Paper Code: 22MCA21 Theory/Week: 4 Hours Credits: 4	NETWORK MANAGEMENT	Hours: 40 IA : 50 Exam: 50

Course Objectives:
- The course is an overview on Network Management Aspects and technologies in Network communication.
- It deals with the common paradigms in Network Management such as, IP Network Management using CISCO networking devices.
- Course also gives hands on working with Switch Management as well as Router Management for Dynamic Routing under CISCO devices.
- Course helps the students in getting CISCO certification at different levels.

Course Outcomes:
After the completion of the course, students will be able
CO1: Understanding the IOS interface
CO2: Hands on Training with CISCO devices
CO3: CCNA/CCNP Certifications

UNIT – I : 8hrs

Internetworking - Models, Devices and Protocols
Layered Approaches, OSI Reference Model, Connection-Oriented Communication, Connection-Less Communication, Devices- Repeaters, Switches and Bridges at the Data Link Layer, Ethernet Networking, Ethernet Frames, Data Encapsulation, Cisco Three-Layer Hierarchical Model, Cabling Cisco Devices, Straight-Through, Crossover, Cabling the Wide Area Network, Console Connections.

Teaching Methodology:
Chalk and Board
Power Point presentation
Activity based Teaching

UNIT – II: 8hrs

Virtual Local Area Network (VLAN)
Broadcast Control, Security, Static VLANs, Dynamic VLANs, Identifying VLANs, Frame Tagging, VLAN Identification Methods, Inter-Switch Link (ISL) Protocol, Trunking, Routing between VLANs, VLAN Trunk Protocol (VTP), VTP Modes of Operation, Configuration Revision Number

Teaching Methodology:
Chalk and Board
Power Point presentation
Self-Study Material
Laboratory Exercise

UNIT – III: 8hrs

Managing a Switch
Connecting to the Console Port, Switch Startup, Connecting to an Ethernet Port, Cisco 1900 IOS Configuration Commands, Configure and verify network device security features, SSH, Service Password, Configuring Switch Interfaces, Setting IP Information, Configure and Verify Switch Port Security features, Port Security, Configure and verify ACLs to filter network traffic, Configuring VLAN.

Teaching Methodology:
Chalk and Board
Power Point presentation

Activity based Teaching Video Lectures

UNIT – IV: 8hrs

Managing a Router

Cisco Router Components, Router Boot Sequence, Managing Configuration Registers, Checking the Current Configuration Register Value, Changing the Configuration Register, Recovering Passwords of a Router, Interrupting the Router Boot Sequence, Changing the Configuration Register, Cisco 2600 Series Commands, Cisco 2500 Series Commands, Viewing and Changing the Configuration. Resetting the Configuration Register and Reloading the Router, Backing Up and Restoring the Cisco IOS, Erasing the Configuration.

Teaching Methodology:
Chalk and Board
Power Point presentation
Activity based Teaching
Video Lectures
Laboratory Exercise

UNIT – V: 8hrs

CDP and ACL

Getting CDP Timers and Holdtime Information, Getting Neighbor Information, Getting Interface Traffic Information, Getting Port and Interface Information, Using Telnet, Telnetting into Multiple Devices Simultaneously, Checking Telnet Connections, Checking Telnet Users, Closing Telnet Sessions, Building a Host Table, Using DNS to Resolve Names, Checking Network Connectivity, Using the Ping Command, Using the Trace Command, Managing Traffic with Access Lists-Access Lists, Standard IP Access Lists, Wildcards, Standard IP Access List Example, Controlling VTY (Telnet) Access, Extended IP Access Lists, Extended IP Access List Example, Monitoring IP Access Lists

Teaching Methodology:
Chalk and Board
Power Point presentation
Video Lectures
Laboratory Exercise

Reference Book:

1. Network Management Study Meterial compilled by Prof. Subrahmanya Bhat, Srinivas
2. University.
3. CCNA Routing and Switching Study Guide by Todd Lammle.
4. CCNA Routing and Switching 200-120 Official Cert Guide Library by Wendell Odem.
5. Leinwand, A., & Fang, K. (1993). *Network management: a practical perspective*. Addison-Wesley Longman Publishing Co., Inc..
6. Aarikka-Stenroos, L., & Ritala, P. (2017). Network management in the era of ecosystems: Systematic review and management framework. *Industrial Marketing Management*, *67*, 23-36.

Paper Code: 22MCA22 Theory/Week: 4 Hours Credits: 4	APPLICATION DEVELOPMENT USING PYTHON	Hours: 40 IA : 50 Exam: 50

Course Objectives:

• Learn the syntax and semantics of Python programming language.

• Illustrate the process of structuring the data using lists, tuples and dictionaries.

Course Outcomes:

After the completion of the course, students will be able

CO1: Identify the methods to create and manipulate lists, tuples and dictionaries.

CO2: Discover the commonly used operations involving regular expressions and file system.

CO3: Interpret the concepts of Object-Oriented Programming as used in Python.

UNIT – I: 8hrs

Python Basics, Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, Flow control, Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), Functions, def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

UNIT – II: 8hrs

Lists, The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, Dictionaries and Structuring Data, The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, Manipulating Strings, Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup

Teaching Methodology:

Chalk and Board

Power Point presentation

Self-Study Material

Laboratory Exercise

UNIT – III: 8hrs

Pattern Matching with Regular Expressions, Finding Patterns of Text Without Regular Expressions, Finding Patterns of Text with Regular Expressions, More Pattern Matching with Regular Expressions, Greedy and Nongreedy Matching, The findall() Method, Character Classes, Making Your Own Character Classes, The Caret and Dollar Sign Characters, The Wildcard Character, Review of Regex Symbols, Case-Insensitive Matching, Substituting Strings with the sub() Method, Managing Complex Regexes, Combining re.IGNORECASE, re.DOTALL, and re.VERBOSE, Project: Phone Number and Email Address Extractor, Reading and Writing Files, Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the pprint.pformat() Function, Project: Generating Random Quiz Files, Project: Multiclipboard, Organizing Files, The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module,

Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File, Debugging, Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE's Debugger. **Teaching Methodology:** Chalk and Board Power Point presentation Activity based Teaching Video Lectures
UNIT – IV: 8hrs
Classes and objects, Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying, Classes and functions, Time, Pure functions, Modifiers, Prototyping versus planning, Classes and methods, Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation, Inheritance, Card objects, Class attributes, Comparing cards, Decks, Printing the deck, Add, remove, shuffle and sort, Inheritance, Class diagrams, Data encapsulation **Teaching Methodology:** Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise
UNIT – V: 8hrs
Web Scraping, Project: MAPIT.PY with the web browser Module, Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML, Parsing HTML with the BeautifulSoup Module, Project: "I'm Feeling Lucky" Google Search, Project: Downloading All XKCD Comics, Controlling the Browser with the selenium Module, Working with Excel Spreadsheets, Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Project: Reading Data from a Spreadsheet, Writing Excel Documents, Project: Updating a Spreadsheet, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts, Working with PDF and Word Documents, PDF Documents, Project: Combining Select Pages from Many PDFs, Word Documents, Working with CSV files and JSON data, The csv Module, Project: Removing the Header from CSV Files, JSON and APIs, The json Module, Project: Fetching Current Weather Data **Teaching Methodology:** Chalk and Board Power Point presentation Video Lectures Laboratory Exercise

Reference Books:
1. Al Sweigart,"Automate the Boring Stuff with Python",1stEdition, No Starch Press, 2015.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015.
3. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018

Paper Code: 22MCA23 Theory/Week: 4 Hours Credits: 4	ADVANCED JAVA	Hours: 40 IA : 50 Exam: 50

Course Objectives:
- To provide strong foundation for database application development, appreciate the underlying core database engine and emerging database technology and insights into recent developments in database technologies

Course Outcomes:

After the completion of the course, students will be able

CO1: Demonstrate the development of application using core java and J2EE.

CO2: Illustrate the use of JDBC in database application.

CO3: Design and implement user interactive dynamic web-based applications.

UNIT – I : 8hrs

JDBC: Introduction to JDBC, JDBC Driver types, JDBC database connections, JDBC Statements, PreparedStatement, CallableStatement, ResultSet, JDBC data types, transactions, Batch Processing, Stored Procedure

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

Video Lectures

UNIT – II: 8hrs

Servlet: Servlet structure, Life Cycle of a Servlet, Using Tomcat for Servlet Development, The Servlet API, Handling Client Request: Form data, Handling client HTTP request and server HTTP Response, HTTP status codes, Handling Cookies, Session tracking, Database Access

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

Video Lectures

UNIT – III: 8hrs

JSP: Overview of JSP Technology, Need of JSP, Advantages of JSP, Life Cycle of JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, JSP Directives, JSP Action, JSP Implicit Objects, JSP Form Processing, JSP Session and Cookies Handling, JSP Session Tracking JSP Database Access, JSP Standard Tag Libraries, JSP Custom Tag, JSP Expression Language, JSP Exception Handling

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

Video Lectures

UNIT – IV: 8hrs

Hibernate: Introduction, Hibernate Configuration, Hibernate Concepts, Hibernate O-R Mapping, Manipulating and Querying, Hibernate Query Language, Criteria Queries, Native SQL, Transaction and Concurrency

Teaching Methodology:

Chalk and Board Power Point presentation Activity based Teaching Video Lectures
UNIT – V: 8hrs
Spring Framework: Spring Basics, Spring Container, Spring AOP, Spring Data Access, Spring O-R /mapping, Spring Transaction Management, Spring Remoting and Enterprise Services, Spring Web MVC Framework, Securing Spring Application **Teaching Methodology:** Chalk and Board Power Point presentation Activity based Teaching Video Lectures

Reference Books :
1. Java - The Complete Reference – Herbert Schildt, 7th Edition, Tata McGraw Hill.
2. J2EE - The Complete Reference – Jim Keogh, Tata McGraw Hill.
3. Lindfors, J., & Fleury, M. (2002). *JMX: Managing J2EE with Java Management Extensions*. Sams Publishing.
4. Hunt, J., & Loftus, C. (2012). *Guide to J2EE: enterprise Java*. Springer Science & Business Media.
5. Broemmer, D. (2003). *J2EE best practices: Java design patterns, automation, and performance* (Vol. 8). John Wiley & Sons.

Paper Code: 22MCA241 Theory/Week: 4 Hours Credits:4	INFORMATION AND CYBER SECURITY	Hours: 40 IA : 50 Exam: 50

Course Objectives:
- To provide an overview on the ethical hacking concepts and methodologies.
- To deal with the understanding of ethical hacking methods and types and cyber-attacks.

Course Outcomes:
After the completion of the course, students will be able
CO1: To plan vulnerability assessment and penetration test for a network
CO2: To execute a penetration test using standard hacking tools in an ethical manner. Report on the strengths and vulnerabilities of the tested network.

UNIT – I: 8hrs

Introduction to Cybercrime and Laws
Introduction to Cybercrime and Laws Introduction, Cybercrime: Definition and Origins of the word, Cybercrime and information Security, Who are Cybercriminals? Classifications of Cybercrimes. How Criminals Plan Them – Introduction, How Criminals Plan the Attacks, Cybercafé and Cybercrimes, Botnets, Attack Vector, The Indian IT ACT 2000 and amendments.

Tools and Methods used in Cybercrime
Introduction, Proxy Server and Anonymizers, Password Cracking, Key loggers and Spyware, Virus and Warms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQLinjection, Buffer Overflow.

Teaching Methodology:
Chalk and Board
Power Point presentation
Activity based Teaching

UNIT– II: 8hrs

Introduction to Ethical Hacking
Cyber-attack scenarios, Data Breaches, Hacker types, Hackers and Hacking groups, Testing types, Malwares, Zero Day Attack, Exploit, Payloads, Attack Types, Ethical Hacking, Skills of an Ethical Hacker, Social Engineering, Ethical Hacking Phases

Ethical Hacking
Information Gathering, Footprinting Methodologies, OS Fingerprinting & Banner Grabbing, Scanning, Scan Types, Enumeration, Gaining Access, Privilege Escalation, Maintaining Access, Rootkits & Backdoors, Covering Tracks, Log Cleaning in Linux and Windows

Teaching Methodology:
Chalk and Board
Power Point presentation
Self-Study Material
Laboratory Exercise

UNIT – III: 8hrs

Vulnerability Assessment & Penetration Testing
Vulnerability Assessment Types, Penetration Testing, Security Testing Methodology, Vulnerability Scoring System, Code Reviews, Technical Reporting, Patch Management, System Hardening, Sandboxing

Teaching Methodology:
Chalk and Board
Power Point presentation

Activity based Teaching Video Lectures Laboratory Exercise

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<tr><td>UNIT – IV: 8hrs</td></tr>
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Cyber Security Attacks and Vulnerabilities

Buffer Overflow, System Hacking, MAC Attacks, Eavesdropping, DoS/DDoS, Ping of Death Attack, Password Cracking, Malware Attacks, Phishing Attack, Google Dorks, Social Engineering

Teaching Methodology:
Chalk and Board
Power Point presentation
Activity based Teaching
Video Lectures
Laboratory Exercise

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<tr><td>UNIT – V: 8hrs</td></tr>
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Wireless Security & Mobile Hacking

Wireless Concepts, Wireless Encryption, Wireless Threats, Wireless Hacking Methodology, Bluetooth Hacking, Wireless Security Tools, Hacking Mobile Platforms, Android Hacking, Mobile Device Management, Bring Your Own Device

Teaching Methodology:
Chalk and Board
Power Point presentation
Video Lectures
Laboratory Exercise

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Reference Books

1. Cannon, D. L. (2011). *CISA certified information systems auditor study guide*. John Wiley & Sons.
2. Messier, R. (2019). *CEH v10 Certified Ethical Hacker Study Guide*. John Wiley & Sons.
3. Bryan, S., & Vincent, L. (2012). Web Application Security: A Beginner's Guide.
4. Harris, S., Harper, A., Eagle, C., Ness, J., & Lester, M. (2004). *Gray hat hacking: the ethical hacker's handbook*. McGraw-Hill Osborne Media.
5. Simpson, M. T., Backman, K., & Corley, J. (2012). *Hands-on ethical hacking and network defense*. Course Technology Press.

Paper Code: 22MCA251 Theory/Week: 4 Hours Credits: 4	BIG DATA ANALYTICS	Hours: 40 IA : 50 Exam: 50

Course Objectives:

- To know the fundamental concepts of big data and analytics and to explore tools and practices for working with big data

Course Outcomes:

After the completion of the course, students will be able

CO1: Identify the business problem for a given context and frame the objectives to solve it through data analytics tools.

CO2: Apply various algorithms for handling large volumes of data.

CO3: Illustrate the architecture of HDFS and explain functioning of HDFS clusters.

CO4: Analyse the usage of Map-Reduce techniques for solving big data problems.

UNIT – I : 8hrs

Classification of Data (Structured, Semi structured and Unstructured), Characteristics of Data, What is Analytics?, Types of analytics, Evolution of Big Data, What is Big Data?, Definition of Big Data, Challenges of Big Data , Characteristics of Big Data, Domain Specific Examples of Big Data – Web, Financial, Healthcare, Internet of Things, Environment, Logistics & Transportation, Industry, Retail, Analytics Flow for Big Data, Big Data Stack, Mapping Analytics Flow to Big Data Stack, Case Study: Genome Data Analysis, Weather Data Analysis, Analytics Patterns

Teaching Methodology:

Chalk and Board

Power Point presentation

Activity based Teaching

UNIT – II: 8hrs

NoSQL: Introduction: Where is it used? What is it?, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL

Hadoop: Introduction, Distributed Computing Challenges, History of Hadoop, Overview of Hadoop and Hadoop Ecosystems, Features and key advantages of Hadoop, Versions of Hadoop, Hadoop distributions, RDBMS versus Hadoop, Hadoop vs SQL, Integrated Hadoop Systems offered by leading market vendors, Cloud based Hadoop solutions, HDFS, Processing data with Hadoop, Managing Resources and applications with Hadoop YARN, Interacting with Hadoop Ecosystem

Teaching Methodology:

Chalk and Board

Power Point presentation

Self-Study Material

Laboratory Exercise

UNIT – III: 8hrs

Apache Cassandra-Introduction, Features-p to p, Gassip and failure detection, partitioner, replication factor, writes in Cassandra, CQL Data types, CQLSH, Keyspaces, CURD operations, Collections-Set, List, Map, collections, Using Map: key, Value pair, Using Counter, Time to Live, Alter command- Alter table, Delete table, drop a table, Drop a database, Import and Export-export to CSV, import from CSV, import from STDIN, Export to STDOUT, Querying System tables

Teaching Methodology: Chalk and Board Power Point presentation Activity based Teaching Video Lectures
UNIT – IV: 8hrs
MongoDB: Introduction: What is MongoDB? Why MongoDb?, using JSON, Creating or generating a unique key, Support for Dynamic Queries, Storing Binary Data, Replication, Sharding, Updating information in –place, Terms used in RDBMS and MongoDb, Data types in MongoDb, MongoDB Query Language **MapReduce:** Introduction, mapper, reducer, combiner, Partitioner, searching, sorting, compression **Teaching Methodology:** Chalk and Board Power Point presentation Activity based Teaching Video Lectures Laboratory Exercise
UNIT – V: 8hrs
HIVE: Introduction: What is HIVE? HIVE Architecture, HIVE data Types, HIVE File Formats, HIVE Query Language, RCFile implementation, SerDe, User-Defined Functions (UDF) **Pig:** Introduction: What is Pig? The anatomy of Pig, Pig on Hadoop, Pig philosophy, Use Case for Pig: ETL Processing, Pig Latin overview, Data types in Pig, Running Pig, Execution modes of Pig, HDFS commands, Relational operators, Eval function, Complex Data Types, Piggy Bank, User-defined Functions, Parameter substitution, Diagnostic Operator, Word Count Example using Pig, When to use and not use Pig? ,Pig at Yahoo, Pig vs HIVE. **Teaching Methodology:** Chalk and Board Power Point presentation Video Lectures Laboratory Exercise

Reference Books:
1. Big Data and Analytics by Seema Acharya, Subhashini Chellappan, Wiley India Pvt.Ltd.,2015
2. Big Data Analytics – A Hands-On Approach by Arshdeep Bahga and Vijay Madisetti
3. Buhl, H. U., Röglinger, M., Moser, F., & Heidemann, J. (2013). Big data. Business & Information Systems Engineering, 5(2), 65-69.
4. George, G., Haas, M. R., & Pentland, A. (2014). Big data and management. Academy of management Journal, 57(2), 321-326.
5. Fan, J., Han, F., & Liu, H. (2014). Challenges of big data analysis. National science review, 1(2), 293-314.