



## SOFTWARE TESTING & QUALITY

(DSE-1)

**Credits:4    Semester :V**

**Subject Code: CS21501A    No. of Lecture Hours:60**

### Objectives:

- To help the students understand the importance and need of testing through testing cycles.
- To learn various testing techniques which are required for any software product.
- To introduce Quality assurance concepts and activities.

### Outcome:

**CO1: Express** importance of testing in software development process, glass-box testing, black-box testing, and how to report and analyze bugs

**CO2: Design** different types of test case.

**CO3: Organize** how to build testing strategy, establishing software testing methodology and software testing techniques.

**CO4: Identify** the definition of quality, metrics for software quality and inspection techniques.

**CO5: Explain** software configuration management, software reengineering and software restructuring techniques.

### UNIT– I      12Hrs

Example test series –first cycle	1
Second cycle, subsequent cycles	1
Objectives and limits of Testing	1
Testing in software development process- planning process –planning stage	1
Design stage testing	1
Glass box code testing	1
Black box testing	1
Software errors	1
Reporting and analysing bugs – problem report, contents characteristics	1
Analysis of reproducible bug	1
Tactics for analyzing a reproducible bug making a bug reproducible	2



**UNIT– II     12Hrs**

1. Problem tracking systems – Objectives, tasks, 2
2. Overview, users, 2
3. Mechanics, further thoughts on problem reporting 2
4. Test case design – characteristics of good test 1
5. Equivalence classes and boundary values 1
6. Visible state transitions, race conditions, load testing, error guessing 1
7. Function equivalence testing 1
8. Regression testing, executing the tests 2

**UNIT– III     12Hrs**

1. Building a software testing strategy 3
  2. Establishing a software testing methodology 2
  3. Determining a software testing techniques. 2
  4. Eleven steps for software testing process – Overview 2
  5. Assess project Management. 3
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1. Product Metrics - Software Quality, Framework for product metrics 2
  2. Metrics for Process and Products - Software measurement 3
  3. Metrics for Software Quality. 2
  4. Quality Management – Quality concepts, Software Quality Assurance 2
  5. Software Reviews, Formal Technical Reviews, Software Reliability 3

**UNIT– IV     12Hrs**

**UNIT– V     12Hrs**



Change Management - Softwareconfigurationmanagement	3
SCM repository,SCMProcess	3
Reengineering –Softwareengineering	3
Reverseengineering,Restructuring.	3

**ESSENTIAL READING:**

1. CemKaner, Jack Falk, Hung Quocguyen. 1998. **Testing computer software**.Comdex.
2. William Perry.2000. **Effective methods for Software testing**.Wiley.
3. Pressman Roger, S. **Software Engineering – a Practioner’s approach**. 6<sup>th</sup> Edition. McGraw-Hill InternationalEdition.



## SOFTWARE ENGINEERING

(DSE-1)

**Credits : 4**

**Semester: V**

**Subject code: CS24501B**

**No. of Lecture Hours: 60**

**Objectives:**

- To enable students to learn software engineering principles
- To learn the theoretical foundation from the view of Object Oriented Concepts.

**Outcome:**

CO1: Design software through various process models. VI (Create)

CO2: Analyze Object-Oriented concepts and various models. IV (Analyse)

CO3: Choose different designs and architectures. III (Apply)

CO4: Explain components, golden rules and design evaluation. II (Understand)

CO5: Select testing techniques and about DevOps. IV (Analyse)

**UNIT - I**

**12Hrs**

1. The evolving role of software, software, changing nature of software	2
2. Legacy Software, Software Myths	2
3. Software engineering-layered technology, Process Framework	2
4. CMMI, Process patterns, Personal and Team Process	2
5. Process Models: waterfall, incremental, evolutionary process models	2
6. Agile Process Models	2

**UNIT- II**

**12Hrs**

Requirements Engineering tasks, Initiating requirements engineering process	2
Eliciting requirements	1
Developing Use Cases, Building analysis model	2
Negotiating and validating requirements	2

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Requirements analysis, analysis modeling approaches, Data modeling Concepts	2
Object oriented analysis, Scenario based modeling, Flow oriented modeling	2
Class based modeling, creating behavioral model	1
<b>UNIT- III</b>	<b>12Hrs</b>
Design Process and Quality	2
Design concepts and Design model	2
Pattern Based software design	2
Software architecture, Data design, Architectural styles and Patterns	2
Architectural design, Assessing alternative architectural design	2
Managing Data flow into Software architecture	2
<b>UNIT-IV</b>	<b>12Hrs</b>
Introduction to Components, Designing class based components	2
Conducting component level design, Object constraint language	2
Design conventional components	2
Golden rules, User Interface Analysis and Design	2
Design Evaluation	2
Software Metrics and its types	2
<b>UNIT-V</b>	<b>12Hrs</b>
A Single approach to Software Testing, Software Quality	1
Strategic issues, Test strategies for Conventional Software	2
Validation testing, System Testing	1
Testing fundamentals, Black box and White Box Testing	2
Devops: Introduction, cloud as a Platform-Operations.	2
Deployment Pipeline: Architecture-Building and testing.	2
Case Study: Migrating to Microservices	2
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### **ESSENTIAL READING**

- 1.Pressman, Rogers S. 2015. Software Engineering, A practitioner's Approach. 8<sup>th</sup> Edition. McGraw Hill Education
- 2.Jennifer Davis and Ryn Daniels 2016. Effective Devops, 1<sup>st</sup> edition O'reilly

### **SUGGESTED READING**

- 1.Deepak Jain. 2009. Software Engineering. New Delhi: Oxford University Press.
2. Rajib Mall. 2018. Fundamentals of Software Engineering. 5<sup>th</sup> Edition. New Delhi: PHI.
3. Sommerville. 2007. Software Engineering. 9<sup>th</sup> Edition. New Delhi: Pearson Education.



## OPERATIONS RESEARCH(GE-4)

**Credits:4**

**Semester: V**

**Subject Code:BS21048**

**No. of Lecture hours:60**

### **Objective:**

To understand and analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively.

**Outcome:** Students will be able to do the best utilization of limited resources to reach optimum solution.

### **UNIT-I 12Hrs**

#### **Operations research:**

Meaning and scope of operations research 1

Convex sets and their properties, Definition of general LPP 1

Solution of linear programming problem by graphical method 1

Statements of fundamental theorem of LPP and other related theorems. 2

Formulation of Linear Programming Problem 3

Optimum solution of linear programming problem by simplex Method. 4

### **UNIT-II 12Hrs**

Concept of artificial variables.

Big M/Penalty method and two phase simplex methods. 6.

Concepts of duality of LPP. 1

Dual primal relationship, statement of fundamental theorem of duality. 5

### **UNIT-III 12Hrs**



Definition of transportation problem 1

TPP as a special case of LPP, 1

Initial basic feasible solution by North West corner rule, Matrix Minima and VAM Methods.

Optimal Solution through MODI and stepping stone method for balanced and unbalanced transportation problem. 4

Degeneracy in Transportation problem and resolving it. 2

Concept of transshipment problem. 1

#### **UNIT-IV 12Hrs**

Formulation and description of Assignment problem and its variations. 1

Assignment problem as a special case of T.P and L.P.P 1

Unbalanced Assignment problem, 1

Optimal solution using Hungarian Method 6

And travelling salesman problem and its solution. 3

#### **UNIT-V 12Hrs**

Problem of Sequencing 2

Optimal sequence of N jobs on two machines 5

and three machines without passing under appropriate conditions. 5

#### **ESSENTIAL READING:**

1. Sharma S.D. 2007.**Operations Research**.NewDelhi:S.Chand& Co.

#### **SUGGESTED READING:**

1. KantiSwarup,P.KGupta and Man Mohan.  
2000.**OperationsResearch**.NewDelhi:S.Chand Company Ltd.



## MOBILE APPLICATION DEVELOPMENT

**Credits:4**

**Semester:V**

**SubjectCode: CS21503**

**No. of Lecture Hours:60**

### Objectives

- To understand the fundamentals of Android Operating Systems.
- To demonstrate the Android software development tools.
- To develop software with reasonable complexity on mobile platform.
- To deploy software to mobile devices.
- To debug programs running on mobile devices.

### Outcome:

**CO1: Compare** different mobile application models/architectures and patterns

**CO2: Apply** a mobile development framework to the development of a mobile application.

**CO3: Explain** components and structure of a mobile development framework.

**CO4: Develop** advanced Java programming competency.

**CO5: Develop** final application.

### UNIT 1

**12 hours**

#### Overview of Android

Introduction to Android – History of Android Platform 1

Introduction to IOS, Android APIs, Android Architecture 2

Framework, Features of Android, Android Components, Manifest File. 2

Downloading and Installing Android – Android SDK, Android Virtual Device,



Android Physical Device, Development Environment. 3

Developing and executing the First Android Application –

Using Eclipse IDE to create an application, 2

Running the Application, Exploring the Application, Using command-line tools. 2

**UNIT 2 12 hours**

Working with Activities – Creating an Activity, Starting an Activity 2

Lifecycle of an activity 2

Applying themes and styles to the activity, Displaying dialogs in the activity 2

Hiding the title of the activity.

Intents – Exploring Intent objects, Intent resolution, Intent Filters, Linking the activities using Intent, Obtaining results from an Intent 2

Passing data Using an Intent Object. 1

Fragments – Life cycle of a fragment, Implementation, using the Intent Object to Invoke Built-in-Application. 3

**UNIT 3 12 hours**

User Interface using Views and View Groups 1

Working with view groups – Linear layout, Relative layout, Scroll layout, Table layout, Frame layout, Tab layout. 3

Working with views – Text , Edit text, Button, Radio button, Checkbox, Image Button, Toggle button, Rating bar. 3

Binding Data with the Adapter View Class – List view, Spinner, Gallery view. Implementing Screen Orientation . 3

Handling UI Events – With Activities, With Views. 2



**UNIT 4** **12 hours**

Handling Pictures and Menus with Views	2
Working with Image views – Displaying image in gallery and grid.	2
Designing context menu, Analog and Digital clock views.	2
Embedding web browser in the Activity.	2
Notifications – Creating and Displaying notifications.	2
Displaying Toasts.	2

**UNIT 5** **12 hours**

Persistent Storage -Using application specific folders and files,	
Creating files,	2
Reading data from files, listing contents of a directory shared preferences	2
Creating shared preferences	2
Database-Introduction to SQLite database, creating and opening a database,	
creating and opening a database, creating tables	2
Inserting retrieving and deleting data, Registering Content Providers.	2
Using content providers – insert, retrieve and update.	2

**ESSENTIAL READINGS:**

1. Pradeep Kothari. Android Application Development- Black Book. DreamTech press.2017
2. Jerome (J.F) DiMarzio. Android – A programmer’s guide – Mc Graw Hill.2008.
3. Dawn riffiths& David Griffiths. Head First Android Development-O’reilly-second edition.



## BIG DATA ANALYTICS

**Credits: 3**

**Semester: V**

**Course code: CS24504**

**No. of lecture hours: 45**

### Objectives:

- To understand and learn about Big Data.
- To learn the analytics of Big Data.
- To understand MapReduce fundamentals.

### Course Outcomes:

CO1: Explain Big Data concepts and various technologies to handle it.

CO2: Use Hadoop Ecosystem and Map Reduce to process Big Data.

CO3: Analyze data processing through MapReduce

CO4: Choose YARN for resource management and Hive for data storage.

CO5: Develop PHP programs and database connectivity through My SQL

### UNIT-I

**12Hrs**

#### Getting an Overview of Big Data:

1. Introduction, History of Data Management-Evolution of Big Data 1
2. Structuring Big Data, Elements of Big Data 1
3. Big Data Analytics, Careers and Future of Big Data 1

Exploring the Use of Big Data in Business Context:

4. Use of Big Data in Social Networking 1

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5. Preventing Fraudulent Activities	1
Introducing Technologies for Handling Big Data:	
6. Distributed and Parallel Computing for Big Data	2
7. Introducing Hadoop, Cloud Computing and Big Data	2
Understanding Big Data Technology Foundations:	
8. Exploring the Big Data Stack, Virtualization and Big Data	2
9. Virtualization Approaches	1

**UNIT-II** **12 Hrs**

**Understanding Hadoop EcoSystem**

1. Hadoop Ecosystem	2
2. Hadoop Distributed File System	4
3. HBase -Architecture, Regions	2
Understanding MapReduce Fundamentals and HBase	
4. The Map Reduce Framework, Uses of MapReduce	2
5. Role of HBase in Big Data Processing	2

**UNIT – III** **12 Hrs**

**Processing your Data with MapReduce**

1. Developing Simple MapReduce Application	2
Customizing MapReduce Execution and Implementing MapReduce program	
2. Controlling MapReduce Execution with InputFormat	1
3. Reading Data with Custom RecordReader	2
4. Organizing Output Data with OutputFormat	2
5. Customizing Data with RecordWriter	2



- |   |   |
|---|---|
| 6. Optimizing MapReduce Execution with Combiner   | 2 |
| 7. Controlling Reducer Execution with Partitioner | 1 |

**UNIT – IV** **12Hrs**

**Understanding Hadoop YARN Architecture:**

- |  |   |
|--|---|
| 1. Background and Advantages of YARN                   | 2 |
| 2. YARN Architecture, Working of YARN, YARN Schedulers | 2 |
| 3. YARN Configurations, YARN Commands, YARN Containers | 2 |

Exploring HIVE:

- |   |   |
|---|---|
| 4. Introducing Hive, Getting started with Hive                            | 2 |
| 5. Data Types and Built-in functions in Hive, Hive DDL                    | 2 |
| 6. Data manipulation in Hive, Data Retrieval Queries, Using Joins in Hive | 2 |

**UNIT – V** **12Hrs**

**Analyzing Data with a Pig**

- |   |   |
|---|---|
| 1. Introducing Pig, Running Pig         | 1 |
| 2. Getting Started with Pig Latin       | 1 |
| 3. Working with Operators in Pig        | 2 |
| 4. Working with Functions in Pig        | 2 |
| 5. Debugging Pig, Error Handling in Pig | 1 |

NoSQL Data Management:

- |  |   |
|--|---|
| 6. Introduction to NoSQL                     | 1 |
| 7. Types of NoSQL Data Models                | 2 |
| 8. Schema-Less Databases, Materialized Views | 1 |
| 9. Distribution Models, Sharding             | 1 |



## ESSENTIAL READING

1. DT Editorial Services. 2016. Big Data Black Book. 1<sup>ST</sup> edition. Dreamtech Press.

## SUGGESTED READING

1. White, Tom. 2012. Hadoop: The Definitive Guide. 3<sup>rd</sup> Edition. O'Reilly Media

## COMPUTER NETWORKS

**Credits:4 Semester:V**

**SubjectCode: BS18545 No. of Lecture Hours:60**

### Objectives:

- To familiarize with fundamental concepts of computer network.
- To gain expertise in various layers of the TCP/IP model.

### Outcome:

**CO1: Identify** basic computer network topologies and protocols and explain Data Communication System components

**CO2: Classify** different error detecting techniques.

**CO3: Construct** sub-netting and routing mechanisms.

**CO4: Sketch** the routing protocols and analyze how to assign the IP addresses for the given network

**CO5: Develop** network design and implementation

## UNIT-I

**12 Hrs**

- |   |   |
|---|---|
| 1. Introduction: Data Communications, networks, Protocols and Standards | 2 |
| 2. OSI Model, layers in the OSI model, TCP/IP Protocol suite            | 2 |
| 3. Analog and Digital, Transmission impairments                         | 2 |
| 4. Transmission Media-Guided media, Connecting Devices                  | 2 |



5. Digital Transmission- digital-to-digital conversion	2
6. Multiplexing: Frequency-division, Wavelength and Time Division	2

## **UNIT-II** **12 Hrs**

### **DATA LINK LAYER**

1. Error detection and correction-Parity, check sum, CRC, Hamming code	3
2. Data Link Control: Framing, flow and error control	2
3. Stop-and-wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ, Piggybacking	2
4. HDLC, Random Access- ALOHA, CSMA, CSMA/CD, CSMA/CA	3
5. Wired LANs- Ethernet	2

## **UNIT-III NETWORK LAYER** **12 Hrs**

1. IP address space-Introduction.	1
2. Classful and Classless addressing, Subnetting and Supernetting	2
3. IPv4- datagram, Fragmentation, checksum, options	2
4. Internet Control Protocols- ICMP, IGMP, ARP and RARP	3
5. Delivery, Forwarding, Unicast routing protocols- RIP, OSPF, BGP	4

## **UNIT-IV** **12 Hrs**

### **TRANSPORT LAYER**

1. Process-to-Process Delivery, UDP-well known ports, user datagram, checksum	2
2. UDP Operation, use of UDP	2
3. TCP- process to process communication, Numbering bytes, TCP services	2
4. Flow control- silly window syndrome, Error Control	3
5. TCP connection, State transition diagram, Congestion control, Timers, Options	3

## **UNIT-V** **12 Hrs**



## APPLICATION LAYER

1. DNS- Namespace, domain name space, distribution of name space 2
2. DNS in internet, resolution, DNS messages, types of records 2
3. TELNET, E-mail- architecture, message transfer agent: SMTP 3
4. Message Access Agent: POP, FTP 2
5. WWW and HTTP- architecture, web documents, HTTP 3

## ESSENTIAL READING

1. Forouzan, Beharouz A. 2011. **Data Communications and Networking**. 3<sup>rd</sup>Edition. New Delhi: Tata McGraw Hill. (UNIT- I andII)
2. Forouzan, Beharouz A. 2010. **TCP/IP Protocol Suite**. 3<sup>rd</sup>Edition. New Delhi: Tata McGraw Hill.(UNIT-III,IV,V)

## SUGGESTED READING

1. Tanenbaum, Andrew S. 2008. **Computer Networks**. 4<sup>th</sup> Edition. New Delhi: Pearson Education



## ADVANCED JAVA

**Credits:4 Semester:V**

**SubjectCode:CS18502 No. of Lecture Hours: 60**

### Objectives:

- To develop web applications using Servlets andJSP.
- To emphasize on various Java beans, data structures and XML concepts inJava.
- To develop client/server programming using networkingpackage.

### Outcome:

**CO1: Understand** and develop concepts of data structures using Java library.

**CO2: Develop** component-based Java software using JavaBeans and create well formed XML document.

**CO3: Develop** client/server applications using Servlets and JSP.

**CO4: Update** and retrieve the data from the databases using SQL

**CO5: Identify** the type of socket used for connection and implement TCP/IP socket programming

### UNIT-I

**12 Hrs**

#### COLLECTIONS FRAMEWORK

- |   |   |
|---|---|
| 1. Over view, Collection Interfaces- Collection, List, Set and Sorted Set     | 2 |
| 2. Collection classes- ArrayList, LinkedList, HashSet, LinkedHashSet, TreeSet | 2 |
| 3. Accessing a Collection via an iterator- using an iterator                  | 1 |
| 4. Working with Maps- Map Interfaces, Map Classes                             | 3 |



5. Comparators- using a comparator	1
6. The Collection Algorithms, Arrays class	2
7. Stack, Dictionary, and Hashtable	1
<b>UNIT-II</b>	<b>12 Hrs</b>
<b>JAVA BEAN</b>	
1. Java Bean-advantages and applications, builder tools, Using BDK	2
2. JAR files- manifest files, The JAR utility	2
3. Introspection, Developing Simple Bean using BDK, Persistence	2
<b>JAVA AND XML</b>	
Introduction, XML and DOM,DOM Nodes	1
Element Node, Node, Attr Node, Document Node,TextNode	2
ParsingXML	3
<b>UNIT-III</b>	
<b>SERVLETS</b>	
1. Introduction, advantages, architecture, servlet life cycle	2
2. Using Tomcat for Servlet development, a simple servlet	2
3. Generic Servlet, HTTP Servlet	1
4. Passing Parameter to servlets, Retrieving parameters	1
<b>JAVA SERVER PAGES</b>	
JSP- Introduction, Architecture, lifecycle,Comments	2
Scripting Elements, Directives- page and include,implicitobjects	2
Action Elements – forward, include, plugin, adding java bean toJSPpage	2
<b>UNIT-IV</b>	<b>12 Hrs</b>
<b>WORKING WITH JSP AND DATABASES</b>	



1. JDBC concept, driver types, over view of JDBC process	2
2. Database Connection- The Connection, associating JDBC/ODBC bridge	1
3. Statement Objects- The Statement, Prepared Statement, Callable	2
4. Result Set- reading, scrollable and updatable, Result Set Metadata	2

**SECURITY**

5. Java Security Architecture, Access control- applets and applications	2
6. Certificates, key stores	1
7. Signing Code and Granting permission	1
8. Signing and verifying JAR files	1

UNIT-V 12Hrs

**BASIC NETWORKING**

Classes and Interfaces, Getting Network interfaces- addresses and properties	1
URL- creating, parsing, webpage retrieval	1
URL Connection, HTTPURLConnection-URLencoder/decoder	2

**SOCKET PROGRAMMING**

4. Client/Server Programs, Sockets-types, ports, address and reserved ports	1
5. TCP Sockets- Server Socket Class, Socket Class, application	2
6. Handling multiple client request, Concurrency solution	2
7. Sending and receiving objects, Writing the server	1
8.UDP Sockets- Datagram packets, Server, client, receiving multiple datagrams	1
9. Sending and receiving object using UDP, Sending object, reconstructing object And running the application	1

**ESSENTIAL READING:**

1. Schildt, Herbert. 2002. **The Complete Reference: Java2**. 5<sup>th</sup> Edition. New Delhi: McGraw-Hill. (UNIT-I, II and III)



2. Roy, Uttam K. 2015. **Advanced Java Programming**. 1<sup>st</sup> Edition. New Delhi:Oxford University Press. (UNIT – II (Java and XML), andV)
3. Bayross, Ivan. Shah, Sharanam. Bayross, Cynthia and Shah Vaishali. 2008. **Java Server Programming for Professionals 2**. India: Shroff Publishers and Distributors Pvt Ltd. (UNIT-III,IV)
4. Keogh, Jim. 2002. **J2EE: The Complete Reference**. First Edition. New Delhi: Tata Mc-GrawHill.(UNIT-IV)
5. Campione, Mary. Walrath, Kathy. Huml, Alison. 1999. **The Java tutorial continued: the rest of JDK**. Addison-Wesley.(UNIT-IV)

### MOBILE APPLICATION DEVELOPMENT LAB

**Credits :1**

**Semester:V**

**Subject Code: CS21505**

**No. of Practical Hours:30**

**Objective:**

- To develop applications in android environment.
- To learn how to develop user interface applications.
- To learn how to develop URL related applications.

No.ofHrs	TOPIC
1- 2	Deploying and Executing the first android application
3 - 4	Program for creating an activity.
5 - 6	Program on activity life cycle.
6 - 7	Working with Fragments.
7 - 8	Program on working with views
8 - 9	Program on working with custom views.
10 - 11	Program on working with view groups.
11 - 12	Working with User Interface using views
13 - 14	Handling pictures and menus with views



15	Storing the details in database
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## BIG DATA ANALYTICS LAB

**Credits: 1**

**Semester: V**

**Subject code: CS24506**

**No. of lecture hours: 15**

### Programs

1. Implement the following file management tasks in Hadoop:
2. Adding file and directories
3. Creating file, Retrieving file and deleting files
4. Map Reduce program for basic word count.
5. Map Reduce program for sorting text data.
6. Map Reduce program for weather data.
7. Using Hive to implement DDL Commands
8. Using Hive to implement DML commands
9. Using Hive to retrieve data.
10. Using Hive to implement bucketing and partitioning.
11. Using Hive to implement built-in functions
12. Pig Latin script to work with operators
13. Pig Latin scripts using eval functions to analyze your data.
14. Pig Latin scripts using math functions to analyze your data.
15. Pig Latin scripts using string functions to analyze your data.
16. Pig Latin scripts to create user defined functions.
17. Simple script to understand the using NoSQLin Hadoop sys



## ADVANCED JAVA LAB

**Credits :1 Semester:V**

**SubjectCode: CS18504 No. of Practical Hours: 30**

### Objectives:

- To develop web applications usingJSP
- To develop XML, Java Bean, Socket programming and Data Structures throughJava.

**Outcome:** Students will be able to develop applications using J2EE technologies.

No.ofHrs	TOPIC
1-2	Collection classes Programs using java.utilpackage
3-4	Maps, Comparators, Dictionary, Hashtable
5-6	Develop Java Bean programs usingBDK
7-8	Java and XML programs
9-10	Programs on Servlets- reading parameters, retrieving parameters



11-12	JSP related programs- actions, scriptingelements
13-14	Working with databases- JSP, Security inJava.
15	Socket Programming- TCP and UDPSockets

## ARTIFICIAL INTELLIGENCE

### (DSE-II)

**Credits: 4    Semester: VI**

**Subject Code: CS24601A**

**No. of Lecture Hours: 60**

**Objectives:** To introduce basic aspects of Artificial intelligence, utilizing and analyze AI techniques for identifying optimal solutions to search strategies.

**Outcomes:**

**CO1:** Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

**CO2:** Understand predicate logic and transform the real-life information in different representation.

**CO3:** Understand formal methods of knowledge representation

**CO4:** Analyse the underlying mathematical relationships and build expert system

**CO5:** Demonstrate Knowledge representation techniques

**UNIT-I**

**12Hrs**

**Introduction**

1. Introduction to AI , applications of AI, History of AI

3





### Applications Of AI:

1.Expert systems: Introduction,Human Experts v/s experts system, Architecture of Expert systems.	3
2.Machine learning :Introduction and types of machine learning.	3
3.NLP:History of NLP, Phases of NLP .	3
4. Computer vision: Human vision Processing,Edge Detection, texture and color, reconstruction of image.	3

### ESSENTIAL READING:

1. Kaushik, Saroj. 2022. **Artificial Intelligence**. Second Edition. Cengage Learning India.
2. Kumar,Ela.2019.Artificial Intelligence. 1<sup>st</sup> Edition. I K International Publishing House Pvt.Ltd. India New Delhi

### SUGGESTED READING:

1. Russell, Norvig. 2004. **Artificial Intelligence: A Modern Approach**. 3<sup>rd</sup> Edition. Pearson Education



## **BLOCK CHAIN TECHNOLOGIES**

**(DSE-II)**

**Credits : 4**

**Semester : VI**

**Subject Code : CS24601B**

**No of Lecture Hours: 60 Hrs**

### **OBJECTIVES:**

- This course is intended to study the basics of Blockchain technology.
- During this course, the learner will explore various aspects of Blockchain technology, like applications in various domains.
- By implementing, learners will have idea about private and public Blockchain, and Smart contracts.

### **COURSE OUTCOMES:**

CO1: Understand and explore the working of Blockchain technology (Understanding)

CO2: Analyze the working of Smart Contracts (Analyze)

CO3: Understand and analyze the working of Hyperledger (Analyze).

CO4: Apply the learning of solidity to build de-centralized apps on Ethereum (Apply)

CO5: Develop applications on Blockchain (Develop)

### **UNIT I**

**12Hrs**

### **INTRODUCTION OF CRYPTOGRAPHY AND BLOCKCHAIN**



Blockchain: Introduction, History, Objectives	2
Blochchain Technology Mechanisms & Networks, Blockchain Challenges,	2
Transactions and Blocks, P2P Systems, Keys as Identity	2
Digital Signatures,	2
Hashing, and public key cryptosystems	2
Private vs. public Blockchain.	2

**UNIT II** **12Hrs**

**BITCOIN AND CRYPTOCURRENCY**

Bitcoin: Introduction, The Bitcoin Network, The Bitcoin Mining Process,	
Mining Developments	3
Bitcoin Wallets	1
Decentralization and Hard Forks	2
Blockchain and Digital Currency, Transactional Blocks	2
Impact of Blockchain Technology on Cryptocurrency	2
Bitcoin Security: Security principles, Developing Bitcoin Systems Securely, The	
Root of Trust, User Security Best Practices	2

**UNIT III** **12Hrs**

**INTRODUCTION TO ETHEREUM**

Ethereum: Introduction to Ethereum, Ethereum Accounts	2
Consensus Mechanisms: History, Types of Consensus, Future of consensus	
Mechanisms, Metamask Setup,	3
Ethereum Virtual Machine (EVM), Merkle Tree, Double- Spend Problem	2
Transactions: Transaction Lifecycle, Broadcasting Transactions to the	
Bitcoin Network, Transaction Structure, Transaction Outputs and Inputs	3
Smart Contracts: Life Cycle of Smart Contracts	2



**UNIT IV**

**INTRODUCTION TO HYPERLEDGER AND SOLIDITY PROGRAMMING 12Hrs**

Hyperledger: Distributed Ledger Technology & its Challenges,	
Hyperledger & Distributed Ledger Technology	3
Hyperledger Fabric,	2
Hyperledger Composer.	2
Solidity - Language of Smart Contracts, Installing Solidity & Ethereum Wallet,	2
Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types	3

**UNIT V**

**BLOCKCHAIN APPLICATIONS 12Hrs**

Ten Steps to Your First Blockchain application	4
Healthcare Blockchain Use Cases: Supply Chain Transparency- Electronic Health Records- IoT Security for Remote Monitoring	2
Financial Technology :Discovering future global bank trends- Uncovering new investment vehicles- Exposing risk in the banking blockchain -Developing new financing strategies.	2
Real Estate :Evaluating global real estate trends-Discovering dead capital and ways to fix it-Uncovering how Fannie Mae will fit in a blockchain world- Revealing how China will evolve with blockchain technology.	4

**REFERENCES:**

1. Blockchain For Dummies,1<sup>st</sup> edition, Tiana Laurence ,Tiana Laurence Publishing,2017
2. Imran Bashir, “Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained”, Second Edition, Packt Publishing, 2018.



3. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" Princeton University Press, 2016

**SUGGESTED READING:**

1. (PDF) BLOCKCHAIN FUNDAMENTALS TEXT BOOK Fundamentals of Blockchain (researchgate.net)

<https://www.hhs.gov/sites/default/files/blockchain-for-healthcare-tlpwhite.pdf>

**CLOUD COMPUTING**

**Credits:4 SemesterVI**

**Subjectcode:CS18602A No. of Lecture hours: 60 Objectives:**

- To implement Basics, techniques and tools for CloudComputing.
- To understand any kind of heterogeneous resources over a network using openstandards.

**Outcome:**

**CO1: Understand** basic advantages and disadvantages of cloud computing

**CO2: Classify** design and architecture of cloud computing, types of clouds and services of cloud computing

**CO3: Explain** cloud computing technology andexamples

**CO4: Analyze**virtualization and virtualizationtechniques

**CO5: Apply** of market oriented cloud computing and third party services

**UNIT-I**

**12Hrs**

**Introduction to Cloud Computing**

**B.Sc.(Computer Science &Engineering)**

**Academic Year 2025-26(CBCS)**



1. Cloud Computing Overview - Introduction to Cloud Computing, Cloud Components, Infrastructure Services	2
2. Benefits – Scalability, Simplicity, Knowledgeable Vendors , More Internal Resources, Security	2
3. Limitations - Your Sensitive Information, Applications Not Ready, Developing Your Own Applications	2
4. Features of cloud platform.	2
5. System models for advanced computing –clusters of cooperative computing,grid computing and Cloud computing.	2
6. Software systems for advanced computing-service oriented software and paralleland distributed programming models with introductory details.	2

**UNIT-II** **12 Hrs**

**Cloud Computing Architecture**

Introduction.	1
The cloud reference model: Architecture, Infrastructure-and hardware-as-a-service, Platform as a service, Software asaservice	3
Types of clouds: Public clouds, Private clouds, Hybrid clouds,Communityclouds	3
Economics ofthecloud.	2
Open challenges: Cloud definition, Cloud interoperability and standards,Scalability and fault tolerance, Security, trust, and privacy,Organizationalaspects.	3

**UNIT-III** **12 Hrs**

**Cloud Computing Technology**

<b>Hardware and Infrastructure:</b> Clients, Mobile,Thin,Thick.	2
<b>Local Clouds and Thin Clients:</b> Virtualization in Your Organization: Why Virtualize?, How to Virtualize,Concerns,Security.	3



Server Solutions: Microsoft Hyper-V, VMware, VMware Infrastructure. 2

Thin Clients: Sun, Hewlett Packard, Dell. 3

**Cloud Storage:** Overview: The Basics, Storage as a Service, Providers, Security, Reliability, Advantages, Cautions 2

**UNIT-IV 12 Hrs**

**Virtualization**

Introduction and characteristics of virtualized environments: Increased security, Managed execution, Portability 3

Taxonomy of virtualization techniques: Execution virtualization, Other types of virtualization. 3

Virtualization and cloud computing 2

Pros and cons of virtualization 1

Technology examples: Xen: paravirtualization, VMware: full virtualization, Microsoft Hyper-V 3

**UNIT-V 12 Hrs**

**Advanced Topics in Cloud Computing**

Energy efficiency in clouds: Energy-efficient and green cloud computing architecture 3

Market-based management of clouds: Market-oriented cloud computing, A reference model for MOCC, Technologies and initiatives supporting MOCC. 3

Federated clouds/Inter Cloud: Characterization and definition, Cloud federation stack, Aspects of interest, Technologies for cloud federations 3

Third-party cloud services: MetaCDN, SpotCloud 3

**ESSENTIAL READING:**

1. Cloud Computing, A Practical Approach Anthony T Velte, Toby J Velte, Robert Elsenpeter.
2. Mastering Cloud Computing - Raj Kumar Buyya, Christian Vecchiola and S. Tanuraj Selvi,



TMH,2012.

**SUGGESTED READING:**

1. Cloud Computing, John W. Ritting House and James F Ramsome, CRC Press,2012.
2. Enterprise Cloud Computing, GautamShroff, Cambridge University Press,2012.

**DATA MINING**

**Credits: 4**

**Semester: VI**

**Subject Code: CS21602B**

**No. of Lecture Hours: 60**

**Objectives:**

- To understand data mining process
- To learn methods for mining frequent patterns, and associations.
- To describe methods for data classification and prediction, and data-clustering approaches.

**Course Outcomes:**

**CO1: Demonstrate** an understanding of the importance of data mining and its related areas.

**CO2: Organize** and prepare the data needed for data mining using pre-processing techniques

**CO3: Perform** exploratory analysis of the data to be used for mining.

**CO4: Implement** the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets.

**CO5: Define** and apply metrics to measure the performance of various data mining algorithms.

**UNIT-I**

**12Hrs**

Data Mining Basics

1

Architecture of Data Mining System, Knowledge Discovery Process

2

Integrating Data Mining with Data Ware House

1

**B.Sc.(Computer Science &Engineering)**

**Academic Year 2025-26(CBCS)**



Related areas of Data Mining, criteria for evaluating data mining tools	1
Categorize data mining systems, Interesting and Useful data	1
Web mining, Text mining, Temporal data mining, Sequence mining	2
Time Series Analysis, Spatial Data Mining	1
Applications of Data mining	2
Issues and challenges, current trends in Data Mining	1

**UNIT-II**

**12Hrs**

**FREQUENT PATTERN MINING**

Basic Problem Definition, Mining Association rules	1
Applications and Variations	2
Interestingness	2
Frequent Item set Mining algorithms-Apriori Algorithm, Partition Algorithm	4
Sampling algorithm, FP Growth Algorithm	2
Incremental Mining	1

**UNIT-III**

**12Hrs**

**CLASSIFICATION**

Classification- Basic Problem Definition, Applications	2
Evaluation of Classifiers	2
Other Issues	2
Classification techniques- Decision Trees, Naïve Bayes	2
Bayesian Belief Networks, K-Nearest Neighbours	2
Neural Networks	1
Regression	1

**UNIT-IV**

**12Hrs**

**B.Sc.(Computer Science &Engineering)**

**Academic Year 2025-26(CBCS)**



**CLUSTERING**

Basic Problem definition, applications	1
Measurement of Similarity	2
Evaluation of clustering algorithms, classification of clustering algorithms	1
Partitioning methods- K-Means algorithm, PAM algorithm	2
Hierarchical methods- Agglomerative and Divisive approach	1
Linkage metrics, BIRCH algorithm	2
Density based methods- DBSCAN algorithm	1
Outlier detection	2

**UNIT-V**

**12Hrs**

**PATTERN DISCOVERY IN REAL WORLD DATA**

Introduction, Relational data	2
Transactional Data	2
Multidimensional data	1
Distributed Data	1
Spatial Data	1
Data Streams	2
Time Series Data	2
Multimedia Data	1

**ESSENTIAL READING**

1. Thareja, Reema. 2009. **Data WareHousing**. 1<sup>st</sup> Edition. New Delhi: Oxford University Press. (UNIT- I)
2. PudiVikram P, Krishna Radha. 2009. **Data Mining**. 1<sup>st</sup> Edition. Oxford University Press. (UNITS: II-V)



## SUGGESTED READING

1. PujariArun K. 2009. **Data Mining Techniques**. 2<sup>nd</sup> Edition. University Press.
2. Han Jiawei, KamberMicheline and Pei Jian. 2012. **Data Mining and Techniques**. 3<sup>rd</sup> Edition. Morgan Kaufmann Publishers. New York: USA.

## PYTHON PROGRAMMING

**Credits:4      Semester:VI**

**SubjectCode:BS21604      No. of Lecture Hours:60**

### Objectives:

- Python is an object-oriented scripting language, runs on almost any operating system or hardware platform.
- Python offers an easy syntax compared to Perl and the Unix/Linux “shell languages” and most people find it easier to learn and maintain.

### Outcome:

**CO1: Demonstrate** basic programming techniques.

**CO2: Apply** concepts of functions, sequences, dictionaries

**CO3: Appraise** how to implement modules, files, exceptions

**CO4: Create** object oriented programming

**CO5: Explain** GUI programming, database and network programming

**Unit –I      12Hrs**



1. **Python Basics**- Origin, features, Statements and Syntax, Variable Assignment, Identifiers, Basic Style Guidelines, Memory Management. 2
2. **Python Objects**- Python Objects, Type object, Null object, Object identity comparison, type () and isinstance (), Categorizing the standard types, 2
3. **Conditionals and Loops**- if, else, elif statement, Conditional Expressions, while, for statement, range() Built-in function, break, continue, pass, Iterators and iter() function, List Comprehensions, Generator Expressions 4
4. **Numbers**- Introduction, Integers, Double precision Floating point numbers, Complex numbers, Operators, Built-in and Factory functions, Other Numeric Types. 4

## Unit- II 12Hrs

1. **Functions**- Introduction, Calling functions, Creating functions, Passing functions, Formal arguments, Variable length arguments, Functional programming, variable scope, recursion, Generators 4
2. **Sequences: Strings, Lists and Tuples**- Sequences, Strings, Strings and Operators, String-Only Operators, Built-in functions, String Built-in Methods, Special features of Strings. Lists- Introduction, Operators, Built-in functions, List type Built-in methods. Tuples- Introduction, Tuple Operators and Built-in Functions, Special features of Tuples 5
3. **Dictionaries**- Introduction, Mapping type operators, Mapping Type Built-in and Factory functions, Mapping type built-in methods, Dictionary keys. 3

## Unit-III 12Hrs

1. **Modules**- Modules, namespaces, importing modules, features of module import, built-in functions, packages. 3
2. **Set Types**- Introduction, Set type operators, Built-in functions and Methods 2
3. **Files and Input/Output**- file objects; file BIF and methods, built-in attributes, Standard files, Command line arguments, File system. 3



4. **Exceptions-** Introduction, Exceptions in python, Detecting and handling exceptions, with statement, raise statement, Assertions-assert statement, Standard Exceptions, Creating exceptions. 4
  
1. **Object oriented programming-** Buzzwords of OOPS, Classes, class attributes, Instances, Instance attributes, binding and method invocation, static methods and class methods, Sub-classing and derivation, Inheritance, Multiple inheritance, BIF for classes, instances and other objects, privacy, Wrapping, date and time functions. 4
2. **Multithreaded programming:** Introduction, Threads and processes, Thread and Python, The thread module, threading module, Synchronization primitives, Producer-ConsumerProblem 3
3. **GUI Programming:** Tkinter and Python programming, Tkinter examples- Label, Button, Checkbutton, Entry, Canvas, Listbox, Message, Radiobutton, Scale. 5

#### Unit-IV      12Hrs

1. **GUI Programming:** Menu, Menubutton, Scrollbar, Spinbox, Slider, Dialogs, Text, tkMessageBox, PanedWindow, TopLevel, Frame 4
2. **Database programming:** Introduction, Database API. 3
3. **Networkprogramming:**Introduction,Sockets-CommunicationEndpoints, Network Programming in python, Socket ServerModule. 5

#### Unit-V12Hrs

#### ESSENTIAL READING

1. Chun Wesley, J. **Core Python Programming**.2<sup>nd</sup> Edition. Pearson Education (Unit I, II, III, IV- Object OrientedProgramming)
2. Chun Wesley, J. **Core Python Applications Programming**. 3<sup>rd</sup> Edition. Pearson Education (Unit IV,V)



## PYTHON PROGRAMMING LAB

**Credits:1 Semester:VI**

**Subject Code:BS21606 No. of practical Hours: 30 Objective:** To develop applications using object oriented concepts of Python.

**Outcome:**Students will be able to demonstrate object oriented concepts using Python.

- 1 Programs on control flow in python
- 2-3 Programs on number, string, list, tuples and dictionary
- 4 Programs on files in python
- 5 Programs on functions and functional programming in python
- 6 Programs on modules, set types in Python
- 7 Programs on exceptions in Python
- 8 Programs demonstrating class and object.
- 9-10 Programs on inheritance and overriding in Python
- 11 Programs on GUI programming in Python
- 12 Programs on advanced controls in Python



13 Programs on data base programming in Python

14 Programs on multithreaded programming

Programs on network programming



## PROJECT EVALUATION CRITERIA

**Credits:6 Semester : VI**

**SubjectCode:CS18605 No. of Practical Hours:15**

Third year students in the Sixth Semester are required to take up a project work which carries a total of 100 marks i.e. internal 40 marks and external 60 marks.

The Criteria for the Internal Evaluation of Project for 40 marks is as follows:

Attendance	5 marks
Review of literature	5 marks
Internal Project Presentation (Presentation & communication skills, objectives, work submission,	10 marks

methodology, results, and practical relevance.)

Finalinternalpresentation 10 marks

(50% marks Evaluation done by the internal guide& 50% marks evaluated by other internal lecturers guiding the projects).

ProjectReport 10marks

**External Evaluation of the Project (60 marks):** The Controller of Examination sends the Project Reports to the External Examiner in advance. The External Examiner evaluates the project for 60 marks. The viva-voce examination is conducted on the Project work done by the student. The Project Report is evaluated for 40 marks and Viva for 20 marks.