(COMPUTER SCIENCE AND ENGINEERING
COURSE CODE	17PCD13/23-PROGRAMMING IN C AND DATA STRUCTURES
CO1	Achieve Knowledge of design and development of C problem solving skills.
CO2	Understand the basic principles of Programming in C language
CO3	Design and develop modular programming skills.
CO4	Effective utilization of memory using pointer technology
CO5	Understands the basic concepts of pointers and data structures.
COURSE CODE	17CPL16/26-COMPUTER PROGRAMMING LABORATORY
CO1	Gaining Knowledge on various parts of a computer.
CO2	Able to draw flowcharts and write algorithms
CO3	Able design and development of C problem solving skills.
CO4	Able design and develop modular programming skills.
CO5	Able to trace and debug a program
COURSE CODE	17CS32-ANALOG AND DIGITAL ELECTRONICS
CO1	Explain the operation of JFETs and MOSFETs, Operational Amplifier circuits and their
COI	application
CO2	Explain Combinational Logic, Simplification Techniques using Karnaugh Maps, Quine
CO2	McClusky technique.
CO3	Demonstrate Operation of Decoders, Encoders, Multiplexers, Adders and Subtractors,
	working of Latches,
CO4	Flip-Flops, Designing Registers, Counters, A/D and D/A Converters
CO5	Design of Counters, Registers and A/D & D/A converters
COURSE CODE	17CS33-DATA STRUCTURES AND APPLICATIONS
CO1	Explain different types of data structures, operations and algorithms
CO2	Apply searching and sorting operations on files
CO3	Make use of stack, Queue, Lists, Trees and Graphs in problem solving.
CO4	Develop all data structures in a high-level language for problem solving.
COURSE CODE	17CS34-COMPUTER ORGANIZATION
CO1	Explain the basic organization of a computer system.
CO2	Demonstrate functioning of different sub systems, such as processor, Input/output, and
	memory.
CO3	Illustrate hardwired control and micro programmed control. pipelining, embedded and other
	computing systems.
CO4	Build simple arithmetic and logical units
COURSE CODE	17CS35-UNIX AND SHELL PROGRAMMING
CO1	Explain UNIX system and use different commands.
CO2	Compile Shell scripts for certain functions on different subsystems.
CO3	Demonstrate use of editors and Perl script writing
COURSE CODE	17CS36-DISCRETE MATHEMATICAL STRUCTURES
CO1	Make use of propositional and predicate logic in knowledge representation and truth
	verification.
CO2	Demonstrate the application of discrete structures in different fields of computer science.
CO3	Solve problems using recurrence relations and generating functions.
CO4	Apply different mathematical proofs, techniques in proving theorems.
CO5	Compare graphs, trees and their applications.
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Demonstrate various Electronic Devices like Cathode ray Oscilloscope, Signal generators, Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit. CO2 Design and demonstrate various types of counters and Registers using Flip-flops CO3 Design and demonstrate various types of counters and Registers using Flip-flops CO4 Make use of simulation package to design circuits. CO5 Infer the working and implementation of ALU. CO6 Infer the working and implementation of ALU. CO7 Analyze and Compare various linear and non-linear data structures CO2 Demonstrate the working nature of different types of data structures and their applications CO3 Develop, analyze and evaluate the searching and sorting algorithms CO4 Choose the appropriate data structure for solving real world problems CO4 Choose the appropriate data structure for solving real world problems CO6 Explain the object-oriented concepts and JAVA. CO2 Develop computer programs to solve real world problems in Java. Develop simple GUI interfaces for a computer program to interact with users, and to comprehen the event-based GUI handling principles using Applets and swings. CO1 Describe computational solution to well known problems like searching, sorting etc. CO2 Estimate the computational complexity of different algorithms. CO3 Develop an algorithm using appropriate design strategies for problem solving. CO4 Develop assembly language code to solve problems CO4 Demonstrate between microprocessors and microcontrollers CO5 Explain interfacing of various devices to x86 family and ARM processor CO6 Develop assembly language code to solve problems CO7 Design a software system, component, or process to meet desired needs within realistic constraints. CO6 Assess professional and ethical responsibility CO7 Esplain interfacing of various devices to x86 family and ARM processor CO8 Function on multi-disciplinary teams Make use of techniques, skills, and modern engineering tools necessary for engineering practice CO6	COURSE CODE	E 17CSL37-ANALOG AND DIGITAL ELECTRONICS LABORATORY
CO1 Digital Trainer Kit, Multimeters and components like Resistors, Capacitors, Op amp and Integrated Circuit. CO2 Design and demonstrate various combinational logic circuits. CO3 Design and demonstrate various types of counters and Registers using Flip-flops CO4 Make use of simulation package to design circuits. CO5 Infer the working and implementation of ALU. CO1 RISE CODE 17CS1.38-DATA STRECTURES LABORATORY CO1 Analyze and Compare various linear and non-linear data structures Demonstrate the working nature of different types of data structures and their applications CO2 Develop, analyze and evaluate the searching and sorting algorithms CO4 Choose the appropriate data structure for solving real world problems CO1 Explain the object-oriented concepts and JAVA. CO2 Develop computer programs to solve real world problems in Java. Develop simple GUI interfaces for a computer program to interact with users, and to comprehend the event-based GUI handling principles using Applets and swings. CO1 Describe computational solution to well known problems like searching, sorting etc. CO2 Estimate the computational complexity of different algorithms. CO3 Develop an algorithm using appropriate design strategies for problem solving. CO4 Describe on a degorithm using appropriate design strategies for problem solving. CO4 Describe on a search using appropriate design strategies for problem solving. CO4 Describe on a search using appropriate design strategies for problem solving. CO5 Describe on a search using appropriate design strategies for problem solving. CO6 Describe on a search using appropriate design strategies for problems of the search of th		
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$(\cdot(\cdot))$	COURSE CODE	17CSL47-DESIGN AND ANALYSIS OF ALGORITHM LABORATORY
programming, etc.)	CO1	Design algorithms using appropriate design techniques (brute-force, greedy, dynamic
	COI	programming, etc.)

CO2	Develop variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.
CO3	Analyze and compare the performance of algorithms using language features.
CO4	Apply and implement learned algorithm design techniques and data structuresto solve real-
	world problems.
	17CSL48-MICROPROCESSOR AND MICROCONTROLLER LABORATORY
COURSE CODE	THE COLOR WITH COLORS AND MICKOCOL WIND LING COLORS AND
	Summarize 80x86 instruction sets and comprehend the knowledge of how assembly language
CO1	works.
CO2	Design and develop assembly programs using 80x86 assembly language instructions
CO3	Infer functioning of hardware devices and interfacing them to x86 family
CO4	Choose processors for various kinds of applications.
CO4	17CS51-MANAGEMENT AND ENTREPRENEURSHIP FOR IT INDUSTRY
COURSE CODE	17 CS31-MANAGEMENT AND ENTREE RENEORSHIT FOR IT INDUSTRI
	Define management, organization, entrepreneur, planning, staffing, ERP and outline their
CO1	importance in entrepreneurship
CO2	Utilize the resources available effectively through ERP
CO3	Make use of IPRs and institutional support in entrepreneurship
COURSE CODE	17CS52-COMPUTER NETWORKS
CO1	Explain principles of application layer protocols
CO2	Outline transport layer services and infer UDP and TCP protocols
CO2	Classify routers, IP and Routing Algorithms in network layer
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CO4 CO5	Explain the Wireless and Mobile Networks covering IEEE 802.11 Standard Define Multimedia Networking and Network Management
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COURSE CODE	17CS53-DATABASE MANAGEMENT SYSTEM
	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using
COURSE CODE CO1	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.
COURSE CODE CO1 CO2	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation.
COURSE CODE CO1 CO2 CO3	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems
COURSE CODE CO1 CO2 CO3 CO4	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems Design code for some application to interact with databases.
COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems Design code for some application to interact with databases. 17CS54-AUTOMATA THEORY AND COMPUTABILITY
COURSE CODE CO1 CO2 CO3 CO4	17CS53-DATABASE MANAGEMENT SYSTEM Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems Design code for some application to interact with databases. 17CS54-AUTOMATA THEORY AND COMPUTABILITY Tell the core concepts in automata theory and Theory of Computation
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COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 CO4 CO5 COURSE CODE CO1 CO5 COURSE CODE CO1 CO2	Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems Design code for some application to interact with databases. ITCSS4-AUTOMATA THEORY AND COMPUTABILITY Tell the core concepts in automata theory and Theory of Computation Explain how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models). Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. Classify a problem with respect to different models of Computation ITCSSSI-OBJECT ORIENTED MODELING AND DESIGN Describe the concepts of object-oriented and basic class modelling. Draw class diagrams, sequence diagrams and interaction diagrams to solve problems.
COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 CO4 CO5 COURSE CODE CO1 CO5 COURSE CODE CO1 CO2 CO3	Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS. Use Structured Query Language (SQL) for database manipulation. Design simple database systems Design code for some application to interact with databases. ITCS54-AUTOMATA THEORY AND COMPUTABILITY Tell the core concepts in automata theory and Theory of Computation Explain how to translate between different models of Computation (e.g., Deterministic and Non-deterministic and Software models). Interpret Grammars and Automata (recognizers) for different language classes and become knowledgeable about restricted models of Computation (Regular, Context Free) and their relative powers. Develop skills in formal reasoning and reduction of a problem to a formal model, with an emphasis on semantic precision and conciseness. Classify a problem with respect to different models of Computation ITCS51-OBJECT ORIENTED MODELING AND DESIGN Describe the concepts of object-oriented and basic class modelling. Draw class diagrams, sequence diagrams and interaction diagrams to solve problems. Choose and apply a befitting design pattern for the given problem
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CO3	Define data intensive computing
CO4	Demonstrate cloud applications
COURSE CODE	17CSL57-COMPUTER NETWORK LABORATORY
CO1	Analyze and Compare various networking protocols.
CO2	Demonstrate the working of different concepts of networking.
CO3	Implement and analyze networking protocols in NS2 / NS3
COURSE CODE	17CSL58-DBMS LABORATORY WITH MINI PROJECT
CO1	Use Structured Query Language (SQL) for database Creation and manipulation.
CO2	Demonstrate the working of different concepts of DBMS
CO3	Implement and test the project developed for an application.
COURSE CODE	17CS61-CRYPTOGRAPHY, NETWORK SECURITY AND CYBER LAW
CO1	Discuss the cryptography and its need to various applications
CO2	Design and Develop simple cryptography algorithms
CO3	Understand the cyber security and need cyber Law
COURSE CODE	17CS62-COMPUTER GRAPHICS AND VISUALIZATION
CO1	Design and implement algorithms for 2D graphics primitives and attributes.
CO2	Illustrate Geometric transformations on both 2D and 3D objects.
CO3	Understand the concepts of clipping and visible surface detection in 2D and 3D viewing, and
	Illumination Models.
CO4	Discussabout suitable hardware and software for developing graphics packages using
	OpenGL
COURSE CODE	17CS63-SYSTEM SOFTWARE AND COMPILER DESIGN
CO1 CO2	Illustrate system software such as assemblers, loaders, linkers and macroprocessors Design and develop lexical analyzers, parsers and code generators
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CO3	Discuss about lex and yacc tools for implementing different concepts of system software
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CO3 COURSE CODE	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS
CO3 COURSE CODE CO1	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS
CO3 COURSE CODE CO1 CO2	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources
CO3 COURSE CODE CO1 CO2 CO3	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands
CO3 COURSE CODE CO1 CO2 CO3 CO4	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH
CO3 COURSE CODE CO1 CO2 CO3 CO4	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies
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CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems.
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system.
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 CO2 CO3 CO4	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system. 17CS666-MULTI-CORE ARCHITECTURE AND PROGRAMMING
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 CO2 CO3 COURSE CODE CO1	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system. 17CS666-MULTI-CORE ARCHITECTURE AND PROGRAMMING Identify the issues involved in multicore architectures
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CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 COURSE CODE CO1 CO2 CO3 COURSE CODE CO1 CO2 CO3 CO4 CO5	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system. 17CS666-MULTI-CORE ARCHITECTURE AND PROGRAMMING Identify the issues involved in multicore architectures Explain fundamental concepts of parallel programming and its design issues Solve the issues related to multiprocessing and suggest solutions Discuss salient features of different multicore architectures and how they exploit parallelism Illustrate OpenMP and programming concept
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 COURSE CODE CO1 CO2 CO3 CO4 CO5 CO4 CO5 COURSE CODE	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system. 17CS666-MULTI-CORE ARCHITECTURE AND PROGRAMMING Identify the issues involved in multicore architectures Explain fundamental concepts of parallel programming and its design issues Solve the issues related to multiprocessing and suggest solutions Discuss salient features of different multicore architectures and how they exploit parallelism Illustrate OpenMP and programming concept 17CSL67-SYSTEM SOFTWARE AND OPERATING SYSTEM LABORATORY
CO3 COURSE CODE CO1 CO2 CO3 CO4 COURSE CODE CO1 CO2 CO3 COURSE CODE CO1 CO2 CO3 CO4 CO5 CO4	Discuss about lex and yacc tools for implementing different concepts of system software 17CS64-OPERATING SYSTEMS Demonstrate need for OS and different types of OS Discuss suitable techniques for management of different resources Illustrate processor, memory, storage and file system commands Explain the different concepts of OS in platform of usage through case studies 17CS653-OPERATIONS RESEARCH Explain optimization techniques for various problems. Understand the given problem as transportation and assignment problem and solve. Illustrate game theory for decision support system. 17CS666-MULTI-CORE ARCHITECTURE AND PROGRAMMING Identify the issues involved in multicore architectures Explain fundamental concepts of parallel programming and its design issues Solve the issues related to multiprocessing and suggest solutions Discuss salient features of different multicore architectures and how they exploit parallelism Illustrate OpenMP and programming concept 17CSL67-SYSTEM SOFTWARE AND OPERATING SYSTEM LABORATORY Implement and demonstrate Lexer's and Parser's

COURSE CODE	17CSL68-COMPUTER GRAPHICS LABORATORY WITH MINI PROJECT
CO1	Apply the concepts of computer graphics
CO2	Implement computer graphics applications using OpenGL
CO3	Implement real world problems using OpenGL
COURSE CODE	17CS71-WEB TECHNOLOGY AND ITS APPLICATIONS
CO1	Define HTML and CSS syntax and semantics to build web pages.
CO2	Understand the concepts of Construct , visually format tables and forms using HTML using CSS
CO3	Develop Client-Side Scripts using JavaScript and Server-Side Scripts using PHP to generate and display the contents dynamically.
CO4	List the principles of object oriented development using PHP
CO5	Illustrate JavaScript frameworks like jQuery and Backbone which facilitates developer to focus on core features
COURSE CODE	17CS72-ADVANCED COMPUTER ARCHITECTURES
CO1	Understand the concepts of parallel computing and hardware technologies
CO2	Illustrate and contrast the parallel architectures
CO3	Recall parallel programming concepts
COURSE CODE	
CO1	Recall the problems for machine learning. And select the either supervised, unsupersvised or reinforcement learning.
CO2	Understand theory of probability and statistics related to machine learning
CO3	Illustrate concept learning, ANN, Bayes classifier, k nearest neighbor, Q,
COURSE CODE	17CS743-INFORMATION AND NETWORK SECURITY
CO1	Analyze the Digitals security lapses
CO2	Illustrate the need of key management
COURSE CODE	17CS754-STORAGE AREA NETWORKS
CO1	Identify key challenges in managing information and analyze different storage networking technologies and virtualization
CO2	Explain components and the implementation of NAS
CO3	Describe CAS architecture and types of archives and forms of virtualization
CO4	Illustrate the storage infrastructure and management activities
COURSE CODE	
CO1	Understand the implementation procedures for the machine learning algorithms.
CO2	Design Java/Python programs for various Learning algorithms.
CO3	Apply appropriate data sets to the Machine Learning algorithms.
CO4	Identify and apply Machine Learning algorithms to solve real world problems
COURSE CODE	
CO1	Design and develop dynamic web pages with good aesthetic sense of designing and latest technical know-how's.
CO2	Understand the concepts of Web Application Terminologies, Internet Tools other web services.
CO3	Recall how to link and publish web sites
COURSE CODE	17CS81-INTERNET OF THINGS TECHNOLOGY
CO1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.

CO2	Compare and contrast the deployment of smart objects and the technologies to connect them
	to network.
CO3	Appraise the role of IoT protocols for efficient network communication.
CO4	Elaborate the need for Data Analytics and Security in IoT.
CO5	Illustrate different sensor technologies for sensing real world entities and identify the
CO3	applications of IoT in Industry.
COURSE CODE	17CS82-BIG DATA ANALYTICS
CO1	Explain the concepts of HDFS and MapReduce framework
CO2	Investigate Hadoop related tools for Big Data Analytics and perform basic Hadoop
CO3	Administration
CO4	Recognize the role of Business Intelligence, Data warehousing and Visualization in decision
CO4	making
CO5	Infer the importance of core data mining techniques for data analytics
CO6	Compare and contrast different Text Mining Techniques
COURSE CODE	17CS833-NETWORK MANAGEMENT
CO1	Analyze the issues and challenges pertaining to management of emerging network
CO1	technologies such as wired/wireless networks and high-speed internets.
CO2	Apply network management standards to manage practical networks
CO3	Formulate possible approaches for managing OSI network model.
CO4	Infer SNMP for managing the network
CO5	Infer RMON for monitoring the behavior of the network
CO6	Identify the various components of network and formulate the scheme for the managing them