

B.Sc. Software Computer Science (CBCS)

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. SOFTWARE COMPUTER SCIENCE

CBCS PATTERN

(With effect from 2020-2021)

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
		SEMESTER I							
1.	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2.	II	English (CE)	Paper-1	6	4	Communicative English I	25	75	100
3.	III	Core Theory	Paper-1	6	4	Programming in C	25	75	100
4.	III	Core Practical	Practical-1	3	2	Programming in C Lab	25	75	100
5.	III	Allied -1	Paper-1	7	3	(to choose any one) 1. Mathematics I 2. Mathematical Foundations I	25	75	100
6.	III	PE	Paper 1	6	3	Professional English I	25	75	100
7.	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		36	22		175	525	700
		SEMESTER II					CIA	Uni. Exam	Total
8.	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9.	II	English (CE)	Paper-2	6	4	Communicative English II	25	75	100
10.	III	Core Theory	Paper-2	5	4	C++ & Data Structure	25	75	100
11.	III	Core Practical	Practical-2	2	2	C++ and Data Structures Lab	25	75	100
12.	III	Allied-1	Paper-2	7	5	to choose any one) 1. Mathematics II 2. Mathematical Foundations II	25	75	100
13.	III	PE	Paper 1	6	3	Professional English II	25	75	100
14.	IV	Value Education		2	2	Value Education	25	75	100
15.	IV	Soft Skill		2	1	Soft Skill	25	75	100
		Sem. Total		36	25		200	600	800
		SEMESTER III					CIA	Uni. Exam	Total
16.	I	Language	Paper-3	6	4	Tamil / Other Languages	25	75	100
17.	II	English	Paper-3	6	4	English	25	75	100
18.	III	Core Theory	Paper-3	5	5	Programming in JAVA	25	75	100
19.	III	Core Practical	Practical-3	4	2	Programming in JAVA Lab	25	75	100

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20.	III	Allied II	Paper-3	5	3	Quantitative Techniques - I	25	75	100
21.	IV	Skill Based Subject	Paper-1	2	2	Design & Analysis of Algorithms	25	75	100
22.	IV	Non-Major Elective	Paper-1	2	2	Introduction to Information Technology	25	75	100
				30	22		175	525	700
		SEMESTER IV					CIA	Uni. Exam	Total
23.	I	Language	Paper-4	6	4	Tamil/Other Languages	25	75	100
24.	II	English	Paper-4	6	4	English	25	75	100
25.	III	Core Theory	Paper-4	3	5	Relational Database Management Systems	25	75	100
26.	III	Core Practical	Practical-4	3	2	RDBMS Lab	25	75	100
27.	III	Allied 2	Paper-4	5	3	Quantitative Techniques - II	25	75	100
28.	III	Allied Practical	Practical 2	3	2	Quantitative Techniques - LAB	25	75	100
29.	IV	NMSDC : Digital Skills for Employability	Paper-2	2	2	Office Fundamentals	25	75	100
30.	IV	Non-Major Elective	Paper-2	2	2	Internet Technology	25	75	100
				30	24		200	600	800
		SEMESTER V					CIA	Uni. Exam	Total
31.	III	Core Theory	Paper-5	6	4	Mobile Application Development	25	75	100
32.	III	Core Theory	Paper-6	6	4	Operating System	25	75	100
33.	III	Core Theory	Paper -7	5	4	Data Mining	25	75	100
34.	III	Core Practical	Practical-5	4	2	Operating System - Lab	25	75	100
35.	III	Core Practical	Practical-6	4	2	Mobile Applications Development - Lab	25	75	100
36.	III	Elective I	Paper-1	3	3	1. Information Security 2. Software Testing 3. Internet of Things	25	75	100
37.	IV	Skill Based Subject	Paper-3	2	2	Multimedia Systems	25	75	100
				30	21		175	525	700
		SEMESTER VI							
38.	III	Core Theory	Paper-8	7	4	Open Source Software	25	75	100
39.	III	Core Theory	Paper-9	6	4	Python Programming	25	75	100
40.	III	Core Practical	Practical-7	5	2	Open Source Software Lab	25	75	100
41.	III	Core Practical	Practical-8	4	2	Python Programming Lab	25	75	100
42.	III	Project		5	5	Group/Individual project	25	75	100

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43.	III	Elective II	Paper-2	3	3	1. Computer Organization and Architecture 2. Software Metrics 3. Wireless and Data Communication	25	75	100
44.	III	Elective III	Paper-3	3	3	1. Web Technology 2. Software Design 3. Software Quality Assurance	25	75	100
45.	III	Emerging Technology for Employability II	Paper-4	2	2	(Choose any one) • PBL Android App Development • Machine Learning	25	75	100
46.	V	Extension Activities		0	1		100	0	100
				30	26		300	600	900
		Total			140				4600

Part	Subject	Papers	Credit	Total Credits	Marks	Total Marks
Part I	Languages	4	4	16	100	400
Part II	Communicative English & English	4	4	16	100	400
Part III	Allied (Odd Semester)	2	3	6	100	200
	Allied (Even Semester)	2	5	10	100	200
	Allied Practical	1	2		100	100
	Electives	3	3	9	100	300
	Core	9	(3-5)	38	100	900
	Core practical	8	(2-3)	16	100	800
	Professional English	2	3	6	100	200
	Compulsory Project (Group/Individual Project)	1	5	5	100	100
Part IV	Environmental Science	1	2	2	100	100
	Soft skill	1	1	1	100	100
	Value Education	1	2	2	100	100
	Lang. & Others /NME	2	2	4	100	200
	Skill Based	4	2	8	100	400
Part V	Extension Activities	1	1	1	100	100
	Total	46		140		4600

**SEMESTER III
(Core Paper - 3)**

PROGRAMMING IN JAVA

COURSE OBJECTIVES:

- Knowing about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Secured, well-suited for internet programming using applets and GUI-based

UNIT I

Declarations and Access Control: Identifiers and Keywords: Oracle's Java Code Conventions. Define Classes: Import Statements and the Java API - Static Import Statements. Use Interfaces: Declaring an Interface- Declaring Interface Constants. Declare Class Members: Access Modifiers - Non access Member Modifiers - Constructor Declarations - Variable Declarations. Declare and Use enums: Declaring enums. Object Orientation: Encapsulation - Inheritance and Polymorphism- Polymorphism - Overriding / Overloading: Overridden Methods -Overloaded Methods.

UNIT II

Object Orientation: Casting - Implementing an Interface - Legal Return Types: Return Type Declarations - Returning a Value. Constructors and Instantiation: Overloaded Constructors - Initialization Blocks. Statics: Static Variables and Methods. Assignments: Stack and Heap - Literals, Assignments, and Variables: Literal Values for All Primitive Types. Scope - Variable Initialization - Passing Variables into Methods: Passing Object Reference Variables - Passing Primitive Variables. Garbage Collection. Operators: Java Operators - Assignment Operators - Relational Operators - instanceof Comparison - Arithmetic Operators - Conditional Operator - Logical Operators.

UNIT III

Working with Strings, Arrays, and Array Lists: Using String and StringBuilder: The String Class - The StringBuilder Class - Important Methods in the StringBuilder Class. Using Arrays: Declaring an Array -Constructing an Array - Initializing an Array. Using ArrayList:ArrayList Methods in Action - Important Methods in the ArrayList Class. Flow Control and Exceptions: Using if and switch Statements -Creating Loops Constructs - Handling Exceptions - Catching an Exception Using try and catch - Using finally. String Processing, Data Formatting Resource Bundles: String, StringBuilder, and StringBuffer -Dates, Numbers, Currencies, and Locales.

UNIT IV

I/O and NIO: File Navigation and I/O: Creating Files Using the File Class - Using FileWriter and FileReader. File and Directory Attributes -DirectoryStream - Serialization. Generics and Collections: toString(), hashCode(), and equals(): The toString() Method - Generic Types -Generic Methods - Generic Declarations. Inner Classes: Method – Local. Inner Classes - Static Nested Classes - Threads: Defining,

Instantiating, and Starting Threads - Thread States and Transitions - Synchronizing Code, Thread Problems - Thread Interaction. Concurrency: Concurrency with the java.util.concurrent Package - Apply Atomic Variables and Locks - Use java.util.concurrent Collections - Use Executors and ThreadPools.

UNIT V

Applets: Applet fundamentals - Applet class - Applet life cycle - Steps for developing an applet program - Passing values through parameters - Graphics in an applet - Event-handling. GUI Applications - Part 1: Graphical user interface - Creating windows - Dialog boxes - Layout managers - AWT component classes - Swing component classes. GUI Applications - Part 2: Event handling - Other AWT components - AWT graphics classes - Other swing controls.

TEXT BOOK(S):

1. Kathy Sierra, Bert Bates — OCA/OCJP Java SE 7 Programmer I & II Study Guide, Oracle Press. (Unit I,II,III,IV).
2. Sagayaraj, Denis, Karthik and Gajalakshmi, 2018, Java Programming - For Core and Advanced Learners, University Press (India) Private Limited, Hyderabad.(Unit V).

REFERENCE BOOKS:

1. Hebert Schild, 2002, The Complete Reference Java2, [Fifth Edition]. Tata McGraw-Hill, New Delhi.
2. John Hubbard, R.2004. Programming with Java. [Second Edition]. Tata McGraw-Hill, New Delhi.
3. Debasish Jana. 2005. Java and Object-Oriented Programming Paradigm, [Second Printing]. Prentice-Hall of India, New Delhi.
4. Sagayaraj, Denis, Karthik and Gajalakshmi 2018, Java Programming for core and advanced Learners, University Press India Pvt. Ltd., Hyderabad.

Course Outcomes:

- Students are able to know about a General-purpose and Purely object-oriented programming language including data types, control statements, and classes
- Students are able to Secured, well-suited for internet programming using applets and GUI-based

CORE PRACTICAL - Practical-3

PROGRAMMING IN JAVA LAB

List of Practical's

1. Implementation of Classes and Objects
2. Implementation of Inheritance and Polymorphism
3. Implementation of Interface and Package concepts
4. Implementation of Flow, Border ,Grid Layouts
5. Implementation of Tic-Tac Toe Application Using Applets
6. Implementation of Frames, Menus, Dialog
7. Implementation of Swing concepts
8. Implementation of Exception Handling
9. Implementation of Multi Threading
10. Implementation of I/O Streams
11. Implementation of Java Networking concepts
12. Implementation of Java Servlets (Connecting Database)
13. Implementation of RMI
14. Implementation of Java Beans

ALLIED 2

PAPER – 3

QUANTITATIVE TECHNIQUES – I

UNIT - I

Operation Research (O.R.) - Nature and significance of Operation Research - Various models - Application and scope of Operation Research.

UNIT - II

Linear Programming Problem (L.P.P.) - characteristic of Linear Programming Problem and its formulation - graphical method of solving Linear Programming Problem - simplex method of solving Linear Programming Problem.

UNIT - III

Linear Programming Problem - Big M. Method - Two phase method Duality

1. North west corner
2. Least cost
3. Vogel's

UNIT - IV

Transportation Problem - Methods of finding Initial Basic Feasible Solution - Optimal Solution - simple problem.

UNIT - V

Assignment Problem - Balanced and unbalanced Assignment Problems - Optimal solution - simple problems.

Text Book

Kanti swarup Manmohan and Gupta - Operation Research chand and sons, New Delhi.

Reference Books:

1. J.K.Sharma (2003) Operation Research - Theory and its application, Mac Millan.
2. Taha. H.A. O.R. An Introduction PHI
3. P.K. Gupta and Hira, Problems in O.R. S.Chand and company Ltd., New Delhi.

SKILL BASED SUBJECT I
PAPER-1
Design and Analysis of Algorithm

OBJECTIVE

1. To introduce the classic algorithms in various domains, and techniques for designing efficient algorithms.
2. To create analytical skills, to enable the students to design algorithms for various real time problems and to analyze the algorithms.
3. To understand the dynamic programming concepts.
4. To know about the basis of traversal and searching techniques.
5. To understand about NP-Hard and NP-Complete Problems

UNIT - I

Introduction: Algorithm - Algorithm Specification - Performance Analysis - Randomized Algorithms - Divide-And-Conquer: General Method - Binary Search - Finding the Maximum and Minimum - Merge Sort - Quick Sort - Selection - Strassen's Matrix Multiplication - Convex Hull.

UNIT - II

The Greedy Method: The General Method - Knapsack Problem - Job Sequencing with Deadlines - Minimum-Cost Spanning Trees - Optimal Storage on Tapes - Single - Source Shortest Paths.

UNIT - III

Dynamic Programming: The General Method - Multistage Graphs - All Pairs Shortest Path - Single-Source Shortest Paths: General Weights - Optimal Binary Search Trees - String Editing - 0/1- Knapsack - Reliability Design - The Traveling Salesperson Problem.

UNIT - IV

Basic Traversal and Search Techniques: Techniques for Binary Trees - Techniques for Graphs - Connected Components And Spanning Trees - Biconnected Components and DFS. Backtracking: The General Method - The 8-Queens Problems - Some of Subsets - Graph Coloring - Hamiltonian Cycles - Knapsack Problem. Branch-And-Bound: The Method - 0/1 Knapsack Problem - Travelling Salesperson - Efficiency Considerations.

UNIT - V

NP-Hard and NP-Complete Problems: Basic Concepts -Cook's Theorem - NP-Hard Graph Problems - NP-Hard Scheduling Problems - NP-Hard Code Generation Problems - Some Simplified NP-Hard Problems. Genetic Algorithms: Introduction - Use Genetic Algorithms - Genetic Algorithms Work - GA Works - Some GA Implementations.

Text Books

1. *Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran.* 2007. **Fundamentals of Computer Algorithms.**[First Edition] Galgotia Publication Pvt. Ltd, New Delhi.
2. *Basu, S.K.* 2007. **Design Methods and Analysis of Algorithms.**[First Edition]. PHI Pvt. Ltd, New Delhi.

REFERENCE BOOKS

1. *AnanyLevitin.* 2005. **Introduction to the Design and Analysis of Algorithms.** [First Edition]. Pearson Education Asia, New Delhi.
2. *Thomas H.Cormen , Charles E. Leiserson, Ronald L. Rivest and Clifford Stein.* 2009. **Introduction to Algorithms.** [Third Edition]. PHI Pvt. Ltd, New Delhi.
3. *Sara Baase and Allen Van Gelder.* 2006. **Computer Algorithms -Introduction to Design and Analysis.**[Third Edition]. Pearson Education Asia, New Delhi.

COURSE OUTCOMES :

- Students are able to understand the classic algorithms in various domains, and techniques for designing efficient algorithms.
- Students are able to create analytical skills, to enable the students to design algorithms for various real time problems and to analyze the algorithms.
- Students are able to understand the dynamic programming concepts.
- Students are able to know about the basis of traversal and searching techniques.
- Students are able to understand about NP-Hard and NP-Complete Problems

NON-MAJOR ELECTIVE

PAPER-1

Introduction to Information Technology

OBJECTIVES:

The subject aims to build the concepts regarding:

- Major components of Computer System and its working principles.
- Role of an Operating System and basic terminologies of networks.
- How the Information Technology aids for the Current Scenario.
- To understand the Computer Software.
- To understand internet applications

UNIT-I

Introduction: Characteristics of Computers-Technological Evolution of Computers-The Computer Generations-Categories of Computer. **Data and Information:** Introduction-Types of Data-A Simple Model of a Computer-Data Processing Using a Computer-Desktop Computer. **Acquisition of Number and Textual Data:** Introduction- Input Units-Internal Representation of Numeric Data-Representation of Characters in Computers–Error-Detecting Codes.

UNIT-II

Data Storage: Introduction-Memory Cell-Physical Devices Used as Memory Cells-Random Access Memory-Read Only Memory- Secondary Memory- Floppy Disk Drive-Compact Disk Read Only Memory (CDROM)-Archival Memory. **Central Processing Unit:** The Structure of a Central Processing Unit-Specification of a CPU-Interconnection of CPU with Memory and I/O Units.

UNIT-III

Computer Networks: Introduction-Local Area Network (LAN)- Applications of LAN-Wide Area Network (WAN)–The Future of Internet Technology. **Output Devices:** Introduction- Video Display Devices-Flat Panel Displays–Printers.

UNIT-IV

Computer Software: Introduction-Operating System-Programming Languages–A Classification of Programming Languages. **Data Organization:** Introduction-Organizing a Database-Structure of a Database- Database Management System-Example of Database Design.

UNIT-V

Some Internet Applications: Introduction- E-mail- Information Browsing Service- The World Wide Web- Information Retrieval from the World WideWeb-Other Facilities Provided by Browsers - Audio on the Internet.**Societal Impactsof Information Technology:** CareersinInformation Technology.

TEXTBOOKS:

1. *Rajaraman, V.* 2008. **Introduction to Information Technology**. [Sixth Printing].

PrenticeHall of India Pvt. Limited, New Delhi.(UNIT I toV)

2. *Nagpal, D.P.* 2010. **Computer Fundamentals**. [First Edition, Revised]. S. Chand & Company Ltd, New Delhi. (UNIT I (Introduction: Characteristics of Computers to Categories of Computer))

REFERENCE BOOKS:

1. *ITL Educations Solution Limited.* 2009. **Introduction to Computer Science**. [Fourth Impression]. Pearson Education, New Delhi.
2. *Alexis Leon and Mathews Leon.* 1999. **Fundamentals of Information Technology**. [First Edition]. Leon TECHWorld, New Delhi.

COURSE OUT COMES :

- Students understand Major components of Computer System and its working principles.
- Students learn and understand the Role of an Operating System and basic terminologies of networks.
- Students understand how the Information Technology aids for the Current Scenario.
- Students understand the Computer Software.
- Students understand internet applications

SEMESTER IV
CORE PAPER - 4
Relational Data Base Management System

COURSE OBJECTIVES

The Course aims

1. The fundamental concepts of database management including database languages and database -system implementation.
2. To understand basic SQL structure and Constraints.
3. To know about the important the Normalizations
4. To know about PL/SQL and File Storage structure.
5. To understand cursors and Exception handling

UNIT - I

Introduction: Database - System Applications - Purpose of Database Systems - View of Data - Database languages - Data Storage and Querying - Database Architecture - Database Users and Administrators. **Relational Databases: Introduction to the Relational Model:** Structure of Relational Databases - Keys.

UNIT - II

Introduction to SQL: SQL Data Definition -Basic Structure of SQL Queries - Set Operations - Aggregate Functions - Nested Sub queries - Modification of the Database. **Intermediate SQL:** Views -Integrity Constraints - Authorization. **Database Design: Database Design and the E-R Model:** The Entity - Relationship Model - Entity - Relationship Diagrams - Extended E-R Features.

UNIT - III

Data Normalization: Introduction - First Normal Form (1NF) - Second Normal Form (2NF), Third Normal Form (3NF) - Boyce - Codd Normal Form (BCNF), Fourth Normal Form (4NF) - Fifth Normal Form (5NF) - Denormalization. **Transaction Management and Concurrency Control:** Introduction -Transactions - Transaction Properties (ACID Properties) Transaction States - Concurrency Control - The COMMIT Command - The ROLLBACK Command - The SAVEPOINT Command.

UNIT - IV

Storage and File Structure: Overview of Physical Storage Media - RAID - File Organization - Organization of Records in Files. **PL/SQL: A Programming Language:** Fundamentals of PL/SQL - PL/SQL Block Structure - Comments - Data Types - Variable Declaration - Assignment Operation - Bind Variables. **More on PL/SQL: Control Structures and Embedded SQL:** Control Structures - Nested Blocks - SQL in PL/SQL.

UNIT - V

PL/SQL Cursors and Exceptions: Cursors - Implicit Cursors - Explicit Cursors - Explicit Cursor Attributes - Implicit Cursor Attributes - Cursor FOR Loops.
PL/SQL Named Blocks: Procedure, Function, Package and Trigger: Procedures - Functions - Triggers.

Textbooks

1. *Abraham Silberschatz, Henry F.Korth, and S.Sudarshan* 2015, **Database System Concepts**, [Sixth Edition]. McGraw-Hill Education (India) Private Limited, New Delhi.(UNIT I, II, IV (Storage and File Structure chapteronly))
2. *Alexis Leon and Mathews Leon* 2006, **Essentials of Database Management Systems**, Vijay Nicole Imprints Private Limited, Chennai. (UNIT III)
3. *Nilesh Shah* 2009, **Database Systems Using Oracle- A Simplified Guide to SQL and PL/SQL**, [Second Edition], PHI Learning Private Limited, New Delhi.(Unit IV and V)

Reference Books

1. *Date, C.J.* 1995, **An Introduction to Database Systems**, [Sixth Edition], Addison Wesley, USA.
2. *Raghu Ramakrishnan and Johannes Gehrke*, 2003, **Database Management Systems**, [Third Edition], Tata Mc - Graw Hill, New Delhi.

Course Outcomes:

- Students are able to understand the fundamental concepts of database management including database languages and database - system implementation.
- To understand basic SQL structure and Constraints.
- To know about the important the Normalizations
- To know about PL/SQL and File Storage structure.
- To understand cursors and Exception handling.

(Core Practical - 4)

Relational Data Base Management System - Lab

OBJECTIVES

The course aims

- Enhance the knowledge of SQL and PL/SQL.
- Understand the Relational model design.
- Solve Database problems using Procedures, Functions, Packages, and Triggers.

PROGRAMS

1. SQL Queries for DDL Commands.
2. SQL Queries for DML Commands.
3. Creating a Table to implement Integrity Constraints and Referential Integrity Constraints in Column and Table Level.
4. SQL Queries for Built-in functions.
5. SQL Queries for creating an Index, Synonym, and Sequence.
6. SQL Queries for creating a User and assigning privileges and roles.
7. Program using PL/SQL for preparing Students Mark Statement.
8. Program for Looping Statements using PL/SQL
9. Program using PL/SQL to prepare Employee Pay slip using Cursor.
10. Program using PL/SQL to implement Functions.
11. Program using PL/SQL to implement Procedures.
12. Program using PL/SQL to implement Triggers

Course outcomes:

- Students are able to Enhance the knowledge of SQL and PL/SQL.
- Students are able to Understand t about the Relational model design.
- Students are able to Solve Database problems using Procedures, Functions, Packages, and Triggers.

ALLIED 2

PAPER – 4

QUANTITATIVE TECHNIQUES – II

UNIT - I

Network scheduling by CPM/PERT - project network diagram - Critical path method (CPM) - PERT Computations.

UNIT - II

Inventory models - EOQ model (a) Uniform demand rate infinite production rate with no shortages (b) Uniform demand rate finite production rate with no shortages - Inventory control with Price Breaks.

UNIT - III

Sequencing problem - n jobs through 2 machines, n jobs through 3 machines - two jobs through m machines - n jobs through m machines.

UNIT - IV

Game Theory - Two person zero sum game - pure and mixed strategies - saddle point - domain and rule - graphical solution of rectangle games.

UNIT - V

Replacement problem - introduction - replacement of items that deteriorate with time - replacement of items that fail completely.

Recommended Text

Gupta P.K. and Hira D.S. (2000) *Problems in Operations Research*, S.Chand & Co. Delhi

Reference Books

1. J.K.Sharma, (2001) *Operations Research: Theory and Applications*, Macmillan, Delhi
2. Kanti Swaroop, Gupta P.K. and Manmohan, (1999) *Operation Research*, Sultan Chand & Sons., Delhi.
3. V.K.Kapoor [1989] *Operations Research*, sultan Chand & sons.
4. Ravindran A., Philips D.T. and Solberg J.J., (1987)*Operations research*, John Wiley & Sons, New York.
5. Taha H.A. (2003) *Operations Research*, Macmillan Publishing Company, New York.
6. P.R.Vittal (2003) *Operations Research*, Margham Publications, Chennai.
7. S.J.Venkatesan, *Operations Research*, J.S. Publishers, Cheyyar-604 407.
8. Arumugam & Issac, *Operation research - Vol. - I*, New Gamma Pub., House. Palayamkottai.

ALLIED PRACTICAL
QUANTITATIVE TECHNIQUES LAB

1. Solving Linear Programming Problem by graphical methods.
2. Solving Linear Programming Problem by simplex methods (Two variables three and more variables)
3. Solving Linear Programming Problem by Big M. methods
4. Solving Linear Programming Problem by Two phase method
5. Solving Linear Programming Problem by Duality
6. Solving Transportation problems (Balanced unbalanced)
7. Solving Assignment Problems (Balanced unbalanced)
8. Solving job sequencing Problems
9. Solving Problems related to game theory

SKILL BASED SUBJECT II

PAPER 2

SOFTWARE ENGINEERING

COURSE OBJECTIVES

The Course aims

1. To understand software engineering and project management
2. To understand the software requirements and engineering process.
3. To understand the architectural design
4. To understand the Software Testing and Validations
5. To understand the software cost estimation and quality management

UNIT - I

Introduction: FAQs about software engineering - Professional and ethical responsibility. **Software processes:** Software process models - Process iteration - Process activities - The Rational Unified Process. **Project management:** Management activities - Project planning - Project scheduling - Risk management.

UNIT - II

Software requirements: Functional and non-functional requirements - System requirements - The software requirements document. **Requirements engineering processes:** Feasibility studies - Requirements elicitation and analysis - Requirements validation. **System models:** Context models - Behavioral models - Data models - Object models - Structured methods.

UNIT - III

Architectural design: Architectural design decisions - System organization - Modular decomposition styles. **Distributed systems architectures:** Multiprocessor architectures - Client-server architectures - Distributed object architectures. **Object-oriented design:** Objects and object classes - An object-oriented design process - Design evolution.

UNIT - IV

Rapid software development: Agile methods - Extreme programming - Rapid application development - Software prototyping. **Verification and validation:** Planning verification and validation - Software inspections. **Software testing:** System testing - Component testing - Test case design - Test automation.

UNIT -V

Managing people: Selecting staff - Motivating people - Managing groups - The People Capability Maturity Model. **Software cost estimation:** Estimation techniques

- Algorithmic cost modelling (the COCOMO model). **Quality management:** Process and product quality -Quality assurance and standards - Quality planning - Quality control.

Textbook(S)

1. Ian Sommerville. 2009, **Software Engineering**, [Eighth Edition], Pearson Education Ltd, New Delhi

Reference Books

1. *Roger S.Pressman*.2010, **Software Engineering: A Practitioner's Approach**, [Seventh Edition]. McGraw Hill, Newyork.
2. *Deepak Jain*, 2009, **Software Engineering: Principles and Practices**, [First Edition]. Oxford University Press.
3. *Waman SJawadekar*, 2008, **Software Engineering: a Primer**, [First Edition]. Tata McGraw Hill, New Delhi.

Course Outcomes:

- Students are able to understand software engineering and project management
- Students are able to understand the software requirements and engineering process.
- Students are able to understand the architectural design
- Students are able understand about the Software Testing and Validations
- Students are able to understand the software cost estimation and quality management

NON-MAJOR ELECTIVE

PAPER-2

INTERNET TECHNOLOGY

OBJECTIVES

The subject aims to build the concepts regarding:

1. Fundamentals of Internet, Connectivity and its Resource Requirements.
2. To understand the Internet Technology and its applications
3. To Understand WWW and Web Browsers.
4. Mailing system and applications of Internet.
5. To Understand relay chat

UNIT-I

Introduction to internet: What is Internet? Evolution and History of Internet- Growth of Internet-Owners of Internet- Internet Services- How does the Internet Works?-Anatomy of Internet-Internet Addressing-Internet vs Intranet-Impact of Internet- Governance of Internet.

UNIT-II

Internet Technology and Protocol: ISO-OSI Reference Model-**Internet Connectivity:** Getting Connected- Different Types of Connections- Levels of Internet Connectivity- Internet Service Provider. **Internet Tools and Multimedia:** Current Trends on Internet-Multimedia and Animation.

UNIT-III

WWW and Web Browser: WWW-Evolution of Web-Basic Elements of WWW-Web Browsers- Search Engines- Search Criteria. **Web Publishing:** Web Publishing- Web Page Design.

UNIT-IV

Email: E-Mail Basics- E-Mail System-E-Mail Protocol-E-Mail Addresses-Structure of an E-Mail Message-E-Mail Clients&Servers-MailingList-E-MailSecurity.

UNIT-V

Usenet and Internet Relay Chat: What is Usenet?-Newsgroup Hierarchies-What is a Newsreader?- How do you Read Newsgroups?- Who Administers Usenet?- Common News reading Tasks- How to Read Articles from Network News?- Relationship between Netnews and E-Mail-What is IRC?-Channels-Nicknames- Microsoft NetMeeting. **Internet and Web Security:** Overview of Internet Security- Aspects and Need of Security-E-Mail Threats and Secure E-mail-Web Security and Privacy Concepts-Firewall.

TEXTBOOK:

1. *ISRD Group*. 2012. **Internet Technology and Web Design**. [Fourth reprint]. Tata McGraw-Hill Education Private Limited., New Delhi.

REFERENCE BOOKS:

1. *Deitel, H.M. Dietel, P.J. and Goldberg A.B.* 2008. **Internet & Worldwide Web- How to Program.** [Third Edition]. PHL, New Delhi.
2. *Comdex.* 2000. **Teach yourself computers and the internet visually.** [First Edition]. IDG Book India (p) Ltd.
3. *Ramachandran, T.M. Nambissan.* 2003. **An Overview of internet and web development.** [First Edition]. T M-Dhruv Publications.

COURSE OUT COMES :

6. Students understand the Fundamentals of Internet, Connectivity and its Resource Requirements.
7. Students understand the Internet Technology and its applications
8. Students Understand the basis of WWW and Web Browsers.
9. Students learn how to Mailing system and applications of Internet.
10. Students Understand relay chat that is how to read e- contents.

**SEMESTER V
CORE PAPER -5
MOBILE APPLICATIONS DEVELOPMENT**

Objectives:

This course aims to provide the students with a detailed knowledge on Mobile Application Development and Deployment about Android programming from basics to building mobile applications for digital world.

1. To understand the basics of smart phones and android platforms.
2. To understand the basic concepts of user interface related to app development.
3. To understand the important of data persistence in mobile environment.
4. To understand the various services and network facilities provided by android platform.
5. To understand the various apps deployed and developed on by mobile platform.

UNIT - I

INTRODUCTION TO ANDROID PLATFORM

Introduction to Mobile Application Development -Various platforms - Smart phones - Android platform: features - Architecture - Versions - ART (Android Runtime) - ADB (Android Debug Bridge) - Development environment/IDE: Android studio and its working environment - Emulator setup - Application framework basics - XML representation and Android manifest file - Creating a simple application.

UNIT - II

ANDROID UI DESIGN

GUI for Android: activities lifecycle - Android v7 support library - Intent: Intent object - Intent filters - Adding categories - Linking activities - User Interface design components - Basic Views - Picker Views - List View - Specialized Fragment - Gallery and Image View - Image Switcher - Grid View, Options Menu - Context Menu - Clock View - Web view - Recycler View.

UNIT - III

DATA PERSISTENCE

Different Data Persistence schemes: Shared preferences - File Handling - Managing data using SQLite database - Content providers: user content provider - Android in build content providers.

UNIT - IV

ANDROID SERVICES & NETWORK ENVIRONMENT

Services: Introduction to services - Local service - Remote service - Binding the service - Communication between service and activity - Intent Service - Multi-Threading : Handlers - Async Task - Android network programming: Http Url

Connection - Connecting to REST - based - SOAP based Web services - Broad cast receivers: Local Broadcast Manager - Dynamic broadcast receiver - System Broadcast - Telephony Manager: Sending SMS and making calls.

UNIT - V

ADVANCED APPLICATIONS

Location based services: Google maps V2 services using Google API - Animations and Graphics: Property Animation - View Animations - Drawable Animations - Media and Camera API: Working with video and audio inputs - camera API - Sensor programming: Motion sensors - Position sensors - Environmental sensors - Publishing Android Apps: Guide lines - policies and process of uploading Apps to Google play.

Text books:

1. “Head First: Android Development”, Dawn Griffiths, David Griffiths, OReilly, 1st Edition, 2015.
2. Barry Burd, “Android Application Development -All-in-one for Dummies”, 2nd Edition, Wiley India, 2016.

References:

1. “Professional Android™ Sensor Programming”, Greg Milette, Adam Stroud, John Wiley and Sons, Inc 2012.
2. “Android 6 for Programmers, App Driven approach”, Paul Deital, Harvey Deital, Alexander Wald, Prentice Hall, 2015.

Course outcomes:

- Students are able to understand the basics of smart phones and android platforms.
- Students are able to understand about the basic concepts of user interface related to app development.
- Students are able understand the importance of data persistence in mobile environment.
- Students are able to understand about the various services and network facilities provided by android platform.
- Students are able to understand about the various apps deployed and developed on by mobile platform.

CORE PAPER - 6

OPERATING SYSTEM

Objectives:

Enable the student to get sufficient knowledge on concepts, functions and various system resources of operating systems.

1. To understand the structure and functions of operating systems.
2. To understand the principles of scheduler, scheduler algorithms and Deadlock.
3. To learn various memory management schemes.
4. To study I/O management, File system and Mass Storage Structure.
5. To learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

UNIT - I

OPERATING SYSTEM BASICS

Basic Concepts of Operating System - Services of Operating System - Operating System Types - Computer System Operation - I/O Structure - Storage Structure - Memory Hierarchy - System Components - System Calls - System Programs - System Design and Implementation - Introduction to Process - Process State - Process Control Block - Process Scheduling - Operations on Process - Interprocess Communication - Communication in Client/Server Systems - Threads.

UNIT - II

CPU SCHEDULING ALGORITHM AND PREVENTION

Introduction - Types of CPU Scheduler - Scheduling Criteria - Scheduling Algorithms - Semaphores - Classic Problems of Synchronization - Basic Concept of Deadlocks - Deadlock Characterization - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection - Recovery of Deadlock.

UNIT - III

STORAGE MANAGEMENT

Memory Management - Basics Concept of Memory - Address Binding - Logical and Physical Address Space - Memory Partitioning - Memory Allocation - Paging - Segmentation - Segmentation and Paging - Protection - Fragmentation - Compaction - Demand Paging - Page Replacement Algorithm - Classification of Page Replacement Algorithm .

UNIT - IV

I/O SYSTEMS

File System Storage - File Concept - File Access Methods - Directory Structure - File Sharing - File Protection - File System Implementation - File System Structure -

Allocation Methods - Free Space Management - Mass Storage Structure - Disk structure - Disk Scheduling and Management - RAID Levels.

UNIT - V

CASE STUDIES

UNIX System - A Case Study - LINUX System - Case Study - Design Principles - Process Management - Scheduling - Memory Management - File Systems - Security .

Text books:

1. "Operating System Concepts" - Abraham Silberschatz Peter B. Galvin, G. Gagne, Sixth Edition, Addison Wesley Publishing Co., 2003.
2. "Operating System" - William Stalling, Fourth Edition, Pearson Education, 2003.

References:

1. "Operating systems -Internals and Design Principles", W. Stallings, 6th Edition, Pearson.
2. "Modern Operating Systems", Andrew S.Tanenbaum, Second Edition, Addison Wesley Publishing Co., 2001.
3. "Fundamentals of Operating System", Prof. R. Sriddhar, Dynaram Publication, Bangalore Company.

Course outcomes:

- Students are able to understand the structure and functions of operating systems.
- Students are able to understand the principles of scheduler, scheduler algorithms and Deadlock.
- Students are able to learn various memory management schemes.
- Students are able to study I/O management, File system and Mass Storage Structure.
- Students are able to learn the basics of UNIX, LINUX systems and perform administrative tasks on LINUX servers.

**SEMESTER V
CORE PAPER - 7
DATA MINING**

Objectives:

To enable the students to understand the importance of Data Mining and its techniques with recent trends and tools.

1. To understand about the basics of Data Mining and Data
2. To understand about the methods of Data Warehousing
3. To understand about the techniques of Data Mining
4. To understand about the importance of Cluster and outlier detection
5. To improve the student's knowledge with recent trends and tools

UNIT - I

DATA MINING BASICS

What is Data Mining - Kinds of Data - Kinds of patterns - Technologies used for Data Mining - Major Issues in Data Mining - Data - Data Objects and Attribute types - Data Visualization - Measuring Data Similarity and Dissimilarity - Data Preprocessing - overview - Data Cleaning - Data Integration - Data Reduction - Data Transformation and Data Discretization.

UNIT - II

DATA WAREHOUSING AND ONLINE ANALYTICAL PROCESSING

Data Warehouse - Basic concepts - Data Warehouse Modeling: Data Cube and OLAP - Data Warehouse Design and Usage - Data Warehouse Implementation - Data Generalization by Attribute - Oriented Induction - Data Cube Technology - Data Cube Computation Methods - Exploring Cube Technology - Multidimensional Data Analysis in cube space.

UNIT - III

PATTERNS AND CLASSIFICATION

Patterns - Basic concepts - Pattern Evaluation Methods - Pattern Mining: Pattern Mining in Multilevel - Multidimensional space - Constraint - Based Frequent Pattern Mining - Mining High Dimensional Data and Colossal patterns - Mining compressed or Approximate patterns - Pattern Exploration and Application. Classification - Decision tree Induction - Bayes Classification methods - Rule based Classification- Model Evaluation and selection - Techniques to Improve Classification Accuracy - Other Classification methods.

UNIT - IV

CLUSTERING AND OUTLIER DETECTION

Cluster Analysis - Partitioning Methods - Hierarchical Methods - Density - Based

Methods - Grid - Based Methods - Evaluation of Clustering. - Clustering High - Dimensional Data - Clustering Graph and Network Data - Clustering with Constraints - Web Mining - Spatial Mining. Outlier Detection - Outliers and Outliers Analysis - Outlier Detection Methods - Outlier Approaches - Statistical - Proximity - Based - Clustering - Based - Classification Based - High - Dimensional Data.

UNIT - V

RECENT TRENDS IN DATA MINING AND TOOLS

Other Methodologies of Data Mining - Data Mining Applications - Data Mining Trends - Recent Data Mining Tools - Rapid miner - Orange - Weka - Knime - Sisense - Ssdt (SQL Server Data Tools) - Oracle - Rattle - Data melt - Apache Mahout.

Text books:

1. “Data Warehousing Fundamentals”, PaulrajPonnaiah, Wiley Publishers, 2001.
2. “Data Mining: Concepts and Techniques”, Jiawei Han, MichelineKamber, Morgan Kaufman Publishers, 2006.
3. “Introduction to Data mining with case studies”, G.K. Gupta, PHI Private limited, New Delhi, 2008. 2nd Edition, PHI, 2011

References:

1. “Advances in Knowledge Discover and Data Mining”, Usama M. Fayyad, Gregory Piatetsky Shapiro, Padhrai Smyth RamasamyUthurusamy, the M.I.T. Press, 2007.
2. “The Data Warehouse Toolkit”, Ralph Kimball, Margy Ross, John Wiley and Sons Inc., 2002
3. “Building Data Mining Applications for CRM”, Alex Berson, Stephen Smith, Kurt Thearling, Tata McGraw Hill, 2000.
4. “Data Mining: Introductory and Advanced Topics”, Margaret Dunham, Prentice Hall, 2002.
5. “Discovering Knowledge in Data: An Introduction to Data Mining”, Daniel T. Larose John Wiley & Sons, Hoboken, New Jersey, 2004

Course outcomes:

- Students are able to understand about the basics of Data Mining and Data
- Students are able to understand about the methods of Data Warehousing
- Students are able to understand about the techniques of Data Mining
- Students are able to understand about the importance of Cluster and outlier detection
- Students are able to improve the student’s knowledge with recent trends and tools

**CORE PRACTICAL - Practical - 3
OPERATING SYSTEM LAB**

1. Basics of UNIX commands.
2. Shell Programming.
3. Implement the following CPU scheduling algorithms
 - a) Round Robin b) SJF c) FCFS d) Priority
4. Implement all file allocation strategies
 - a) Sequential b) Indexed c) Linked
5. Implement Semaphores
6. Implement all File Organization Techniques
 - a) Single level directory b) Two level c) Hierarchical d) DAG
7. Implement Bankers Algorithm for Dead Lock Avoidance
8. Implement an Algorithm for Dead Lock Detection
9. Implement all page replacement algorithms
 - a) FIFO b) LRU c) LFU
10. Implement Shared memory and IPC
11. Implement Paging Technique of memory management.
12. Implement Threading & Synchronization Applications.

(CORE PRACTICAL - Practical 4)

MOBILE APPLICATIONS DEVELOPMENT LAB

1. Develop an application that uses GUI components, Font and Colors.
2. Develop an application that uses Intent and Activity.
3. Develop an application that uses Layout Managers and event listeners.
4. Write an application that draws basic graphical primitives on the screen.
5. Develop an application that makes use of RSS Feed.
6. Implement an application that implements Multi-threading.
7. Develop an application that create alarm clock.
8. Develop an application Using Widgets.
9. Implement an application that writes data to the SD card.
10. Implement an application that creates an alert upon receiving a message.
11. Develop an application that makes use of database.

INTERNAL ELECTIVE
Paper-1
(Choose any one from three)

A. INFORMATION SECURITY

Objectives:

To enable the student to understand various methodologies available for securing information.

1. To understand the basic concepts of Information Security
2. To understand the legal, ethical and professional issues in Information Security
3. To know about risk management
4. To understand the technological aspects of Information Security
5. To understand the concepts of Cryptography and Hacking methods

UNIT - I

INFORMATION SECURITY BASICS

Introduction - History - What is Information Security? - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC-The Security SDLC.

UNIT - II

SECURITY INVESTIGATION

Security - Business Needs - Threats - Attacks - Legal - Ethical and Professional Issues - Relevant U.S. Laws - International Laws and Legal Bodies - Ethics and Information Security - Codes of Ethics and Professional Organizations

UNIT - III

SECURITY ANALYSIS

Risk Management - Introduction - An Overview of Risk Management - Risk Identification - Risk Assessment - Risk Control Strategies - Selecting a Risk Control Strategy - Quantitative versus Qualitative Risk Control Practices - Risk Management Discussion Points.

UNIT - IV

SECURITY MODELS

LOGICAL DESIGN - Blueprint for Security - Information Security Policy - Standards and Practices - ISO 17799/BS 7799 - NIST Models - VISA International Security Model - Design of Security Architecture - Planning for Continuity - Security Physical Design - Firewalls - Security Technology - IDS - IPS - Honey Pots - Honey Nets - Padded cell Systems Scanning and Analysis Tools - Access Control Devices.

UNIT - V

CRYPTOGRAPHY AND ETHICAL HACKING

Cipher methods - Cryptographic Algorithms and Tools - Attacks on Cryptosystems – Hacking - Effects of Hacking - Hacker - Types of Hacker - Ethical Hacker- Hactivism - Networking & Computer Attacks - Malicious Software (Malware) - Protection Against Malware - Intruder Attacks on Networks and Computers - Wireless Hacking - Windows Hacking - Linux Hacking Session.

Text books:

1. “Principles of Information Security”, Michael E Whitman and Herbert J Mattord, 5th Edition, Vikas Publishing House, New Delhi, 2003.
2. “Fundamentals of Information Systems Security”, David Kim, Michael G. Solomon, 3rd Edition, Jones & Bartlett Learning, October 2016.
3. “The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy”, Patrick Engebretson, 2nd Edition, Syngress Basics Series - Elsevier, 2011.
4. “Hands-On Ethical Hacking and Network Defense”, Michael T. Simpson, Kent Backman, James E. Corley, Second Edition, CENGAGE Learning, 2010.

References:

1. “Handbook of Information Security Management”, Micki Krause, Harold F. Tipton, sixth Edition, CRC Press LLC, 2004.
2. “Hacking Exposed”, Stuart McClure, Joel Scrambray, George Kurtz, Tata McGraw-Hill, 2003.
3. “Computer Security Art and Science”, Matt Bishop, 2nd Edition, Pearson/PHI, 2002.

COURSE OUTCOMES:

- Students are able to understand about the basic concepts of Information Security
- Students are able to understand about the legal, ethical and professional issues in Information Security
- Students are able to understand about risk management
- Students are able to understand about the technological aspects of Information Security
- Students are able to understand about the concepts of Cryptography and Hacking methods

INTERNAL ELECTIVE

Paper-1

B. Software Testing

Objectives:

To study the concepts of software engineering with the aim of acquiring skills to develop Software applications, following all standardized procedures and techniques.

1. To understand the concept of software testing, and software quality
2. To learn to inspect and detect errors by going through each and every code segment
3. To gain knowledge of various functional and structural testing techniques
4. To understand basic concept of Software Management tools and object oriented testing
5. To understand basic concept of Software quality and software quality assurance

UNIT - I

INTRODUCTION TO SOFTWARE TESTING

Fundamentals of software testing - need for software testing - Psychology of testing - various approaches - characteristics of testing - principles of testing - testing strategies - verification and validation - Defect and Prevention strategies.

UNIT - II

SOFTWARE DEVELOPMENT MODEL AND TESTING

Water fall model - V - model - Spiral model - Agile model - Life cycle of testing - Static Testing - dynamic testing - White box testing - Block box testing - Regression testing - Integration Testing - System and Performance Testing - Usability Testing

UNIT - III

FUNCTIONAL AND STRUCTURAL TESTING

Boundary Value Analysis - Equivalence Class Testing - Decision Table - Based Testing - Cause Effect Graphing Technique - Path testing - Cyclomatic Complexity - Graph Metrics - Data Flow Testing - Slice based testing.

UNIT - IV

TEST MANAGEMENT AND TOOLS

Test planning - cost - benefit analysis of testing - monitoring and control - Test reporting - Test control - Specialized testing - Object Oriented Testing - Automated Tools for Testing - Tool Selection and Implementation - Challenges in test automation - GUI Testing

UNIT - V

SOFTWARE QUALITY AND SOFTWARE QUALITY ASSURANCE

Introduction to software quality and software quality assurance - basic principles about the software quality and software quality assurance - Planning for SQA - various models for software product quality and process quality - SCM - RAD - System Documentation

Text books:

1. “Software Testing - A Craftsman’s Approach” - Paul C. Jorgensen -Second Edition - CRC Press 2008
2. “Software Testing”, - Ron Patton, Second Edition - Sams Publishing, Pearson Education, 2007.
3. “Software Testing - A Craftsman’s Approach” - Paul C. Jorgensen, Second Edition - CRC Press, 2008

References:

1. “Software Testing and Analysis: Process, Principles and Techniques” -Mauro Pezze, Michal Young -Wiley India , 2008
2. “Software Engineering” -K.K. Aggarwal&Yogesh Singh -New Age International Publishers -New Delhi, 2003.
3. “Software Testing -Principles and Practices” -SrinivasanDesikan and Gopalaswamy Ramesh, Pearson Education, 2006.

Course outcomes:

- Students are able to understand the concept of software testing, and software quality
- Students are able to learn to inspect and detect errors by going through each and every code segment
- Students are able to gain knowledge of various functional and structural testing techniques
- Students are able to understand basic concept of Software Management tools and object oriented testing
- Students are able to understand basic concept of Software quality and software quality assurance

INTERNAL ELECTIVE

Paper-1

C. INTERNET OF THINGS

Objectives:

This course presents the Introduction to IoT, M2M, IoT Architecture, IoT Model And Views, IOT protocols and Real world design constraints enable the students to learn the concepts of IoT.

1. To understand the fundamentals of Internet of Things.
2. To understand the M2M and IoT Architecture
3. To understand the IoT Model And Views
4. To learn about the basics of IOT protocols.
5. Analyze applications of IoT in real time scenario.

UNIT - I

INTRODUCTION TO IoT

Introduction to Internet of Things - Definition and Characteristics of IoT - Physical Design - Logical Design - IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - Home - City - Environment - Energy - Retail - Logistics - Agriculture - Industry - health and Lifestyle.

UNIT - II

M2M and IoT ARCHITECTURE

IoT and M2M - Difference between IoT and M2M - SDN - IoT System Management with NETCONF - YANG - IoT Platforms Design Methodology - M2M high - level ETSI architecture - IETF architecture for IoT - OGC architecture - Service Oriented Architecture - IoT reference architecture

UNIT - III

IoT MODEL AND VIEWS

IoT reference model - Domain model - information model - functional model - communication model - Functional View - Information View - Deployment and operational View - other relevant architectural views - data representation and visualization.

UNIT - IV

IoT PROTOCOLS

Protocol Standardization for IoT - Efforts - M2M and WSN Protocols - SCADA and RFID Protocols - Unified Data Standards - Protocols - IEEE 802.15.4 - BACNet Protocol - Modbus - Zigbee Architecture - Network layer - 6LowPAN - CoAP - Security

UNIT - V**REAL - WORLD APPLICATIONS**

Real world design constraints - Applications - Asset management, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT - Software & Management Tools for IoT Cloud Storage Models & Communication APIs - Cloud for IoT - Amazon Web Services for IoT.

Text books:

1. "Interconnecting Smart Objects with IP: The Next Internet", Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann, 2010.
2. Internet of Things -A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015.
3. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014.

References:

1. "Internet of Things -A hands-on approach", ArshdeepBahga, Vijay Madisetti, Universities Press, 2015
2. "Architecting the Internet of Things", DieterUckelmann, Mark Harrison, Michahelles, Florian (Eds), Springer, 2011.
3. "The Internet of Things in the Cloud: A Middleware Perspective", Honbo Zhou, CRC Press, 2012.
4. "From Machine-to-Machine to the Internet of Things -Introduction to a New Age of Intelligence", Jan Ho"ller, VlasiosTsiatsis, Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand, David Boyle, Elsevier, 2014.
5. "The Internet of Things -Key applications and Protocols", Olivier Hersent, David Boswarthick, Omar Elloumi ,Wiley, 2012.

Course outcomes:

- Students are able to understand the fundamentals of Internet of Things.
- Students are able to understand about M2M and IoT Architecture
- Students are able to understand the IoT Model And Views
- Students are able to learn about the basics of IOT protocols.
- Students are able to analyze applications of IoT in real time scenario.

**SKILL BASED SUBJECT
PAPER -3**

Multimedia systems

Objectives:

This course presents the Introduction to Multimedia, Images & Animation and enables the students to learn the concepts of Multimedia.

1. To Learn about fundamentals of Multimedia.
2. To Learn how to make Video and Animation.
3. To Learn how to Create Presentation in Multimedia.
4. To Learn how to Create Sound Links in Multimedia.
5. To Learn about Imaging Special Visual Effects in Multimedia.

UNIT - I

INTRODUCTION TO MULTIMEDIA

Introduction to Multimedia PCs - Components of Multimedia - Multimedia Tools - Sound and Graphics - Digital Sound - Editing and Mixing sound files - MIDI creation - Tracking Procedure - Interactive and Non Interactive Graphics - High Resolution Graphics - Difference between TV and Computer Display.

UNIT - II

VIDEO AND ANIMATION:

Digital Image concepts - Video Capturing -Scanning Images - Digital Filters - Morphing and Warping - Two Dimensional and Three dimensional animation - Animation Tools - Layering technique - Blue Screen technique - Latest movie technologies - Motion Tracking System - Motion Capturing System.

UNIT - III

CREATING PRESENTATION:

Script Writing and creating interactive and non-interactive presentation - Linear and Non Linear Editing - Authoring Tools - File Formats SOUND -VIDEO - ANIMATION - Presentation Images - Multimedia Programming - Text Links - Hyper Text system - Form Creation - File storing - Error Trapping.

UNIT - IV

SOUND LINKS:

Multimedia interfaces - MCI - API - High Level Multimedia Functions - WAVE, MIDI file processing - Animation - Color Palette - Events - ROPs.

UNIT - V

IMAGING SPECIAL VISUAL EFFECTS:

Bitmap - Brushes - Dissolve - Hotspot Editor - Scrolling - Media Control Interface: Simple Commands - API functions - CD player - Video Capturing - Form - AVI Play Form.

Text books:

1. "Introduction to Multimedia System", KaliyaperumalKarthikeyan, LAP Lambert Academic Publishing, 2011.
2. "Multimedia Making It Work ",TayVaughan, Tata McGraw-Hill Publishing Company, Eighth Edition, 2011.
3. "Multimedia Systems", ParagHavaladar and Gerald Medioni, Cengage Learning, 2011.
4. "Multimedia Systems", S. K. Bansal, Aph Publishing Corporation, 2011.

References:

1. "Multimedia Handbook", Keyes, TMH, 2000.
2. "Multimedia Computing Communications & Applications", R. Steinmetz and K. Naharstedt, Pearson, Delhi. 2001.
3. "Advanced Multimedia Programming", S. Rimmer, PHI, New Delhi, 2000.

Course outcomes:

- Students are able to Learn about fundamentals of Multimedia.
- Students are able to learn how to make Video and Animation.
- Students are able to Learn how to Create Presentation in Multimedia.
- Students are able to Learn how to Create Sound Links in Multimedia.
- Students are able to Learn about Imaging Special Visual Effects in Multimedia.

**SEMESTER VI
CORE PAPER - 8**

Open Source Software

Course Objectives

1. To understand the basics of open source software
2. To familiarize with open source software licensing models
3. To learn to use open source software for development
4. To understand the basics of open source software operating systems
5. To educate the fundamentals of open source software databases

UNIT - I

INTRODUCTION: Objectives, Overview of Open Source System, Open source tools, Open source components, Open source methodology, Open Source Software Development Models, The FOSS Philosophy, Social and Cultural Impacts

UNIT - II

LICENSING: Licensing, Types of licensing, Intellectual Proprietary Right, Commercial License versus Open Source License - Open Source Licensing: Contract, and Copyright Law - Basic Principles of Copyright Law, Contract and Copyright, Open Source Software Licensing, Types of OSS licenses, OSS licensing strategies, Issues with Copyrights and Patents, Warranties - The MIT (or X) License, The BSD License, The Apache License, Versions of Apache License - Academic Free Licenses, Provisions under Academic Free License (v2.0), Applications of AFL, Philosophy of Open Source License

UNIT - III

OPEN SOURCE DEVELOPMENT: Infrastructure Needed for an Open-Source Project, Public code archive, Project documentation, Bug database, Open mailing lists and newsgroup, Project website, Software Development Life Cycle, Building a Community - Joining an Existing Open Source Project, To become a good community member, To adopt development process of OSS, Get the contributions accepted, Ending an Open-Source Project, Open Source Within a Company

UNIT - IV

OPEN SOURCE OPERATING SYSTEM (SHELL PROGRAMMING): Bash Shell Scripting, Executing Script, Working with Variables and Input, Using Control Structures, Handling signals, creating functions, working sed and gawk, working with web using shell script: Downloading web page, Converting Web page content to a text file, parsing data, working cURL.

UNIT - V

OPEN SOURCE DATABASE AND APPLICATION: MySQL: Configuring MySQL Server, working with MySQL Databases, MySQL Tables, SQL Commands - INSERT, SELECT, UPDATE, REPLACE, DELETE. Date and Time functions in MySQL. PHP - MySQL Application Development: Connecting to MySQL with PHP, Inserting data with PHP, Retrieving data with PHP

Textbook

1. Prof. Dayanand Ambawade, Deven Shah, "Linux Labs And Open Source Technologies", Dream Tech Press, 2014
2. Julie C Meloni, "PHP, MySQL and Apache", Pearson Education, 2009

Reference Book

1. Peterson, "The Complete Reference Linux", Tata McGraw HILL, 2010
2. Steve Suehring, Tim Converse and Joyce Park, "PHP6 and MySQL Bible", Wiley-India, New Delhi, 2009

Course Outcomes

- The student will be able to understand the basics of open source software
- The student will be able to develop software under various open source software licensing models
- The student will be able to develop applications using open source software
- The student will be able to use open source software operating systems
- The student will be able to develop applications that uses open source software databases

CORE PAPER - 8
Python Programming

Course Objectives

1. To understand the basics of python programming language
2. To familiarize with control flow statements, exceptions and string manipulations
3. To learn to use the python built-in functions: tuple, zip and set
4. To understand the basic python list operations
5. To educate the fundamentals of python OOPS concepts.

UNIT - I

Identifiers -Keywords - Statements and Expressions - Variables - Operators - Arithmetic operators - Assignment operators - Comparison operators - Logical operators - Bitwise operators - Precedence and Associativity - Data types - Number - Booleans - Strings - Indentation - Comments - Single line comment - Multiline comments - Reading Input - Print Output - Type Conversions - int function - float function - str() function - chr() function - complex() function - ord() function - hex() function - oct() function - type() function and Is operator - Dynamic and Strongly typed language.

UNIT - II

Control Flow Statements - If statement - If else statement - If elif else statement - nested if statement - while loop - for loop - continue and break statements - catching exceptions using try and except statement - syntax errors - exceptions - exception handling - Strings - str() function - Basic string operations - String comparison - Built in functions using strings - Accessing characters in string - String slicing - String joining - split() method - string traversing

UNIT - III

Functions - Built in functions - function definition and calling - return statement - void function - scope and lifetime of variables - args and kwargs - command line arguments - Tuples - creation - basic tuple operations - tuple() function - indexing - slicing - built-in functions used on tuples - tuple methods - packing - unpacking - traversing of tuples - populating tuples - zip() function - Sets - Traversing of sets - set methods - frozenset.

UNIT - IV

Lists: Using List - List Assignment and Equivalence - List Bounds - Slicing - Lists and Functions - Prime Generation with a List. List Processing: Sorting - Flexible Sorting - Search - List Permutations - Randomly Permuting a List - Reversing a List..

UNIT - V

Objects: Using Objects - String Objects - List Objects. Custom Types: Geometric Points - Methods - Custom Type Examples - Class Inheritance. Handling Exceptions: Motivation - Exception Examples - Using Exceptions - Custom Exceptions.

Text Books

1. Gowrishankar S, Veena A, “Introduction to Python programming”, 1st Edition, CRC Press/Taylor & Francis, 2008. (Units 1-3)
2. Learn to Program with Python, 3th Edition, Richard L. Halterman, Southern Adventist University. (Units 4-5)

References

1. Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.
2. Jake VanderPlas,”Python Data Science Handbook:Essential Tools for working with Data”,1st edition, O’Reilly Media, 2016.

Course Outcomes

- The student will be able to understand the basics of python programming.
- The student will be able to develop string manipulation programs with exception handling
- The student will be able to invoke the built-in functions
- The student will be able to develop list manipulation programs
- The student will be able to develop python based OOPS programs

(Core Practical Paper 3)

Open Source Software Lab

1. Creating a basic website using HTML. The website should contain the following pages:
 - a. User Registration page, Login Page, Home Page
 - b. Profile page, Product details page
 - c. Shopping Cart page and Payment Page
2. Implement CSS for the website using inline, internal and external Stylesheets
3. Event Handling in the website using JavaScript
4. Validate the registration, user login and payment details using JavaScript
5. Design a scientific calculator using JavaScript
6. Implement the following using JavaScript:
 - a. Find factorial of the given number.
 - b. Find if a given number is an Armstrong number
 - c. Find if a given number is Automorphic
7. Create an XML document, which contains 10 users information. Implement a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.
8. Create an XML document for library. Display the books for any particular subject in table form using XSLT.
9. Handling form elements in servlets.
10. Program for finding whether a given number is palindrome or not using JSP
11. Create user information and product information table in MySQL database and perform user verification via JSP

(Core Practical Paper - 4)

Python Programming Lab

List of Experiments

1. Write a Python program to find the area and perimeter of a circle.
2. Write a Python program to generate Fibonacci series.
3. Write a Python program to compute the GCD of two numbers.
4. Write a Python program to generate first n prime numbers.
5. Write a Python program to find the sum of squares of n natural numbers.
6. Write a Python program to find the sum of the elements in an array.
7. Write a Python program to find the largest element in the array.
8. Write a Python program to check if the given string is a palindrome or not.
9. Write a Python program to store strings in a list and print them.
10. Write a Python program to find the length of a list, reverse it, copy it and then clear it.

References

1. Core Python Programming, 2thEdition, Wesley J. Chun, Prentice Hall.

INTERNAL ELECTIVE
Paper - 2
(Choose any ONE of Three)

A. Computer Organization and Architecture

Course Objectives:

1. To acquaint students with the basic concepts of fundamental component, architecture, register organization and performance metrics of a computer.
2. To impart the knowledge of data representation in binary and understand implementation of arithmetic algorithms in a typical computer.
3. To teach students how to describe machine capabilities and design an effective data path design for instruction execution.
4. To introduce students to syntax and semantics of machine level programming.
5. To make students understand the importance of memory systems, IO interfacing techniques and external storage and their performance metrics for a typical computer. And explore various alternate techniques for improving the performance of a processor.

UNIT - I

INTRODUCTION AND OVERVIEW OF COMPUTER ARCHITECTURE:

Introduction to computer systems - Overview of Organization and Architecture - Functional components of a computer - Registers and register files-Interconnection of components - Organization of the von Neumann machine and Harvard architecture - Performance of processor

UNIT - II

DATA REPRESENTATION AND COMPUTER ARITHMETIC: Fixed point representation of numbers - algorithms for arithmetic operations: multiplication (Booths, Modified Booths) - division (restoring and non-restoring) - Floating point representation with IEEE standards and algorithms for common arithmetic operations - Representation of non-numeric data (character codes).

UNIT - III

FUNDAMENTALS OF COMPUTER ARCHITECTURE: Introduction to ISA (Instruction Set Architecture) - Instruction formats - Instruction types and addressing modes - Instruction execution (Phases of instruction cycle) - Assembly language programming - Subroutine call and return mechanisms - Single cycle Data path design - Introduction to multi cycle data path - Multi cycle Instruction execution.

UNIT - IV

MEMORY SYSTEM ORGANIZATION AND ARCHITECTURE: Memory systems hierarchy - Main memory organization - Types of Main memory - memory inter - leaving and its characteristics and performance - Cache memories: address mapping-line size - replacement and policies - coherence - Virtual memory systems – TLB - Reliability of memory systems - error detecting and error correcting systems

UNIT - V

INTERFACING AND COMMUNICATION: I/O fundamentals: handshaking, buffering-I/O techniques: programmed I/O, interrupt-driven I/O, DMA - Interrupt structures: vectored and prioritized-interrupt overhead - Buses: Syn - chronous and asynchronous - Arbitration. External storage systems - organization and structure of disk drives: Electronic - magnetic and optical technologies - RAID Levels - I/O Performance

Textbook:

1. David A. Patterson and John L. Hennessy Computer Organization and Design-The Hardware/Software Interface 5th edition, Morgan Kaufmann, 2013.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Computer organization, McGraw Hill, Fifth edition, Reprint 2011.

Reference Book:

1. W. Stallings, Computer organization and architecture, Prentice-Hall, 8th edition, 2013

Course Outcomes

- The student will be able to do understand the overview of computer architecture
- The student will be able to understand the computer arithmetic
- The student will be able to the basics of computer architecture
- The student will be able to understand the memory architecture
- The student will be able to recognize interface and communication architecture

INTERNAL ELECTIVE

Paper - 2

B. SOFTWARE METRICS

Objectives:

1. To understand basic concepts of software metrics.
2. To learn about framework for software measurement
3. To know the basic knowledge of Software metric data collections
4. To understand the Analyzing Software Measurement Data
5. To know about Software Engineering Measurement

UNIT - I

INTRODUCTION TO SOFTWARE METRICS

Measurement in Software Engineering - Scope of Software Metrics - Representational Theory of Measurement - Measurement and Models - Measurement Scales and Scale Types - Meaningfulness in Measurement .

UNIT - II

FRAMEWORK FOR SOFTWARE MEASUREMENT

Classifying Software Measures: Processes - Products - Resources - Determining What to measure - Applying the Framework - Software Measurement Validation - Performing Software measurement Validation.

UNIT - III

SOFTWARE METRICS DATA COLLECTION

Defining Good Data: The Problem with Problems - Failures - Faults - Challenges - How to Collect Data: Data Collection Forms - Data Collection Tools - Reliability of Data Collection Procedures.

UNIT - IV

ANALYZING SOFTWARE MEASUREMENT DATA

Statistical Distributions and Hypothesis Testing - Classical Data Analysis Techniques: Nature of the Data - Purpose of the Experiment - Decision Tree - Examples of Simple Analysis Techniques: Box Plots, Bar Charts, Control Charts, Scatter Plots, Measures of Association, Linear Regression and Multivariate Regression.

UNIT - V

SOFTWARE ENGINEERING MEASUREMENT

Properties of Software Size - Code Size - Design Size - Requirements Analysis and Specification Size - Functional Size Measures and Estimators - Applications of Size Measures - Problem, Solution Size, Computational Complexity. Overview of

Measures Internal Product Attributes and Overview of measuring External Product Attributes.

Text Book:

1. Software Metrics: A Rigorous and Practical Approach, Third Edition , Norman Fenton and James Bieman, Nov 2014

Reference Books:

1. Metrics-Driven Enterprise Software Development , Datta and Sd , Cengage Learning Books Publishers, January 2014.
2. Software Metrics A Complete Guide - 2019 Edition, Blokdyk Gerardus, 5starcooks Publishers.

COURSE OUTCOMES

- Students are able to understand basic concepts of software metrics.
- Students are able to learn about framework for software measurement
- Students are able to know the basic knowledge of Software metric data collections
- Students are able to understand the Analyzing Software Measurement Data
- Students are able to know about Software Engineering Measurement

INTERNAL ELECTIVE

Paper - 2

C. WIRELESS DATA COMMUNICATION

Objectives:

1. This course introduces the concepts and theories of networking
 2. To apply them to various situations, classifying networks, analyzing performance and implementing new technologies.
 3. To implement the various new wireless technologies.
 4. To implement the various TCP/IP protocols.
 5. To implement the various security threads.
- .

UNIT - I

BASIC CONCEPTS OF OSI LAYERS

Data Communication - Networks - Protocol and Standards - Line Configuration - Topology - Transmission Modes - Categories of Networks - Internetworks - OSI Models - Functions of OSI Layers.

UNIT - II

SIGNALS AND TRANSMISSION MEDIA

Analog and digital - Periodic and Non Periodic signals - Analog Signals - Time And Frequency Domain - Composite Signals - Digital signals - Guided Media - UnGuided Media - Transmission Impairment - Performance.

UNIT - III

ERROR DETECTION, CORRECTION AND DATA LINK CONTROL

Type of errors - Detection - Vertical Redundancy Check (VRC) - Longitudinal Redundancy Check (LRC) Cyclic Redundancy Check (CRC) - check sum - Error Corrections - Flow Control - Error Control.) **SWITCHING & NETWORK DEVICES:** Circuit Switching - Packet Switching - Message Switching Repeaters - Bridges - Routers - Gateways - other Devices - Routing Algorithms - Distance Vectors Routing - Link State Routing.

UNIT - IV

WIRELESS NETWORKS

Wireless LAN: Advantages and Disadvantages-Infrared Vs Radio Transmission - Infrastructure Networks - Ad hoc Networks -Bluetooth- Wireless ATM: Working Group Services - Reference Model - Functions - Radio Access Layer - Handover - Handover reference model - Requirements and Types.

UNIT - V

TCP/IP PROTOCOL SUITE: PART I, PROTOCOLS & NETWORK SECURITY

Overview Of TCP/IP - Network Layer - Addressing - Subnetting - Other Protocols In The Network Layer - Transport Layer - Client/Server Model - Boot Strap Protocol and DHCP - Domain Name System (DNS) - Tel Net - File Transmission Protocol (FTP) - Simple Mail Transfer Protocol (SMTP) - SNMP Protocol - Hyper Text Transmission Protocol (HTTP) - World Wide Web (WWW) - Four Aspects of Security - Privacy - Digital Signature - PGP - Access Authorization.

Text Book:

1. Data Communication and Networking 2nd Edition Behrouz A. Forouzan, McGraw Hill Education 2014.
2. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley, 2002, ISBN 0471419028.

Reference books:

1. Data and Communication Network, William Stalling PHI 2014.
2. Computer Networks, Andrew S. Tanenbaum , David J. Wetherall, 5th Edition, Prentice Hall. 2010

E References

1. <http://nptel.ac.in/video.php?subjectId=117102062>

COURSE OUTCOMES:

- Students are able to understand the concepts of basic OSI layers.
- Students are able to understand the concepts of signals and transmission media.
- Students are able to understand the basic concepts of error detection and DLC
- Students are able to understand the Characterize of wireless transmission technologies
- Students are able to understand the concepts of Security

INTERNAL ELECTIVE

Paper - 3

A. Web Technology

Course Objectives

1. To comprehend and analyze the basic concepts of web programming and internet protocols.
2. To describe how the client-server model of Internet programming works.
3. To demonstrates the uses of scripting languages and their limitations.

UNIT - I

INTRODUCTION TO INTERNET: Internet Overview - Networks - Web Protocols - Web Organization and Addressing - Web Browsers and Web Servers - Security and Vulnerability - Web System Architecture - URL - Domain Name - Client-side and server-side scripting

UNIT - II

WEB DESIGNING: HTML5 - Form elements, Input types and Media elements, CSS3 - Selectors, Box Model, Backgrounds and Borders, Text Effects, Animations, Multiple Column Layout, User Interface.

UNIT - III

SCRIPTS: Client side scripting, What is Javascript, How to develop Javascript, simple Javascript, variables, functions, conditions, loops and repetition - Javascript and objects, Javascript ownobjects, the DOM and web browser environments, forms and validations - DHTML - Combining HTML, CSS and Javascript, events and buttons, controlling your browse

UNIT - IV

XML: Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT

UNIT - V

PHP: Starting to script on server side, Arrays, function and forms, advance PHP - Databases: Basic command with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHP my admin and database bugs.

Textbook:

1. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education.

Reference book:

1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.

Course Outcomes

- The student will be able to understand Internet architecture
- The student will be able to do Web designing using HTML
- The student will be able to develop client-side validation scripts
- The student will be able to understand XML processing
- The student will be able to develop server-side validation scripts

INTERNAL ELECTIVE

Paper - 3

B. SOFTWARE DESIGN

Course Objectives

1. To comprehend and analyze the basic concepts of software design.
2. To describe the modeling and design of software.
3. To demonstrate the software design using use-cases

UNIT - I

INTRODUCTION: Software Modeling - Object oriented Methods and UML - Software Architectural design - Method and Notation - Evolution of Software Modeling and Design Methods - Overview of UML Notations - Software Life cycles and UML Processes - Software Life cycle and Models - Design Verification and Validation - Software Design and Architectural Concepts Structured Design - Design Principles - Problem Partitioning and Hierarchy - Abstraction, Modularity - Top-down and Bottom-up Strategies - Transformation of a DFD to a Structure Chart - Transform Analysis - Transaction Analysis - Coupling - Cohesion - Multiple types of Cohesion in a module - Data Design - Normalization - Denormalization - Procedural Design - Design Patterns - Requirements analysis and Design Modeling - Designing Software Architectures.

UNIT - II

SOFTWARE MODELING: Use case Modeling - Use case - Conceptual model - Behaviour - Class Analysis Patterns - Overview - Diagrams - Aggregation - UML - Diagrams - Collaboration - Sequence - Class - Design patterns and Frameworks - Static Modeling - Association between classes - Composition and Classification Hierarchies - Constraints - Static Modeling and the UML - Categorization of classes using UML stereotypes - Modeling External Classes - Static Modeling of Entity Classes - Object and class Structuring.

UNIT - III

DETAILED DESIGN: Dynamic Interaction Modeling - Object Interaction Modeling - Message Sequence Numbering on Interaction Diagram - Dynamic Interaction Modeling - Stateless Dynamic Interaction Modeling - Finite State Machines and State Transitions - Events, Guard Conditions and Actions - Hierarchical State charts - Guidelines for designing State Charts - Steps in State Dependent Dynamic Interaction Modeling - Modeling Interaction Scenarios using Interaction and State Chart Diagrams. Real-World Problems Design based on State Charts, Sequence Diagram,

UNIT - IV

ARCHITECTURAL DESIGN: Software Architecture and Component Based Software Architecture - Multiple views of Software Architecture and Patterns - Documenting Software Architecture - Interface Design - Designing Software Architecture - Software Sub system Architectural Design - Designing Object oriented Software Architecture - Designing Component Based Software Architecture

UNIT - V

CASE STUDIES: Designing Concurrent and Real time Software Architectures - Designing Software Product Line Architectures - Software Quality Attributes - Case Studies - Client - Server Software Architecture Case Study - Component Based Software Architecture - Case Study - Real Time Software Architecture. Domain Name System - Email - World Wide Web (HTTP) - Simple Network Management Protocol - File Transfer Protocol - Security - Multimedia applications.

Text Books

1. Hassan Gomma, “Software Modeling and design with UML”, Cambridge University Press, 1 edition, 2011.
2. Michael Bigrigg, “Software Design Specification with UML”, Addison- Wesley, 2007.

References

1. David Budgen, “Software Design”, Addison-Wesley, 2007.
2. Christopher Fox, “Introduction to Software Engineering Design: Processes, Principles and Patterns with UML2”, Pearson, 2007.

Course Outcomes

- The student will be able to understand the overview of software modeling
- The student will be able to model new software
- The student will be able to design new software
- The student will be able to practice various architectural styles for software design
- The student will be able to demonstrate the software design using several use-cases

INTERNAL ELECTIVE

Paper - 3

C. SOFTWARE QUALITY ASSURANCE

Course Objectives

1. To comprehend and analyze the basic concepts of software quality assurance.
2. To describe software. Project lifecycle together with SQA components
3. To describe software. Project lifecycle together with SQ Infrastructure components
4. To describe software. Project lifecycle together with SQmanagement components
5. To proficient with SQA standards and best practices

UNIT - I

INTRODUCTION: Need for Software quality - Quality Challenge - Software Quality Factors - Components of the Software Quality Assurance (SQA). Pre-Project Quality Components - Contract Review - Development and Quality Plans

UNIT - II

SOFTWARE PROJECT LIFE CYCLE & SQA COMPONENTS: Identifying & Integrating Quality Activities in the Project Life Cycle - Verification & Validation - Reviews - Software Testing - Strategies - Software Testing Methods - Software Testing Implementation - Assuring the Quality of Software Maintenance - Assuring the Quality of External Participants' Parts - CASE Tools for software quality - Software maintenance quality.

UNIT - III

SOFTWARE QUALITY INFRASTRUCTURE COMPONENTS: Procedures and Work Instructions - Supporting Quality Devices - Staff Training Instructing and Certification - Preventive and Corrective Actions - Configuration Management - Software Change Control - Configuration Management - Documentation and Quality Records Controls.

UNIT - IV

SOFTWARE QUALITY MANAGEMENT COMPONENTS: Project Progress Control - components of project progress control - Progress control of internal projects and external participants - Implementation of project progress control. Total Quality Management (TQM) - Software Quality Metrics Analysis - Objectives of quality measurement - Process metrics - Product metrics. Estimation of a Software Quality Program - Software Quality Costs - Objectives of cost of software quality metrics - classic model of cost of software quality.

UNIT - V

STANDARDS - CERTIFICATION AND ASSESSMENT: SQA Standards - ISO 9001 Certification - Software Process Assessment. Organizing for Quality Assurance - Capability Maturity Model - SEI CMM Level 5 - Comparison of ISO 9000 Model with SEI's CMM - Management and its Role in Quality Assurance - The Software Quality Assurance Unit - SQA Trustees and Committees

Text Books

1. Daniel Galin - "Software Quality Assurance: From Theory to Implementation" - Pearson Addison-Wesley, 2012.
2. Allen Gilles, "Software quality: Theory and management" - International Thomson - Computer press, 1997.

References

1. Stephen H.Kan - "Metrics and models in software quality Engineering" - Addison-Wesley, 1955.
2. Roger S. Pressman - "Software Engineering-A Practitioner's Approach" - McGraw Hill pub, 2001.
3. Humphrey Watts - "Managing the Software process", Addison Wesley, 1986

Course Outcomes

- The student will be able to understand the concepts of software quality assurance
- The student will be able to design software project lifecycle and devise SQ components
- The student will be able to design SQ Infrastructure components
- The student will be able to design and demonstrate SQ management components
- The student will be able to demonstrate best practices for software quality

**SKILL BASED SUBJECT
PAPER- 4**

SOFTWARE PROJECT MANAGEMENT

Course Objectives

1. To understand the basics of project estimation and project planning
2. To familiarize with project lifecycle and effort estimation
3. To learn to assess the activity planning and risk management
4. To understand the basics of project management
5. To educate the fundamentals of staffing in software project

UNIT - I

PROJECT ESTIMATION AND PROJECT PLANNING: Importance of Software Project Management - Activities Methodologies - Classification of Software Projects - Setting objectives - Management Principles - Management Control - Project portfolio Management - Cost-benefit evaluation technology - Risk evaluation - Strategic program Management - Stepwise Project Planning.

UNIT - II

PROJECT LIFE CYCLE AND EFFORT ESTIMATION: Software process and Process Models - Choice of Process models - mental delivery - Rapid Application development - Agile methods - Extreme Programming - SCRUM - Managing interactive processes - Basics of Software estimation - Effort and Cost estimation techniques - COSMIC Full function points - COCOMO II A Parametric Productivity Model - Staffing Pattern.

UNIT - III

ACTIVITY PLANNING AND RISK MANAGEMENT: Objectives of Activity planning - Project schedules - Activities - Sequencing and scheduling - Network Planning models - Forward Pass & Backward Pass techniques - Critical path (CRM) method - Risk identification - Assessment - Monitoring - PERT technique - Resource Allocation - Creation of critical patterns - Cost schedules.

UNIT - IV

PROJECT MANAGEMENT AND CONTROL: Framework for Management and control - Collection of data - Visualizing progress - Cost monitoring - Earned Value Analysis - Prioritizing Monitoring - Project tracking - Change control - Software Configuration Management - Managing contracts - Contract Management.

UNIT - V

STAFFING IN SOFTWARE PROJECTS: Managing people - Organizational behavior - Best methods of staff selection - Motivation - The Oldham - Hackman job characteristic model - Stress - Health and Safety - Ethical and Professional concerns - Working in teams - Decision making - Organizational structures - Communications genres - Communication plans - Leadership.

Text book:

1. Bob Hughes, Mike Cotterell and Rajib Mall: Software Project Management -Fifth Edition, Tata McGraw Hill, New Delhi, 2012.
2. PankajJalote, Software Project Management in Practice, Addison-Wesley Professional, 2002.

References:

1. Robert K. Wysocki —Effective Software Project Management -Wiley Publication, 2011.
2. Walker Royce: —Software Project Management- Addison-Wesley, 1998.
3. Gopalaswamy Ramesh, —Managing Global Software Projects -McGraw Hill Education (India), Fourteenth Reprint 2013.

Course Outcomes

- The student will be able to do project estimation and project planning
- The student will be able to do project lifecycle and effort estimation for a given project
- The student will be able to plan the activities as well as risk management
- The student will be able to devise project management plans
- The student will be able to do the efficient staffing for the software project
