in mobile device for different types of attack and Distinguish different aspects of cyber law |
| PO4 | PSO2 | 4.6 | 4.6.1 | L3 | CO3 | Use of Different tools and methods in Cyber Security |
| PO6 | PSO1 | 6.4 | 6.4.1 | L2 | CO4 | Interpret legislation ,regulation, codes and standards relevant to E-Commerce , The Contract Aspects ,The Security Aspect ,The Intellectual Property Aspect in Cyber Law |
| PO6 | PSO1 | 6.4 | 6.4.1 | L2 | CO5 | Interpret legislation ,regulation, codes and standards relevant to cyber law and explain IT act 2000 and its latest amendments . |
| PO3 | PSO2 | 3.5 | 3.5.4 | L3 | CO6 | Able to choose appropriate information security standards during software design and development |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To understand and identify different types cybercrime and cyber law |
| 2 | To understand how criminal plan the attacks in system and mobile devices |
| 3 | To recognize various security challenges in mobile device for different types of attack. |
| 4 | To understand different tools and methods in Cyber Security. |
| 5 | To recognized Indian IT Act 2008 and its latest amendments |
| 6 | To learn various types of security standards compliances |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|-----|--|
| 2 | 1 | 2.6 | 2.6.3 | L2 | | Understand the Enterprise Business goals , Busness Constarints, Technical Goal , Technical Constraints, Applications and Services. |
| 3 | 1 | 3.5 | 3.5.2 | L4 | | Identify Customer Requirements |
| 2 | 1 | 2.6 | 2.6.2 | L4 | CO2 | Identify functional areas to construct high level modules for enterprise architecture using Hierarchical network model. |
| 5 | 1 | 2.6 | 2.6.4 | L2 | | Select the networking devices as per functionality requirements and budget constraints |
| 4 | 1 | 1.7 | 1.7.1 | L3 | | Apply knowledge of network design to configure the devices as per the Core, Access and Distribution layers |
| 2 | 1 | 2.6 | 2.6.4 | L4 | | Identify WAN technology for remote site connectivity |
| 4 | 2 | 3.8 | 3.8.1 | L6 | | Design the Remote branch office/ Server Farm for an enterprise network |
| 4 | 2 | 3.8 | 3.8.1 | L6 | | Designing sub-nets including detailed IP addressing for an enterprise network. |
| 5 | 1 | 2.1 | 2.5.2 | L2 | | Selects the most appropriate routing protocols to configure them on routers |
| 5 | 2 | 3.8 | 3.8.3 | L5 | | Test proposed desing of a nework using a simulation software tool. |
| 9 | 1 | 9.6 | 9.6.1 | L2 | CO6 | Undersatnd Team work effectiveness. |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | Be familiarized with the requirements of an enterprise. |
| 2 | Address its major design areas. |
| 3 | Identify the networking devices and their configurations required for the design Entherprise network and also prepare a bill of materials. |
| 4 | Propose a design for the remote offices/Data center of an enterprise network. |
| 5 | Provide suitable IP addressing plan and best possible routing protocol for an enterprise network and Construct a suitable design for an enterprise network and test it using a tool. |
| 6 | Work effectively with a team |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.5.2 | Level 2 Understand | CO1 | Understand and identify the concept of vulnerabilities, attacks, protection and management mechanisms |
| PO2 | PSO2 | 2.6 | 2.6.2 | Level 4 Analyze | CO2 | Analyze and identify software vulnerabilities and attacks on databases and operating systems and apply appropriate protection techniques for it. |
| PO3 | PSO1 | 3.6 | 3.6.3 | Level 4 Analyze | CO3 | Identify security loopholes in wireless communication and design security protocols. |
| PO6 | PSO2 | 6.3 | 6.3.1 | Level 4 Analyze | CO4 | Analyze Web and Cloud infrastructure , identify its vulnerabilities and understand its impact on social, cultural and legal |
| PO8 | PSO2 | 8.3 | 8.3.1 | Level 2 Understand | CO5 | Identify different attacks on Open Web Applications and Web services and understand its impact on society. |
| PO5 | PSO2 | 5.5 | 5.5.1 | Level 6 Create | CO6 | Design appropriate security policies, protocols, system and apply them to protect infrastructure components in a group and present your work. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | Understand and identify underlying different principles of infrastructure security |
| 2 | Analyze and identify software vulnerabilities, attacks and protection mechanisms for database and operating system. |
| 3 | Investigate security aspects of wireless network infrastructure and protocols |
| 4 | Investigate web and cloud vulnerabilities and their countermeasures |
| 5 | Learn the different attacks on Open Web Applications and Web services. |
| 6 | Identify and Use the different security policies in group. |

Lab Outcomes

| PO | PSO | Competency | PI | Bloom's Level | LO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 3 | 1 | 3.6 | 3.6.2 | L2 L6 | LO1 | Understand the concepts of a Rational Intelligent Agent and the different types of Agents that can be used to Design the building blocks of an Intelligent Agent using PEAS representation. |
| 3 | 1 | 3.6 | 3.6.1 | L3 | LO2 | Representation of difficult real life problems in a state space representation and solve them using AI techniques. |
| 5 | 1 | 5.4 | 5.4.1 | L2 L3 | LO3 | Understand various AI methods like searching and game playing and apply them to solve real applications. |
| 5 | 2 | 3.6 | 5.4.2 | L3 L6 | LO4 | Use knowledge representation and Logic to design inference engines. |
| 3 | 2 | 3.5 | 3.5.1 | L6 | LO5 | Develop solution of problems with uncertain information using Bayesian approaches. |
| 4 | 2 | 4.6 | 4.6.3 | L3 L6 | LO6 | Apply concept Natural Language processing and cognitive computing for creation of domain specific ChatBots |

Lab Objective

| Sr. No. | Description |
|----------------|---|
| 1 | To gain knowledge building blocks of an Intelligent Agent using PEAS representation . |
| 2 | Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them |
| 3 | To Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing |
| 4 | To represent various real life problem domains using logic based techniques and use this to perform inference or planning. |
| 5 | To solve problems with uncertain information using Bayesian approaches. |
| 6 | To Apply concept Natural Language processing and cognitive computing for creation of domain specific ChatBots. |

Subject- Android App Development Lab Subject Code: ITL704**Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|--|
| 3 | 1 | 3.6 | 3.6.2 | L2 | CO1 | Understand Integrated Development Environment for Android Application Development. |
| 3 | 2 | 3.6 | 3.6.1 | L2 L6 | CO2 | Design and Implement User Interfaces and Layouts of Android App. |
| 2 | 1 | 2.7 | 2.7.1 | L3 | CO3 | Use Intents for activity and broadcasting data in Android App |
| 3 | 2 | 3.6 | 36.1 | L3 L6 | CO4 | Design and Implement Database Application and Content Providers |
| 5 | 1 | 5.4 | 5.4.2 | L3 | CO5 | Implement with Camera and Location Based service. |
| 3 | 2 | 3.7 | 3.7.1 | L6 | CO6 | Develop Android App with Security features for real time application |

Course Objective

| Sr. No. | Description |
|----------------|--|
| 1 | To gain knowledge of installing Android Studio and Cross Platform Integrated Development Environment |
| 2 | To learn designing of User Interface and Layouts for Android App. |
| 3 | To learn how to use intents to broadcast data within and between Applications. |
| 4 | To use Content providers and Handle Databases using SQLite |
| 5 | To introduce Android APIs for Camera and Location Based Service. |
| 6 | To discuss various security issues with Android Platform. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problem statements and identifies potential research areas in the field of IT. |
| PO10 | PSO1 | 10.4 | 10.4.1 | L2 | CO2 | Read, understand and interpret technical and non-technical information from several available literature in the preferred field of study. |
| PO4 | PSO1 PSO2 | 4.6 | 4.6.2 | L6 | CO3 | Critically plan, select, investigate and analyze several existing solutions for trends and correlations, stating possible errors and limitations for research challenge |
| PO9 | PSO2 | 9.5 | 9.5.1 | L2 | CO4 | Demonstrate an ability to work and communicate effectively in teams , apply professional ethics in problem-solving, conflict resolution and manage the conduct of the research study. |
| PO2 | PSO1 PSO2 | 2.7 | 2.7.1 | L3 | CO5 | Able to apply computer engineering principles to formulate and propose a plan of a system with required applicability and performance and appropriately incorporate a solution for the research plan identified. |
| PO12 | PSO1 | 12.6 | 12.6.1 | L4 | CO6 | Source , identify and comprehend technical literature and other credible sources of information and communicate effectively the findings of the study conducted in the preferred domain. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To offer students a glimpse into real world problems and challenges that need IT based solutions |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges |
| 4 | To create awareness among the students of the characteristics of several domain areas where IT |
| 5 | To enable students to use all concepts of IT in creating a solution for a problem |
| 6 | To improve the team building, communication and management skills of the students. |

Semester-VIII

Subject-Big Data

Subject Code-ITC801

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|--|
| 5 | 1 | 5.4 | 5.4.1 | L4 | 1 | Identify main sources of bigdata in real world |
| 4 | 1 | 4.6 | 4.6.1 | L2 | 2 | Demonstrate an ability to use appropriate frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics |
| 1 | 1 | 1.7 | 1.7.1 | L3 | 3 | Able to apply Map Reduce Paradigm |
| 1 | 1 | 1.7 | 1.7.1 | L3 | 4 | Apply various algorithms for Clustering Classifying and finding associations in Big Data |
| 4 | 2 | 4.5 4.6 | 4.5.1 4.6.2 | L6 L4 | 5 | Design algorithms for data analysis Critically analyze Big data like streams, Web Graphs and Social Media data |
| 4 | 2 | 4.5 | 4.5.1 | L6 | 6 | Design and develop successful Recommendation engines for enterprises |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To provide an overview of an exciting growing field of Big Data analytics. |
| 2 | To discuss the challenges traditional data mining algorithms face when analyzing Big Data. |
| 3 | To introduce the tools required to manage and analyze big data like Hadoop, NoSql Map Reduce. |
| 4 | To teach the fundamental techniques and principles in achieving big data analytics with Clustering and classification. |
| 5 | To introduce to the students several types of big data like social media, web graphs and data streams. |
| 6 | To enable students to have skills that will help them to solve complex real-world problems for recommendation system. |

Course Outcomes

| PO | PSO | Competency | PI | Blooms Level | CO | Description |
|-----------|------------|-------------------|-----------|---------------------|-----------|--|
| PO2 | 2 | 2.1 | 2.5.1 | Level 4 Analyze | | Identify the objects in IoE |
| PO5 | 2 | 5.6 | 5.6.1 | Level 4 Analyze | | discuss IoE-enabling technology and |
| PO4 | 2 | 4.6 | 4.6.1 | Level 2 Understand | CO2 | apply the knowledge to solve wireless system with RFID |
| PO5 | 2 | 5.5 | 5.5.1 | Level 1 Remember | | Identify the application areas of an RFID system |
| PO2 | 2 | 2.5 | 2.5.2 | Level 3 Apply | | identify the algorithms for RFID anti-collision protocols |
| PO4 | 2 | 4.6 | 4.6.1 | Level 4 Analyze | | Analyze the WSN architecture |
| PO4 | 2 | 4.5 | 4.5.1 | Level 1 Remember | | List the various types of network topology in WSN |
| PO2 | 2 | 2.1 | 2.5.2 | Level 3 Apply | CO5 | Identify the various localization technique and examine the technology consideration and performance evaluation. |
| PO5 | 2 | 5.4 | 5.4.2 | Level 6 create | CO6 | evaluate the data received through sensors in IOT and Design and develop smart city in IOT |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | learn the concepts of IOT. |
| 2 | identify the different technology and learn basic components of RFID |
| 3 | Understand the different applications in IOT |
| 4 | Understand the need of different protocols used in IOT. |
| 5 | Learn the concept of localization and its types |
| 6 | learn how to analysis the data in IOT |

Subject: UID**Subject Code: ITDO8041****Course Outcomes**

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|----|-----|------------|-------|---------------|----|---|
| 1 | 1 | 4.6 | 4.6.1 | 2,3 | 1 | Identify and criticize bad features of interface designs and identify good interaction design interfaces for developing applications |
| 3 | 2 | 5.6 | 5.6.1 | 2,4 | 2 | Discuss and predict good features of interface designs and identify human psychology and social emotional aspects for good interaction design |
| 4 | 1 | 3.6 | 3.6.1 | 4 | 3 | Illustrate and analyze user needs and formulate user design specifications and identify appropriate techniques and languages for designing user interaction |
| 4 | 2 | 5.6 | 5.6.1 | 4 | 4 | Interpret and evaluate the data collected during the process and find resources which is used to design user interaction |
| 4 | 1 | 3.6 | 3.6.2 | 4 | 5 | Evaluate designs based on theoretical frameworks and methodological approaches and convert conceptual design to implementation in interaction design |
| 3 | 2 | 3.6 | 3.6.1 | 3 | 6 | Cultivate/show better techniques to improve the user interaction design interfaces and use innovative prototypes for designing applications |

Course Objectives

| Sr. No. | Description |
|---------|--|
| 1 | To stress the importance of good interface design. |
| 2 | To understand the importance of human psychology as well as social and emotional aspect in designing good interfaces. |
| 3 | To learn the techniques of data gathering, establishing requirements, analysis and data interpretation. |
| 4 | To learn the techniques for prototyping and evaluating user experiences. |
| 5 | To understand interaction design process. |
| 6 | To bring out the creativity in each student – build innovative applications that are usable, effective and efficient for intended users. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|---------------------|------------|---------------------|---------------------------|----------------------|-----------|--|
| PO2 | | 2.6 | 2.6.3 | 1 | 1 | Identify and define Project life cycles and Role of project manager |
| PO1 PO11 | | 1.5 11.5 | 1.5.1 11.5.1 | 3 | 2 | Apply selection criteria and select an appropriate project from different options |
| PO3 PO10 PO11 | | 3.7 10.4 11.6 | 3.7.1 10.4.1 11.6.2 | 6 | 3 | Develop a schedule for a project , based on work break down structure |
| PO7 | | 7.3 | 7.3.1 | 3 | 4 | predict opportunities and threats to the project and determine an approach to deal with them strategically |
| PO1 PO8 | | 1.5 8.3 | 1.5.1 8.3.1 | 3 | 5 | Use Earned value technique and determine status of the project. |
| PO5 PO9 PO10 | | 5.4 9.5 10.6 | 5.4.1 9.5.1 10.6.1 | 4 | 6 | analyze lessons learned during project phases and document them for future reference |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To Understand the students with utilizing project management concepts, project management life cycle ,tools and techniques. |
| 2 | Gain knowledge about the selection criteria and select an appropriate project from different options |
| 3 | To familiarize the students with the use of a structured methodology/WBS/approach for each and every unique project . |
| 4 | To appraise the students with the opportunities and threats to the project and select an approach to deal with them |
| 5 | To acquaint the student with the importance of Executing Project phase, Planning monitoring and controlling cycle |
| 6 | To recognized lessons learned about Project Leadership ,Ethics and document them for future reference |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| 7 | | 7.1 | 7.1.2 | 1 | 1 | To Understand and identify environmental issues relevant to India and global concerns |
| 7 | | 7.2 | 7.2.1 | 2 | 2 | To Study the needs for sustainable development |
| 7 | | 7.1 | 7.1.1 | 1 | 3 | To Learn concepts of ecology |
| 7 | | 7.2 | 7.2.2 | 2 | 4 | To Understand the Scope and implementation of Environment Management in corporates |
| 7 | | 7.1 | 7.1.1 | 3 | 5 | To Learn Total Quality Environmental Management and its certification process |
| 7 | | 7.2 | 7.2.2 | 2 | 6 | To Familiarize environment related legislations |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the concept of environmental management |
| 2 | Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development. |
| 3 | Explain the concept of ecosystem its interdependence & food chain etc |
| 4 | Illustrate EQM and Corporate Environmental Responsibility |
| 5 | Apply the process of ISO-14000, EMS Certification to their respective companies |
| 6 | Understand and interpret environment related legislations |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|----------------|----------------------|-----------|---|
| 4 | 1 | 4.6 | 4.6.1 | L2 | 1 | Demonstrate an ability to use Big Data Frameworks like Hadoop |
| 4 | 2 | 4.6 | | L3 | 2 | Use appropriate tools like Hive, pig, , NO SQL and MongoDB for Big data Applications |
| 1 | 1 | 1.7 | 1.7.1 | L3 | 3 | Apply scalable algorithms for large Datasets using Map Reduce techniques |
| 1 | 1 | 1.7 | 1.7.1 | L3 | 4 | Apply algorithms for Clustering, Classification and finding associations in Big Data |
| 4 4 | 2 | 4.5 4.6 | 4.5.1 4.6.2 | L6 | 5 | Design algorithms Big data like streams, Web Graphs and Social Media data and construct recommendation systems. analyze Big data like streams, Web Graphs and Social Media data and construct recommendation |
| 1 | 1 | 1.7 | 1.7.1 | L3 | 6 | Apply the knowledge of Big Data gained to fully develop a BDA applications for real life applications. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To introduce the tools required to manage and analyze big data like Hadoop, NoSql |
| 2 | To impart knowledge of Map reduce paradigm to solve complex problems Map-Reduce. |
| 3 | To introduce several new algorithms for big data mining like classification, clustering and finding frequent patterns. |
| 4 | To introduce to the students several types of big data like social media, web graphs and data streams. |
| 5 | To identify various sources of Big data |
| 6 | To enable students to have skills that will help them to solve complex real-world problems in for decision support. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | 2 | 4.4 | 4.4.1 | L4 | CO1 | define the problem statement and scope of application |
| PO3 | 2 | 3.6 | 3.6.1 | L6 | CO2 | design the problem solution as per the requirement analysis |
| PO4 | 2 | 4.3 | 4.4.3 | L1 | co3 | choose appropriate hardware and software for system |
| PO3 | 2 | 3.6 | 3.6.2 | L6 | Co4 | produce user interface using mobile/web application |
| Po5 | 2 | 5.6 | 5.6.1 | L5 | CO5 | Demonstrate and validate mobile/web application |
| PO9 | 2 | 9.5 | 9.5.1 | L2 | CO6 | Demonstrate an ability to work in teams |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | Understand the basic concept of sensor and its types |
| 2 | Learn basic concept of wireless technology and its components |
| 3 | Understand the hardware and software concept for wireless |
| 4 | design the architecture of project |
| 5 | learn and select test criteria for mini project |
| 6 | understand the importance of communication ,teamwork etc. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO4 | PSO1 | 4.4 | 4.4.3 | L1 | CO1 | Able to identify and choose appropriate devops tools used in software development life cycle |
| PO5 | PSO1 | 5.5 | 5.5.1 | L4 | CO2 | Identify the strengths and limitations of Jenkins tools to Build, Deploy and Test Software Applications |
| PO3 | PSO2 | 3.8 | 3.8.2 | L2 | CO3 | Able to select, implement and integrate Version Control strategies in the modules. |
| PO2 | PSO1 | 2.8 | 2.8.2 | L4 | CO4 | Analyze & Illustrate the Containerization of images and deployment of applications over Docker |
| PO5 | PSO2 | 5.4 | 5.4.2 | L6 | CO5 | Adapt and integrate Software Configuration Management tools and technique in DevOps to solve engineering problems |
| PO2 | PSO1 | 2.6 | 2.6.4 | L5 | CO6 | Compare, contrast, analyze and choose the best provisioning using Chef/Puppet/Ansible or Saltstack. |

Course Objectives

| Sr. No. | Description |
|----------------|---|
| 1 | To understand the concept of DevOps with associated technologies and methodologies |
| 2 | To be familiarized with Jenkins, which is used to build & test software Applications & Continuous integration in Devops environment. |
| 3 | To understand different Version Control tools like GIT, CVS or Mercurial |
| 4 | To understand Docker to build, ship and run containerized images |
| 5 | To use Docker to deploy and manage Software applications running on Container |
| 6 | To be familiarized with concept of Software Configuration Management & provisioning using tools like Puppet,Chef, Ansible or Saltstack. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|------------|-------------------|-----------|----------------------|-----------|---|
| PO3 | PSO2 | 3.6 | 3.6.2 | Level 3 Apply | CO1 | Use R Programming Language in R Studio IDE to perform basic code |
| PO2 | PSO1 | 2.6 | 2.6.2 | Level 2 Understand | CO2 | Extend the functionality of R by using add-on packages |
| PO3 | PSO1 | 3.6 | 3.6.3 | Level 4 Analyze | CO3 | Identify data from files and other sources and perform various data manipulation tasks on them. |
| PO5 | PSO2 | 5.4 | 5.4.2 | Level 3 Apply | CO4 | Define, calculate and implement code for statistical functions in R |
| PO4 | PSO2 | 4.6 | 4.6.3 | Level 3 Apply | CO5 | Use R Graphics and Tables to visualize results of various statistical operations on |
| PO5 | PSO2 | 5.6 | 5.6.2 | Level 3 Apply | CO6 | Apply the knowledge of R gained to data Analytics for real life applications. |

Course Objectives

| Sr. No | Description |
|---------------|--|
| 1 | To provide an overview of a new language R used for data science. |
| 2 | To introduce students to the R programming environment and related eco-system and thus provide them with an in-demand skill-set, in both the research and business |
| 3 | To introduce the extended R ecosystem of libraries and packages |
| 4 | To demonstrate usage of as standard Programming Language. |
| 5 | To familiarize students with how various statistics like mean median etc. can be collected for data exploration in R |
| 6 | To enable students to use R to conduct analytics on large real life datasets. |

Course Outcomes

| PO | PSO | Competency | PI | Bloom's Level | CO | Description |
|-----------|--------------|-------------------|-----------|----------------------|-----------|--|
| PO2 | PSO1 | 2.1 | 2.5.1 | L5 | CO1 | Evaluate problem statements and identifies potential research areas in the field of IT. |
| PO10 | PSO1 | 10.4 | 10.4.1 | L5 | CO2 | Read, understand and interpret technical and non-technical information from several available literature in the preferred field of study. |
| PO4 | PSO1 PSO2 | 4.6 | 4.6.2 | L6 | CO3 | Critically plan, select, investigate and analyze several existing solutions for trends and correlations, stating possible errors and limitations for research challenge |
| PO9 | PSO2 | 9.5 | 9.5.1 | L2 | CO4 | Demonstrate an ability to work and communicate effectively in teams , apply professional ethics in problem-solving, conflict resolution and manage the conduct of the research study. |
| PO2 | PSO1 PSO2 | 2.7 | 2.7.1 | L3 | CO5 | Able to apply computer engineering principles to formulate and propose a plan of a system with required applicability and performance and appropriately incorporate a solution for the research plan identified. |
| PO12 | PSO1 | 12.6 | 12.6.1 | L4 | CO6 | Source , identify and comprehend technical literature and other credible sources of information and communicate effectively the findings of the study conducted in the preferred domain. |

Course Objectives

| Sr. No. | Description |
|----------------|--|
| 1 | To offer students a glimpse into real world problems and challenges that need IT based solutions |
| 2 | To enable students to create very precise specifications of the IT solution to be designed. |
| 3 | To introduce students to the vast array of literature available of the various research challenges |
| 4 | To create awareness among the students of the characteristics of several domain areas where IT |
| 5 | To enable students to use all concepts of IT in creating a solution for a problem |
| 6 | To improve the team building, communication and management skills of the students. |