KARNATAK LAW SOCIETY'S

# GOGTE INSTITUTE OF TECHNOLOGY

UDYAMBAG, BELAGAVI-590008

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

**(APPROVED BY AICTE, NEW DELHI)**

## Department of Information Science and Engineering

## Scheme and Syllabus (2018 Scheme)

## 5th Semester BE

## INSTITUTION VISION

Gogte Institute of Technology shall stand out as an institution of excellence in technical education and in training individuals for outstanding caliber, character coupled with creativity and entrepreneurial skills.

## MISSION

To train the students to become Quality Engineers with High Standards of Professionalism and Ethics who have Positive Attitude, a Perfect blend of Techno-Managerial Skills and Problem solving ability with an analytical and innovative mindset.

## QUALITY POLICY

- Imparting value added technical education with state-of-the-art technology in a congenial, disciplined and a research oriented environment.
- Fostering cultural, ethical, moral and social values in the human resources of the institution.
- Reinforcing our bonds with the Parents, Industry, Alumni, and to seek their suggestions for innovating and excelling in every sphere of quality education.

## DEPARTMENT VISION

Department of Information Science and Engineering shall provide excellent learning environment with focus on innovation, research and entrepreneurship among aspiring engineers to contribute to the workforce of the nation

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## MISSION

To impart Quality Technical Education in the field of Information Technology and enhance intellectual and professional competence amongst the aspiring engineers

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

1. To develop the ability among students to synthesize data and technical concepts for software design and development hence prepare students for successful careers in software industry that meet the needs of Indian and multinational companies or to excel in higher studies.
2. To inculcate professional and ethical attitude amongst students with effective communication skills, teamwork skills, and an ability to relate engineering issues to broader social context.
3. To provide students with an excellent academic environment, entrepreneur capabilities and to enable students for life-long learning needed to lead a successful professional career.

**PROGRAM OUTCOMES (POs)**

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

**PROGRAM SPECIFIC OUTCOMES (PSOs)**

1. **Problem solving Skills:** An ability to analyze a problem design, implement andevaluate software solutions related to algorithms, system software, web design big data analytics & networking.
2. **Professional skills:** An ability to develop standard software solutions for existing andemerging industry verticals and research domains.
3. **Career Skills:** An ability to harness Information Science & Engineering knowledgewith ethics and societal concern for career and further educational abilities along with entrepreneurial skills.

| **Fifth Semester (Regular)** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S.No. | Course Code | Course | | Contact Hours | Total Contact Hours/week | Total credits | Marks | | |
| | | | | L – T - P | | | CIE | SEE | Total |
| 1. | 18IS51 | Computer Networks | PC | 4 – 0 – 0 | 4 | 4 | 50 | 50 | 100 |
| 2 | 18IS52 | Object Oriented Modeling and Design | PC | 3– 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 3 | 18IS53 | Internet of Things | PC | 3 – 2 – 0 | 5 | 4 | 50 | 50 | 100 |
| 4 | 18IS54 | Formal Language Automata Theory | PC | 3-2-0 | 5 | 4 | 50 | 50 | 100 |
| 5 | 18IS55X | Professional Elective-I | PE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 6 | 18IS56X | Open Elective – I (Only for Other branches) | OE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 7 | 18IS59A | EMPLOYABILITY SKILLS –I | MNC | 3 -0 – 0 | 3 | - | 50 | - | 50 |
| 8 | 18ISL57 | Computer Networks Lab | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| 9 | 18ISL58 | Software Design and Modeling Lab(Mini-Project) | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| | | Total | | | 32 | 24 | 400 | 350 | 750 |

| Fifth Semester (Diploma) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S.No. | Course Code | Course | | Contact Hours | Total Contact Hours/week | Total credits | Marks | | |
| | | | | L – T - P | | | CIE | SEE | Total |
| 1 | 18DMATIS51 | Numerical Methods and Probability | BS | 4 – 0 – 0 | 4 | 4 | 50 | 50 | 100 |
| 2. | 18IS52 | Object Oriented Modeling and Design | PC | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 3 | 18IS53 | Internet of Things | PC | 3 – 2 – 0 | 5 | 4 | 50 | 50 | 100 |
| 4 | 18IS54 | Formal Language Automata Theory | PC | 3 – 2 – 0 | 5 | 4 | 50 | 50 | 100 |
| 5 | 18IS55X | Professional Elective-I | PE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 6 | 18IS56X | Open Elective – I (Other branches) | OE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 7 | 18ISL57 | Computer Networks Lab | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| 8 | 18IS59A | EMPLOYABILITY SKILLS – I | MNC | 3 -0 - 0 | 3 | | 50 | | 50 |
| 9 | 18ISL58 | Software Design and Modeling Lab (Mini-Project) | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| | | Total | | | 32 | 24 | 400 | 350 | 750 |

**** One Course exemption in 5th sem for Diploma lateral entry students to maintain the same credits as regular.(**Computer Networks **– exempted for Diploma students)**

| | V sem | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Professional Elective I** | **L-T-P** | **Course Code** | **Open Elective I (Other branches)** | **L-T-P** |
| 18IS551 | Unix System Programming | 3-0-0 | 18IS561 | UNIX Shell Programming ( integrated) | 2-0-2 |
| 18IS552 | Advanced Java (integrated) | 2-0-2 | 18IS562 | Introduction to Data Structure | 3-0-0 |
| 18IS553 | Probability & Statistics | 3-0-0 | 18IS563 | Computer Graphics | 3-0-0 |

| **Sixth Semester** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| S.No. | Course Code | Course | | Contact Hours | Total Contact Hours/week | Total credits | Marks | | |
| | | | | L – T - P | | | CIE | SEE | Total |
| 1. | 18IS61 | Artificial Intelligence | PC | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 2 | 18IS62 | Data Science | PC | 4– 0 – 0 | 4 | 4 | 50 | 50 | 100 |
| 3 | 18IS63 | Distributed Computing System | PC | 4 – 0 – 0 | 4 | 4 | 50 | 50 | 100 |
| 4 | 18IS64X | Professional Elective-II | PE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 5 | 18IS65X | Professional Elective-III | PE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 6 | 18IS66X | Open Elective – II | OE | 3 – 0 – 0 | 3 | 3 | 50 | 50 | 100 |
| 7 | 18ISL67 | Data Science Lab | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| 8 | 18ISL68 | Artificial Intelligence Lab | LAB | 0 – 0 – 3 | 3 | 1.5 | 25 | 25 | 50 |
| 9 | 18IS69 | Constitution of India, PE and HV | HS | 1 – 0 – 0 | 1 | 1 | 25 | 25 | 50 |
| 10 | 18IS69A | EMPLOYABILITY SKILLS – II | MNC | 3-0-0 | 3 | - | 50 | - | 50 |
| | | Total | | | 27 | 24 | 425 | 375 | 800 |

| **VI sem. (Electives)** | | | | | |
|---|---|---|---|---|---|
| **Course Code** | **Professional Elective II** | **Course Code** | **Professional Elective III** | **Course Code** | **Open Elective II(only for other branches)** |
| 18IS641 | Data Mining (2-0-2) | 18IS651 | Cloud Computing (3-0-0) | 18IS661 | Java Programming Basics (2-0-2) |
| 18IS642 | **Big Data Management (3-0-0)** | 18IS652 | Network Programming(3-0-0) | 18IS662 | Basics of Computer Networks (3-0-0) |
| 18IS643 | **System Software(3-0-0)** | 18IS653 | Introduction to Sales Force (2-0-2) | 18IS663 | Database Application Designing (2-0-2) |
| 18IS644 | Cyber Security(3-0-0) | 18IS654 | Compiler Design(3-0-0) | 18IS664 | Internet of Things (IoT) (2-0-2) |
| 18IS645 | Robotic Process Automation(2-0-2) | | | | |

# V SEM

## COMPUTER NETWORKS

| | | | |
|---|---|---|---|
| **Course Code** | 18IS51/18CS51 | **Credits** | 4 |
| **Course type** | PC | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 4 – 0 – 0 | **SEE Marks** | 50 marks |
| **Total Hours:** | Lecture = 45 Hrs | **SEE Duration** | 3 Hours for 100 marks |

**Course learning objectives**

1. Elucidate basic computer networking.
2. Demonstration of application layer protocols.
3. Discuss transport layer services and understand UDP and TCP protocols.
4. Explain routers, IP and Routing Algorithms in network layer.
5. Demonstrate the error detection and correction at link layer.

**Pre-requisites:** Fundamentals of basic mathematics, Data Structures and algorithms, Computer Organization, Operating systems.

### Unit - I 9 Hours

**Introduction to Computer Networks and the Internet:** What Is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and Their Service Models

**Self Study**: Networks Under Attack

### Unit – II 9 Hours

**Application Layer:** Principles of Network Applications, The Web and HTTP, File Transfer: FTP Commands and Replies, Electronic Mail in the Internet, The Internet's Directory Service, Peer-to-Peer Applications-Bit Torrent File distribution protocol.

**Unit - III** **9 Hours**

**Transport Layer:** Introduction and Transport-Layer Services, Multiplexing and DeMultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer: Go-Back-N and Selective Repeat, Connection-Oriented Transport: TCP.

Self Study: Using the wireshark for exploring the TCP and UDP.

**Unit – IV** **9 Hours**

**The Network layer:** Introduction, Virtual Circuit and Datagram Networks, What's Inside a Router? The Internet Protocol (IP): Forwarding and Addressing in the Internet.

**Self Study:** Routing in the Internet: BGP

**Unit - V** **9 Hours**

**The Link Layer:** Links, Access Networks, and LANs: Introduction to the Link Layer, Error Detection and Correction Techniques, Multiple Access Links and Protocols, Introduction to Link Virtualization and Data Center Networking.

## Books

**Text Books:**

1. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017 .

**Reference Books:**

1. Behrouz A Forouzan, Data and Communications and Networking, Fifth Edition, McGraw Hill, Indian Edition

2. Larry L Peterson and Bruce S Davie, Computer Networks, fifth edition, ELSEVIER

**E-recourses (NPTEL/SWAYAM.. Any Other)-** https://nptel.ac.in/courses/106105081/

3 Andew S Tanenbaum and David Wetherall, Computer Networks, Fifth Edition Pearson

## Course Outcome (COs)

| At the end of the course, the student will be able to | Bloom's Level |
|---|---|
| 1. Explain the use of computer networking and the layering concept. | L2 |
| 2. Explain the principles of application layer protocols. | L2 |

| | | |
|---|---|---|
| 3. | Recognize transport layer services and infer UDP and TCP protocols. | L3 |
| 4. | Differentiate between the different routing algorithms in network layer. | L4 |
| 5. | Perform error detection and correction at link layer. | L3 |

| | **Program Outcome of this course (POs)** | **PO No.** |
|---|---|---|
| 1. | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 2. | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | **2** |
| 3 | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | **10** |

| **Course delivery methods** | **Assessment methods** |
|---|---|
| 1. Lecture | 1. Internal Assessment |
| 2. PPT | 2. Assignment |
| 3. Demonstration | 3. Quiz |
| 4. Video Lectures | 4. Course project |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Additionof two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting at least one full question from each unit.

## OBJECT ORIENTED MODELING AND DESIGN

| Course Code | 18IS52/CS52 | Credits | 3 |
|---|---|---|---|
| Course type | PC | CIE Marks | 50 marks |
| Hours/week: L-T-P | 3 – 0 – 0 | SEE Marks | 100marks |
| Total Hours: | 39 | SEE Duration | 3 Hours for 100 marks |

**Course Learning Objectives**

1. To Bring out the importance of object oriented software development.
2. To study and understand the UML notations as applicable to different stages of software development
3. To model given real world problem using object oriented concepts and notations.

**Pre-requisites:** Basics of object oriented programming and Software Engineering

**Unit – I** **8 Hours**

**Introduction, Modeling Concepts, Class Modeling:** Introduction to Object Orientated (OO) development. OO themes; OO modeling history Modeling as Design Technique: Modeling; abstraction; The three models.

Class Modeling: Object and class concepts; Link and associations concepts; Generalization and Inheritance; Advanced object and class concepts; Association ends; N-ary associations; Aggregation;

Abstract classes; Metadata; Reification; Constraints; Derived data; Packages;

**Unit – II** **8 Hours**

**State Modeling, Advanced State Modeling:** State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Advanced State Modeling: Nested state diagrams;

Nested states; Signal generalization; Concurrency; A sample state model;

**Unit – III** **7 Hours**

**Interaction Modeling, Advanced interaction Modeling:** Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special

constructs for activity models

**Unit – IV** **8 Hours**

**Domain Analysis:** Overview of domain analysis; Domain class model; Domain state model; Domain

interaction model; Iterating the analysis.

**Unit – V** **8 Hours**

**Application Analysis:** Application interaction model; Application class model; Application state

model; Adding operations. .

**Text Books**

1. Michael Blaha, James Rumbaugh: Object-Oriented Modeling and Design with UML, Pearson Education, 2nd Edition and onwards.

2. Grady Booch, James Rumbaugh, Ivar Jacobson, “Unified Modeling Language User Guide”,
Publisher: Addison Wesley.

**Reference Books**

1 Grady Booch et al: Object-Oriented Analysis and Design with Applications, 3rd Edition,
Pearson Education, 2007 and onwards.
2 Brahma Dathan, SarnathRamnath: Object-Oriented Analysis, Design, and Implementation,
Universities Press, 2009 and onwards.
3 Grady Booch, James Rumbaugh, Ivar Jacobson, “Unified Modeling Language Reference
Manual”, Publisher: Addison Wesley.

**E-Resources**

1 https://nptel.ac.in/courses/106105153/

**Course Outcome (COs)**

| At the end of the course, the student will be able to | | **Bloom’s Level** |
|---|---|---|
| 1. | Identify and explain different UML notations for a given problem statement | **L2** |
| 2. | Apply UML notations to model real world problems at different stages of software development. | **L3** |
| 3. | Perform domain and application Analysis for a given real world problems | **L4** |

| **Program Outcome of this course (POs)** | | **PO No.** |
|---|---|---|
| 1. | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 2. | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | **2** |
| 3. | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | **3** |
| 4. | **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | **5** |

**Course delivery methods**

1. Chalk and board
2. PPT
3. Video lectures

**Assessment methods**

1. Internal assessment
2. Assignment
3. Quiz
4. Seminar / project

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Addition of two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## INTERNET OF THINGS

| | | | |
|---|---|---|---|
| Course Code | 18IS53 | Credits | 4 |
| Course type | PC | CIE Marks | 50 Marks |
| Hours/week: L-T-P | 3 – 2 – 0 | SEE Marks | 50 Marks |
| Total Hours: | 40 | SEE Duration | 3 Hours |

### Course learning objectives

1. To introduce the concepts of designing the Embedded systems using the microcontroller and peripheral circuits.
2. To present the techniques of interfacing the sensors and actuators with IoT development board.
3. To develop the skills of designing and developing the IOT applications

**Pre-requisites :**

Microprocessors and Microcontrollers, Embedded C and Python programming.

### Unit – I 8 Hours

**Embedded Computing:** Introduction, Complex Systems and Microprocessors, Embedded Systems Design Process.

**Instruction Sets, CPUs:** Preliminaries, ARM Processor, Programming Input and Output, Supervisor mode, Exceptions, Traps, Coprocessors, Memory Systems Mechanisms, CPU Performance.

Self-Study: CPU Power Consumption.

### Unit – II 8 Hours

**Introduction To Internet Of Things :** Definition and Characteristics of IoT, physical design of IoT, IoT Protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates. Overview of Microprocessor and Microcontroller.

Self-Study: Basics of Sensors and actuators.

### Unit – III 8 Hours

**Prototyping IoT:**

IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software, Technology & Protocols. Domain Specific IoTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Self-Study: IoT Key Features, Advantages & Disadvantages, Hardware: Sensors, Smart Wearable Devices, Standard Devices. Software

**Unit – IV** **8 Hours**

**IoT Architecture And Protocols:** Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model. Protocols- 6LowPAN, RPL, CoAP, MQTT.

Self-Study: Device Discovery capabilities – Registering a device, De-register a device, Querying for devices, Intel IoTivity, XMPP Discovery extension.

**Unit – V** **8 Hours**

**Cloud Services For IoT:** Introduction to Cloud Storage models and communication APIs Web-Server Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API

Self-Study: Amazon Web services for IoT.

**Text Book:**


1. Wayne Wolf: Computers as Components, Principles of Embedded Computing Systems Design, 2nd Edition, Elsevier, 2008. (UNIT I)
2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things (A Hands-on-Approach)" **,** 1st Edition, VPT, 2014. (UNIT 2,4,5)
3. Internet of Things Quick Guide - PDF https://www.tutorialspoint.com/internet_of_things/internet_of_things_quick_guide.htm (UNIT 3)


**Reference Book:**


1. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things – Key applications and Protocols", Wiley, 2012.
2. Marco Schwartz, "Internet of Things with Arduino: Build Internet of Things Projects With the Arduino Platform**".**


**Course Outcome (COs):**

| At the end of the course, the student should be able to: | | Blooms Level |
|---|---|---|
| 1. | **Illustrate** the functionality of Microprocessors, Complex Systems, Embedded System and IoT. | **L2** |
| 2. | **Identify** the skills of interfacing sensors and actuators with IoT systems, using IoT protocols and communication models. | **L2** |
| 3. | **Design** software programs Domain Specific IOT applications. | **L3** |
| 4. | **Apply** Architecture Reference Models for IoT applications | **L3** |
| 5. | **Analyze** the Cloud Storage models and Web services for IoT. | **L4** |

| | Program Outcome of this course (POs) | PO No. |
|---|---|---|
| 1. | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **PO1** |
| 2. | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | **PO2** |
| 3. | **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations. | **PO5** |
| 4. | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | **PO9** |
| 5. | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | **PO10** |

| | Course delivery methods | | Assessment methods |
|---|---|---|---|
| 1. | Lecture & Board | 1. | Assignments |
| 2. | Power-point Presentation | 2. | Quizzes |
| 3. | Online Videos / Learning | 3. | Internal Assessment Tests |
| 4. | NPTEL / EDUSAT | 4. | Course Seminar |
| 5. | Class Room Exercises | 5. | Course Project (Mini project) |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Addition of two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## FORMAL LANGUAGE AUTOMATA THEORY

| | | | |
|---|---|---|---|
| **Course Code** | 18IS54 | **Credits** | 4 |
| **Course type** | PC | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 4-0-0 | **SEE Marks** | 50 marks |
| **Total Hours:** | 40 | **SEE Duration** | 3 Hours for 100 marks |

### Course learning objectives

1. To study abstract computing machines, Language representation techniques, Regular Expressions, Grammar constructions and associated theories and tools to realize formal language.
2. Employ finite state machines to solve problems in computing.
3. Discuss the hierarchy of problems arising in the computer science.
4. Understand the Turing theory and its significance.

**Pre-requisites : Basic knowledge of problem solving and Discrete mathematics**

**Unit – I** **08 Hours**

**Introduction to Finite Automata:** Introduction to Finite Automata, Structural Representation. The central concepts of Automata theory – Alphabet, Strings & Languages. Deterministic Finite Automata (DFA), Non-Deterministic and Equivalence of NFA and DFA,

**Self learning :** FA with Epsilon ( ε) transitions and Applications of Finite automata.

**Unit– II** **08 Hours**

**Regular Expressions and languages:** Regular Expressions, Finite Automata and Regular Expressions, Properties of Regular Languages (RL): Proving Languages not to be Regular. Equivalence and Minimization of Automata.

**Self learning :** Closure properties of Regular Languages and Applications of Regular Expressions

**Unit – III** **08 Hours**

**Context-Free Grammars (CFG) and Languages (CFL):** Context-Free Grammars, Parse Trees, Applications of Context-Free Grammars, Ambiguity in Grammars and Languages. Normal forms for Context Free Grammar.

**Self learning :** Closure properties and Pumping lemma for Context Free Languages.

**Unit – IV** **10 Hours**

**Pushdown Automata (PDA):** Definition of Pushdown Automata, The languages of a PDA: Acceptance by Final state & Empty stack.

**Introduction to Turing Machines (TM):** Turing Machine model : Definition of Turing Machine , Transition Function , Instantaneous Description & Moves , Programming a Turing Machine , Language recognition by Turing Machine.

**Self learning :** Deterministic Pushdown Automata, Turing Machine as a acceptors, Turing Machine as Transducers.

**Unit – V** **06 Hours**

**LEX and YACC Tools**: The Simplest Lex Program, Recognizing Words with Lex. Grammars: Parser-lexer communication, A Yacc Parser, Rules section. Running Lex and Yacc and examples Using Lex: Regular Expressions and examples.
Using Yacc: Shift reduce parsing, Arithmetic Expressions and Ambiguity.

**Book**


1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, "Introduction to Automata Theory,
   Languages and Computation", Pearson Education, 3/E, 2013.
2. John R. Levine and Tony Mason and Doug Brown, Lex and Yacc, "UNIX programming tools", 2/E, 2012.
3. S . P. Euguene Xavier "Theory of Automata , Formal Languages and Computation ", 5 / E 2011.


**Reference Books**


1. Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey
   D. Ullman , "Compilers *Principles, Techniques and Tools",*Pearson Education , 2 / E,2008
2. Peter Linz, "An Introduction to Formal Languages and Automata",Narosa Publishing House, 5/E,
   2011.


**Course Outcome (COs)**

| At the end of the course, the student will be able to | Bloom's Level |
|---|---|
| 1. **Explain** the concepts & properties of automata and **Design** the optimized DFA for the given problem description. | L2, L4 |
| **2. Design** the Regular Expressions for the given pattern and examine the properties of RE. | L4 |
| **3. Write** the Grammar for the given language description and survey the properties of languages | L3 |
| 4. **Write** programs to implement lexical analyzer & parsers using software tools. | L3 |
| **5. Explain** the properties of PDA and **Design** PDA for the given problem description . | L2, L4 |
| **6. Explain** the properties of TM and **Design** Turing Machine for the given problem description. | L2, L4 |

| **Program Outcome of this course (POs)** | **PO No.** |
|---|---|
| 1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems. | 1 |
| 2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | 2 |

3. **Design / development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. 3
4. **Modern tool usage:** Create, select, apply appropriate techniques, resources, and modern engineering IT tools including prediction, modeling to complex engineering activities with an understanding of the limitations. 5

| **Course delivery methods(planned)** | **Assessment methods(planned)** |
|---|---|
| 1. Chalk and board | 1. Internal assessment |
| 2. PPT | 2. Assignment |
| 3. Video lectures | 3. Quiz |
| | 4. Seminar / project |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Addition of two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## UNIX SYSTEM PROGRAMMING

| | | | |
|---|---|---|---|
| **Course Code** | 18IS551 | **Credits** | 3 |
| **Course type** | PE | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 3-0-0 | **SEE Marks** | 50 marks |
| **Total Hours:** | 40 Hrs. | **SEE Duration** | 3 Hours for 100 marks |

### Course learning objectives

1. To introduce POSIX and UNIX standards as applicable to files and processes.
2. To develop the ability to handle processes and its related functionalities.
3. To learn the concept of inter process communication.
4. To provide basic knowledge about UNIX signals handling.

**Pre-requisites : Operating System, Unix Shell Programming.**

### Unit – I 8 Hours

**POSIX Standards and File System:** POSIX Standards and APIs, File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program
Interface to Files, UNIX Kernel Support for Files.

### Unit – II 8 Hours

**UNIX Files APIs:** General File APIs, open, creat, read, write, lseek, chmod, close, stat, fstat, File and
Record locking, Directory file APIs, FIFO file APIs, Symbolic link APIs.

### Unit – III 8 Hours

**UNIX Processes:** The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit
Functions, UNIX Kernel Support for Processes.

### Unit – IV 8 Hours

**Inter-process Communication:** Introduction, Pipes, popen and pclose Functions, Co-processes,
FIFOs, Message Queues, Semaphores, Shared Memory.

### Unit – V 8 Hours

**Signals and Daemon Processes:** Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and waitpid API, The sigsetjmp and siglongjmp Functions, kill, alarm, Interval Timers.
**Daemon Processes:** Introduction, Daemon Characteristics, Coding Rules, Error Logging, Client-Server Model.

**Text Books:**

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999 and onwards.
2. W. Richard Stevens, "Advanced Programming in the UNIX Environment", Pearson Education, 2nd Edition and onwards.

**Reference Books:**

1. W. Richard Stevens, Bill Fenner, Andrew M. R., "UNIX® Network Programming The Sockets Networking API", Volume 1, Prentice Hall India, 2nd edition and onwards.

## Course Outcome (COs)

| At the end of the course, the student will be able to | Bloom's Level |
|---|---|
| 1. **Describe** the POSIX/UNIX standards and File system. | **L2** |
| 2. **Discuss** the concept of different file APIs. | **L2** |
| 3. **Explain** the different features of UNIX processes and its related functionalities. | **L2** |
| 4. **Design** and implement programs for inter process communication using pipes. | **L3** |
| 5. **Implement** and demonstrate the concept of UNIX signals and daemon processes. | **L3** |

| **Program Outcome of this course (POs)** | **PO No.** |
|---|---|
| 1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 2. **Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural science and engineering science | **2** |
| 3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | **3** |
| 4. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | **10** |

**Course delivery methods**

1. Chalk and board
2. PPT
3. Video lectures
4.

**Assessment methods**

1. Internal assessment
2. Assignment
3. Quiz
4. Seminar / project

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Additionof two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## ADVANCED JAVA

| | | | |
|---|---|---|---|
| Course Code | 18IS552/CS552 | Credits | 3 |
| Course type | PE | CIE Marks | 50 |
| Hours/week: L-T-P | 2-0-2 | SEE Marks | 50 |
| Total Hours | 40 | **SEE Duration** | 3 Hours for 100 marks |

**Course learning objectives (CLOs)**

1. Understand the different ways of handling I/O in Java, including file I/O.
2. Demonstrate the multithreading concepts and develop multithreaded applications.
3. Build Java applications using Java Data Base Connectivity (JDBC) to interact with databases
4. Build server-side programs using Servlets.

**Pre-requisites: Java programming concepts.**

**Unit – I** 08 Hours

**Java I/O**: Byte streams and Character streams, The Byte Stream classes, The Character Stream classes, Predefined streams, Using Byte Streams, Using Java's Type Wrappers to Convert Numeric Strings.

**Unit – II** 08 Hours

**File I/O**: Reading and Writing Files using Byte Streams, Automatically closing a file, Reading and Writing Binary data, Random-Access Files, Using Java's Character-based Streams, File I/O using Character Streams,

**Unit – III** 08 Hours

**Multithreaded Programming**: Multithreading Fundamentals, The Thread class and Runnable interface, Creating a thread, Creating multiple threads, Determining when a thread ends, Thread Priorities, Synchronization, Using Synchronized Methods, The synchronized statement, Thread communication using notify(), wait() and notifyall(), Suspending, Resuming and Stopping threads

**Unit – IV** 08 Hours

**JDBC**: The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing - commit(), rollback(), SavePoint.

**Unit – V** 08 Hours

**Servlets**: Background; The Life Cycle of a Servlet; Using Tomcat for Servlet Development; A simple Servlet; The Servlet API; The Javax.servlet Package; Reading Servlet Parameter; The Javax.servlet.http package; Handling HTTP Requests and Responses; Using Cookies; Session Tracking.

**Text Books:**


1. Herbert Schildt and Dale Skrien, "Java Fundamentals A Comprehensive Introduction", TMH. Special Indian edition.
2. Jim Keogh, J2EE: The Complete Reference, TMH Edition 2002 onwards.


**Reference Books:**


1. Kathy Sierra & Bert Bates, "Head First Java", O'Reilly, 2nd Edition and onwards.
2. Y. Daniel Liang , "Introduction to JAVA Programming", Pearson's , Seventh Edition onwards.


**Lab Term-works**

1. Write a Java Program to demonstrate the implementation of stream classes in Java.
2. Write a Java Program to demonstrate the implementation of Java's Type Wrappers.
3. Write a Java Program to demonstrate the implementation of reading and writing binary operations in Java.
4. Write a Java Program to demonstrate the implementation of File I/O operations in Java.
5. Write a Java Program to demonstrate the implementation of Multithreading.
6. Write a Java Program to demonstrate the implementation of Synchronization in Java.
7. Write a Java Program to demonstrate the implementation of JDBC packages in Java.
8. Write a Java Program to demonstrate the implementation of Java Servlets.

**Course Outcome (COs)**

| At the end of the course, the student will be able to | | Bloom's Level |
|---|---|---|
| 1. | Identify the different ways of handling I/O and file I/O in Java | L2 |
| 2. | Write Java programs to demonstrate multithreading concepts. | L3 |
| 3. | Apply Java Data Base Connectivity (JDBC) concepts to write applications that interact with databases | L3 |
| 4. | Demonstrate server-side programs using Servlets | L3 |

| **Program Outcome of this course (POs)** | | PO No. |
|---|---|---|
| 1. | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | 3 |
| 2. | **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 9 |
| 3. | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | 10 |
| 4. | **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. | **12** |

**Course delivery methods**

1. Lecture & Board
2. Power-point Presentation
3. Online Videos / Learning
4. Class Room Exercises

**Assessment methods**

1. Assignments
2. Quizzes
3. Internal Assessment Tests
4. Course Activity

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | IA test* | Journal and lab test **OR** Project report and intermediate evaluation | Total Marks |
|---|---|---|---|
| Maximum marks :50 | 30 | 20 | 50 |
| *IA test could be two tests each of one hour duration or only one test of 2 hours duration.<br>Submitting Journal/ Project report is compulsory.<br>Minimum marks required to qualify for SEE : 20 out of 50 marks | | | |

**Semester End Examination (SEE):**

| | | | |
|---|---|---|---|
| 1. | It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA. | | |
| 2. | Initial write up stating the objectives, methodology and the outcome | 10 marks | 50 marks |
| | Presentation (PPT) of the project | 15 marks | |
| | Hardware project: Exhibiting and demonstration of working of project.<br>Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project. | 25 marks | |
| 3. | Minimum passing marks to be scored in SEE: 20 out of 50 marks | | |

## PROBABILITY AND STATISTICS

| | | | |
|---|---|---|---|
| **Course Code** | 18IS553 | **Credits** | 3 |
| **Course type** | PE | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 3 – 0 – 0 | **SEE Marks** | 50 marks |
| **Total Hours:** | 40 | **SEE Duration** | 3 Hours for 100 marks |

**Course learning objectives**

1. This course aims at providing the required skill to apply the statistical tools in engineering problems.
2. To introduce the basic concepts of probability and random variables and introduce the basic concepts of two dimensional random variables.
3. To acquaint the knowledge of testing of hypothesis for small and large samples which plays an important role in real life problems.
4. To introduce the basic concepts of classifications of design of experiments which plays very important roles in the field of agriculture and statistical quality control.

**Pre-requisites : Mathematics**

**Unit – I** **8 Hours**

**PROBABILITY AND RANDOM VARIABLES:** Probability – The axioms of probability – Conditional probability – Baye‘s theorem - Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions.

**Unit – II** **8 Hours**

**BASICS OF STATISTICS:** What are statistics?, How do we obtain and sample data?, sampling data, Measure of statistics,Point estimates, Joint distributions – Marginal and conditional distributions – Covariance – Correlation and linear regression, Central limit theorem

**Unit – III** **8 Hours**

**TESTING OF HYPOTHESIS:** Sampling distributions - Estimation of parameters - Statistical hypothesis - Large sample tests based on Normal distribution for single mean and difference of means -Tests based on t, Chi-square and F distributions for mean, variance and proportion - Contingency table (test for independent) - Goodness of fit.

**Unit – IV** **8 Hours**

**DESIGN OF EXPERIMENTS :** One way and Two way classifications - Completely randomized design – Randomized block design – Latin square design - factorial design..

**Unit – V** **8 Hours**

**STATISTICAL QUALITY CONTROL:** Control charts for measurements (X and R charts) – Control charts for attributes (p, c and np charts) – Tolerance limits - Acceptance sampling.

**Text Books**


1. Johnson, R.A., Miller, I and Freund J., "Miller and Freund‘s Probability and Statistics for Engineers", Pearson Education, Asia, 8th Edition, 2015.
2. Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2007.


**Reference Books**


1. Devore. J.L., "Probability and Statistics for Engineering and the Sciences‖, Cengage Learning, New Delhi, 8th Edition, 2014.
2. Papoulis, A. and Unnikrishnapillai, S., "Probability, Random Variables and Stochastic Processes", McGraw Hill Education India, 4th Edition, New Delhi, 2010.


**Course Outcome (COs)**

| At the end of the course, the student will be able to | | Bloom’s Level |
|---|---|---|
| 1. | Exemplify the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. | L2 |
| 2. | Apply the basic concepts of one and two dimensional random variables to various engineering applications. | L3 |
| 3. | Apply the basic concepts of classifications of design of experiments in different and statistical quality control. | L3 |
| 4. | Apply the concept of testing of hypothesis for small and large samples in real life problems and have the notion of sampling distributions and statistical techniques used in engineering and management problems. | L3 |

| **Program Outcome of this course (POs)** | | **PO No.** |
|---|---|---|
| 1. | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 3. | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | **2** |
| 3. | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | **3** |
| 4. | **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions. | **4** |

**Course delivery methods**

1. Chalk and talk
2. Power Point Presentations
3. Demos
4. Videos

**Assessment methods**

1. Quiz
2. Assignment
3. IA Test

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Additionof two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## UNIX SHELL PROGRAMMING

| Subject Code: | 18IS561 | Credits: | 3 |
|---|---|---|---|
| Course Type: | OE | CIE Marks: | 50 |
| Hours/week: L – T – P | 2-0-2 | SEE Marks: | 50 |
| Total Hours: | 40 | SEE Duration: | 3 Hours for 100 Marks |

Course Learning Objectives (CLOs):

1. Understand history, origin features and architecture of UNIX Operating system.
2. Learn basic commands to interact with UNIX System and VI editor.
3. Understand UNIX file system, basic and advanced filters in UNIX
4. Learn Shell Scripting and Perl Scripting.

Prerequisites: Basic knowledge of computer concepts & programming.

**Unit I** **8 Hours**

UNIX architecture: The operating System, The UNIX operating system, UNIX architecture, Internal and External commands, Command structure, man browsing and general purpose utilities. The File System: The Parent-Child relationship, the HOME variable, pwd, cd, mkdir, Absolute pathnames, Relative pathnames.
vi editor: vi basics, input mode, saving text and quitting, searching for pattern(. and ?), substitution(search and replace using :s command).

**Unit II** **8 Hours**

Basic File attributes: ls: listing directory contents, the UNIX file system, ls –l, -d option, file ownership, file permissions, chmod, directory permission, changing file ownership.
More File Attributes: File systems and inodes, hard links, symbolic link and ln, the directory, umask, modification and access times, find command.
The Process: Process basics, ps: process stutus, system processes (-e or –a), mechanism of process creation, Process states and zombies, running job in background, nice: job execution, job control, at and batch, corn, time.

**Unit III** **8 Hours**

Simple Filters:pr, head, tail, cut, paste, sort, uniq, tr., Filters using Regular Expressions-grep and sed: grep, basic regular expressions(BRE), Extended Regular Expressions(ERE) and egrep,sed: the stream editor, line addressing using multiple instructions(-E and –F) context addressing, writing seleted lines to file(w), text editing, substitution(s), basic regular expression additional topics.

**Unit IV** **8 Hours**

The Shell: The shell's interpretive cycle, shell offerings, pattern matching, escaping and quoting, redirection, pipes, tee, command substitution, shell variables.

**Unit V** **8 Hours**

Essential shell programming: Shell scripts, command line arguments, exit and exit status of command, the logical operators && and .., the if condition, using test and { } to evaluate expression. The case conditional expression, expr, $0, while, for, debugging shell scripts with ser –x.

Text Books:

1. Sumitabha Das: "UNIX – Concepts and Applications", Tata McGraw Hill, 4th Edition.

Reference Books:

1. Behrouz A. Forouzan and Richard F. Gilberg: "UNIX and Shell Programming", Cengage Learning, 2005.
2. M.G. Venkateshmurthy: "UNIX & Shell Programming", Pearson Education, 2005.

Online Courses:

1. https://www.udemy.com/course/linux-shell-programming-for-beginners/
2. https://intellipaat.com/unix-shell-scripting/ NPTEL course:

1. LINUX programming & Scripting, URL: https://nptel.ac.in/courses/117/106/117106113/

| Sl. No. | **Course Outcomes (COs)** | Bloom's Level |
|---|---|---|
| 1. | Describe the architecture and features of the UNIX operating system and distinguish it from other operating systems | L1,L2 |
| 2. | Demonstrate UNIX commands for file handling and process control | L3 |
| 3. | Construct regular expressions for pattern matching and apply them to various filters for a specific task | L3 |
| 4. | Analyze a given problem and apply requisite facets of shell programming in order to devise a shell script to solve the problem | L4 |

| Sl. No. | **Program Outcomes (POs)** | PO No. |
|---|---|---|
| 1. | Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | PO1 |
| 2. | Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | PO3 |
| 3. | Modern tool usage: Create, select, apply appropriate techniques, resources, and modern engineering IT tools including prediction, modeling to complex engineering activities with an understanding of the limitations. | PO5 |

**Program List**:

1. Develop a Shell program to check and display 10 leap years.
2. Develop a Shell program to check the given string is palindrome or not.
3. Develop a Shell program to find the roots of a quadratic equation.
4. Develop a Shell program to check the given integer is Armstrong number or not.
5. Develop a Shell program to generate prime numbers between 1 and 50.
6. Develop a Shell program to find the sum of square of individual digits of a number.
7. Develop a Shell program to execute various UNIX commands using case statements set of numbers.
8. Develop a Shell program to count the number of vowels in a line of text.
9. Develop a Shell program to display student grades.
10. Develop a Shell program to find the smallest digit from a number.
11. Develop a Shell program to find the sum of two numbers using function programming.
12. Develop a Shell program to generate Fibonacci series.

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | IA test* | Journal and lab test **OR** Project report and intermediate evaluation | Total Marks |
|---|---|---|---|
| Maximum marks :50 | 30 | 20 | 50 |
| *IA test could be two tests each of one hour duration or only one test of 2 hours duration.<br>Submitting Journal/ Project report is compulsory.<br>Minimum marks required to qualify for SEE : 20 out of 50 marks | | | |

**Semester End Examination (SEE):**

| | | | |
|---|---|---|---|
| 1. | It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA. | | |
| 2. | Initial write up stating the objectives, methodology and the outcome | 10 marks | 50 marks |
| | Presentation (PPT) of the project | 15 marks | |
| | Hardware project: Exhibiting and demonstration of working of project.<br>Software project: Demonstration of the programming capabilities by writing flowchart, algorithm and codes related to a section of the project. | 25 marks | |
| 3. | Minimum passing marks to be scored in SEE: 20 out of 50 marks | | |

## INTRODUCTION TO DATA STRUCTURES

| | | | |
|---|---|---|---|
| Subject Code: | 18IS562 | Credits: | 3 |
| Course Type: | OE | CIE Marks: | 40 |
| Hours/week: L – T – P | 3-0-0 | SEE Marks: | 40 |
| Total Hours: | 40 | SEE Duration: | 3 Hours for 100 Marks |

**Course Learning Objectives:**

1. To introduce elementary data structures.
2. To give emphasis on selection of right data structure for given problem scenario.
3. To provide an insight to linear and nonlinear data structures and their applications.

Pre requisites:

1. Programming Knowledge using C/C++.

**UNIT I** **8 Hours**

Introduction to Data Structures:
Introduction to data structures, Characteristics of data structures, types of data structures.
Arrays:
Introduction, Types of arrays, Representation of 1-D array in memory, Array Traversal, Insertion and deletion, Sorting and Searching, 2-D arrays, Matrix Operations.

**UNIT II** **8 Hours**

Linked Lists:
Introduction, Linked list-Basic Concept, Implementation, Types of linked lists, Circular linked list Doubly linked list.

**UNIT III** **8 Hours**

Linear Data Structures-Stacks:
Introduction, Stack representation in Memory, Stack Operations, Stack Implementation.

**UNIT IV** **8 Hours**

Linear Data Structures-Queues:
Introduction, Queues-Basic concept, Logical representation of Queues, Queue Operations, Queue Implementation, Circular Queues.

**UNIT V** **8 Hours**

Non Linear Data Structures: Trees
Introduction, Basic concept, Binary Tree, Binary Tree Representation, Binary Tree Traversal, Binary Search tree, Expression Trees.

**Text Books**


1. E. Balguruswamy,Data Structures, McGraw Hill Education(india) Private Limited.
2. Langsam, Augenstein and Tenenbaum—Data Structures using C and C++, Second edition, Prentice Hall India

**Online Courses**

**NPTEL Course URL**: https://nptel.ac.in/courses/106/102/106102064/

**edX Course URL:** https://www.edx.org/course/introduction-to-data-structures

| Sl. No. | Course Outcomes (COs) | Bloom's Level |
|---|---|---|
| 1. | Define and discuss basics oflinear and nonlinear data structures. | **L2** |
| 2. | Demonstrate advantages and disadvantages of specific data structures. | **L2** |
| 3. | Select appropriate data structures for providing solution to real world problem. | **L3** |
| 4. | Develop understanding of linear and non-liner data structures. | **L2** |
| 5. | Apply linear and non-liner data structures for solving complex problems. | **L3** |

| Sl. No. | Program Outcomes (POs) | PO No. |
|---|---|---|
| 1. | **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **PO1** |
| 2. | **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | **PO2** |
| 3. | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | **PO3** |
| 4. | **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions. | **PO10** |

| | Course delivery methods | | Assessment methods |
|---|---|---|---|
| 1. | Chalk and talk | 1. | Quiz |
| 2. | Power Point Presentations | 2. | Assignment |
| 3. | Demonstrations / Animations | 3. | IA Test |
| 4. | Audio and Videos | 4. | Course Project/Seminar |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Additionof two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |

- **Writing two IA test is compulsory.**
- **100 marks will be reduced to 50**
- **Minimum marks required to qualify for SEE : 20 out of 50**

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## COMPUTER GRAPHICS

| | | | |
|---|---|---|---|
| **Course Code** | 18IS563 | **Credits** | 3 |
| **Course type** | OE | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 3-0-0 | **SEE Marks** | 50 marks |
| **Total Hours:** | 40 Hrs; | **SEE Duration** | 3 Hours for 100 marks |

**Course learning objectives**

1. To present the computer graphics fundamentals and all aspects of computer picture formation.
2. To introduce the OpenGL package.
3. To understand the concept of transformations and animations.
4. To familiarize the techniques of visualization for both 2D and 3D objects.

**Pre-requisites: C Programming, Linear Algebra and Geometry.**

**Unit - I** **8 Hours**

**Introduction:** A graphics system, Images: Physical and synthetic, The synthetic camera model, The programmer's interface, Graphics architectures, The Sierpinski gasket, Programming 2D Applications, The OpenGL API, Primitives and attributes.

**Unit - II** **8 Hours**

**Introduction**: Color, Viewing, Control functions, The Gasket program, Polygons and recursion, The three-dimensional gasket**.**

**Input and Interaction:** Interaction, Input devices, Programming Event Driven Input, Menus, A simple CAD program, Building Interactive Models, Animating Interactive Program, Design of Interactive Programs, Logic Operations.

**Unit - III** **8 Hours**

**Geometric Objects and Transformations :** Three-dimensional Primitives, Coordinate Systems and Frames, Frames in Open GL, Modeling a Colored Cube, Affine Transformations, Rotation, Translation and Scaling, Transformation in Homogeneous Coordinates, Concatenation of Transformations, 3D Transformations.

Case study : Paint 3D windows tool.

**Unit - IV** **8 Hours**

**Viewing:** Classical and computer viewing, Viewing with a Computer; Positioning of the camera, Simple projections, Projections in OpenGL, Hidden-surface removal.

**Lighting:** Light and Matter, Light Sources, The Phong Lighting model, Computation of vectors.

**Unit - V** **8 Hours**

**Shading:** Polygonal Shading, Approximation of a sphere by recursive subdivisions, Light sources in OpenGL, Specification of materials in OpenGL, Shading of the sphere model, Global Illumination.

**Book**

**Text Books:**

1. Edward Angel: Interactive Computer Graphics A Top-Down Approach with OpenGL, 5th Edition & above, Pearson Education, 2008

**Reference Books:**

1. Donald Hearn and Pauline Baker: Computer Graphics- OpenGL Version, 3rd Edition, Pearson Education, 2004.
2. F.S. Hill Jr.: Computer Graphics Using OpenGL, 3rdEdition, PHI, 2009.

| **Course Outcome (COs)** | | |
|---|---|---|
| At the end of the course, the student will be able to : | | Bloom's Level |
| 1. | **Explain** the computer graphics system and all aspects computer image generation. | L2 |
| 2. | **Apply** OpenGL API to design and develop simple 2D & 3D applications. | L3 |
| 3. | **Illustrate** the concepts of viewing, lighting and shading with respect to Computer graphics. | L2 |

| **Program Outcome of this course (POs)** | | **PO No.** |
|---|---|---|
| 1. | **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 2. | **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences | **2** |
| 3. | **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | **3** |

Course delivery methods

1. Chalk and talk
2. Power Point Presentations
3. Demos
4. Audio and Videos

Assessment methods

1. Quiz
2. Assignment
3. IA Test

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Addition of two IA tests | Addition of two assignments | Quiz/Seminar/Course Project | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 30+30 = 60 | 20 | 20 | 100 |
| ➢ **Writing two IA test is compulsory.**<br>➢ **100 marks will be reduced to 50**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Semester End Examination (SEE):**

1. It will be conducted for 3 hours duration and 100 marks. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. Minimum passing marks required to be scored in SEE: 40 out of 100 marks
3. Question paper will have 10 questions carrying 20 marks each. Students have to answer FIVE full questions selecting atleast one full question from each unit.

## EMPLOYABILITY SKILLS - I

| | | | |
|---|---|---|---|
| **Course Code** | | **Credits** | MNC |
| **Course type** | MNC | **CIE Marks** | 50 marks |
| **Hours/week: L-T-P** | 3 – 0 – 0 | **SEE Marks** | - |
| **Total Hours:** | Lecture = 30 Hrs; Tutorial = 00Hrs<br>Total = 30 Hrs | **SEE Duration** | 3 Hours for 100 marks |

**Course learning objectives**

1. The course is designed to develop the employability skills of a student.

**Unit – I** **6 Hours**

**Quantitative Aptitude:** Number System (3 Hours)
**Soft Skills:** Body Language (1.5), Grooming and Etiquette (1.5)

**Unit – II** **6 Hours**

**Quantitative Aptitude:** Ratio, Proportion & Partnership (1.5), Average(1.5)
**Logical Reasoning:** Number Series (1)
**Verbal Ability:** Comprehension (2)

**Unit – III** **6 Hours**

**Quantitative Aptitude:** Percentages (2)
**Logical Reasoning:** Blood Relations (1), Letter Series (1)
**Verbal Ability:** Sentence Correction (2)

**Unit – IV** **6 Hours**

**Quantitative Aptitude:** Profit and Loss (2)
**Logical Reasoning:** Seating Arrangement (1), Data Arrangement (1)
**Verbal Ability:** Ordering of Sentences (2)

**Unit – V** **6 Hours**

**Quantitative Aptitude:** Time & Work (2)
**Logical Reasoning:** Analogy (1), Direction Sense Test (1.5)
**Soft Skills:** Group Discussions (1.5)

**Text Books:**


1. How to prepare for Quantitative Aptitude for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 4th Edition, 2018.
2. How to prepare for Logical Reasoning for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.

3. How to prepare for Verbal Ability and Reading Comprehension for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 8th Edition, 2018.
4. How to prepare for Data Interpretation for CAT & other Management Examinations, Arun Sharma, McGraw Hill Education(India) Private Limited, 5th Edition, 2018.

**Course Outcome (COs)**

At the end of the course, the student will be able to

1. Clear the Aptitude round of recruiters during placements
2. Perform confidently during the GD and Interview process
3. Develop behaviors that are appropriate for a professional

| **Program Outcome of this course (POs)** | **PO No.** |
|---|---|
| 1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | 1 |
| 2. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations. | 3 |
| 3. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings. | 9 |

| **Course delivery methods** | | **Assessment methods** | |
|---|---|---|---|
| 1. | Black Board Teaching | 1. | Internal Assessment |
| 2. | Power Point Presentation | 2. | Assignment |
| 3. | Class Room Exercise | 3. | Quiz |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Average of best two IA tests out of three | Average of two Online Tests | Class Participation | Total Marks |
|---|---|---|---|---|
| Maximum Marks: 50 | 25 | 15 | 10 | 50 |
| ➢ **Writing two IA tests is compulsory.**<br>➢ **Minimum marks required to qualify for SEE : 20 out of 50** | | | | |

**Self-Study** topics shall be evaluated during CIE (Assignments and IA tests) and 10% weightage shall be given in SEE question paper.

**Scheme of Semester End Examination (SEE):**

1. It will be conducted for 100 marks of 3 hours duration. It will be reduced to 50 marks for the calculation of SGPA and CGPA.
2. **Minimum marks required in SEE to pass: 40 (out of 100 )**
3. Question paper contains two questions from each unit each carrying 20 marks. Students have to answer one full question from each unit.

## COMPUTER NETWORKS LABORATORY

| | | | |
|---|---|---|---|
| **Course Code** | 18ISL57 | **Credits** | 1.5 |
| **Course type** | LAB | **CIE Marks** | 25 marks |
| **Hours/week: L-T-P** | 0-0-3 | **SEE Marks** | 25 marks |
| **Total Hours:** | 36 | **SEE Duration** | 3 Hours/2 Hours for 50 marks |

### Course learning objectives

1. To practice the students for network programming in UNIX based operating systems
2. To design and simulate the network in latest simulation tools
3. To illustrate message controlling mechanisms
4. To Perform the real time network traffic analysis using network monitoring tools

**Pre-requisites: Computer Network, Network Programming and Unix System Programming**

1. Implementing client server communication using socket programming that uses connection oriented protocol at transport layer.
2. Implementing client server communication using socket programming that uses connection-less protocol at transport layer.
3. Implement the distance vector routing algorithm
4. Implement the Error detection technique using CRC-16.
5. Implement the RSA algorithm for encryption and decryption of a text file.
6 Implement Leaky bucket algorithm for congestion control
7 Using WIRESHARK observe the data transferred in client server communication using UDP and identify the UDP datagram.
8. Using WIRESHARK analyze three way handshaking connection establishment, data transfer and connection termination in client server communication using TCP.
9. Simulate a Full duplex connection in a wired network using NS3.
10. Simulate a simple Wireless network using NS3.

### Books


1. W. Richard Stevens, Bill Fenner, Andrew M. Rudoff: "UNIX Network Programming". Volume 1,
   Third Edition, Pearson 2004.
2. Barry Nance: "Network Programming in C", PHI 2002 3.Bob Quinn, Dave Shute: "Windows Socket
   Network Programming", Pearson 2003.
3. Richard Stevens: "UNIX Network Programming". Volume 2, Second Edition.
4. James F Kurose and Keith W Ross, Computer Networking, A Top-Down Approach, Sixth edition, Pearson,2017.

| **Course Outcome (COs)** | | |
|---|---|---|
| At the end of the course, the student will be able to | | Bloom's Level |
| 1. | Develop Inter Process Communication and client server communication using Sockets. | L3 |
| 2. | Implement message controlling mechanisms like error detection and encryption. | L3 |
| 3. | Design and Analyze network traffic using network simulation and monitoring tools | L4 |
| **Program Outcome of this course (POs)** | | **PO No.** |
| 1. | Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems. | **1** |
| 2. | Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences. | **2** |
| 3. | Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. | **12** |

| Assessment methods | |
|---|---|
| 1. | Lab IA |
| 2. | Lab journal evaluation |
| 3. | Day today Lab Conduction from students |

**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Attendance/conduct of lab | Journal | Lab project | Total Marks |
|---|---|---|---|---|
| Maximum marks :25 | 10 | 10 | 5 | 25 |
| Submission and certification of journal is compulsory to qualify for SEE<br>Minimum marks required to qualify for SEE : 10 out of 25 marks | | | | |

**Semester End Examination (SEE):**

| | | | |
|---|---|---|---|
| 1. | It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA. | | |
| 2. | Only one experiment to be conducted. In case, there are two parts then one experiment from each part. | | |
| 3. | Initial write up | 10 marks | 50 marks |
| | Conduct of experiment(s), result and conclusion | 20 marks | |
| | One marks question | 10 marks | |
| | Viva-voce | 10 marks | |
| 4. | Viva voce is conducted for individual student and not in group | | |
| 5. | Minimum passing marks to be scored in SEE: 20 out of 50 marks | | |

## SOFTWARE DESIGN AND MODELLING LAB

| | | | |
|---|---|---|---|
| **Course Code** | 18ISL58 | **Credits** | 1.5 |
| **Course type** | LAB | **CIE Marks** | 25 marks |
| **Hours/week: L-T-P** | 0 – 0 – 3 | **SEE Marks** | 25 marks |
| **Total Hours:** | 30 | **SEE Duration** | 3 Hours for 50 marks |

**Course learning objectives**

1. To Understand and Implement various phases of SDLC
2. To Apply concepts learnt in Databases, Software Engineering and programming subjects
3. To create new software based on user requirements
4. To impart state-of-the-art knowledge on Software Engineering and UML in an interactive manner through the Web
5. Present case studies to demonstrate the practical applications of different
6. concepts Provide opportunities to the students where they can solve small, real life problems

**Pre-requisites: Databases Management Systems, Software Engineering, Web Programming**

| | **Part A** |
|---|---|
| | **List of experiments** |
| | **For a given application,** |
| 1. | Identifying the Requirements from Problem Statements:<br>Requirements Characteristics of Requirements. Categorization of Requirements . Functional Requirements. Identifying Functional Requirements |
| 2. | Modeling UML Use Case Diagrams and Capturing Use Case Scenarios<br>Use case diagrams. Actor. Use Case. Subject. Graphical Representation. Association between Actors and Use Cases. Use Case Relationships. Include Relationship. Extend Relationship.<br>Generalization Relationship . Identifying Actors . Identifying Use cases . Guidelines for drawing Use Case diagrams |
| 3. | E-R Modeling from the Problem Statements<br>Entity Relationship Model . Entity Set and Relationship Set . Attributes of Entity . Keys . Weak Entity . Entity Generalization and Specialization . Mapping Cardinalities . ER Diagram .<br>Graphical Notations for ER Diagram . Importance of ER modeling |
| 4 | Identifying Domain Classes from the Problem Statements |
| | Domain Class . Traditional Techniques for Identification of Classes . Grammatical Approach<br>Using Nouns . Advantages . Disadvantages . Using Generalization . Using Subclasses . Steps to Identify Domain Classes from Problem Statement . Advanced Concepts |
| 5 | Statechart and Activity Modeling<br>Statechart Diagrams . Building Blocks of a Statechart Diagram . State . Transition . Action . Guidelines for drawing Statechart Diagrams . Activity Diagrams . Components of an Activity Diagram . Activity . Flow . Decision . Merge . Fork . Join . Note . |

| | |
|---|---|
| | Partition . A Simple Example . Guidelines for drawing an Activity Diagram |
| 6 | Modeling UML Class Diagrams and Sequence diagrams<br>Structural and Behavioral aspects . Class diagram . Elements in class diagram . Class . Relationships . Sequence diagram . Elements in sequence diagram . Object . Life-line bar . Messages |
| 7 | Modeling Data Flow Diagrams<br>Data Flow Diagram . Graphical notations for Data Flow Diagram . Explanation of Symbols used in DFD . Context diagram and leveling DFD |
| 8 | Designing Test Suites<br>Software Testing . Standards for Software Test Documentation . Testing Frameworks . Need for Software Testing . Test Cases and Test Suite . Types of Software Testing . Unit Testing . Integration Testing . System Testing . Example . Some Remarks |
| | **Part B** |
| | **The students will design and implement their proposed project on the lines of part A.** |
| | **Books** |
| 1. | Joel Murach and Ray Harris, PHP and MySQL, Shroff/Murachs, 2nd Edition, 2014 |
| 2. | Zak Ruvalcaba and Anne Boehm, HTML5 and CCS3, Shroff/Murachs, 3rd Edition, 2015 |
| 3. | Mary Delamater, JavaScript, Shroff/Murachs, 2nd Edition, 2015 |

**Course Outcome (COs)**

| At the end of the course, the student will be able to | | Bloom's Level |
|---|---|---|
| 1. | **Create** requirement document for application problems in the standard format. | L3 |
| 2. | **Analyze** and translate a requirements specification into a design. | L4 |
| 3. | **Construct** the software from the design, using appropriate software engineering<br>Methodology | L5 |
| 4 | **Utilize** modern engineering tools for specification, design, implementation and<br>Testing | L3 |

| | **Program Outcome of this course (POs)** | **PO No.** |
|---|---|---|
| 1. | **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations | **4** |
| 2. | **Use of engineering tools:** An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations | **6** |
| 3. | **Life-long learning:** An ability to identify and to address their own educational needs in a changing world in ways sufficient to maintain their competence and to allow them to contribute to the advancement of knowledge. | **12** |

**Assessment methods**

1. Periodic journal evaluation
2. Execution of lab experiments

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**Scheme of Continuous Internal Evaluation (CIE):**

| Components | Attendance/conduct of lab | Journal | Lab project | Total Marks |
|---|---|---|---|---|
| Maximum marks :25 | 10 | 10 | 5 | 25 |
| Submission and certification of journal is compulsory to qualify for SEE<br>Minimum marks required to qualify for SEE : 10 out of 25 marks | | | | |

**Semester End Examination (SEE):**

| | | | |
|---|---|---|---|
| 1. | It will be conducted for 50 marks having 3 hours/2 hours duration. It will be reduced to 25 marks for the calculation of SGPA and CGPA. | | |
| 2. | Only one experiment to be conducted. In case, there are two parts then one experiment from each part. | | |
| 3. | Initial write up | 10 marks | 50 marks |
| | Conduct of experiment(s), result and conclusion | 20 marks | |
| | One marks question | 10 marks | |
| | Viva-voce | 10 marks | |
| 4. | Viva voce is conducted for individual student and not in group | | |
| 5. | Minimum passing marks to be scored in SEE: 20 out of 50 marks | | |