

B. E. SYLLABUS

**INFORMATION SCIENCE
& ENGINEERING**

V & VI SEMESTER

**With
Scheme of Teaching
& Examination**

DEPARTMENT : INFORMATION SCIENCE & ENGINEERING

Sl. No.	Name	Qualification	Designation
1	Dr. B. Neelima	Ph. D.	Prof. & Head
2	Dr. Balasubramani R.	Ph. D.	Professor/Chief Project Leader, EDC
3	Mr. Karthik Pai B. H.	M. Tech. (Ph. D.)	Assoc. Prof.
4	Ms. Ashwini B.	M. Tech. (Ph. D.)	Assoc. Prof.
5	Mr. Vasudeva Pai	M. Tech.	Asst. Prof. Gd. II
6	Mr. Pranesh	M. Tech. (Ph. D.)	Asst. Prof. Gd. II
7	Ms. Deepa J Shetty	M. Tech. (Ph. D.)	Asst. Prof. Gd. II
8	Mr. Devidas	M. Tech. (Ph. D.)	Asst. Prof. Gd. II
9	Ms. Rashmi Naveen	M. Tech. (Ph. D.)	Asst. Prof. Gd. II
10	Mr. Jason Elroy Martis	M. Tech. (Ph. D.)	Asst. Prof. Gd. II
11	Ms. Chinmai Shetty	M. Tech.	Asst. Prof. Gd. II
12	Mr. Abhishek Rao	M.Tech	Asst. Prof.Gd.II
13	Mr. Abhir Bhandary	M. Tech. (Ph. D.)	Asst. Prof. Gd. I
14	Mr. Srikanth Bhat. K.	M. Tech.	Asst. Prof. Gd. I
15	Ms. Akshaya Devadiga	M.Tech	Asst. Prof. Gd. I
16	Ms. Prathyakshini Devadiga	M.Tech	Asst. Prof. Gd. I
17	Ms. Anusha Nayak	M.Tech	Asst. Prof. Gd. I

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING

VISION :

To uniquely position the Department as a leader in innovation and excellence in information science and engineering through education, research and scholarship in a professional framework by addressing evolving global needs. Also the Department aims at creating top quality successful and sustainable programs and curricula for the students to address the emerging educational challenges and market demands.

MISSION :

- To provide outstanding education and research training to the students for their productive careers in industry, academia and government.
- To provide a learning environment that promotes excellence and innovation, ethical practice and responsibility towards society.
- To prepare the students to practice their professions competently to meet the ever- changing needs of society and to continue learning their discipline, allowing them to move into other related fields.
- To promote active learning, critical thinking, and engineering judgment coupled with business and entrepreneurial skills.

Programme Educational Objectives (PEOs):

- Graduates must gain both theoretical and practical knowledge to identify, formulate & solve challenges in Information Science & Engineering problems.
- Graduates must work productively as Information Science Engineers, including supportive and leadership roles on multidisciplinary teams.
- Graduates must communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavors, and practice their profession with high regard to legal and ethical responsibilities.
- Graduates must engage in life-long learning, such as graduate study, to remain current in their profession and be leaders in our technological society.

Programme Outcomes (POs):

After successful completion of the program students will be able to:

1. Apply the knowledge of mathematics, science, engineering fundamentals and Information Science & Engineering principles to the solution of complex engineering problems.
2. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
3. 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. Design solutions to the problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline.
5. Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequence responsibilities relevant to the professional engineering practice.
7. Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
8. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10. 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.
11. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Recognise the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (POs):

1. An ability to strengthen the knowledge and understanding in computer networking and related areas. **(Programme Specific Outcome – PSO)**
2. An ability to strengthen the knowledge and understanding in software development and related areas. **(Programme Specific Outcome – PSO)**

Graduate Attributes :

Sl. No.	Graduate Attributes
a	Engineering Knowledge
b	Problem Analysis
c	Design / development of solutions
d	Conduct investigations of complex problems
e	Modern tool usage
f	The engineer and society
g	Environment and sustainability
h	Ethics
i	Individual and team work
j	Communication
k	Project management and finance
l	Life-long learning

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING
SCHEME OF TEACHING AND EXAMINATION

V SEMESTER B.E.

31 Hours / Week

Sl. No.	Sub. Code	Subject	Theory/Tuto./Prac./ Self Study	Total Hrs./Week	C.I.E	S.E.E	Credits
1	15IS501	Java Programming	4+0+0+0	4	50	50	4
2	15IS502	Relational Database Management Systems	4+0+0+0	4	50	50	4
3	15IS503	Microprocessor and Interfacing	4+1+0+0	5	50	50	4
4	15IS504	Object Oriented Modeling and Design	4+0+0+S	4	50	50	4
5	15IS505	Operating Systems	4+0+0+0	4	50	50	4
6	15IS51X	Elective -I	3+0+0+0	3	50	50	3
7	15IS506	Microprocessors and Interfacing Lab	0+0+2+0	2	50	50	1
8	15IS507	Java Programming Lab	0+0+4+0	4	50	50	2
9	15IL001	Employability Skill Development	1+0+0+0	1	50	0	0
TOTAL			31	31	500	450	26

DEPARTMENT OF INFORMATION SCIENCE & ENGINEERING
SCHEME OF TEACHING AND EXAMINATION

VI SEMESTER B.E.

32 Hours / Week

Sl. No.	Sub. Code	Subject	Theory/Tuto./Prac./ Self Study	Total Hrs./Week	C.I.E	S.E.E	Credits
1	15IS601	Computer Graphics and Visualization	4+1+0+0	5	50	50	4
2	15IS602	Computer Networks	4+0+0+0	4	50	50	4
3	15IS603	Artificial Intelligence	4+0+0+0	4	50	50	4
4	15IS604	Data Mining	4+0+0+S	4	50	50	4
5	15IS61X	Elective – II	3+0+0+0	3	50	50	3
6	15IS62X	Elective –III	3+0+0+0	3	50	50	3
7	15IS605	IGW Lab	0+4+0+0	4	50	50	0
9	15IS607	Computer Networks Lab	0+0+2+0	2	50	50	1
10	15IS608	Computer Graphics and Visualization Lab	0+0+2+0	2	50	50	1
11	15IL002	Employability Skill Development	1+0+0+0	1	50	0	0
TOTAL			32	32	550	450	25

ELECTIVE - I

	Sl. No.	Sub. Code	Subject
15IS51X	1	15IS511	Information Storage Management (EMC2)
	2	15IS512	Distributed Systems and Objects
	3	15IS513	Software Architecture
	4	15IS514	Operation Research
	5	15IS515	Advanced UNIX Programming
	6	15IS516	Program Verification

ELECTIVE - II

	Sl. No.	Sub. Code	Subject
15IS61X	1	15IS611	C# and.NET Technologies (Infosys)
	2	15IS612	Multicast Communication
	3	15IS614	Fundamentals of Image Processing
	4	15IS615	Software Testing
	5	15IS616	Web Technology

ELECTIVE - III

	Sl. No.	Sub. Code	Subject
15IS62Y	1	15IS621	Mobile Application Development (Infosys)
	2	15IS622	Multicore Architecture and Programming
	3	15IS623	Network Management
	4	15IS624	Software Project Management

JAVA PROGRAMMING

Sub Code : 15IS501
Hrs/Week : 4+0+0+0

Credits : 04
Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3. Be aware of the important topics and principles of software development.
4. Have the ability to write a computer Java program to solve specified problem
5. Create web solutions using java script, PHP.

UNIT – I

INTRODUCING CLASSES

Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, this keyword, Method overloading, Using objects as parameters, Argument passing, Returning objects, Access control, static, final, Using command line arguments, variable length arguments.

Inheritance Basics, Using super, creates a Multilevel Hierarchy, When constructors are called? Method Overriding, Using abstract classes, Using final with Inheritance.

PACKAGES: Access protection, Importing Packages, Interfaces.

EXCEPTION-HANDLING

Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, multiple catch Clauses, Nested try statements, throw, throws, finally.

10 Hours

UNIT – II

MULTITHREADED PROGRAMMING

The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Inter-thread Communication.

EVENT HANDLING MECHANISMS

The Delegation Event Model, Event Classes, Sources of Events, Event Listener Interfaces, Using the Delegation Event Model.

WORKING WITH WINDOWS

Graphics and Text - Overview, AWT Classes, Window Fundamentals, Working with Frame Windows, Creating a Frame Window in an Applet, Creating a Windowed Program, Displaying Information within a Window, Working with Graphics, Working with color, Setting the Paint Mode, Working with Fonts, Managing Text Output Using Font Metrics.

12 Hours

UNIT – III**INTRODUCING SWINGS**

Component and container, Event handling, Painting, Exploring Swings, Swings UI components, JLabel and ImageIcon; JTextField; The Swing Buttons; JTabbedPane; JScrollPane; JList; JComboBox; JTable I/O Basics, Reading Console Input, Writing Console Output, The PrintWriter Class.

FILE HANDLING

Serial Access Files, File Methods, Redirection, Command Line Parameters, Random Access Files

10 Hours**UNIT – IV****JAVA DATABASE CONNECTIVITY (JDBC)**

SQL and Versions of JDBC, Simple Database Access, Modifying the Database Contents, Transactions, Meta Data, Scrollable ResultSets in JDBC

PHP

Overview of PHP, General Syntactic Characteristics, Primitives, Output, Arrays, Functions, Pattern Matching, Form Handling, Files. Database Access with PHP and MySQL. Using Bootstrap With PHP

10 Hours**UNIT – V****JAVA SCRIPT**

Overview, Object orientation and JavaScript, General syntactic characteristics, Primitives, Operations and Expressions, Screen Output and Keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern Matching using regular expressions, Errors in Scripts, Simple Examples. JavaScript execution environment, The Document Object Model (DOM), handling events from: Body elements, Button Elements, Text Box and Password Elements, Simple Examples.

JAVA SCRIPT DEVELOPMENT

Understanding jQuery, Event Manipulation Methods, AngularJS Template & live data binding, Struts architecture & versions

10 Hours**Course Outcomes:**

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

Sl.No	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C503.1	Design a object oriented logic for a given problem scenario	L2
C503.2	Write standalone programs using Java.	L3
C503.3	Explain various programming constructs that are used in Java.	L4
C503.4	Design Java solutions with database connectivity.	L4
C503.5	Create webbased applications using JavaScripts.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C503.1	L	M	L	M			M					M		L
C503.2		M				L						L		M
C503.3	L											L		
C503.4		L		M		L						L		
C503.5			L	H			M				L	M		M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. The Complete Reference Java by Herbert Schildt, TMH.
2. AngularJS By Brad Green, ShyamSeshadri O'Reilly Media Publication
3. jQuery Pocket Reference By David Flanagan □ O'Reilly Media Publication

REFERENCE BOOKS:

1. James Lee and Brent Ware, Open Source Web Development with LAMP-Using Linux, Apache, MySQL, PERL and PHP, Addison Wesley/Pearson Education Inc.2003.
2. Patrick Naughton, Java Hand Book, TMH,
3. STRUTS 2 –tutorialpoint

E-RESOURCES:

1. <https://www.coursera.org/learn/object-oriented-java>
2. <http://www.learnjavaonline.org/>

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Sub Code : 15IS502

Credits : 04

Hrs/Week: 4+0+0+0

Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. This course introduces the concepts of database concepts, database management systems and its importance in software development.
2. The course introduces how to create the database, updating it and how to query the database using structured query language.
3. This course gives the foundation to help data base design using definite structured terms.
4. The course describes the normalization process for achieving good designs by testing designs of undesirable types of functional dependencies.
5. It discusses the concepts of database transactions and the operations related to database processing.

UNIT – I

INTRODUCTION TO DATABASE SYSTEMS

Introduction, Characteristics of the Database approach, Actors on the scene, Advantages of using the DBMS approach, Data models, Schemes and Instances, Three Schema Architecture and Data Independence.

Entity-Relationship Model Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design for the COMPANY Database; ER Diagrams, Naming Conventions and Design Issues.

10 Hours

UNIT – II

RELATIONAL MODEL AND RELATIONAL ALGEBRA

Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations and Dealing with Constraint Violations; Unary Relational Operations: SELECT and PROJECT

Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION ;Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping.

12 Hours

UNIT - III**SQL**

The Relational Database Standard SQL Data Definition and Data Types, Specifying Basic Constraints in SQL, Schema Change Statements in SQL; Basic Queries in SQL; More Complex SQL Queries;

Insert, Delete and Update Statements in SQL; Additional Features of SQL; Views (Virtual Tables) in SQL; Database Programming: Issues and Techniques; Embedded SQL **12 Hours**

UNIT - IV**DATABASE DESIGN**

Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms.

Boyce-Codd Normal Form; Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form **12 Hours**

UNIT - V**TRANSACTION MANAGEMENT**

The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of Locking; Transaction Support in SQL ;Introduction to Crash Recovery; 2PL, Serializability and Recoverability; Introduction to Lock Management; Lock Conversions

Dealing with Deadlocks; Specialized Locking Techniques; Concurrency Control without Locking; Introduction to recovery: Recovery Concepts, Recovery Techniques Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging, The Aries Recovery Algorithm **6 Hours**

Course Outcomes:

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

Sl.No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C502.1	Know about the fundamentals of DBMS.	L2
C502.2	Apply the structure of Table and entities in DBMS.	L3
C502.3	Understand the ideas of queries and how to query DBMS.	L3
C502.4	Analyze the optimization Techniques on Tables.	L4
C502.5	Applying the usage of transactions and their lifetime.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C502.1	L													
C502.2		L		L		L		M		M		H		
C502.3			H		L		L		L		M			
C502.4		H												
C502.5			H	M	H	M		L					M	M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Fundamentals of Database Systems (Fourth Edition)-Elmasri and Navathe, Pearson Education, 2003
2. Database Management Systems (Third Edition)- Raghu Ramakrishnan and Johannes Gehrke McGraw-Hill, 2003

REFERENCE BOOK:

1. Database System Concepts- Silberschatz, Korth and Sudharshan, Fourth Edition, Mc-GrawHill, 2002

E-RESOURCES:

1. <http://nptel.ac.in/courses/106104135/>

MICROPROCESSOR AND INTERFACING

Sub Code : 15IS503

Hrs/Week : 4+1+0+0

Credits : 04

Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. Apply knowledge of mathematics and engineering in microprocessor based system design.
2. Design and conduct experiments related to microprocessor based system design and to analyze their outcomes.
3. Design, debug and test a small scale microprocessor system.
4. Identify, formulate and solve engineering problems in microprocessor based system design.
5. To know about the real time applications of Microprocessor.

UNIT – I

MICROCOMPUTER STRUCTURE

Overview of microcomputer structure and operation, microprocessor evolution and types. Microprocessor and 8086 Architecture: 8086 internal architecture, introduction to programming the 8086, 8086 Instruction Set: 8086 instruction description and assembler directives

12 Hours

UNIT – II

PROGRAMMING THE MICROPROCESSOR

8086 family assembly language programming – instruction templates, MOV instruction coding format and examples, writing programs for use with an assembler, assembly language program development tools

Implementing Standard Program Structures in 8086 Assembly Language: simple sequence programs, jumps, flags, and conditional jumps, if-then, if-then-else, and multiple if-then-else programs, while-do programs, repeat-until programs, instruction timing and delay loops

9 Hours

UNIT – III

STRINGS, PROCEDURES, AND MACROS

The 8086 string instructions, writing and using procedures, writing and using assembler macros

INTERRUPT SERVICE ROUTINE

8086 interrupts and interrupt responses, hardware interrupt applications, 8259A priority interrupt controller, software interrupt applications.

10 Hours

UNIT - IV

DIGITAL INTERFACING

Programmable Parallel Ports and handshake I/O, methods of data transfer, implementing handshake data transfer, 8255A internal block diagram and system connections, 8255A operation modes and initialization, construction and sending 8255A control words

Interfacing a microprocessor to keyboards, Interfacing to alphanumeric displays, Interfacing to stepper motor

ANALOG INTERFACING

D/A converter operation, interfacing and applications

9 Hours

UNIT - V

MICROPROCESSORS AND MICROCONTROLLERS

Introduction , RISC and CISC CPU architecture, Harward and Von-Neumann architecture

8051 Microcontroller Architecture: Introduction, Hardware, Input/output pins. Port and circuits, External memory, counters and timers, serial data input output, Interrupts

ADDRESSING MODES

Introduction, Addressing modes, External data moves/ Indexed addressing modes, PUSH and POP instructions, Data exchanges, Byte level and Bit level logical operations, Rotate and swap operations.

ARITHMETIC OPERATION Flags, Incrementing and decrementing, Addition, Subtraction, Multiplication and Division, Decimal Arithmetic.

JUMP AND CALL INSTRUCTIONS : The JUMP and CALL program ranges. **12 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C501.1	Comprehend the internal architecture of 8086 microprocessor, concept of addressing modes and instruction assembling.	L2
C501.2	Develop and Execute assembly level language program for 8086 and must be able to write assembly level program for any processor by studying its architecture.	L4
C501.3	Understand the working of interrupts in Microprocessor 8086.	L3
C501.4	Interface microprocessor to external I/O devices like logic controller, stepper motor, seven segment display, DAC, keypad etc.	L4
C501.5	To understand the differences between Microprocessor and Microcontroller and To explore the features of a Microcontroller.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C501.1	L	L			L		L	M		M		M	L	
C501.2	M		M	H	L	L			H		H			M
C501.3		M		M			M	H		H		H	M	H
C501.4				L	H	M	H		M		H			
C501.5	H	H	H			H		M				M	H	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Microprocessors – Douglas V. Hall, revised 2nd edition
2. Kenneth J. Ayala: “The 8051 Microcontroller Architecture, Programming & Applications” 2en, Penram International, 1996/Thomson learning 2005.

REFERENCE BOOKS:

1. Advanced Microprocessors – Barry B. Brey, 4th edition
2. Microprocessors- Liu and Gibson 2nd edition

E-RESOURCES:

1. <http://nptel.ac.in/courses/106108100/>

OBJECT ORIENTED MODELING & DESIGN

Sub Code : 15IS504 Credits : 04
Hrs/Week : 4+0+0+S Total Hours : 52

*** Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.**

Course Learning Objectives:

This Course will enable students to

1. Explain what is meant by object-oriented modelling. Apply object-oriented modelling techniques to the problem solving. Introduce various models that can be used to describe an object-oriented design
2. Show how the UML may be used to represent these models
3. Create class diagrams that model both the domain model and design model of a software system.
4. Create interaction diagrams that model the dynamic aspects of a software system.
5. Understand and analyse the basics of Design pattern

UNIT – I

INTRODUCTION, MODELING CONCEPTS, CLASS MODELLING

What is Object Orientation? What is OO development? OO themes; Evidence for usefulness of OO development; 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; A sample class model; Navigation of class models; Practical tips.

OBJECT ORIENTED METHODOLOGIES

Rumbaugh, Booch, Jacobson et al. Methodologies

10 Hours

UNIT – II

UNIFIED MODELING LANGUAGE

Static and Dynamic models, Modeling, The importance of modeling, Four principles of modeling, Object oriented Modeling, An overview of UML, A conceptual model of UML – Building blocks of UML, Common mechanisms in UML, Software Architecture, Software development life cycle.

ADVANCED CLASS MODELING, STATE MODELING

Advanced object and class concepts; Association ends; N-ary associations; Aggregation; Abstract classes; Multiple inheritance; Metadata; Reification; Constraints; Derived data; Packages; Practical tips. State Modeling: Events, States, Transitions and Conditions; State diagrams; State diagram behavior; Practical tips. **11 Hours**

UNIT – III

ADVANCED STATE MODELING, INTERACTION MODELLING

Advanced State Modeling: Nested state diagrams; Nested states; Signal generalization; Concurrency; A sample state model; Relation of class and state models; Practical tips. Interaction Modeling: Use case models; Sequence models; Activity models. Use case relationships; Procedural sequence models; Special constructs for activity models. **11 Hours**

UNIT – IV

PROCESS OVERVIEW, SYSTEM CONCEPTION, DOMAIN ANALYSIS

Process Overview: Development stages; Development life cycle. System Conception: Devising a system concept; Elaborating a concept; Preparing a problem statement. Domain Analysis: Overview of analysis; Domain class model; Domain state model; Domain interaction model; Iterating the analysis.

OBJECT ANALYSIS-CLASSIFICATION

Introduction, Classifications theory, Approaches for identifying classes, Noun phrase approach, Common class patterns approach, Use-case driven approach - identifying classes and their behaviors through Sequence/ collaboration modeling, Classes, Responsibilities and collaborators approach **10 Hours**

UNIT – V

APPLICATION ANALYSIS

Application Analysis: Application interaction model; Application class model; Application state model; Adding operations.

CLASS DESIGN, IMPLEMENTATION MODELING

Class Design: Overview of class design; Bridging the gap; Realizing use cases; Designing algorithms; Recursing downwards, Refactoring; Design optimization; Reification of behavior; Adjustment of inheritance; Organizing a class design; ATM example.

Implementation Modeling: Overview of implementation; Fine-tuning classes; Fine-tuning generalizations; Realizing associations; Testing. **10 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C504.1	Importance of object orientation, modeling, and design	L2
C504.2	Learn and apply UML for class and state modeling	L4
C504.3	Learn and apply UML for advanced state Modeling and interaction modeling	L3
C504.4	Apply domain analysis, system conception, application analysis to refine the model and design	L5
C504.5	Learn and apply advanced concepts like Design Patterns	L6

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C504.1	M										H	H		H
C504.2					M						H	H		H
C504.3	M				M						H			H
C504.4	M				M						H			H
C504.5	L				M						H			H

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Object-Oriented Modeling and Design with UML – Michael Blaha, James Rumbaugh, 2nd Edition, Pearson Education, 2005.
2. Object oriented systems development, Ali Bahrami, Tata McGraw-Hill Edition 2008.
3. The unified modeling language user guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Publisher: Addison Wesley, First Edition: (Chapters 1, 2)
4. Pattern-Oriented Software Architecture: A System of Patterns - Volume 1– Frank Buschmann, RegineMeunier, Hans Rohnert, Peter Sommerlad, Michael Stal, John Wiley and Sons, 2006.

REFERENCE BOOKS:

1. Rebecca Wirfs, Designing Object-oriented software, Prentice-Hall India, 1990.
2. Martin. J and Odell J, Object-oriented methods: A foundation, Prentice-Hall, 1995.

E-RESOURCE:

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

OPERATING SYSTEMS

Sub Code : 15IS505

Credits : 04

Hrs/Week : 4+0+0+0

Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. Summarize the general concepts of an operating system related to process and threads.
2. Demonstrate the process scheduling algorithms, detecting and avoiding deadlocks.
3. Summarize the process synchronization and memory management concepts of an operating system.
4. Discuss the file implementation in operating system
5. Explain secondary storage concepts of an operating system.

UNIT – I

INTRODUCTION AND SYSTEM STRUCTURES

Operating system definition; Operating System operations; Different types of operating system – Mainframe systems, Multi programmed systems, Time sharing systems, Desktop systems, Parallel systems, Distributed systems, Real time systems, Clustered systems, Handheld systems. Operating System Services; User - Operating System interface; System calls; Types of system calls; Operating System structure; Virtual machines

PROCESS MANAGEMENT

Process concept; Process scheduling; Operations on processes; Inter-process communication.

MULTI-THREADED PROGRAMMING

Overview; Multithreading models.

11 Hours

UNIT – II

PROCESS SCHEDULING

Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling

DEADLOCKS

System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock. **10 Hours**

UNIT – III

Process Synchronization: The Critical section problem; Semaphores; Classical problems of synchronization; Monitors.

Memory Management: Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. **11 Hours**

UNIT – IV

VIRTUAL MEMORY MANAGEMENT

Background; Demand paging; Page replacement; Allocation of frames, Thrashing

FILE SYSTEM: File concept; Access methods; Directory structure;

10 Hours

UNIT – V

IMPLEMENTING FILE SYSTEM

File system structure; File system implementation; Directory implementation; Allocation methods;

SECONDARY STORAGE STRUCTURES, PROTECTION

Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. **10 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C505.1	Discuss the operating system structure and management of process	L2
C505.2	Apply the process scheduling algorithms , deadlock prevention and avoidance concepts of operating system	L3
C505.3	Discuss synchronization of process and memory management concepts	L2
C505.4	Describe the file implementation in operating system	L2
C505.5	Explain the secondary storage structure and management	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C505.1	M										M			
C505.2	M	M			M						M	M		
C505.3	M	M			M						M	M		
C505.4	M										M	M		
C505.5	M	M			M						M	M		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating System Concepts, 8th Edition

REFERENCES BOOK:

1. William Stallings, "Operating System Internals and Design Principles", 6th ed, Pearson Education,.

E-RESOURCE:

1. <http://nptel.ac.in/courses/106106144/>

INFORMATION STORAGE MANAGEMENT

Sub Code : 15IS511

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Describe about different types of computer storage and its working.
2. Focus on the latest technologies which are used for data protection and storage.
3. Analyze requirement and suggest appropriate storage technology to store the data.
4. Use and compare different storage techniques and its pros and cons.
5. How computer storage techniques have evolved.

UNIT – I

STORAGE SYSTEM: INTRODUCTION TO INFORMATION STORAGE AND MANAGEMENT

Information Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle.

DATA PROTECTION

RAID: Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares. **7 Hours**

UNIT – II

INTELLIGENT STORAGE SYSTEM

Components of an Intelligent Storage System, Intelligent Storage Array,

STORAGE NETWORKING TECHNOLOGIES AND VIRTUALIZATION

Direct-Attached Storage and Introduction to SCSI: Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model.

7 Hours

UNIT – III

STORAGE AREA NETWORKS: FIBRE CHANNEL

Overview, The SAN and Its Evolution, Components of SAN, FC Connectivity, Fibre Channel Ports, Fibre Channel Architecture, Zoning, Fibre Channel Login Types, FC Topologies.

NETWORK-ATTACHED STORAGE

General-Purpose Servers vs. NAS Devices, Benefits of NAS, NAS File I/O, Components of NAS, NAS Implementations, NAS File-Sharing Protocols, NAS I/O Operations, Factors Affecting NAS Performance and Availability.

8 Hours

UNIT – IV

IP SAN

iSCSI, FCIP.

CONTENT-ADDRESSED STORAGE

Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples.

STORAGE VIRTUALIZATION

Forms of Virtualization, SNIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization 9 Hours

UNIT – V

BUSINESS CONTINUITY: INTRODUCTION TO BUSINESS CONTINUITY

Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions.

BACKUP AND RECOVERY

Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.

SECURING THE STORAGE INFRASTRUCTURE

Storage Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking.

8 Hours

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C511.1	Describe about computer storage technologies.	L2
C511.2	Focus on the latest technologies of storage.	L3
C511.3	Analyze requirements and suggest the appropriate storage technology.	L4
C511.4	Use and compare different storage techniques.	L5
C511.5	To learn the computer storage techniques evolution.	L5

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C511.1	L			M								L	M	
C511.2	L			M	H							L	M	
C511.3	L			M	H							L	M	
C511.4	L			M								L	M	
C511.5	L			M								L	M	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Information Storage and Management by EMC Education Services.

REFERENCE BOOKS:

1. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, 2nd Edition, Published by John Wiley & Sons, Inc.
2. Storage Networks Explained by Ulf Troppen, Rainer Erkens, Wolfgang Muller.
3. Storage Networks by Robert Spalding.

E-RESOURCE:

1. <http://nptel.ac.in/courses/106108058/>

DISTRIBUTED SYSTEMS AND OBJECTS

Sub Code : 15IS512

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Explain the concepts, principles and services of distributed operating system.
2. Assess the benefits of Message passing and Remote procedure calls.
3. Analyze basic distributed shared memory and architecture of DSM and structure of shared memory space.
4. Use and compare different resource management techniques and Study about process management and distributed File system.
5. Explain the basics of CORBA architecture.

UNIT – I

INTRODUCTION TO DISTRIBUTED SYSTEMS

Fundamentals:- What is Distributed Computing Systems?, Distributed Computing System Models, What is DOS?, Issues in designing a DOS.

REMOTE PROCEDURE CALLS

The RPC model, Transparency of RPC, Implementing RPC mechanism, Stub generation, RPC messages, Marshaling Arguments and results. Server management , Parameter passing semantics, call semantics, communication protocols RPC's. **9 Hours**

UNIT – II

SYNCHRONIZATION IN DISTRIBUTED SYSTEMS

Clock synchronization – logical clocks – physical clocks – vector clocks– clock synchronization algorithms, Mutual exclusion – A centralized algorithm – A distributed algorithm – a token ring algorithm, Comparison of the three algorithms, Election algorithms – the Bully algorithm – ring algorithm, Dead locks in distributed systems – distributed deadlock avoidance algorithms – distributed deadlock prevention algorithms, distributed deadlock detection algorithms: Centralized approach, Hierarchical approach and Fully distributed approach. **8 Hours**

UNIT – III

PROCESS & THREADS IN DISTRIBUTED SYSTEMS

Process Migration, Threads – Introduction – usage – design issues for thread packages – an example for thread package.

DISTRIBUTED FILE SYSTEMS

Desirable features of a good distributed file system, file models, file accessing models, file sharing semantics, File Replication. **7 Hours**

UNIT – IV

DISTRIBUTED SHARED MEMORY

General structure, Design and implementation issues of DSM, Granularity, structure of shared memory.

RESOURCE MANAGEMENT

Desirable features, task management approach, load balancing approach, load sharing approach. **8 Hours**

UNIT –V

DISTRIBUTED OBJECTS

Introduction to CORBA2: Overview, An IDL Tutorial, An IDL Guidelines, Standard Object Model, The CORBA Architecture, CORBA clients and Object Implementations, Language mappings. **7 Hours**

Course Outcomes

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C512.1	Explain the concepts, principles and services of distributed operating system, Assess the benefits of Remote procedure calls.	L2
C512.2	Analyze the synchronization issue in distributed system with different algorithms and study deadlocks in distributed system.	L4
C512.3	Asses the process migration and thread management in distributed system, study the distributed file system.	L2
C512.4	Analyze basic distributed shared memory and architecture of DSM and structure of shared memory space. Use and compare different resource management techniques.	L6
C512.5	Explain the basics of CORBA architecture.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C512.1		M			H			M	L		M	H		M
C512.2	M		H	L	M			L			M		M	

C512.3		M	H		H			L			L	M	L	
C512.4	L	M	H	M	H			M	L		M	L	L	M
C512.5	L	M	H		M			M			H	L		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Distributed Operating Systems, Concepts & Design, Pradeep K Sinha, PHI (Chapters 1,4,5,6 and 8.2,8.3, 9)
2. Thomas J.Mowbray and William A.Ruh:Inside CORBA, Addison-Wesley, 1997 (Chapter 1,2 & 3)

REFERENCE BOOKS:

- 1.Lampson (Ed), Distributed Systems, Singer – Verlay NY 1981.
- 2.MukeshSinghal, Niranjn G. Advanced Concepts in Operating Systems.

SOFTWARE ARCHITECTURE

Sub Code : 15IS513
Hrs/Week: 3+0+0+0

Credits : 03
Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. To learn the basics of Software Architecture.
2. To study the various Architectural Styles.
3. Discuss the Quality Aspects of Software Architecture
4. To Learn the various Architectural Patterns
5. To be able Describe & Use the design patterns and need for Documentation of Software Architecture

UNIT – I

INTRODUCTION

The Architecture Business Cycle: Where do architectures come from? Software processes and the architecture business cycle; What makes a “good” architecture? What software architecture is and what it is not; Other points of view; Architectural patterns, reference models and reference architectures; Importance of software architecture; Architectural structures and views.

8 Hours

UNIT – II

ARCHITECTURAL STYLES AND CASE STUDIES

Architectural styles; Pipes and filters; Data abstraction and object-oriented organization; Event-based, implicit invocation; Layered systems; Repositories; Interpreters; Process control; Other familiar architectures; Heterogeneous architectures. Case Studies: Keyword in Context; Instrumentation software; Mobile robotics; Cruise control; Three vignettes in mixed style. **8 Hours**

UNIT – III

QUALITY

Functionality and architecture; Architecture and quality attributes; System quality attributes; Quality attribute scenarios in practice; Other system quality attributes; Business qualities; Architectural qualities. Achieving Quality: Introducing tactics; Availability tactics; Modifiability tactics; Performance tactics; Security tactics; Testability tactics; Usability tactics; Relationship of tactics to architectural patterns; Architectural patterns and styles. **8 Hours**

UNIT – IV

ARCHITECTURAL PATTERNS – 1

Introduction; from mud to structure: Layers, Pipes and Filters, Blackboard.

ARCHITECTURAL PATTERNS – 2

Distributed Systems: Broker; Interactive Systems: MVC, Presentation-Abstraction-Control.

ARCHITECTURAL PATTERNS – 3

Adaptable Systems: Microkernel; Reflection. **7 Hours**

UNIT – V

SOME DESIGN PATTERNS

Structural decomposition: Whole – Part; Organization of work: Master – Slave; Access Control: Proxy.

DESIGNING AND DOCUMENTING SOFTWARE ARCHITECTURE

Architecture in the life cycle; Designing the architecture; Forming the team structure; Creating a skeletal system. Uses of architectural documentation; Views; Choosing the relevant views; Documenting a view; Documentation across views. **8 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C513.1	Learn the basics of Software Architecture	L2
C513.2	To know about the various Architectural Styles	L2
C513.3	Explain the Quality Aspects of Software Architecture	L2
C513.4	Learn the various Architectural Patterns	L2
C513.5	Describe the design patterns and Documentation of Software Architecture	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C513.1	L	L						L			L			H
C513.2		M		H				L			L			L
C513.3	M	M		H	L			M		M	M			H
C513.4	M	M		H	M			H		M				H
C513.5	M	L		L	H	L		H		M	H			H

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

OPERATIONS RESEARCH

Sub Code : 15IS514

Credits : 03

Hrs/Week: 3+0+0+0

Total Hours : 39

Prerequisite: NIL

Course Learning Objectives:

1. To know the basics of OR, modelling and applications of OR.
2. Definition of linear programming model, formulation of linear programming model and application of linear programming model using different techniques.
3. To formulate the problem and solve the problem by using different techniques.
4. Describe mathematical formulation of an Assignment Problem and solve various scenarios by using different methods.
5. Understand and identify the project management techniques

UNIT – I

Introduction: Introduction to OR, nature and meaning, applications, modeling in OR, phases of OR study. **Linear Programming:** Introduction to Linear Programming through an

example, graphical method, formulation of LP model from practical problems, assumptions and properties of linear programming, simplex method

7 Hours

UNIT - II

Revised simplex method, Big M method, 2 phase method, Duality theory, Primal and dual relationship, Dual simplex method

8 Hours

UNIT – III

Transportation Problems: Special types of main programming, transportation problems, methods to find initial feasible solution and modification to obtain optimal solution (Degeneracy in transportation problems, unbalanced transportation problems)

8 Hours

UNIT – IV

Assignment problem Mathematical formulation of an assignment problem, unbalanced assignment problem, TSP, Hungarian method

8 Hours

UNIT – V

CPM, PERT : Representation of a project by a network, activities and events, starting times, finishing times, floats, slacks, CPM, Idea of crashing probabilistic times and PERT analysis

8 Hours

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C514.1	Comprehend OR basics, its modeling and applications	L2
C514.2	Analyze Linear Programming model	L4
C514.3	Apply Transportation Problem	L3
C514.4	Synthesize mathematical formulation of an Assignment Problem and solve various scenarios by using different methods.	L5
C514.5	Evaluate Project management techniques	L6

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C514.1	H	L				L								
C514.2	H	L									L			
C514.3	M													
C514.4	H				M									
C514.5	L	L			M	L					L	M		L

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Operations Research, S D Sharma, 15th edition
2. Operations Research – An introduction, Hamdy A Taha, PHI, 7 th edition

REFERENCE BOOKS:

1. Operation research, Kantiswaroop, Manmohan and Gupta
2. Introduction to operation research, a computer oriented algorithmic approach, Gillett B G, McGraw Hill, 1976

ADVANCED UNIX PROGRAMMING

Sub Code : 15IS515

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

At the end of the course student should be able to:

1. **List** the file APIs and **Write** and execute file handling programs.
2. **Explain** the concept of processes and its environment.
3. **Implement** programs to handle processes in Linux platform.
4. **Apply** inter process communication concept for data exchange between programs.
5. **Demonstrate** the concepts of signals and timers.

UNIT - I

The POSIX standards. File types. General File APIs, File handling programs.

7 Hours

UNIT - II

Makefile – introduction, creation and execution of make file.

THE PROCESS: Introduction, Mechanism for creating process. The UNIX Kernel support for process.

THE ENVIRONMENT OF A UNIX PROCESS: Introduction, main function, Process Termination, Command line arguments, Environment List, Memory layout Of a C program, Memory allocation, Environment variables, functions. **8 Hours**

UNIT - III

Setjmp and longjmp functions, getrlimit, setrlimit

PROCESS CONTROL: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, Wait3, wait4 functions, Race conditions, exec functions, Interpreter files, System Function.

SIGNALS: The UNIX Kernel Support for signals, Signal, **8 Hours**

UNIT - IV

Signal mask, Sigaction, The SIGCHLD Signal and waitpid functions, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX .1b Timers.

DAEMON PROCESSES: Introduction, Daemon Characteristics, Coding Rules.

8 Hours

UNIT - V

INTERPROCESS COMMUNICATIONS: Overview of IPC Methods, Pipes, popen, Pclose functions, FIFOs, Message Queues, Semaphores, Shared Memory.

SOCKETS: Introduction, functions, Client/Server Message Handling Example.

8 Hours

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C515.1	Define and discuss the POSIX standard and different types of files	L2
C515.2	Explain and apply various APIs for file handling	L4
C515.3	Illustrate the representation of a process and its environment and apply various process APIs for handling the processes	L4

C515.4	Explain the concept of signal and its handling methods. Use the signal handling APIs in programs.	L4
C515.5	Describe and implement the concepts of demon process and inter process communication.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C515.1		M										H		
C515.2		H			M						L	H		
C515.3		H			M							H		
C515.4		H			M						L	H		
C515.5		H			M						L	H		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Terrence Chan: UNIX System Programming Using C++, Prentice Hall India, 1999.
2. W.Richard Stevens: Advanced Programming in the UNIX Environment, Addison – Wesley/PHI
3. Sumitaba Das, UNIX-Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006. (Chapter 9).

REFERENCE BOOKS:

1. Maurice.J.Bach:The Design of the Unix Operating System, Pearson Education / Prentice Hall of India.
2. Uresh Vahalia: UNIX Internals, Pearson Education, ASIA, 2001.
3. R. Stones, N. Matthew, Beginning Linux Programming, Wrox publication.

PROGRAM VERIFICATION

Sub Code : 15IS516
Hrs/Week : 3+0+0+0

Credits : 03
Total Hours : 39

Course Learning Objectives :

After studying this subject, the student should be able to:

1. **Apply** the mathematical and logical concepts for programming.
2. **Explain** various Programming paradigms.
3. **Identify** the specifications of a sequential program.
4. **Write** simple program using Dafny.
5. **Perform** program verification using Dafny.

UNIT – I

BACKGROUND AND INTRODUCTION:

Sequential, concurrent, and reactive systems, Programming languages and paradigms, Type systems of programming languages, Assigning meaning to programs, operational semantics denotational semantics, Partial and total correctness, Hoare triples, Logic for Program Design : Propositional Calculus, Predicate Calculus.

6 Hours

UNIT – II

MATHEMATICAL AND LOGICAL FOUNDATIONS:

Mathematics for Specification: Sets, Relations, Functions and Sequences. Pre conditions, Post conditions Loop invariants.

7 Hours

UNIT – III

SPECIFICATION OF PROGRAMS:

Variant functions, the state model of programs, Partial and total correctness, Weakest precondition, Guarded commands, Why functional programming matters, Algebraic data types, Higher order functions.

8 Hours

UNIT – IV

PROGRAM VERIFICATION USING DAFNY PART-I

Methods and functions, pre and post conditions, Assertions, loop invariants, termination, quantifiers, framing, Binary search—an example.

9 Hours

UNIT – V

PROGRAM VERIFICATION USING DAFNY PART-II:

Predicates, sets, sequences, collections, Lemmas, modules: Declaring a new module, Import and export new module, opening modules.

9 Hours

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C516.1	Identify various paradigms related to programming.	L2
C516.2	Build logical and mathematical specifications for program	L4
C516.3	Testing for specifications of the program.	L4
C516.4	Design and write simple Dafny programs and learn basic syntax	L4
C516.5	Apply advanced Dafny tool for program verification	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C516.1	L	L									H	H		
C516.2	H	L			M							L		
C516.3	L										H	H		
C516.4		M			L						H	H		
C516.5	L	L			L						H	M		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS, REFERENCES, AND ONLINE RESOURCES:

1. Geoff Dromey, Program Derivation. International Computer Science Series. Addison-Wesley. 1989.
2. Michael Huth and Mark Ryan. Logic in Computer Science - Modeling and Reasoning about Systems. Cambridge University Press. 2004.
3. Dafny: a language and program verifier for functional correctness. <http://research.microsoft.com/en-us/projects/dafny/>, Microsoft Research

MICROPROCESSORS AND INTERFACING LAB

Sub Code : 15IS506

Credits : 01

Hrs/Week : 0+0+2+0

Total Hours : 26

Course Learning Objectives:

This Course will enable students to

1. Apply knowledge of mathematics and engineering in microprocessor based system design.
2. Design and conduct experiments related to microprocessor based system design and to analyze their outcomes.
3. Design, debug and test a small scale microprocessor system.
4. Identify, formulate and solve engineering problems in microprocessor based system design.
5. To know about the real time applications of Microprocessor.

Course Content:

1. a) Search a key element in a list of 'n' 16-bit numbers using the Binary search algorithm.
b) Read the status of eight input bits from the Logic Controller Interface and display 'FF' if it is even parity bits otherwise display 00. Also display number of 1's in the input data.
2. a) Write ALP macros:
 - i. To read a character from the keyboard in the module (1) (in a different file)
 - ii. To display a character in module(2) (from different file)
 - iii. Use the above two modules to read a string of characters from the keyboard terminated by the carriage return and print the string on the display in the next line.b) Perform the following functions using the Logic Controller Interface.
 - i. BCD up-down Counter
 - ii. Ring Counter
3. a) Sort a given set of 'n' numbers in ascending and descending orders using the Bubble Sort algorithm.
b) Read the status of two 8-bit inputs (X & Y) from the Logic Controller Interface and display X*Y.
4. a) Read an alphanumeric character and display its equivalent ASCII code at the center of the screen.
b) Display messages FIRE and HELP alternately with flickering effects on a 7-segment display interface for a suitable period of time.
5. a) Reverse a given string and check whether it is a palindrome or not.

b) Assume any suitable message of 12 characters length and display it in the rolling fashion on a 7-segment display interface for a suitable period of time. Ensure a flashing rate that makes it easy to read both the messages.

6. a) Read two strings, store them in locations STR1 and STR2. Check whether they are equal or not and display appropriated messages. Also display the length of the stored strings.

b) Convert a 16-bit binary value (assumed to be an unsigned Integer) to BCD and display it from left to right and right to left for specified number of times on a 7-segment display interface.

7. a) Read your name from the keyboard and display it at a specified location on the screen in front of the message What is your name? You must clear the entire screen before display.

b) Drive a Stepper Motor interface to rotate the motor in clockwise direction by $N=150$ steps. Introduce suitable delay between successive steps.

8. a) Compute the factorial of a positive integer 'n' using recursive procedure.

b) Drive a stepper motor interface to rotate the motor in anticlockwise direction by $N=100$ steps. Introduce suitable delay between successive steps.

9. a) Compute nCr using recursive procedure. Assume that 'n' and 'r' are non-negative integers.

b) Drive a stepper motor interface to rotate the motor by $N=100$ steps left direction and $N=150$ steps right direction. Introduce suitable delay between successive steps.

10. a) Find out whether a given sub-string is present or not in a main string of characters.

b) Scan a 8×3 keypad for key closure and to store the code of the key pressed in a memory location or display on screen. Also display row and column numbers of the key pressed.

11. a) Generate the first 'n' Fibonacci numbers.

b) Scan a 8×3 keypad for key closure and simulate ADD and SUBTRACT operations as in a calculator.

12. a) Read the current time from the system and display it in the standard format on the screen.

b) Generate the Sine Wave using DAC interface (The output of the DAC is to be displayed on the CRO).

13. a) Program to simulate a Decimal Up-counter to display 00-99.

b) Generate a Half rectified Sine wave form using the DAC interface. (The output of the DAC is to be displayed on the CRO).

14. a) Read a pair of input co-ordinates in BCD and move the cursor to the specified location on the screen.

b) Generate a Fully Rectified Sine waveform using the DAC interface. (The output of the DAC is to be displayed on the CRO).

15. a) Program to create a file (input file) and to delete an existing file.

b) Drive an elevator interface in the following way:

i. Initially the elevator should be in the ground floor, with all requests in OFF state.

ii. When a request is made from a floor, the elevator should move to that floor, wait there for a couple of seconds, and then come down to ground floor and stop. If some requests occur during going up or coming down they should be ignored.

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C506.1	To know about the assembly language instructions used in microprocessor 8086	L4
C506.2	Understand the assembly language looping constructs of microprocessor programming.	L4
C506.3	To understand the usage of macros, procedures and string instructions	L4
C506.4	To implement programs which uses interrupts	L3
C506.5	To interface(analog and digital) external peripheral with microprocessor 8086.	L5

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C506.1	M		L	M			M		H			M		L
C506.2		M			M	L		L		H			L	M
C506.3	L	H	M	L			L		M			L		
C506.4		L		M	H	M		H		L			H	
C506.5	H		L	H			M		L		L	H		H

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Microprocessors – Douglas V. Hall, revised 2nd edition

REFERENCE BOOKS:

1. Advanced Microprocessors – Barry B. Brey, 4th edition
2. Microprocessors- Liu and Gibson 2nd edition

JAVA PROGRAMMING LAB

Sub Code : 15IS507

Credits : 02

Hrs/Week: 0+0+4+0

Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Use fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Implement the important topics and principles in java in software development.
4. Design java programs to solve specified problems.
5. Create, debug and run programs using the Java SDK, JavaScript, PHP environment.

Course Content:

1. Write a java program for generating 2 threads, one for printing even numbers and the other for printing odd numbers.
2. Create a base class and derived class having data and overridden function members. Demonstrate the dynamic method dispatch.
3. Create a class customer for a bank. Class account should inherit the properties of customer and having type of account and interest rate as members. Use constructors in base and derived class to initialize the data members. An account may be created with zero initial deposit. (Use default arguments, super keyword). Implement the methods Deposit (), Withdraw (), and Get_Balance() to operate on account.
4. Write a Java class Worker and derive classes DailyWorker and SalariedWorker from it. Every worker has a name and a salary rate. Write a method ComPay (int hours) to compute the week pay of every worker. A Daily Worker is paid on the basis of the number of days s/he works. The Salaried Worker gets paid the wage for 40 hours a week no matter what the actual hours are.
Test this program to calculate the pay of workers. Create a array of n workers of each category, read the inputs from the user.

5. Write a program in Java to display the names and roll numbers of students. Initialize respective array variables for 10 students. Handle `ArrayIndexOutOfBoundsException`, so that any such problem doesn't cause illegal termination of program. Read a character from user and display the student names starting with given character.
6. Write a program in Java to display the names and roll numbers of students in sorted order. Place the read and display functions in a package. Handle `ArrayIndexOutOfBoundsException`, so that any such problem doesn't cause illegal termination of program.
7. Define a `Person` class with three data members' age, name and gender. Derive a class called `Employee` from `Person` that adds a data member code to store employee code. Derive another class called `Specialist` from `Employee`. Add a method to each derived class to display the information about what it is. Write a program to generate an array of three ordinary employees and another array of three specialists and display the information about them. Also display the information of the specialists by calling the method inherited from employee class.
8. Consider the string "NMAMIT" [Nitte] (Autonomous Institute) {Karkala}. Write synchronized thread program to print this string. Demonstrate the importance of synchronization.
9. Develop a set of methods, which work with an integer array. The methods to be implemented are:-
 - (i) min (which finds the minimum element in the array)
 - (ii) max (which finds the maximum element in the array – variable length argument)
 - (iii) scale (method to multiply the array – Use default arguments)Place this in a package called `p1`. Let this package be present in a folder called "myPackages", which is a folder in your present working directory. Write a main method to use the methods of package `p1`.
10. Write a program to handle following exceptions: 1. Arithmetic 2. Array index out of Bound 3. Null pointer 4. Number Format 5. Illegal Access. Include one nested exception case.
11. Write a java program to create two threads that search a given key in a set of elements in an array. The main thread should divide the array into two parts and assign each one to the threads. The two threads should independently search the element in the assigned array and report success or failure to the main thread. Once main thread gets success message from any of the thread it should terminate the program. If both the threads report unsuccessful then the main thread should display "Unsuccessful search".
12. Write a Java Swing program to read two numbers from Textfields and calculate the sum if the user clicks on ADD button else find the difference if the user clicks on SUB button.
13. Write a Java program to perform the following operations in for a student database.
 - i. Insert a new record
 - ii. Display all records

- iii. Display a specific record
14. Write a JDBC program to perform the following operations in MySQL database system using SQL Statements for employee database..
 - i. Insert a new record
 - ii Delete a specific record
 - iii. Update record
 - iv. Display all records
 - v. Display specific record
15. Write a JDBC program to perform the following operations in MySQL database system using Java Methods for booking rooms in a hotel .
 - i. Insert a new record
 - ii. Delete a specific record
 - iii. Update record
 - iv. Display all records
 - v. Display specific record
16. Write a script that checks the validity of your USN number. If the input is valid, insert the USN and name to a database. Else display the message to re enter.
17. Write a Java script to check the strength of password. A strong password should have min 8 character length and having alphabets, digits and some special characters.
18. Write an Java script that inputs the three floating point numbers from the user and display the sum, avg, largest of three these numbers.
19. Program to design read.html to read the student Name address and RegNo. Store the details in to database. Search for the RegNo in the MySQL table and display the searched record else display appropriate message in search.php.
20. Design read.html to read the student details – RegNo, Name, Sem and Marks. Store the entered details in save.php and display all the records in the table. Marks <35, are to be shown in red color.
21. Design read.html to read the Employee details –No, Name, Gender. Store the entered details in save.php and display all the records in the table. Count the number of male and female employees.
22. Design read.html to read the Employee details –No, Name, Gender. Store the entered details in save.php and display all the records in the table. Male employee details to be shown in green color and female employee in blue color.

DBMS PROGRAMS

1. Consider the Insurance database given below. The primary keys underlined and the data types are specified.

PERSON (driver-id #: String, name: string, address: string)
CAR (Regno: string, model: string, year: int)
ACCIDENT (report-number:int, date: datetime, location: string)
OWNS (driver-id #:string, Regno:string)
PARTICIPATED (driver-id: string, Regno: string, report-number:int, damage amount:int)

- (i) Create the above tables by properly specifying the primary keys and the foreign keys.
- (ii) Enter at least five tuples for each relation.
- (iii) Demonstrate how you
 - a. Update the damage amount for the car with a specific Regno in the accident with report number 18 to 30000.
 - b. Add a new accident to the database.
- (iv) Find the total number of people who owned cars that were involved in accidents in 2009.

2. The following tables are maintained by a book dealer.

AUTHOR (author-id:int, name:string, city:string, country:string)

PUBLISHER (publisher-id:int, name:string, city:string, country:string)

CATALOG (book-id:int, title:string, author-id:int, publisher-id:int, category-id:int, year:int, price:int)

CATEGORY (category-id:int, description: string)

ORDER-DETAILS (order-no:int, book-id:int, quantity:int)

- (i) Create the above tables by properly specifying the primary keys and the foreign keys.
- (ii) Enter at least five tuples for each relation.
- (iii) Give the details of the authors who have 2 or more books in the catalog.

Demonstrate how you increase the price of books published by a specific publisher by 10%.

3. Consider the following relations for a database to solve the queries:

Sailors(sid: integer, sname: string, rating: integer, age: real)

Boats(bid: integer, bname: string, color: string)

Reserves (sid: integer, bid: integer, day: date)

- Create the above tables by properly specifying the primary keys and the foreign keys
- Enter at least five tuples for each relation
- Find all sids of sailors who have a rating of 10 or reserved boat 104.
- Find the names of sailors who have reserved boat 103

Course Outcomes:

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

Sl.no	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C507.1	Design a object oriented logic for a given problem scenario	L2
C507.2	Write standalone programs using Java.	L3
C507.3	Explain various programming constructs that are used in Java.	L4

C507.4	Design Java solutions with database connectivity.	L4
C507.5	Create web based applications using PHP and JavaScripts.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C507.1	L	M	L	M			M					M		L
C507.2		L				L						L		M
C507.3	L											L		
C507.4		M				L						L		
C507.5			L	H			L				L	M		M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. The Complete Reference Java by Herbert Schildt, TMH.
2. James Lee and Brent Ware, Open Source Web Development with LAMP-Using Linux, Apache, MySQL, PERL and PHP, Addison Wesley/Pearson Education Inc.2003.

REFERENCE BOOKS:

1. Patrick Naughton, Java Hand Book, TMH,
2. STRUTS 2 – tutorialpoint
3. AngularJS By Brad Green, ShyamSeshadri O'Reilly Media Publication
4. jQuery Pocket Reference By David Flanagan □ O'Reilly Media Publication

COMPUTER GRAPHICS AND VISUALIZATION

Sub Code : 15IS601

Credits : 04

Hrs/Week : 4+1+0+0

Total Hours : 52

Course Learning Objectives:**This Course will enable students to**

1. Know to design a Graphical System
2. Know to use device driven interfaces and its custom related tools.
3. Know and apply the use of affine transformations in openGL.
2. Construct and view about viewing in Graphics
3. Learn and develop the use of Algorithms used in the GL engine

UNIT – I

INTRODUCTION

Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging Systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable Pipelines; Performance Characteristics Graphics Programming: The Sierpinski gasket; Programming Two Dimensional Applications
The OpenGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three dimensional gasket; Plotting Implicit Functions

10 Hours

UNIT – II

INPUT AND INTERACTION

Interaction; Input devices; Clients and Servers; Display Lists; Display Lists and Modeling; Programming Event Driven Input; Menus; Picking; A simple CAD program; Building Interactive Models; Animating Interactive Programs; Design of Interactive Programs; Logic Operations Geometric Objects and Transformations - I: Scalars, Points, and Vectors; Three - dimensional Primitives; Coordinate Systems and Frames; Modeling a Colored Cube; Affine Transformations; Rotation, Translation and Scaling;

12 Hours

UNIT – III

GEOMETRIC OBJECTS AND TRANSFORMATIONS - II

Geometric Objects and ransformations; Transformation in Homogeneous Coordinates; Concatenation of Transformations; OpenGL Transformation Matrices; Interfaces to three-dimensional applications; Quaternion's.

12 Hours

UNIT – IV

VIEWING

Classical and computer viewing; Viewing with a Computer; Positioning of the camera; Simple projections; Projections in OpenGL; Hidden surface removal; Interactive Mesh Displays; Parallel - projection matrices; Perspective - projection matrices; Projections and Shadows.

LIGHTING AND SHADING

Light and Matter; Light Sources; The Phong Lighting model; Computation of vectors; 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.

10 Hours

UNIT – V

IMPLEMENTATION

Basic Implementation Strategies; Four major tasks; Clipping; Line - segment clipping; Polygon clipping; Clipping of other primitives; Clipping in three dimensions; Rasterization;

Bresenham's algorithm; Polygon Rasterization; Hidden - surface removal; Antialiasing; Display considerations.

8 Hours

Course Outcomes:

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

Sl. No.	Course Outcomes (CO)	Bloom's Taxonomy Level (BTL)
C601.1	Know about the role of Computer graphics and its library in Daily Life	L2
C601.2	Analyse about the input and transformation criteria in OpenGL	L4
C601.3	Apply the knowledge about additional level homogenous coordinates in OpenGL	L5
C601.4	Understand about Viewing lighting and shading models in CG	L4
C601.5	Analyse & understand clipping and rasterization in OpenGL	L3

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PSO 2
C601.1	L													
C601.2		L		L	H	H		M		M		H		
C601.3			H		M		L		L		M			
C601.4		H			M			L						
C601.5			H	M	H	M		L					M	M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Edward Angel: Interactive Computer Graphics A Top Down Approach with OpenGL, 5th Edition, 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, 3rd Edition, PHI, 2009.
3. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Computer Graphics, Pearson Education 1997

E-RESOURCES:

1. <http://nptel.ac.in/courses/106106090/>
2. <http://nptel.ac.in/courses/106102065/>

COMPUTER NETWORKS

Sub Code : 15IS602

Credits : 04

Hrs/Week : 4+0+0+0

Total Hours : 52

Course Learning Objectives:

This Course will enable students to

1. Compare different frame formats.
2. Comprehend different network layer functionalities.
3. Design and analyze different Routing and congestion control algorithms.
4. Analyze the working of transport layer.
5. Understand Internet control protocols and Internet transport protocols in computer network.

UNIT – I

USES OF COMPUTER NETWORKS

Business Applications, Home Application, Mobile Users, Social Issues; Local Area Networks : LAN Protocols : LAN Structure , The Medium Access Control Sub layer, The Logical Link Control Sub layer; Ethernet and IEEE 802.3 LAN Standard : Ethernet Protocol, Frame structure, Physical Layers, Fast Ethernet, Gigabit Ethernet. Wireless LANs and IEEE 802.11 Standard : Ad hoc and Infrastructure Networks, Frame structure and addressing , Medium Access Control; LAN Bridges and Ethernet Switches: Transparent Bridges, Mixed-Media Bridges, Virtual LANs.

11 Hours

UNIT – II

NETWORK LAYER

Network layer design issues: Store and Forward packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service, Comparison of Virtual Circuit and Datagram Subnets.

ROUTING

Routing algorithms: The Optimality Principal , Shortest Path Routing, Flooding, Distance Vector Routing, Link state Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts

11 Hours

UNIT – III**CONGESTION CONTROL**

Congestion Control Algorithms: General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets, Load Shedding, Jitter Control; Quality Of Service: Requirements, Techniques for Achieving Good Quality of Service, Integrated Services, Differentiated Services, Label Switching and MPLS, Internetworking, Tunneling, IP Addressing , IPV4, IP V6.

11 Hours**UNIT – IV****INTERNET CONTROL PROTOCOLS: ARP, RARP, ICMP, BOOTP, DHCP**

OSPF – The interior gateway routing protocol

BGP – The exterior gateway routing protocol

THE TRANSPORT LAYER

The Transport Service: Services Provided to the Upper Layers, Transport Service Primitives, Berkley Sockets; Elements of Transport Protocols: Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing, Crash Recovery

9 Hours**UNIT – V****THE INTERNET TRANSPORT PROTOCOLS**

Introduction to UDP, Remote Procedure Call, The Real-Time Transport Protocol; The Internet Transport Protocols(TCP): Introduction to TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, Modeling TCP Connection Management, TCP Transmission Policy, TCP Congestion Control.

10 Hours**Course Outcomes:**

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

Sl. No.	Course Outcomes (CO)	Bloom's Taxonomy Level (BTL)
C602.1	Explain the Frame formats and addressing schemes of different protocols of Data Link Layer.	L2
C602.2	Apply the basic algorithms to route the packets using Network Layer algorithms.	L4
C602.3	Analyze the concepts of IP Addressing and Congestion Control.	L6
C602.4	Discuss the working of Transport Layer Protocols.	L4
C602.5	Analyze the working of RPC, RTCP, RTP and other Transport Layer Protocols.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C602.1	M						L	L					H	
C602.2	L	M		M	H	L		M	M		L		H	
C602.3	H	H		M	H			H			L		H	
C602.4		L	L	M				M				L	H	
C602.5				L				L					H	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Andrew S. Tanenbaum , Computer Networks, Fourth edition, PHI / Pearson Publication, 2002.
2. Alberto Leon – Garcia and IndraWidjaja , Communication Networks – Fundamental Concepts and Key architectures, Tata McGraw-Hill 2nd edition,2004

REFERENCE BOOKS:

1. Behrouz A. Forouzan , Data Communications and Networking, Tata McGraw-Hill 4th Edition.
2. William Stalling , Data and Computer Communication, Fifth Edition, Prentice Hall, India
3. James F. Kurose and Keith W. Ross, Computer Networking- A Top-Down Approach Featuring the Internet, 5th Edition, Pearson.
4. Larry L. Peterson and Bruce S. Davie, Computer Networks, 4th Edition, Elsevier – Morgan Kaufmann Publishers.

E-RESOURCE:

1. <http://nptel.ac.in/courses/106105081/>

ARTIFICIAL INTELLIGENCE

Sub Code : 15IS603

Credits : 04

Hrs/Week : 4+0+0+0

Total Hours: 52

Prerequisites:

This course is fast-paced and covers a lot of ground, so it is important that you have a solid foundation on both the theoretical and empirical fronts. You should know the following concepts

1. Differential and Integral calculus
2. Partial integrals and Derivatives
3. Interpolation and Hypothesis Estimation
4. Probability

Course Learning Objectives:

1. This course introduces the concepts of Artificial Intelligence and Machine Learning
2. The course introduces how to evaluate and learn hypothesis based on models
3. This course gives an overview of Learning and how learning Algorithms are used
4. The course describes the techniques of Computational learning and its uses
5. It also teaches how reinforced learning can be used along with real time examples.

UNIT – I

Introduction to Artificial Intelligence Introduction, Applications of AI, Natural Language processing, Semantic Analysis **10 Hours**

UNIT –II

Expert Systems: Knowledge base and Inference Engines, case Studies: Game Playing, AI Languages- Introduction **10 Hours**

UNIT – III

Machine Learning: Discriminative Vs generative, Concept learning and general to Specific Ordering, Decision tree learning, Artificial neural Networks (only Overview) **10 Hours**

UNIT – IV

Evaluating Hypothesis, Bayesian Learning, Computational Learning theory, Instance based Learning, Learning Set of rules **12 Hours**

UNIT – V

Analytical learning, Combine inductive and Analytical learning, Reinforcement Learning, Machine Learning applications **10 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C603.1	Know about AI and its Applications	L2
C603.2	Asses the need of expert Systems in AI	L3
C603.3	Know about the use of ML and ANN's	L2
C604.4	Analyse and Design Hypothesis in AI	L3
C605.5	Combine techniques for designing Analytical solutions	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C603.1	L					H		L		L		H		
C603.2		L		H			M		M		M		M	
C603.3		M		H		H		H		H		H		M
C604.4		H				M		L		H		H		M
C605.5				H		H		M			M		M	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. Eliane rich, Artificial Intelligence, mc graw hill International Student edition, 1984
2. Machine Learning, tom Mitchell, Mcgraw Hill, 1997

REFERENCE BOOK:

1. Artificial Intelligence by Patterson

E-RESOURCE:

1. nptel.ac.in/courses/106105077/

DATA MINING

Sub Code : 15IS604

Credits : 04

Hrs/Week: 4+0+0+S*

Total Hours : 52

*** Self Study to be exercised under the supervision of course instructor and to be restricted to not more than 10% of the total teaching hours.**

Course Learning Objectives:

This Course will enable students to

1. Summarize the concepts of Data Mining
2. Identify frequent patterns & learn association rules
3. Apply various classification methods & classify the given data
4. Apply clustering methods on the given data.
5. Summarize the applications of Data mining

UNIT - I

INTRODUCTION

Introduction to Data Mining – Kind of Data – Functionalities – Interesting Patterns – Task Primitives – Issues In Data Mining - Data Preprocessing: Why Preprocessing **12 Hours**

UNIT - II

ASSOCIATION RULES

Mining Frequent Patterns: Associations And Correlations - Basic Concept
Frequent Item Set Mining Methods – Mining Various Kinds Of Association Rules **10 Hours**

UNIT – III

CLASSIFICATION AND PREDICTION

Issues Regarding Classification and Prediction – Decision Tree Induction
Classification – Bayesian, Rule Based Classification – Support Vector Machine **10 Hours**

UNIT – IV

CLUSTER ANALYSIS

What Is Cluster Analysis? Types Of Data In Cluster Analysis – A Categorization Of
Major Clustering Methods – Hierarchical Methods **10 Hours**

UNIT – V

APPLICATIONS AND TRENDS IN DATA MINING

Applications and Trends in Data Mining: Data Mining Applications – Web Mining, Spatial Mining, Temporal Mining. Social Impacts of Data Mining. **10 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C604.1	Explain the functionalities, interesting patterns and kind of data for data mining & the need of pre-processing of data.	L2
C604.2	To identify frequent patterns and develop the association's rules	L3
C604.3	To classify data & predict possible outcomes	L3
C604.4	Apply clustering methods on the given data.	L3
C604.5	Explain data mining applications and its social impact.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C604.1	L						H		M					L
C604.2	H	M	M		L			M			M	H		L
C604.3	L	H	L		M			M		M	L			
C604.4	L	M						L			L			
C604.5				L				H		M	L	M		M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:.

1. Jiawei Han and Micheline Kamber, "Data Mining – Concepts and Techniques", Third Edition, Morgan Kaufmann Publishers.

REFERENCE BOOKS:

1. M. H. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education. 2001.
2. D. Hand, H. Mannila and P. Smyth, "Principles of Data Mining", Prentice-Hall. 2001.
3. I. H. Witten and E. Frank, "Data Mining: Practical Machine Learning Tools and Techniques", Morgan Kaufmann. 2000.

C#.NET TECHNOLOGIES

Sub Code : 15IS611

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours: 39

Course Learning Objectives:

This Course will enable students to

1. Building new data types.
2. Handling events.
3. Programming the user interface.
4. Accessing a database.
5. Performing operations asynchronously.

At the end of the course, students should leave the class with a solid knowledge of C# and how to use it to develop .NET Framework 4.5 applications.

This course uses Visual Studio 2013, running on Windows 8.1

UNIT – I

THE PHILOSOPHY OF .NET

The .NET Solution, The Building Block of the .NET Platform (CLR, CTS, and CLS), Additional .NET-Aware Programming Languages, An Overview of .NET Binaries (aka Assemblies), The Role of the Common Intermediate Language, NET Type Metadata and Assembly Manifest, Understanding the CTS, CLS and CLR, NET Namespaces, ildasm.exe, Deploying the .NET Runtime.

BUILDING C# APPLICATIONS

The Role of the Command Line Compiler (csc.exe), Building C# Application Using csc.exe, Working with csc.exe Response Files, Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe)

5 Hours

UNIT – II

INTRODUCTION TO C#

Overview of Writing Applications using C#; Data types, Operators, and Expressions; C# Programming Language Constructs.

Creating Methods, Handling Exceptions: Creating and Invoking Methods; Creating Overloaded Methods and Using Optional and Output Parameters; Handling Exceptions

8 Hours

UNIT – III

REVIEWING THE PILLARS OF OOP

The First Pillars: C#'s Encapsulation Services,

The Second Pillar: C#'s Inheritance, Extending .NET Framework Classes; Creating Generic Types.

THE THIRD PILLAR

C#'s Polymorphic Support, Casting rules, Partial types. The Role of Application Roots , Understanding Object Generations, The System.GC Type, Building Finalizable Objects, Building Disposable Objects, Building Finalizable and Disposable Types.

File I/O and Object Serialization: Directory, Directory Info, Files and File Types, Stream Writers and Readers, Object Serialization(Overview) **12 Hours**

UNIT – IV**ADVANCED C# FEATURES**

Collections and its variants, Delegates and Event Handling, Indexers, Operator Overloading, Anonymous Types, Extension Methods, Pointers and LINQ

Accessing a Database: The ADO.NET Data Provider Factory Model and ADO.NET Disconnected Layer (Overview). **8 Hours**

UNIT – V**WINDOWS PRESENTATION FOUNDATION**

Introduction, Motivation, Flavors, Assemblies, Building WPF Application with and without using XAML,XAML Keywords and Data Binding. **6 Hours**

Course Outcomes:

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

No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C611.1	Know about the Basic architecture of .Net Framework	L2
C611.2	Know about The standards of C# programming and its uses	L5
C611.3	Design and create programs based on object oriented design	L5
C611.4	Understand the know how of advanced C# object oriented programming	L4
C611.5	Apply the use of Windows Presentation Foundation and design Applications	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C611.1	L													
C611.2		L		M		L		M		M		H		
C611.3			H		L		L		L	L	L	L		
C611.4		H									M			
C611.5			H	M	H	M		L	M				M	M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Pro C# 5.0 and the .NET 4.5 Framework (Professional Apress). Publication Date: 22 Sep 2012 | ISBN-10: 1430242337 | ISBN-13: 978-1430242338 | Edition: 6th New edition.

REFERENCE BOOK:

1. C# 5.0 in a Nutshell: The Definitive Reference. Publication Date: 29 Jun 2012 | ISBN-10: 1449320104 | ISBN-13: 978-1449320102 | Edition: 5.

MULTICAST COMMUNICATIONS

Sub Code : 15IS612

Credits : 03

Hrs/Week: 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Understand the necessity and mechanism of group communication.
2. Study the group dynamics and addressing the nodes in the multicast networks
3. Compare the switching technologies for multicast networking
4. Discuss various transport layer protocols supporting multicast networks
5. Discuss the multicast backbone of the Internet (Mbone) and the tools available.

UNIT – I

THE BASICS OF GROUP COMMUNICATIONS

Types of communications; Multicast vs Unicast; Scalability; Applications of group communication; characteristics of groups; Special aspects of group communication

7 Hours

UNIT - II

MULTICAST ROUTING

Basic Routing algorithms; Group dynamics; scoping and multicast address allocation; Concepts of multicast routing; Multicast routing on the internet.

8 Hours

UNIT - III

MULTICAST IN ATM NETWORKS

The switching technology ATM; ATM multicast. Transport protocols: UDP; XTP

8 Hours

UNIT - IV**TRANSPORT PROTOCOLS**

MTP; RMP; LBRM; SRM; RMTP

8 Hours**UNIT -V****MBONE- THE MULTICAST BACKBONE OF THE INTERNET**

Mbonearchitecture ;Mbone applications; Mbone Tools; Outlook; Multicast Routing and Mobile Systems

8 Hours**Course Outcomes:**

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C612.1	Understand the necessity and mechanism of group communication.	L2
C612.2	Study the group dynamics and addressing the nodes in the multicast networks	L4
C612.3	Discuss various transport layer protocols supporting multicast networks	L4
C612.4	Discuss various transport layer protocols supporting multicast networks	L4
C612.5	Discuss the multicast backbone of the Internet (Mbone) and the tool available.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C612.1	L												M	
C612.2	M	M	L								M		M	
C612.3	L									L	L		H	
C612.4					L						L		H	
C612.5	M	L	L		M					L	L		H	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)**TEXT BOOK:**

1. Ralph Wittmann and Martina Zittebart , Multicast Communication- protocols and Applications , Morgan Kaufmann Pub, 2001

FUNDAMENTALS OF IMAGE PROCESSING

Sub. Code : 15IS614

Credits : 03

Hrs/Week : 03+0+0+0

Total hours: 39

Course Learning Objectives:

This Course will enable students to

1. Outline the theory behind the basics of digital image processing, the relation between the components of image processing system.
2. Make use of Electromagnetic Spectrum, find the equivalence between pixels.
3. Make use of Homomorphic Filtering and how to simplify Detection of Discontinuities.
4. Get the idea of Models Elements of Information, find the equivalence between Dilation and Erosion, Opening and Closing, and identify the Hit-or-Miss Transformation.
5. Tell how Components of an Image Processing System works, their design, and get the feeling of Histogram Processing.

UNIT - I

INTRODUCTION

What Is Digital Image Processing? Examples of Fields that Use Digital Image Processing, Fundamental Steps in Digital Image Processing , Components of an Image Processing System Digital Image Fundamentals - Elements of Visual Perception, Brightness Adaptation and Discrimination, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization, Some Basic Relationships between Pixels Image Enhancement in the Spatial Domain - Background, Some Basic Gray Level Transformations, Histogram Processing. **7 Hours**

UNIT – II

Enhancement Using Arithmetic/Logic Operations, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Image Enhancement in the Frequency Domain- Background, Introduction to the Fourier Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, **8 Hours**

UNIT – III

Sharpening Frequency Domain Filters, Homomorphic Filtering. Image Segmentation- Detection of Discontinuities, Edge Linking and Boundary Detection, Thresholding, Region-Based Segmentation, Segmentation by Morphological Watersheds, the Use of Motion in Segmentation **8 Hours**

UNIT – IV**IMAGE COMPRESSION**

Fundamentals Image Compression, Models Elements of Information, Theory Error-Free Compression, Lossy Compression, Image Compression Standards

MORPHOLOGICAL IMAGE PROCESSING

Preliminaries, Dilation and Erosion, Opening and Closing, the Hit-or-Miss Transformation
Some Basic, Morphological Algorithms **8 Hours**

UNIT – V**COLOR IMAGE PROCESSING**

Color Fundamentals, Color Models, Pseudo color Image Processing, Basics of Full-Color Image Processing, Color Transformations, Smoothing and Sharpening, Color Segmentation, Noise in Color Images, Color Image Compression. Introduction to wavelet based processing.

8Hours**Course Outcomes****At the end of the course the student will be able to:**

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C614.1	Identify the concept of Digital Image Processing, and design Steps in Digital Image Processing.	L2
C614.2	Apply Image Sampling and Quantization, illustrate an equivalence between Light and the Electromagnetic Spectrum, prove Some Basic Relationships between Pixels.	L3
C614.3	Design and apply Smoothing Spatial Filters, Sharpening Spatial Filters.	L3
C614.4	Design a Smoothing Frequency-Domain Filters, illustrate an equivalence between Transform and the Frequency Domain, Smoothing Frequency-Domain Filters, prove the properties Region-Based Segmentation	L4
C614.5	Construct Image Compression Standards, explain the concept of Morphological Image Processing.	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C614.1	H	H			H									
C614.2		H					M							
C614.3	H							M	L					
C614.4		H		H			M							
C614.5	H		H		H						L			

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing”, Pearson Education, 2nd Edition, 2003.

REFERENCE BOOKS:

1. Anil K Jain, “Fundamentals of Digital Image Processing”, Prentice-Hall of India Pvt. Ltd., 1997.
2. Milan Sonka, Vaclav Hlavac and Roger Boyle, “Image Processing, Analysis and Machine Vision”, Thomson Learning, Brooks/Cole, 2nd Ed. 2001.
3. B.Chanda, D Dutta Majumder, “Digital Image Processing and Analysis”, Prentice-Hall, India, 2002.
4. The Scientist and Engineers Guide to Digital Signal Processing – by Steven W. mith 2nd Edition , 1999, California Technical Publishing

E-RESOURCES

1. <https://www.coursera.org/learn/digital>
2. <http://nptel.ac.in/courses/106105032/>
3. <http://nptel.ac.in/courses/106105032/>

SOFTWARE TESTING

Sub Code : 15IS615

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Comprehend the software testing life cycle.
2. Apply various test frameworks for different test cases.
3. Designing test plan for different test cases.
4. Understanding how to manage test data.
5. Understanding and applying automation testing using Selenium

UNIT – I

INTRODUCTION TO TESTING

Why is testing necessary? What is testing? Role of Tester, Testing and Quality, Overview of STLC.

SOFTWARE TESTING LIFE CYCLE-

V model, SDLC vs STLC, different stages in STLC, d different levels of testing, different types of testing.

6 Hours

UNIT – II**STATIC TESTING**

Static techniques, reviews, walkthroughs.

Basics of test design techniques, Various test categories, test design techniques for different categories of tests. Control Flow graph. **6 Hours**

UNIT – III**TEST and DEFECT MANAGEMENT**

Documenting test plan and test case, effort estimation, configuration management. Defect management, logging defects, defect lifecycle, fixing/closing defects. Test data management Challenges. **6 Hours**

UNIT – IV**STRUCTURAL TESTING**

Overview, Statement testing, Branch Testing, Condition Testing, path testing, Procedure call testing, Comparing structural testing criteria, The infeasibility problem.

DEPENDENCE and DATA FLOW MODELS

Definition-use pairs, Data Flow analysis. **7 Hours**

UNIT – V**BASICS OF AUTOMATION TESTING**

Basics of Automation testing, Introduction to automation testing, why automation, what to automate, tools available for automation testing. Using Selenium, Introduction to Selenium, using Selenium IDE for automation testing, using Selenium Web driver for automation testing, understanding TestNG framework with Selenium Web driver for automation testing. **14 Hours**

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C615.1	Understand complete software testing life cycle and Demonstrate understanding of various terms and technologies used in testing domain.	L2
C615.2	Demonstrate understanding of usage of testing framework, process and test management, generating test plan and designing test cases and test management process.	L1
C615.3	Given a business scenario, identify and write the test plan, design test cases, document test cases .understanding of defect management life cycle .	L3
C615.4	Understand different structural testing criteria and compare.	L5
C615.5	Demonstrate understanding of automation testing.	L6

TEXT BOOKS :

1. Rex Black (2001), Managing the Testing Process (2nd edition), John Wiley & Sons
2. Foundations of software testing – by Dorothy Graham, Erik van Veenendaal, Isabel Evans, Rex Black
3. Software Testing and Analysis Process Principles and Techniques , Mauro Pezze, Michal Young, Wiley India, 2008.
4. Foundations of Software Testing Aditya P Mathur, Pearson Education, 2008.

REFERENCE BOOKS:

1. Selenium.org -<http://docs.seleniumhq.org/docs/>

WEB TECHNOLOGY

Sub Code : 15IS616

Credits : 03

Hrs/Week: 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. To build web applications and create web forms.
2. Validate form data using server side validation controls.
3. Create dynamic web applications that interact with a database using server side programming
4. Applications of building dynamic XHTML documents using DOM.
5. Introduce PHP, a server side scripting language as a database access language.

UNIT – I

FUNDAMENTALS OF WEB, XHTML – 1

Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, The Web Programmers Toolbox. XHTML: Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links. **7 Hours**

UNIT – II

XHTML – 2, CSS: XHTML (CONTINUED)

Lists, Tables, Forms, Frames CSS: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

7 Hours

UNIT – III**XML**

Introduction, Syntax, Document structure, Document type definitions, Namespaces, XML schemas, Displaying raw XML documents, Displaying XML documents with CSS, XSLT style sheets, XML processors, Web services.

JAVASCRIPT

Overview of Javascript, Object orientation and Javascript, Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts, Examples. **11 Hours**

UNIT – IV**JAVASCRIPT AND HTML DOCUMENTS, DYNAMIC DOCUMENTS WITH JAVASCRIPT**

The Javascript execution environment, The Document Object Model, Element access in Javascript, Events and event handling, Handling events from the Body elements, Button elements, Text box and Password elements, The DOM 2 event model, The navigator object, DOM tree traversal and modification. Introduction to dynamic documents, Positioning elements, Moving elements, Element visibility, Changing colors and fonts, Dynamic content, Stacking elements, Locating the mouse cursor, Reacting to a mouse click, Slow movement of elements, Dragging and dropping elements. **7 Hours**

UNIT – V**PHP**

Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control, statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies, Session tracking, Database access with PHP and MySQL.

7 Hours**Course Outcomes**

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C616.1	Explain the history of the internet and related internet concepts that are vital in understanding web development	L2
C616.2	Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet	L2
616.3	To acquire a knowledge of key features of XML and overview of Java script	L3

C616.4	Utilize the concepts of JavaScript and Java	L5
C616.5	Use web application development software tools i.e. PHP and XML etc. and identify the environments currently available on the market to design web sites.	L5

Mapping of POs & COs

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
C616.1	L				L		M							M
C616.2	L				L		M							M
C616.3	M	H			H						M			M
C616.4	M	H			H						M			M
C616.5	H	H			H				H		M			M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Robert W. Sebesta: Programming the World Wide Web, 4 th Edition, Pearson Education, 2008. (Listed topics only from Chapters 1 to 9, 11 to 15)

REFERENCE BOOKS:

1. M. Deitel, P.J. Deitel, A. B. Goldberg: Internet & World Wide Web How to Program, 4th Edition, Pearson Education, 2004.
2. Chris Bates: Web Programming Building Internet Applications, 3rd Edition, Wiley India, 2007.
3. Xue Bai et al: The web Warrior Guide to Web Programming, Cengage Learning, 2003.

E RESOURCES:

1. nptel.ac.in/courses/106105084/11

MOBILE APPLICATION DEVELOPMENT

Sub Code : 15IS621

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Design a basic user interface for the problem.
2. Develop the UI design with the extra features like services, broadcast receivers, telephony and sms services.
3. Manage the data handling of the app using databases, shared preferences.
4. Support the application with the graphical features or animations and sensors.
5. Illustrate the method of testing and distributing the app.

UNIT – I

INTRODUCTION AND OVERVIEW

Mobility landscape, Mobile platforms, Mobile apps development, Overview of Android Platform, setting up the mobile app development environment along with an emulator.

USER INTERFACE DESIGNING

App user interface designing – mobile UI resources (Layout, UI elements, Draw-able, Menu), Activity –states and life cycle, interaction amongst activities. **8 Hours**

UNIT – II

APP FUNCTIONALITY BEYOND USER INTERFACE

App functionality beyond user interface – Threads, Async task, Services – state and lifecycle. Notifications, Broadcast receivers, Telephony and SMS APIs. **8 Hours**

UNIT – III

DATA HANDLING

Native data handing – on device file I/O, shared preferences, mobile databases such as SQLite, and enterprise data access. **8 Hours**

UNIT – IV

GRAPHICS AND ANIMATION

Graphics and animation – custom views, canvas, animation APIs, Multimedia-audio/video playback and record.

SENSORS

Location awareness and native hardware access (sensors such as accelerometer and gyroscope). **8 Hours**

UNIT – V**TESTING MOBILE APPS**

Debugging mobile apps, White box testing, Black box testing, and test automation of mobile apps using suitable tools like JUnit.

TAKING APPS TO MARKET

Versioning, signing and packaging mobile apps, distributing apps on mobile market place.

7 Hours**Course Outcomes:**

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C621.1	Design a basic user interface for the given problem	L5
C621.2	Develop Mobile apps having various features like services, broadcast receivers, telephony and sms facilities.	L5
C621.3	Develop a suitable back end for the problem using databases, shared preferences.	L5
C621.4	Support the application with graphical features or animations and sensors.	L4
C621.5	Describe the method of testing and distributing the app.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PS O2
C621.1	H	H	M		H				M		H	M		
C621.2	H	H	M		H	M			M		H	H		
C621.3	H	H	M		H	M			M		H	H		
C621.4	H	M	M		M	M			M		H	H		
C621.5	M	L			L						M	M		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS:

1. AnubhavParadhan, Anil V Deshpande, Mobile apps Development, Edition: 1, Publication: Wiley, 2014, ISBN: 978-81-265-4660-2
2. Barry Burd , Android Application Development All in one for Dummies
3. Teach Yourself Android Application Development in 24 Hours, Publication : SAMS

E-RESOURCES

1. <https://freevidelectures.com/blog/2011/07/mobile-application-development-courses/>

2. <https://www.lynda.com/Mobile-Apps-training-tutorials/55-0.html>
3. <https://developer.android.com/training/index.html>
4. <https://www.udacity.com/course/new-android-fundamentals--ud851>

MULTICORE ARCHITECTURE AND PROGRAMMING

Sub Code : 15IS622

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives:

This Course will enable students to

1. Understand the principles of fundamentals of multi-core design and performance measurement
2. Compare the working of various parallel programming models and their performance issues
3. Discuss the concept of parallelization and also can deal the major hurdle of data dependencies.
4. Analyze the process of optimization and understand different code optimizations.
5. Identify the issues of synchronization, communication overhead and study the ways to handle these issues.

UNIT – I

INTRODUCTION TO MULTI-CORE ARCHITECTURE

Introduction, Moore's law, Amdahl's law, Gustafson's law, Motivation for Multi-core processors, Types and levels of parallelism, Flynn's classification of multi-processors, Introduction to parallelization and vectorization: Data dependencies, SIMD technology, Hardware Multithreading vs. Software multi-threading, Hyper threading, SMT, Case Study of multi-core processors: Intel, AMD, IBM/Sony. **8 Hours**

UNIT – II

CONCEPTS AND DESIGN OF PARALLEL AND THREAD PROGRAMMING

Definition of thread and process, Parallel programming models, Parallel Programming constructs: Synchronization, Deadlock, Critical sections, Threading APIs- Win 32, POSIX threads. **7 Hours**

UNIT – III**PARALLEL PROGRAMMING: MPI MODEL**

Collective communication, Data decomposition, Communicators and topologies, point-to-point communication, MPI Library, OpenMP: Directives and clauses, environment variables, Programs using OpenMP and MPI. Introduction to intel TBB, Thread-Safeness, Cache related issues.

8 Hours**UNIT – IV****MULTITHREADED PROGRAM DEBUGGING**

Benchmarks and other performance analysis tools, vTune Performance Analyzer, Thread Checker, Thread Profiler, hotspots, performance issues in algorithms, branch misprediction, cache organization, cache loads, efficiency, hardware and software prefetch.

7 Hours**UNIT – V****COMPILER OPTIMIZATIONS AND PARALLEL ALGORITHMS**

Compilers for High performance Computing, compiler optimization, code and loop optimization, scalar and vector processing, temporal and spatial locality-matrix multiplication example. OS support to multi-core architectures. Parallel algorithms study and analysis- The Sieve of Eratosthenes, Floyd's algorithm, Matrix-Vector multiplication, Monte Carlo methods, Matrix Multiplication, Parallel Quicksort Algorithm.

9 Hours**Course Outcomes:**

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C622.1	Understand the concept of multi core architecture.	L3
C622.2	Design parallel program using the multi thread concept.	L2
C622.3	Explain and implement program using Openmp.	L3
C622.4	Familiarize the multithreaded program debugging.	L2
C622.5	Explain the optimization of computer for parallel program.	L3

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
C622.1			M				H					H		
C622.2	L			H					M		M		H	
C622.3														L
C622.4	L							H		M	H		L	
C622.5					H					H		H		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOKS :

1. Multicore programming- Increasing performance through software multithreading,-- ShameemAkhter and Jason Roberts, Intel press
2. The software optimization cookbook- High performance Recipes for IA-32 Platforms – Richard Gerber, AartJ.C.Bik, Kevin B.Smith, XinminTian, Intel press
3. www.openmp.org
4. Advanced Compiler Design Implementation- Steven S.Muchnick, Morgan Kaufman Publishing 2000.
5. www tutorials on introduction to parallel computing

NETWORK MANAGEMENT

Sub Code : 15IS623

Credits : 03

Hrs/Week : 3+0+0+0

Total Hours : 39

Course Learning Objectives :

This Course will enable students to

1. Understand the network management overview and the need of data communications
2. Know about general concepts and architecture behind standards based network management
3. Understand concepts and terminology associated with organizing SNMP and various models
4. Understand various communication and functional models based on SNMP, remote monitoring concepts and go through various case studies.
5. Get to know about broadband network management

UNIT – I

DATA COMMUNICATIONS AND NETWORK MANAGEMENT OVERVIEW

Analogy of telephone network, Data and telecommunication network, Distributed computing environment, Internet, Protocols and standards, IT management, Network and system management, Current status and future of network management

8 Hours

UNIT – II

BASIC FOUNDATIONS: STANDARDS, MODELS, AND LANGUAGE

Network Management Standards, Network Management Model, Organizational Model, Information Model, Communication Model, Abstract Syntax Notation One, TLV Encoding, Functional Model.

8 Hours

UNIT – III

SNMPV1 NETWORK MANAGEMENT: ORGANIZATION AND INFORMATION MODELS

Managed Network, The history of SNMP management, Internet Organizations and Standards, The SNMP model, The Organization Model, System Overview, The information model

8 Hours

UNIT – IV

SNMPV1 NETWORK MANAGEMENT: COMMUNICATION AND FUNCTIONAL MODELS

Communication and Functional Models, Administrative Model, SNMP Community, Administration Model, Generalized Administration Model, Get and Set PDU, Trap PDU, SNMP Operations, MIB for Get-Next-Request, MIB Lexicographic Order, Get-Next-Request Operation, Sniffer Data, SNMP MIB

SNMP MANAGEMENT: RMON
What is Remote Monitoring? RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring, Case Study, Case Study Results

8 Hours

UNIT – V

BROADBAND NETWORK MANAGEMENT

ATM Technology, ATM Network management, HFC Management, DSL Technology and ADSL Management, Network management applications

7 Hours

Course Outcomes:

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C623.1	Have knowledge on data communications and network management basics	L2
C623.2	Should know about the basic standards, models and the languages used in the network management	L3
C623.3	Get to know how to manage and organize the SNMP and various models	L2
C623.4	Should know about various communication and functional models and have knowledge on how case studies are implemented.	L2
C623.5	Should know how to implement the technologies based on broadband network management	L4

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C623.1	L						H				M			
C623.2			M	H								H	M	
C623.3								H		M			L	
C623.4	L				H				M					L
C623.5										H	H	H		

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Network Management- Principles and Practice, Mani Subramanian, Pearson Education,2003

SOFTWARE PROJECT MANAGEMENT

Sub Code :15IS624

Credits : 03

Hrs/Week: 3+0+0+0

Total Hours: 39

Prerequisites:

Students are expected to have a fundamental knowledge of Software Engineering, Advanced Software Engineering and Software Testing.

Course Learning Objectives (CLOs):**This Course will enable students to**

1. To discuss the need of Software Project Management.
2. To perform effective project evaluation.
3. To properly plan various activities in software project management.
4. To monitor and control the progress of a software project.
5. To effectively manage people and organizing teams.

UNIT – I**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT**

Project Definition – Contract Management – Activities Covered by Software Project Management – Overview of Project Planning – Stepwise Project Planning. **7 Hours**

UNIT - II**PROJECT EVALUATION**

Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation. **8 Hours**

UNIT – III**ACTIVITY PLANNING**

Objectives – Project Schedule – Sequencing and Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature of Risk – Types of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning and Control.

8 Hours**UNIT – IV****MONITORING AND CONTROL**

Creating Framework – Collecting the Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back to Target – Change Control – Managing Contracts – Introduction – Types of Contract – Stages in Contract Placement – Typical Terms of a Contract – Contract Management – Acceptance.

8 Hours**UNIT – V****MANAGING PEOPLE AND ORGANIZING TEAMS**

Introduction – Understanding Behaviour – Organizational Behaviour: A Background – Selecting the right perform for the job – Instruction in the Best methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working in Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health and Safety – Case Studies.

8 Hours**Course Outcomes (COs):**

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

Sl. No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C624.1	Understand the need for Software Project Management	L2
C624.2	Perform effectively Project Evaluation	L4
C624.3	Efficiently plan various Software Project Management activities	L3
C624.4	Properly monitor and control various SPM activities	L4
C624.5	Effectively manage People and Organizing Teams	L3

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2
C624.1	M						H				M	H		H
C624.2					L						M			H
C624.3	M	M	H	H						L				H
C624.4					H		M		L					H
C624.5			M			M		M				H		H

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Bob Hughes, Mikecoterrell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

REFERENCE BOOKS:

1. Ramesh, Gopaldaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Management in Practice", Pearson Education, 2002.

E-RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc17_mg01

ENTRY EDGE: IMMERSIVE GROUP WORKSHOP (IGW)

Sub Code: 15IS605

Duration: 5 Days

Timings : 9.00 AM to 12.30 PM, 1.15 PM to 4.45 PM

Module 1: Minds-on and hands-on simulation project

1. Understanding Task environment – Goals, responsibilities, Task focus
2. Working in Teams towards common goals
3. Organizational performance expectations–technical and behavioural competencies.

5 Hours

Module 2: Re- enforcement of critical individual skills and behaviours

1. Application of individual effectiveness skills in team and organizational context – improving self awareness, goal setting, time management, communication and presentation skills.

7 Hours

Module 3: Etiquettes and Ethics

1. Professional etiquettes at workplace – dressing, telephone, e-mail, meeting and general behaviour
2. Basic honesty & respect for law / rules
3. Conflict of interest
4. Use of organizational resources
5. Misrepresentation and misappropriation
6. Intellectual property
7. Whistle blowing

7 Hours

Module 4: Interpersonal Behaviour & relationship skills

1. Establishing trust based relationships in team & organizational environment
2. Trust equation – credibility, responsiveness, integrity, self-interest

3.5 Hours

Module 5: Dealing with Conflicts

Orientation towards conflicts in team and organizational environment

1. Understanding sources of conflicts
2. Conflict resolution styles and techniques

3.5 Hours

Pedagogical tools & techniques used in the workshop

Organizational templates for simulating a organizational context- structures, units, roles and activities

Metaphoric scenarios for simulating real –life tasks and dynamics in a team/project context

LEGO™ building blocks for simulating last-mile technical activity in teams

Case studies, Role play scenarios group learning activities, observation and feedback.

Note: Evaluation is done and a grade of P (pass) or NP (not pass) is awarded

COMPUTER NETWORKS LAB

Sub Code : 15IS607
Hrs/Week : 0+0+2+0

Credits : 01
Total Hours : 26

Course Learning Objectives:

This Course will enable students to

1. Analysis of wired/wireless networks using simulations.
2. Design different network topologies.
3. Demonstrate different encoding and decoding techniques.
4. Experiment with sockets.
5. Infer the performance of congestion control and prevention algorithms.

PART –A

The following experiments shall be conducted using NS2/NS3.

1. Simulate a three nodes point to point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
2. Simulate a four node point-to-point network, and connect the links as follows: n0 – n2, n1-n2 and n2-n3. Apply TCP agent between n0-n3 and UDP agents changing the parameter and find the number of packets dropped.
3. Simulate the different types of Internet traffic such as FTP and TELNET over a network and find the number of packets dropped (4 nodes).
4. Simulate the transmission of ping messages over a network topology consisting of 3 nodes and find the number of packets dropped.
5. Simulate an Ethernet LAN using N nodes (6-10), and set traffic between nodes.
6. Simulate an Ethernet LAN using N nodes (6-10), change error rate and data rate and find the number of packets dropped for different error rates and data rates.
7. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and find the number of packets dropped.
8. Simulate an Ethernet LAN using N nodes and set multiple traffic nodes and show congestion window for different source/destination and find the number of packets dropped.
9. Simulate simple wireless scenario consisting of 3 nodes.

PART –B

The following experiments shall be conducted using C

1. Write a program for error detecting code using CRC-CCITT (16- bits)
2. Write a program for frame sorting technique used in buffers.
3. Write a program for distance vector algorithm to find suitable path for transmission.
4. Using TCP/IP sockets, write a client-server program to make client sending the file name and the server to send back the contents of the requested file if present.
5. Write a program for simple RSA algorithm to encrypt and decrypt the data.

6. Write a program for Hamming code generation for error detection and correction.
7. Write a program for congestion control using leaky bucket algorithm.

Course Outcomes:

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

Sl. No.	Course Outcomes (CO)	Bloom's Taxonomy Level (BTL)
C607.1	Examine the behavior of wired/wireless networks using simulations.	L4
C607.2	Build different network topologies for different scenarios	L6
C607.3	Contrast different encoding and decoding techniques.	L2
C607.4	Make use of raw sockets for sending live data	L3
C607.5	Demonstrate the performance of congestion control and prevention algorithms.	L2

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C607.1	M						L	L					H	
C607.2	L	M		M	H	L		M	M		L		H	
C607.3	H	H		M	H			H			L		H	
C607.4		L	L	M				M				L	H	
C607.5				L				L					H	

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

COMPUTER GRAPHICS AND VISUALIZATION LAB**Sub Code : 15IS608****Credits : 01****Hrs/Week : 0+0+2+0****Total Hours : 26****Course Learning Objectives:****This Course will enable students to**

1. Apply the knowledge of 3d in openGL
2. Know and use the Clipping Algorithms in openGL
3. Understand the use of interaction API's in openGL
4. Apply the usage of Affine transformations in openGL
5. Analyze the line Clipping algorithms in openGL

Course Content:

1. Program to draw 3D Sierpinski gasket, the user is allowed to determine the number of divisions for the tetrahedron.
2. Program to implement Liang-Barsky line clipping algorithm.
3. Program to draw a color cube and spin it using openGL transformation matrices.
4. Program to create a house like figure and rotate it about a given fixed point using openGL functions.
5. Program to implement Cohen–Sutherland line clipping algorithm
6. Program to create a cylinder and parallelepiped by extruding a circle and a quadrilateral respectively.
7. Program to draw a color cube and allow the user to move the camera suitability and experiment with perspective viewing using openGL functions
8. Program to display a set of values {fj} as a rectangular mesh.
9. Program to demonstrate the interaction of HCI devices using openGL functions
10. Program to fill any convex polygon using Scan line filling algorithm.

Course Outcomes:

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

No.	Course Outcome (CO)	Bloom's Taxonomy Level (BTL)
C608.1	Understand the usage of 3d Applications in Graphics	L2
C608.2	Create a Layout for Architecture of Transformations	L6
C608.3	Analyses the usage of Mapping from Coordinates in real world to Graphical world	L6
C608.4	Know the Aspects of Clipping Algorithms.	L4
C608.5	Know about Viewing lighting and shading models in CG	L5

Mapping of POs & COs:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2
C608.1	L								M				L	
C608.2		L		L		L		M		M		H		
C608.3			H		L		L		L		M			
C608.4		H												
C608.5			H	M	H	M	M	L					M	M

(L = Low 30%-49%, M = Medium 50%-69%, H = High >70%)

TEXT BOOK:

1. Edward Angel: Interactive Computer Graphics A Top Down Approach with OpenGL, 5th Edition, 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, 3rd Edition, PHI,2009.
3. James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes,Computer Graphics, Pearson Education 1997

EMPLOYABILITY SKILL DEVELOPMENT

Sub Code : 15IL001/ 002
Hrs/Week : 0+1+0+0

Credits : Nil (MLC)
Total Hours : 12

UNIT – I

Analytical Aptitude Skill: concept of analytical skill, definition-logical thinking and testing of Analytical Aptitude

UNIT – II

Quantitative Aptitude skill-Concept-definition-Preliminary requirement for development of quantitative skill- testing of quantitative skill.

UNIT – III

Verbal and ability skill – Knowledge and Vocabulary and grammar-comprehension-Verbal Reasoning skill

REFERENCE BOOKS:

1. Aggarwal R.S “Modern Approach to Logical Reasoning” S. Chanda Publication ,2008.
2. Aggarwal R.S “Quantitative Aptitude” S. Chand Publication ,2014.
3. Aggarwal R.S “Modern Approach to verbal and non verbal reasoning” S. Chanda Publication ,2013
4. Arun Sharma “Verbal ability and reading comprehension CAT” TMH Publications,2014
5. Ethnus Consultancy Pvt. Ltd “ APTIMTRA: Your friend for cracking aptitude test”, MGH Publications ,2014
6. Aggarwal R.S “Advanced objective general knowledge” S. Chanda Publication ,2014.

Examination pattern:

This course is a mandatory learning course without credit. Continuous internal examination (CIE) consists of 2 internal exams (20 marks each) and tasks (10 marks). There is no semester end examination (SEE). The student will be awarded PP or NP grade as per autonomous regulations.
