M.Sc. (CE & NT)

Master of Science

(Computer Engineering & Network Technology)

Program Structure and Syllabus 2019-20 Admissions Onwards

(UNDER MAHATMA GANDHI UNIVERSITY PGCSS REGULATIONS 2019)

EXPERT COMMITTEE IN COMPUTER ENGINEERING AND APPLICATION

MAHATMA GANDHI UNIVERSITY

2019

EXPERT COMMITTEE IN COMPUTER ENGINEERING AND APPLICATION (PG)

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M.Sc. (CE & NT) Degree Program

(Mahatma Gandhi University Regulations PGCSS2019 from 2019-20 Academic Year)

1. Aim of the Program

Everywhere in the world, technology is changing the way we live and work. Network technology has now become part and parcel of our day to day life. Networking and Digital skills give the students an edge and an opportunity to make a career in any sector. The Master of Science Computer Engineering & Network Technology (M.Sc. (CE & NT)) program is specifically customized to equip students with the capability of building networks, develop apps and secure devices.

2. Eligibility for Admissions

2.1. Qualifications

i.) A candidate seeking admission to M.Sc. course must have

a) A pass with not less than 50% marks in any recognized regular bachelor's Degree course of minimum three years duration in any discipline with Mathematics at 10+2 level.

OR

b) A pass with not less than 50% marks in any recognized Regular Bachelors Degree course of minimum three years duration in any discipline with Mathematics / Statistics / Business Mathematics / Business Statistics / Computer Science as one of the Subjects.

OR

c) A pass with not less than 50% marks in BCA / BSc Computer Science / BSc Information Technology / B.Tech degree of a minimum three years duration from a recognized University.

ii.) Subject to the regulation relating to prescribed minimum of the respective qualifying examination, the minimum marks of admission to the course of studies shall be a pass in the case of SC/ST candidates.

iii.) Candidates belonging to Socially and Educationally Backward Classes (SEBC) referred to GO(P)208/66/Edn dated 2-5-96 and subsequent amendments to orders issued by the Government and University shall be given a relaxation of 3% marks in the prescribed minimum for admission.

iv.) A relaxation of 5% marks from the prescribed minimum shall be allowed in the case of OEC Candidates.

v.) A relaxation of 5% marks from the prescribed minimum shall be allowed in the case of physically handicapped persons.

vi.) Candidates who have passed the qualifying examination in more than one chance in the subject (excluding languages) will have their percentage marks de-rated at the rate of 5% for every additional appearance for the purpose of ranking.

Candidates with such degrees awarded by the Mahatma Gandhi University or any other degree recognized as equivalent to degrees in (i) by the Mahatma Gandhi University also are eligible to apply.

2.2. Selection

The selection to the M. Sc. programme shall be as per the rules and regulations of the University. Students admitted under this programme are governed by the Regulations in force.

3. Medium of Instruction

The medium of instruction and examination shall be in English for all courses.

4. Duration of the Course

The course shall extend over a period of two academic years consisting of four semesters. The candidates should complete the two year M.Sc. Programme within a period of 5 years from the date of admission.

5. Assessment

i.) The assessment will comprise of sessional assessment and university examination in certain subjects, and wholly sessional assessments in others, carrying marks as specified in the subject of study and scheme of assessment.

ii.) University examinations will be conducted at the end of each semester. The Examinations of the odd semesters will be conducted only in odd semesters and that of the even semesters only in even semesters.

iii.) Practical examinations will be conducted by the College itself.

iv.) A candidate who fails to submit the report on the project / industrial training within the prescribed date (or whose report is not accepted for reasons of incompleteness or

other serious deficiencies) will have to register, redo the project / industrial training and submit the report at the end of a subsequent semester.

v.) All Sessional work shall be valued and marks awarded on the basis of day to day performance, periodic tests and assignments. The allocation of sessional marks for individual subjects shall be on the following basis.

Theory - Internal

Components	Weightage
Assignment	1
Seminar	2
Best Two Test papers	1 each (2)
Total	5

vi.) Practical examinations will be conducted by the College itself.

Practical - External

Components	Weightage
Written / Lab test	7
Lab involvement and Record	3
Viva	5
Total	15

Practical - Internal

Components	Weightage
Written / Lab test	2
Lab involvement and Record	1
Viva	2
Total	5

5.1. Elective Courses

The students have the choice to select any one group from the group of electives. The selection of courses from different groups are not permissible.

5.2. Industrial Training in Networking (Internship)

A student has to spend in a reputed organization for Internship. A faculty guide shall be appointed to guide students. The intern will learn how to apply skills she or he may have acquired from the course, in a professional setting. A report shall be submitted and the marks shall be awarded based on presentations by students followed by viva-voce. The weightage of the Internship shall be 5 for internal and 15 for external.

Internship - External

Components	Weightage
Depth of Knowledge and Skills	6
Presentation	3
Report	3
Viva - Voce	3
Total	15

Internship - Internal

Components	Weightage
Depth of Knowledge and Skills	2
Presentation	1
Report	1
Viva - Voce	1
Total	5

5.3. Main Project

During the fourth semester, the students are required to do a Project Work in Networking domain, addressing Network related technology in a reputed organization and a Report of the same is to be submitted.

Project- External

Components	Weightage
Relevance of the topic and analysis	3
Project content and presentation	7
Project viva	5
Total	15

Project- Internal

Components	Weightage
Relevance of the topic and analysis	2
Project content and presentation	2
Project viva	1
Total	5

5.4. Viva Voce

A comprehensive Viva-voce shall be conducted in the fourth semester by a Board of examiners, consisting of at least one external examiner, duly appointed by the University. For the viva-voce the examiners can ask questions from all the courses studied in the entire program including elective courses. The weightage of the Comprehensive viva-voce shall be 2.5 for internal and 7.5 for external.

6. Direct Grading System

Direct Grading System based on a 7 – point scale is used to evaluate the performance of External and Internal Examination of the students. For all courses (Theory & Practical) in all semesters letter grades and GPA / SGPA / CGPA are given on the following scale:

Range	Grade	Indicator
4.50 to 5.00	A+	Outstanding
4.00 to 4.49	A	Excellent
3.50 to 3.99	B+	Very good
3.00 to 3.49	B	Good (Average)
2.50 to 2.99	C+	Fair
2.00 to 2.49	C	Marginal
up to 1.99	D	Deficient (Fail)

No separate minimum is required for Internal evaluation for a pass, but a minimum C grade is required for a pass in an external evaluation. However, a minimum C grade is required for pass in a course.

First stage of evaluation for both internal and external assessment is as follows

Grade	Grade Points
A+	5
A	4
B	3
C	2
D	1
E	0

7. External evaluation and Question paper pattern for Theory subjects.

   Maximum weight for external evaluation is 30. Therefore Maximum Weighted Grade Point (WGP) is 150. Different types of questions shall be given different weights to quantify their range as follows:

Sl.No.	Type of Questions	Weight	Number of questions to be answered
1.	Short Answer type questions	1	8 out of 10
2	Short essay/ problem solving type questions	2	6 out of 8
3.	Long Essay type questions	5	2 out of 4

8. Faculty under which the Degree is Awarded

   Faculty of Science.

9. The Program Structure

M.Sc. COMPUTER ENGINEERING & NETWORK TECHNOLOGY
(M.Sc. CE & NT)

Semester I

CE010101	Mathematics for Network Engineers
CE010102	Digital Logic and Micro Processors
CE010103	Problem solving in C
CE010104	Data Communication & Computer Networks
CE010105	(a) C Lab (b) Digital Logic Lab

Semester II

CE010201	Internet Technology & Distributed Applications
CE010202	Java and Network Programming
CE010203	Web Technology & Cloud Computing
CE010204	Data Structures using Python
CE010205	(a) Java and Network Programming Lab (b) DS using Python Lab

Semester III

CE010301	MPLS & VPN
CE010302	Operating Systems and Linux Administration & Virtualisation
CE010303	Wireless Communication
CE010304	Cryptography and Network & Cyber Security
CE010305	(a) Linux Administration Lab (b) N/W & security Lab

Semester IV

CE	Elective 1
CE	Elective 2
CE	Elective 3
CE010401	Industrial Training in Networking
CE010402	Project
CE010403	Viva – Voce

Group A

CE800401	Network Management & Administration
CE800402	Internet Protocol Version 6
CE800403	Storage Area Network

Group B

CE810401	Mobile Communication
CE810402	Satellite Communication
CE810403	Multi Media Communication

Group C

CE820401	Ad HOC Networks
CE820402	Wireless Sensor Networks & IOT
CE820403	Optical Networks

10. Scheme

Semester	Course Code	Course Name	Type of the Course	Teaching Hours		Credit	Total Credit
				Lect.	Lab.		
I	CE010301	Mathematics for Network Engineers	Core	4	-	4	19
	CE010302	Digital Logic and Micro Processors	Core	4	-	4	
	CE010303	Problem solving in C	Core	4	-	3	
	CE010304	Data Communication & Computer Networks	Core	4	-	4	
	CE010305	(a) C Lab (b) Digital Logic Lab	Core	-	9	2 2	
II	CE010201	Internet Technology & Distributed Applications	Core	4	-	4	20
	CE010202	Java and Network Programming	Core	4	-	4	
	CE010203	Web Technology & Cloud Computing	Core	4	-	4	
	CE010204	Data Structures using Python	Core	4	-	4	
	CE010205	(a) Java and Network Programming Lab (b) DS using Python Lab	Core	-	9	2 2	
III	CE010301	MPLS & VPN	Core	4	-	4	20
	CE010302	Operating Systems and Linux Administration & Virtualisation	Core	4	-	4	
	CE010303	Wireless Communication	Core	4	-	4	
	CE010304	Cryptography and Network & Cyber Security	Core	4	-	4	
	CE010305	(a) Linux Administration Lab (b) N/W & security Lab	Core	-	9	2 2	
IV	CE	Elective 1	Elective	5	-	3	21
	CE	Elective 2	Elective	5	-	3	
	CE	Elective 3	Elective	5	-	3	
	CE010401	Industrial Training in Networking	Core	-	5	5	
	CE010402	Project	Core	-	5	5	
	CE010403	Viva – Voce	Core	-	-	2	

FIRST SEMESTER COURSES

CE010301	Mathematics for Network Engineers
CE010302	Digital Logic and Micro Processors
CE010303	Problem solving in C
CE010304	Data Communication & Computer Networks
CE010305	(a) C Lab (b) Digital Logic Lab

CE010101 - Mathematics for Network Engineers

Total Credits: 4
Total Hours: 40
Weightage: 20

Objective

Mathematics for Network Engineers will helps to get an introduction to the fundamental idea of discrete mathematics and a foundation for the development of more advanced mathematical concepts. This paper helps to extend mathematical maturity and ability to deal with abstraction, algorithms and its analysis and graphs.

Unit 1

Modular Arithmetic and Mathematical Logic : Congruence, Residue classes, Binary Operations, Groups- Definition of groups, abelian group, finite and infinite groups, simple examples. Mathematical propositions, logical connectives. Conditional Statements. Algebra of propositions. Fundamental rules of Inference.

Unit 2

Basic concepts of graph theory: Basic Definitions walks, paths and circuits, Connected and Disconnected graphs. Enter graphs. Hamiltonian graph, Matrix Representations of graphs. Graph Isomorphism.

Unit 3

Trees and Cut – Sets: Trees, Rooted trees, Binary trees and binary search trees, tree traversals – Pre order, in order and post order spanning trees and cutsets.

Unit 4

Network Models and Project Scheduling: Introduction to network models, Modeling with networks: Minimal spanning tree model, Maximal flow Model, Shortest Route Algorithm: Dijkstra's Algorithm. Project Scheduling: CPM, PERT

Unit 5

Formal language and Automata: Basic concepts of automata theory: Alphabets, strings, Languages (DFA, NFA and their representations). Formal Languages: Languages, Phrase structure grammar, Types of grammars, BNF notation

References:

1. Elements of Discrete Mathematics – C.L. Liu (Tata-McGraw Hill) 2nd ed.
2. Graph Theory with applications to Engineering and Computer Science – Narsingh Dev (Prentice – Hal of India, Pvt. Ltd.
3. Principles of Operations Research for Management – Frnak S. Budinick & Chris
4. A First course in Abstract Algebra - John B.Fraleigh.
5. Discrete Mathematical structures with Applications to Computer Science - J.P. Tremblay and R Manohar, Mc Graw Hill 1987

CE010102 - Digital Logic and Microprocessors

Total Credits: 4
Total Hours: 40
Weightage: 20

Objective

Digital Logic and Microprocessors introduce the principles, features and properties of digital devices and circuits. This paper presents the basic tools for the design of digital circuits and provides methods and procedures suitable for a variety of digital design applications. The paper familiarizes the student with the internals of a microprocessor with a wide range of processing capabilities. It gives a fair idea of various interfacing methods and devices, along with a detailed treatment of important design issues.

Unit 1

Number Systems and Codes: Binary, Octal and Hexa decimal number Systems – Binary arithmetic, BCD, Excess-3 code, Gray error detection and correction.
Logic gates: Basic logic gates-AND, OR, NOT, NAND, NOR, XOR and XNOR - symbols, truth tables and timing diagrams.
Boolean algebra: Laws, postulates, duality and theorems of Boolean algebra. Boolean function, truth table Canonical forms-SOP and POS. Conversion between canonical forms, Minimization of Boolean functions using K-map method, realization using logic gates and universal gates, don't care conditions.

Unit 2

Combinational logic circuits:- Half adder, full adder, subtracter magnitude comparator, seven- segment decoder, decoder, encoder, demultiplexer, multiplexer.
Sequential logic circuits:.Flipflops :RS, JK, T and D. Clocked, edge triggered and pulse triggered (Master-slave). Operating characteristics, applications
Registers and counters:-Shift registers, serial in - serial out, serial in - parallel out, parallel in - serial out, parallel in - parallel out, universal shift registers. Synchronous and asynchronous counters, modulo-N-counters, applications of counters.

Unit 3

Microprocessor: Microprocessor History, Introduction to the concept of 8085 microprocessor: Intel 8085 introduction, Architecture, Pin diagram, Timing diagrams, Interrupts of Intel 8085.
Addressing modes, 8085 instruction set.

Unit 4

Microcontrollers: Introduction, Components of Microcontroller, 8051 microcontroller features, block diagram, Pin diagram of 8051, Memory organization, External Memory interfacing, addressing modes of 8051, Timers/counters of 8051.

Unit 5

Introduction to Embedded systems, classification, Hardware Components of an embedded system, Introduction to PIC microcontroller, Architecture of PIC 16F877A, Memory organization, addressing modes, peripheral features of PIC: I/O ports, UART, sensor interfacing.

Reference

1. Thomas. C Bartee - Digital Computer Fundamentals
2. M. Moris Mano - Digital Logic and Computer Design - PHI
3. A. Anand Kumar – Fundamentals of Digital Circuits – Fourth Edition – PHI Learning Private Limited.
4. Ramesh S. Goankar - Microprocessor Architecture, Programming and Applications with 8085" - 5th Edition - Prentice Hall.
5. Scott Mueller - Upgrading and Repairing PCs - 20th Edition - Que.
6. John Iovine, 'PIC Microcontroller Project Book ', McGraw Hill 2000
7. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey ' PIC Microcontroller and Embedded Systems using Assembly and C for PIC18', Pearson Education2008

CE010103 - Problem solving in C

Total Credits: 3
Total Hours: 40
Weightage: 15

Objectives:

To develop C Programs using basic programming constructs. To develop C programs using arrays and strings. To develop applications in C using functions, pointers and structures. To do input / output and file handling in C.

Unit 1 Basics of C Programming

Logic development - Algorithms, Need for algorithm, Flow Charts - Symbols, Rules for making Flow chart, Practice problems for algorithms and flowchart.

C language basics: C character set, Identifiers and keywords, Data types, Enumeration type, constants, variables, declarations, arithmetic operators, unary operators, relational and logical operators, assignment operators, increment and decrement operators, Precedence and order of evaluation, conditional operators, bit operators, type casting, using library functions in math.

Decision making: If statement, if else statement, nested if else statement, switch statements, break, continue and go to statements.

Unit 2 Loops and Arrays

Looping: while loop, do while statements, for loop, nested loop structure.

Arrays : Declaration, Array Initialization – Accessing individual elements of an array - Single dimensional arrays, multidimensional arrays, initializing array using static declaration, Searching and sorting of Arrays,

Unit 3 Strings and Functions

Array of Characters, Character arrays and strings, String handling Functions - String I/O, string Manipulation.

User Defined Functions: Function declaration, definition & scope, Arrays and functions, Passing an array element to a function, call by value, call by reference, recursion.

Unit 4 Structures and Unions

Structures: Definition of Structures, declaration, structure passing to functions, array of structures, arrays with in structures,

Unions: Definition of Union, declaration, structure passing to functions, array of Union, arrays with in Union. Compare and contrast union and structure.

Storage Classes: automatic, extern, static & register. typedef statements.

Unit 5 Pointers and Files

Pointers - Pointer Definition, Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers, dynamic memory allocation.

Files: Creating, Processing, Opening and Closing a data file.

References

1. Programming in ANSI C , E. BalaGuruswamy, TMH
2. Programming in C, Byron S Gottfried, Shaums Outline series. TMH
3. Spirit of C , Mullish Cooper
4. Let us C, Yashwanth Kanethar., BPB Pub.
5. Kernighan, B.W and Ritchie,D.M, ―The C Programming language, Pearson Education.

CE010104 - Data Communication & Computer Networks

Total Credits: 4

Total Hours: 40

Weightage: 20

Objectives

To understand the basic principles of computer networking. To analyse in detail and understand the different protocols. To learn network security aspects.

Unit 1

Data Communication: Theoretical basis of data communication; Data and Signals, Analog and Digital signals; asynchronous and synchronous transmission, data encoding and modulation techniques, broadband and baseband transmission; pulse code modulation, transmission impairments, bandwidth of channel, baud rate of transmission; multiplexing.

Transmission medium; transmission errors - error handling mechanisms.

Unit 2

Introduction to Computer Networks – History, Circuit Switching and Packet Switching Network, Classification and Data Communication Services: Local Area Networks, Wide Area Network, wireless network, internetworking. Network Reference Models: Layered architectures, protocol hierarchies, interface and services: ISO-OSI reference model, TCP/IP Protocol Stack – Basic Overview.

Unit 3

Data Link Layer Service Primitives – Forwarding, Flow Control, Error Control, Framing, Media Access Control - Channel Access Protocols ALOHA, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols, ETHERNET, Repeaters, Hubs, Bridges, Switches, Routers and Gateways.

Unit 4

Network Layer Primitives – Internet architecture, IP, IP4 and IP6 , IP Addressing- classless and class full addressing, subneting and superneting, Network address Translation, Routing – Intra Domain Routing Protocols, Inter Domain Routing Protocols (BGP), IP Services – SNMP, ARP. QoS.

Unit 5

Transport Layer Primitives – End to End Packet delivery, Connection Establishment and Closure, Flow Control and Congestion Control at the Transport Layer, Transmission Control Protocol – Basic Features, TCP Congestion Control, User Data Gram Protocol. Introduction to Socket Programming.

Application Layer Services: Domain Name System (DNS), File Transfer Protocol (FTP), Hypertext Transfer Protocol (HTTP), Simple Mail Transport Protocol (SMTP), Simple Network, Management Protocol (SNMP), Telnet.

References

1. A.S. Tanenbaum, Computer Networks (4th ed.), Prentice-Hall of India, 2003
2. Behrouz Forouzan and S.C. Fegan, Data Communications and Networking, McGraw Hill, 2006
3. W. Tomasi, Introduction to Data Communications and Networking, Pearson Education, 2007.
4. S. Haykin, Digital Communications, John Wiley & Sons, Inc., 2005

CE010105 - (a) C Lab

1. Write a program to generate Fibonacci series.
2. Write a program to convert a number in one base to another base.
3. Write a program to find the transpose of a matrix.
4. Write a program to find the sum of upper and lower triangular matrices.
5. Write a program to find the smallest and largest difference of numbers in an array.
6. Write a program to sort a list of names.

7. Write a program to evaluate sine function.
8. Write a program to evaluate cosine function.
9. Write a program to compute exponential series.
10. Write a program to print prime numbers up to a limit
11. Write a program to print a Pascal's triangle.
12. Write a program to find the root of a quadratic equation.
13. Write a program to add, subtract and multiply two matrices and displays the result.
14. Write a program to evaluate the factorial of a number using recursion.
15. Write a program to check whether the given string is a palindrome or not
16. Define a structure containing data members such as product code, product name, price, qty store values to the structure & display a report.
17. Implement binary and linear searching.
18. Write a program to sort an array.
19. Write a program for implementing Tower of Hanoi
20. Create a sequential file with fields sno, sname, mark1 and mark2 and display a report.

CE010105 – (b) Digital Logic Lab

1. Realization of basic gates using Universal logic gates.
2. Code conversion circuits- BCD to Excess-3 & vice-versa.
3. 4-bit parity generator & comparator circuits.
4. Construction of simple Decoder & Multiplexer circuits using logic gates.
5. Design of combinational circuit for BCD to decimal conversion to drive 7-segment display using multiplexer.
6. Construction of simple arithmetic circuits-Adder, Subtractor.
7. Realization of RS-JK & D flip-flops using Universal logic gates.
8. Realization of Universal Register using JK flip-flops & logic gates.
9. Realization of Universal Register using multiplexer & flip-flops.
10. Construction of Adder circuit using Shift Register & full Adder.

SECOND SEMESTER COURSES

CE010201	Internet Technology & Distributed Applications
CE010202	Java and Network Programming
CE010203	Web Technology & Cloud Computing
CE010204	Data Structures using Python
CE010205	(a) Java and Network Programming Lab (b) DS using Python Lab

CE010201 - Internet Technology & Distributed Applications

Total Credits: 4

Total Hours: 40

Weightage: 20

Objective

This course is about Internet Technology. We will cover the architecture of the Internet from the application layer down to Ethernet connections. In the course of doing this, we will delve into network programming, TCP and UDP protocols, reliable message delivery, routing, access protocols, VLANs, and firewalls.

Unit – I

Introduction: History of data networking from ARPANET to SDN, evolution of the Internet, circuit vs. packet switching, TCP/IP protocol stack, sockets, introduction to network programming in different languages

Unit – II

Application layer: principles of network applications, Domain Name System, HTTP, and FTP, Application layer: email protocols: SMTP, POP3, IMAP, Peer-to-peer networking, introduction to Bit Torrent

Unit – III

Transport layer: UDP operations, reliable data transfer TCP features,

Network layer: protocols – IP, ARP,RARP,ICMP, Ping, Traceroute, NAT/PAT, IGMP, classful and classless addressing, CIDR, sub netting and super netting, Router architecture, IP datagram format, DHCP, comparison IPv4 and IPv6 addressing

Unit – IV

Routing protocols: shortest path, Dijkstra's algorithm (link state routing), distance vector routing

Internet routing: autonomous systems, RIP, OSPF, BGP

Datalink layer: link-layer services, error detection and correction, medium access control, Ethernet- protocol architecture, types of Ethernet, Ethernet switches

Unit – V Introduction to recent networking terminologies

VLAN concept, Wifi and Wimax, Network quality of service, Firewalls, VPNs, Software Defined Networks

Textbook

1. Computer Networking: A Top-Down Approach (6th Edition), James F. Kurose and Keith W. Ross, Pearson, pub.

Reference Text

1. TCP/IP Protocol Suite, FOROUZAN, McGraw Hill International Edition
2. TCP/IP Illustrated: The Protocols, Fall & Stevens

CE010202 - Java and Network Programming

Total Credits: 4
Total Hours: 40
Weightage: 20

Objective
Java and Network Programming aims to make students aware of fundamentals of programming such as variables, conditional and iterative execution, methods, etc. It also create an understanding about fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. It develops the ability to write a computer network program to solve network problems.

Unit 1
Introduction to JAVA, features of Java, The Java Environment-JVM, JDK and JRE, Data types, variables, operators, Arrays, Control Statements, Command line Arguments, Class and Objects, Constructors, Method overloading, Inheritance, Method overriding, Dynamic method dispatch, Interface, package.

Unit 2
Exception handling, Multithreading – thread life cycle, Runnable interface and thread class, thread priorities, Synchronization, string handling, File class, stream classes – Byte steam classes, Character stream classes.

Unit 3
Java applets-Life cycle of an applet, adding images and sound to an applet, passing parameters to an applet. The event delegation model – Event classes – Event Listener interfaces, working with graphics class, working with color and fonts, using AWT controls, Layout managers and menus-Dialog boxes, Swing API components.

Unit 4
JDBC, Network programming, Basic network concept, InetAddressclass, The URL class, Socket for client- Socket basic, The Socket class, socket exception, Socket for servers- Server socket class, secure sockets, creating secure client sockets, creating secure server sockets.

Unit 5
UDP Datagram and Sockets-UDP protocol, Datagram packet class, Datagram Socket class, working with multicast socket, URL connections-Opening URL connections, Reading data from a server, Configuring the connection, configuring the client request HTTP Header, wring data to a server, security considerations for URL types, Java mail API.

References:

1. Herbert Schildt, Java 2 The complete Reference, Tata Mc.Graw Hill 6th Edn.
2. Elliotle Rusty Harold, Java & Network programming O'Reilly Publishers, 4th Edn.
3. Deitel and Deitel, Java: How to program, PHI publishers, 9th Edn.

CE010203 - Web Technology & Cloud Computing

Total Credits: 4
Total Hours: 40
Weightage: 20

Objectives

Web Technology & Cloud Computing aims to transform graduates with potential in computational into experts in information technology that the industry requires from time to time. This paper helps students to study the basics involved in publishing content on the World Wide Web and to create web pages using html, css and Javascript. The student could understand the common terms and definitions of virtualization and cloud computing and be able to comprehend the technical capabilities and business benefits of virtualization and cloud computing.

Unit 1

Internet Concept: What is internet, history of internet, Fundamental of Web, Web development overview, Domain Name System (DNS), Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture and protocol (IP), Web Browser and Web Server.

Unit 2

HTML and DHTML: HTML Tag, Rules of HTML, Text Formatting & Style, List, Adding Graphics to Html Document, Tables and Layout, Linking Documents, Frames, Forms, Project in HTML, Introduction to DHTML, CSS, Class & DIV, External Style Sheet.

Unit 3

Scripting Languages: Java Script (JS) in Web Page, Advantage of Java Script, and JS object model and hierarchy, Handling event, Operators and syntax of JS, Function, Client side JS Vs Server side JS, JS Security.

Unit 4

Cloud Computing Basics - cloud computing Overview – Cloud components, Infrastructure, Services, Applications – Storage, Database services, Intranets and the cloud – components, Hypervisor applications, First Movers in the Cloud. Your Organization and Cloud Computing – When you can use Cloud computing, Benefits, Limitations, Security Concerns, Regulatory Issues.

Unit 5

Cloud Computing with the Titans – Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM, The Business case for going to the Cloud. The Business case for going to the cloud- Cloud Computing services- Infrastructure as a Service, Platform as a Service, Software as a Service, Software plus services. How applications help your business.

Cloud storage overview - the basics, storage as a service ,providers, security, reliability, advantages, cautions, outages theft, cloud storage providers, Developing Applications -

Virtualization in your Organization - why virtualize, How to virtualize, concerns, security, Server solutions- Microsoft Hyper - V,VM ware, VMware Infrastructure

Text Books:

1. N.P.Gopalan, J.Akilandeswari, "Web Technology: A de velopers Perspective", Second Edition, PHI Publications, 2014.
2. Anthony TVelte, Toby JVelte and Robert Elsenpeter, "Cloud Computing –A Practical Approach " Tata McGraw Hill Education Pvt Ltd, 2010

References

1. Thomas A. Powel "HTML The complete Reference",Third Edition,TMH publication, 1999
2. David Flangan, "JavaScript: The definite Guide", Si xth Edition, O Reilly Publication, 2011 Syed A. Ahsonand Mohammed Ilyas,
3. Cloud Computing and Software Services : Theory and Techniques, CRC Press, Taylor and Francis Group, 2010 Judith Hurwitz, Robin Bloor, Marcia Kaufman and Fern Halper
4. Cloud Computing for Dummies. Wiley- India edition,2010Ronald L. Krutz and Russell Dean Vines
5. Cloud Security: A Comprehensive Guide to Secure Cloud Computing. Wiley Publishing, Inc.,2012

CE010204 - Data Structures using Python

Total Credits: 4
Total Hours: 40
Weightage: 20

Objective:
To introduce the concept of data structures through ADT including List, Stack, Queues. To introduce various techniques for representation of data in the real world. To develop application using data structure algorithms. To introduce the versatile Python Programming language.

Module 1
Data Structures, Types of data structures, examples. Python Overview, Objects in Python, Expressions, Operators, Control Flow, Functions, Input output, Exception Handling, Class Definitions, Inheritance.

Module 2
Python Sequences -Arrays, Dynamic implementation of arrays, Stack, Applications, Implementation, Queue, Priority queues, Applications, Implementation, Linked List, Types of Linked List, Applications, Implementation, Recursion.

Module 3

Trees, Binary trees, Insertion and deletion of nodes in binary tree, binary tree traversals, Binary search trees, threaded binary trees, Balanced trees, B trees – insertion and deletion of nodes. Graphs, Representation of graphs.

Module 4

Searching – Sequential search, Binary search, Tree search. Sorting – Bubble sort, Quick sort, Insertion sort, selection sort, shell sort, radix sort, merge sort, heap sort

Module 5

Hashing – Hash Functions, Hash Tables – Python implementation, Introduction to maps, sorted maps, skip lists, sets and multi sets.

References

1. Data Structures & Algorithms in Python, Michael T Goodrich, Roberto Tamassia, Michael H Goldwasser, Wiley
2. Data Structures and Algorithmic Thinking with Python, Narasimha Karumanchi, career Monk Publications.
3. Introduction to data structures with applications, Tremblay and Sorenson., TMH (Second Edition), McGraw Hill Book Company, 1998
4. Introduction to Computing and Problem Solving With PYTHON, Jeeva Jose & P Sojan Lal
5. Practical Programming: An introduction to Computer Science Using Python 3, Paul Gries, Jennifer Campbell, Jason Montojo

CE010205 - (a) Java and Network Programming Lab

1. Program to illustrate class, objects and constructors
2. Program to implement overloading, overriding, polymorphism etc.
3. Program to implement the usage of packages
4. Program to create our own exception
5. Program for handling file operation
6. Implement the concept of thread programming
7. Program to implement Generic class and generic methods
8. Applet program for passing parameters
9. Applet program for running an audio file
10. Program for event-driven paradigm in Java
11. Event driven program for Graphical Drawing Application
12. Program that uses Menu driven Application
13. Program to implement JDBC in GUI and Console Application
14. Demonstrate InetAddressclass
15. Socket programming to implement communications
16. Demonstrate Datagram Socket class and Datagram packet class
17. Develop a multi-threaded GUI application of your choice.

CE010205 - (b) DS using Python Lab

1. Implement Linear Search.
2. Implement Binary Search.
3. Sort a list of numbers using Bubble sort.
4. Sort a list of numbers using Insertion sort.
5. Sort a list of numbers using Selection sort.
6. Sort a list of numbers using Quick sort.
7. Sort a list of numbers using Merge sort.
8. Implement Stack and its operations using List.
9. Implement Queue and its operations using List.
10. Convert infix expression into postfix expression using Stack operations
11. Evaluate postfix expression using Stack operations
12. Store a polynomial expression using singly linked list.
13. Implement following operations on Linked List.
    (i) Creation (ii) Insertion (iii) Deletion (iv) Traversal
14. Use functions to perform the following operations on Double Linked List.
    (i) Creation (ii) Insertion (iii) Deletion (iv)Traversal in both ways.
15. (a) Create a binary search tree b) Traverse the tree recursively in pre-order, post-order and in in-order c) Count the number of nodes in the binary search tree.

References

1. Y Daniel Liang, “Introduction to Programming using Python”, Pearson.
2. Benjamin Baka, David Julian, “Python Data Structures and Algorithms”, Packt Publishers,2017.
3. Rance D. Necaise, “Data Structures and Algorithms using Python”, Wiley Student Edition.
4. Martin Jones, “Python for Complete Beginners”, 2015.
5. Zed A. Shaw, “Learn Python the Hard Way: a very simple introduction to the terrifyingly beautiful world of computers and code”, 3e, Addison-Wesley, 2014.
6. Hemant Jain, “Problem Solving in Data Structures and Algorithms using Python: programming interview guide”, 2016.

THIRD SEMESTER COURSES

CE010301	MPLS & VPN
CE010302	Operating Systems and Linux Administration & Virtualisation
CE010303	Wireless Communication
CE010304	Cryptography and Network & Cyber Security
CE010305	(a) Linux Administration Lab (b) N/W security Lab

CE010301 - MPLS & VPN

Total Credits: 4
Total Hours: 40
Weightage: 20

Objectives
To understand the fundamental concepts of Multiprotocol label switching and its advantages. To get an idea about MPLS routing using labels and compare it with IP routing. To understand how MPLS works with connection oriented technology ATM. To get a better understanding of VPN and the protocols. To get an awareness about Interpret traffic engineering concepts and how QoS is guaranteed in MPLS.

Unit 1
Introduction to MPLs: Definitions of MPLS, Benefits of -MPLS- MPLS Architecture – MPLS labels, MPLS modes- frame mode, cell mode, label stacking, MPLS and the OSI Reference model, Label Switched router, Label forwarding instance base, MPLS pay load, MPLS label spaces, MPLS modes – Label distribution, label retention mode, LSP control mode.

Unit 2
Forwarding Labeled packets: Label operation, IP Lookup Vs Label Lookup, Load balancing Labeled packets, Unknown label, Reserved label, Implicitly Null label, Explicit null label, Router Alert label, OAM Alert Label, Unreserved labels.
Label distribution Protocol:- LDP overview, LDP operation, LDP session establishment and maintenance.

Unit 3
MPLS and ATM Architecture:- Brief introduction to ATM, Label encoding Label advertisement. Downstream – on-demand label advertisement, LDP control mode for ATM, LDP for LC-ATM, VC-merge, Non MPLS-aware ATM switches, Label switch controller.

Unit 4
VPN:- What is a VPN? What is IPSec and How does it work, IPSec components-ESP, AA, SA transport mode, Tunnel mode, Key management. VPN model overlay VPN model, Peer-to-peer VPN model,
MPLS-VPN:- MPLS VPN model- Architectural overview of MPLS VPN VRF.

Unit 5
Traffic Engg. With MPLS: What is traffic Engg? The fish problem, Traffic Engg. With MPLS, solving fish problem with MPLS TE, Introduction to MPLS QoS, any Transport over MPLS (ATOM)

References:-

1. Vivek Alwayn, “Advanced MPLS Design and Implementation”, Cisco press.
2. Luc De Ghein, “ MPLS Fundamentals”, Cisco press.
3. James Reagan, “MPLS” Sybex
4. Ivan Pepelnjake, Jim Guichard, “MPLS and VPN” Cisco press.

CE010302 - Operating Systems and Linux Administration & Virtualisation

Total Credits: 4
Total Hours: 40
Weightage: 20

Objectives

To understand basic functions and concepts of Operating system. To understand Architecture of Operating System, process management, memory management, process synchronization, CPU scheduling, deadlock, I/O and File management. To explore the features of Linux operating system.

Unit 1

Basics of Operating Systems: Definition, Types of Operating Systems, OS Service, System Calls, OS structure, User interface for OS, OS Functions, System calls, Types of system calls.

Unit 2

Process Management :Concepts, Process Scheduling, Operations on Processes, Co-operating Processes, Inter Process Communication, CPU Scheduling, Scheduling Concepts, Criteria, Scheduling Algorithms, Multiprocessor Scheduling, Real time Scheduling

Process Synchronization : Critical Section, Synchronization Hardware, Semaphores, Problems of Synchronization, Critical Regions, Monitors, Deadlocks, Characterization, Handling Deadlocks, Deadlock Prevention, Avoidance, Detection, Deadlock Recovery

Unit 3

Memory Management - Storage Hierarchy, Storage Management Strategies, Contiguous, Non Contiguous Storage Allocation, Single User, Fixed Partition, Variable Partition, Swapping, Paging, Segmentation, Page Replacement Methods, Working Sets. Disk Scheduling, File Concepts, File System Structure, Access Methods, Directory Structure, Protection.

Unit 4

LINUX - introduction and file system, Basic features, advantages, installing requirement, basic architecture of Linux system, Kernel, shell. Linux File system, Boot block, super block, Inode table, data blocks, How Linux access files, storage files. Commands for files and directories cd, ls, cp, md, rm, mkdir, rmdir, more, less, creating and viewing files, using cat, file comparisons, View files, disk related commands, checking disk free spaces. Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down. Processes in Linux, process fundamentals, connecting processes with pipes, Redirecting input

output, manual help, Background processing, managing multiple processes, changing process priority, scheduling of processes at command, batch commands , kill, ps, who, sleep, Printing commands, grape, fgrep, find, sort, Cal, banner, touch, file, file related commands-ws, sat, cut, grep, dd, etc. Mathematical commands- bc, expr. vi editor

Unit 5

Shell programming Basic of shell programming, Various types of shell, shell programming in bash, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, shell keywords, Creating Shell programs for automate system tasks and report printing, use of grep in shell, awk programming. Virtualization concepts in Linux.

Text Books

1. Silberschatz and Galvin, Operating System Concepts, 6th Edition, John Wiley & Sons, Inc., 2004
2. "Beginning Linux Programming" Neil Matthew, Richard stones, Alan Cox, Wrox Publication.
3. "Linux Device Drivers", Alessandro Rubini, Jonathan Corbet, Third Edition.
4. "Linux Kernel Development" Robert Love, 2nd Edition.

References

1. Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, 1992
2. P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2004
3. H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson EducatION,2002
4. Tim Burke, Mark A. Parenti, and AI Wojtas, Writing Device drivers, Tutorial and reference, Butterworth-Heinemann, July, 1995.
5. George pajari, Writing Unix device drivers, Addision Wesley Professional, November, 1991.
6. Mel Gorman, Understanding the Linux Virtual Memory Manager, Prentice Hall, 2004. CS3815

CE010303 - Wireless Communication

Total Credits: 4
Total Hours: 40
Weightage: 20

Objectives

To give the students an idea about the cellular communication theory and technology. To understand the idea of mobile standard evolution. To get a clear idea about Wireless communication standards used in PAN, LAN and MAN.

Unit 1

Antennas and Propagation:- Antennas- Radiation Patterns, Antenna Types, Antenna Gain. Propagation Modes- Ground wave propagation, Sky propagation, Line-of-sight propagation- Attenuation, free space loss, Noise, Atmospheric Absorption, Multipath. Fading in the Mobile Environment- Multipath Propagation, Error Compensation Mechanisms.

Spread Spectrum:- The concept of spread spectrum, Frequency-Hopping Spread Spectrum, Direct Sequence Spread Spectrum, Code Division Multiple Access, Generation of Spreading Sequences.

Unit 2

MIMO Systems: Types of MIMO systems, Beam forming -spatial multiplexing, Functions of MIMO systems, Applications, Introduction to Smart Antennas. Multiple Access in wireless System:- Multiple access scheme, FDMA, TDMA, CDMA, SDMA, Packet Radio access.

Unit 3

Satellite Communications:- Satellite Parameters and Configurations- Satellite Orbits, Frequency Bands, Transmission Impairments, Satellite Network Configurations. Capacity Allocation-Frequency Division, Time Division.

Cellular Wireless Networks:- Principles of Cellular Networks-Cellular Network Organization, Frequency Reuse, Operation of Cellular Systems, Mobile Radio Propagation Effects, Handoff, Power control. Evolution of cellular networks 1G, 2G, 3G, 4G, 5G.

Unit 4

Wireless Personal Area Networks: Introduction, Wireless Local Loop, Bluetooth (802.15.1) Protocol stack and network connection establishment, Zigbee- IEEE 802.15.4 - Stack architecture, components, Network Topologies, Applications.

Unit 5

Wireless LAN Technology:-Overview-Wireless LAN Applications, WLAN Network topologies, IEEE 802.11 WLAN: Architecture, Physical Layer, Data Link Layer, MAC Layer (PCF & DCF), Hidden & exposed terminals, MACA and MACAW protocols, Point coordination function & Distributed Coordination function. Wireless MAN Technology: IEEE 802.16- Protocol Architecture, IEEE 802.16a -Wimax and LTE / 3GPP comparison.

Text Books:

1. W. Stallings, "Wireless Communications and Networks", Prentice Hall, 2004.

Reference Books:

1. W. Stallings, " Data and Computer Communications", Prentice Hall of India.
2. T.S. Rappaport, "Wireless Communications: Principles & Practice", Second Edition, Prentice Hall, 2002.
3. A.S. Tanenbaum, " Computer Networks" Prentice Hall of India.
4. Behrouz A.Forouzan, "Data Communications and Networking", TATA McGraw Hill.
5. Jochen Schiller, " Mobile Communication" Second Edition, Pearson.

CE010304 - Cryptography and Network & Cyber Security

Total Credits: 4
Total Hours: 40
Weightage: 20

Objectives

To provide students with contemporary knowledge in Cryptography and Security. To understand how crypto can be used as an effective tools in providing assurance concerning privacy and integrity of information. To study about cybercrime categories. To get awareness about various hacking, cracking and attacks. To study about various investigation strategies.

Unit 1

Introduction -Security Goals, Cryptographic attacks, Services and mechanism, Traditional symmetric key ciphers – Introduction, Substitution ciphers, Transposition Ciphers, Modern Symmetric key ciphers – Block ciphers, stream ciphers, DES, Triple DES, AES ,Blowfish ,Use of modern Block ciphers – Block cipher modes of operation, Use of stream ciphers – RC4.

Unit 2

Principles of Public Key Cryptosystems- RSA algorithm, Comparison of Symmetric key Cryptography and Asymmetric key cryptography, Message Integrity – Message and message Digest, Cryptographic Hash function Criteria, Message Authentication, Message Authentication Code (MAC). Cryptographic Hash functions- Hash functions based on cipher block chaining, SHA-512, SHA – 3, Digital signature – Digital signature process, Digital Signature Standard, Authentication protocols

Unit 3

Entity Authentication – Data origin Vs Entity Authentication, Passwords, challenge response, Zero-knowledge, Biometrics, Key management- Symmetric key distribution, Key distribution centre, KDC session keys, simple protocol using a KDC, Needham-Schroeder protocol, Kerberos, Key exchange - Diffie – Hellman Key exchange algorithm, station to station key agreement, Public Key Distribution, X.509, PKI.

Unit 4

Electronic Mail security – PGP, S/MIME – IP security – security policy Internet Key Exchange (IKE), ISAKMP, Web Security – SSL/TLS, Operating System Security Memory and Address protection, File Protection Mechanism, User Authentication, Firewalls- Firewalls Characteristics, Types of Firewalls, Intruders- Intrusion Detection. Wireless Network: Security, WEP, WPA IEEE 802.11i wireless LAN security – Services, phases of operation, Discovery phase, Authentication phase, Key management phase, protected Data transfer phase, IEEE 802.11i Pseudorandom function.

Unit 5

Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Categories of Cyber Crime, Cyber Crime Issues-Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Software Piracy, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Introduction to Cyber Crime Investigation, Investigation Tools, Digital Evidence Collection, Evidence Preservation, E-Mail Investigation, E-Mail Tracking, IP Tracking, E-Mail Recovery, Password Cracking.

Text Books:

1. Cryptography and Network Security, 2nd Edition, Behrouz. A.Forouzan, DebdeepMukhopadhyay, Tata McGraw Hill.
2. Cryptography and Network Security Principles and Practice 5thedn, William Stallings, Pearson.
3. Bernadette H Schell, Clemens Martin, ―Cybercrime‖, ABC – CLIO Inc, California, 2004. Understanding Forensics in IT ―, NIIT Ltd, 2005

Reference

1. Cory Altheide and Harlan Carvey, ―Digital Forensics with Open Source Tools‖ Elsevier publication, April 2011
2. Nelson Phillips and Enfinger Steuart, ―Computer Forensics and Investigations‖, Cengage Learning, New Delhi, 2009.

CE010305 - (a) Linux Administration Lab

1. Write a menu driven shell script to (a) find sum of digits and (b) sum up to that number.
2. Write a shell script to accept two file names as arguments. Check whether the file Contents are same or not.
3. Write a shell script to accept two file names and check it both exists. If the second file name exists then the contents of the first file name should be appended to it. If the second file name does not exist then create a new file with contents of the first file name.
4. Write a menu driven shell script to check if the given string and the number are Palindromes.
5. Write a shell script to search a file from the current directory in any of the Subdirectories and report the path.
6. Write a shell script to prepare pay slip.
7. Create a file called test.dat which contains sample data as follows: A00001 Shanthi 80 A00007 Arun 70 S00005 Karthi 50 Answer the following questions based on the above data: A. Display the contents of the file sorted according to the marks in descending order. B. Display the names of the students in alphabetical order ignoring the cases. C. Display the list of students who have scored marks between 60 and 80. D. Display the list of students and their register numbers.

8. Write a menu driven shell script for file manipulation which includes 1) Creating a file 2) editing a file 3) removing a file/directory 4) copying a file 5) appending contents of files 6) displaying content of a file 7) translating Contents of a file either lowercase or uppercase
9. Write a menu driven shell script for computing factorial Value of a given number & generating Fibonacci series using recursive function.
10. Write a shell script to display all perfect numbers between 1 and the given limit.

CE010305 - (b) N/W & security Lab

1. Networking components : cables and connectors, crimping tools, hubs , switches, Access servers etc
    a) Ethernet cabling - cross cable and straight cable crimping and connections
    b) Host to host connections
    c) Switch to host and host to hub connections
2. Packet tracer tool
    a) Adding Routers and Installing Modules
    b) Prototyping a network and observing traffic flow
    c) Configuring a Web Server and observing web requests using Packet Tracer
    d) Configuring a DHCP Server
    e) Configuring a Cisco router and a simple routing protocol.
3. Configuring an ADSL/Wireless router
4. Configuring VLAN on a manageable switch
5. Network simulation using NS2
    a) Familiarizing Network Simulator – 2 (NS2).
    b) Simulate a wired network consisting of TCP and UDP Traffic using NS2
    c) Simulation of wireless Ad hoc networks using NS2
    d) Simulate a wireless network consisting of TCP and UDP Traffic using NS2 and then calculate their respective throughput.
    e) Performance evaluation of different ad-hoc wireless routing protocols (DSDV, DSR, AODV etc) using NS2
6. Implementation of InetAddress and URL concepts
7. Implementation of PING
8. Implementation of Socket programming – client server communication
9. Implementation public chat
10. Implementation of multicasting concepts

FOURTH SEMESTER COURSES

CE8004	Elective 1	CE800401 - Network Management & Administration CE800402 - Internet Protocol Version 6 CE800403 - Storage Area Network
CE8104	Elective 2	CE810401 - Mobile Communication CE810402 - Satellite Communication CE810403 - Multi Media Communication
CE8204	Elective 3	CE820401 - Ad HOC Networks CE820402 - Wireless Sensor Networks & IOT CE820403 - Optical Networks

CE800401 - Network Management & Administration

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective

To learn the principles of system management, including network and system design, analysis, efficiency and security. To understand general concepts and architecture standards in network management and terminology associated with SNMP and TMN Appreciate network management. To understand Advanced Information Processing Techniques such as broadband network management.

Unit 1

Introduction: Analogy of Telephone Network Management, Data and Telecommunication Network Distributed computing Environments, TCP/IP-Based Networks: The Internet and Intranets, Communications Protocols and Standards- Communication Architectures, Protocol Layers and Services; Case Histories of Networking and Management – The Importance of topology , Filtering Does Not Reduce Load on Node, Some Common Network Problems; Challenges of Information Technology Managers, Network Management: Goals, Organization, and Functions- Goal of Network Management, Network Provisioning, Network Operations and the NOC, Network Installation and Maintenance; Network and System Management, Network Management System platform, Current Status and Future of Network Management.

Unit 2

Basic Foundations: Standards, Models, and Language: Network Management Standards, Network Management Model, Organization Model, Information Model – Management Information Trees, Managed Object Perspectives, Communication Model; ASN.1- Terminology, Symbols, and Conventions, Objects and Data Types, Object Names, An Example of ASN.1 from ISO 8824; Encoding Structure; Macros, Functional Model

Unit 3

SNMPv1 Network Management: Managed Network: The History of SNMP Management, Internet Organizations and standards, Internet Documents, The SNMP Model, The Organization Model, System Overview. The Information Model – Introduction, The Structure of Management Information, Managed Objects, Management Information Base. The SNMP Communication Model – The SNMP Architecture, Administrative Model, SNMP Specifications, SNMP Operations, SNMP
MIB Group, Functional Model

Unit 4

SNMP Management – RMON: Remote Monitoring, RMON SMI and MIB, RMONI1- RMON1 Textual Conventions, RMON1 Groups and Functions, Relationship Between Control and Data Tables, RMON1 Common and Ethernet Groups, RMON Token Ring

Extension Groups, RMON2 – The RMON2 Management Information Base, RMON2 Conformance Specifications.

Unit 5

Broadband Network Management: Broadband Access Networks and Technologies: Broadband Access Networks, Broadband Access Technology; HFCT Technology: The Broadband LAN, The Cable Modem, The Cable Modem Termination System, The HFC Plant, The RF Spectrum for Cable Modem; Data Over Cable Reference Architecture; HFC Management – Cable Modem and CMTS Management, HFC Link Management, RF Spectrum Management, DSL Technology; Asymmetric Digital Subscriber Line Technology – Role of the ADSL Access Network in an Overall Network, ADSL Architecture, ADSL Channeling Schemes, ADSL Encoding Schemes; ADSL Management – ADSL Network Management Elements, ADSL Configuration Management, ADSL Fault Management, ADSL Performance Management, SNMP-Based ADSL Line MIB, MIB Integration with Interfaces Groups in MIB-2, ADSL Configuration Profiles.

Text Books

1. Mani Subramanian: Network Management- Principles and Practice, 2nd Pearson Education, 2010.

Reference

1. J. Richard Burke: Network management Concepts and Practices: a Hands-On Approach, PHI,
2. William Stalling, "SNMP – SNMPv2, SNMPv3 & RMON 1 and 2", 3rd Edition, Addison Wesley, 1999.
3. Steve Wisniewski, "Network Administration", Prentice Hall, 2000.

CE800402 - Internet Protocol Version 6

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective

This paper helps to master the IPV6 basics, IPV6 subnets and provide a comprehensive overview of ICMPV_6. Upon completion of this paper the students will also have idea regarding the differences of IPV4 & IPV6, address configuration, transition technologies and security aspects. Ultimately the importance of IPV6 in internet applications are summarized in this paper.

Unit 1

Introduction to IPV_6 :- Limitations of IPV_4, Consequences of the limited IPV_4 address space, Features of IPV, IPV_6 Addressing - IPV_6 Address space, IPV_6 address syntax, Types

of IPV_6 addresses – Unicast IPV_6 addresses, Multicast IPV_6 addresses, Anycast IPV_6 addresses, IPV_6 addresses for a host, IPV_6 addresses for a router, Subnetting the IPV_6 addresses space, IPV_4 addresses and IPV_6 Equivalence.

Unit 2

IPV_6 Header: IPV_6 Header, IPV_6 Extension headers – Extension headers order, Hop-by-hop option header, Destination options header, Routing header, Fragment header, Authentication header, Encapsulating security header and trailer. IPV_6 MTU, Upper – layer cheeksum.

$ICMPV_6$: Overview, $ICMPV_6$ Header, Types of $ICMPV_6$ messages – Error messages, Informational messages, Neighbour discovery messaes, Multicast Listener Discovery (Group Membership Messages), and MLD version 2.

Unit 3

Address Auto configuration: Overview, types of Auto configuration, Auto configured address states, Auto configuration process, $DHCPV_6$.

IPV_6 and Name Resolution : Name Resolution for IPV_6 DNS Enhancement for IPV_6, LLMNR, source and Destination address selection, source address selection algorithm, Destination address, selection algorithm.

Unit 4

IPV_6 Routing: Routing in IPV_6, IPV_6 Routing table entry types, Route Determination Process, End to End IPV_6 delivery process, IPV6 on the sending host, IPV_6 on the Router, IPV6 on the destination host.

IPV_6 Routing Protocols: RIPng, OSPF for IPV_6, Integrated IS – IS for IPV_6, BGP-4 for IPV_6.

Unit 5

IPV_6 Transition Technologies: Overview, Node types, IPV_6 Transition addresses, Transition Mechanisms:- using both IPV_4 and IPV_6, IPV_6 over IPV_4 tunneling, DNS Infrastructure, Tunneling configurations: Router to router, host to router and router to host, host to host, Types of tunnel :- Configured, Automatic.

IPV6 security considerations: Authorization for automatically assigned addresses and configurations, protection of IPV6 packets, Host protection from scanning and attacks. Control of what traffic is exchanged with the internet.

References:

1. Joseph Davies, “Understanding IPV6 “, II Edn. Microsoft Press.
2. Silvia Hagen, “ IPv6 Essentials” 2nd Edition, O'Reilly
3. Adeel Ahmed, Salman Asadullah, Bruce Pinsky, “ Introduction to IP v6”, Cisco press.

CE800403 - Storage Area Network

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective

The Storage Area Networks course provides students with the foundational knowledge necessary to perform essential job responsibilities in a Storage Area Network (SAN) environment. Students learn the architecture and components of a SAN and the technological underpinnings that make SANs work. Describe processes and technologies for identifying, analyzing, and mitigating security risks in storage infrastructure

Unit 1

Introduction: What is a Storage Area Network?, SAN components, The importance of standards, Where are SANs heading?, Why use a SAN?, How can we use a SAN, Using the SAN components - Storage - SAN connectivity - Servers - Putting the components together .
Fibre Channel internals: Fibre Channel architecture? - The SCSI legacy - Why Fibre Channel?. Fibre Channel Layers, Optical cables, Dark fiber, Classes of service, Fibre Channel data movement, Data transport, Flow control, Addressing: - World Wide Name - Port address - 24-bit port address - Loop address - FICON address.

Unit 2

Topologies and other fabric services: Fibre Channel topologies, Port types, Fibre Channel Arbitrated Loop protocols, Fibre Channel login, Fibre Channel fabric services, Routing mechanisms, Spanning tree, Fabric shortest path first, Zoning

Unit 3

IP storage networking : Fibre Channel over IP, iFCP , iSCSI , The FCIP, iFCP or iSCSI conundrum , The multiprotocol environment - Fibre Channel switching - Fibre Channel routing - Tunneling - Routers and gateways - Internet Storage Name Service. Deeper into the protocols - FCIP - iFCP - iSCSI Routing considerations - Packet size - TCP congestion control - Round-trip delay - Write acceleration - Tape acceleration Multiprotocol solution briefs

Unit 4

Fibre Channel products and technology : The environment, SAN devices - Bridges and gateways - Arbitrated loop hubs - Switched hubs - Switches and directors - Multiprotocol routing - Service modules - Multiplexers - Storage considered as legacy. Componentry - ASIC -Fibre Channel transmission rates - SerDes - Backplane and blades. Gigabit transport technology -Ten Gigabit small form-factor pluggable - Small form-factor pluggable media - Gigabit interface converters - Gigabit Link Modules - Media Interface Adapters- 1x9 Transceivers - Host bus adapters. Inter-switch links - Cascading - Hops - Fabric shortest path first – Blocking - Latency - Oversubscription - Congestion - Trunking.

Unit 5

Management: Management principles- Management types - SAN management levels - SAN fault isolation and troubleshooting. Management interfaces and protocols - SNIA initiative - Simple Network Management Protocol - Service Location Protocol - Vendor-specific mechanisms. Management features - IBM Total Storage Productivity Center. Vendor management applications - IBM Total Storage b-type family - Cisco - IBM TotalStorage e-type family - IBM Total Storage m-type family. SAN multipathing software. Storage virtualization in the SAN - SANs and storage virtualization - Virtualization levels - Virtualization models - Virtualization strategies.

Security: Security principles - Access control - Auditing and accounting - Data security - Encryption - Encryption schemes - Encryption tools and systems. Security mechanisms - IP security. Fibre Channel security- Securing a fabric- Zoning, masking and binding -Data security

Text Book:

1. Jon Tate, Fabiano Lucchese, Richard Moore, "Introduction to Storage Area Networks", IBM Redbooks, fourth edition, 2006.

References:

1. Tom Clark, "Designing Storage Area Networks", Addison-Wesley Professional, 1st edition, 1999
2. Alex Goldman, "Storage Area Networks Fundamentals", Cisco Press 2002

CE810401 - Mobile Communication

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective

To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies. To enable the student to analyze and understand wireless and mobile cellular communication systems. To provide the student with an understanding of transport and network layer of mobile communication.

Unit 1 Wireless Communication

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks

Unit 2 Wireless Networks

Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- Wi-Fi and Wi-MAX - Wireless Local Loop

Unit 3 Mobile Communication Systems

GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS –International roaming for GSM- call recording functions-subscriber and service data mgt –-Mobile Number portability -VoIP service for Mobile Networks – GPRS –Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing

Unit 4 Mobile Network and Transport Layers

Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols– Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks

Unit 5 Application Layer

WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WMLScripts - WTA - iMode- SyncML.

Text Books

1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education,.

Reference

1. KavehPahlavan, PrasanthKrishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
2. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

CE810402 - Satellite Communication

Total Credits: 3
Total Hours: 40
Weightage: 15

Objectives

To prepare students to excel in basic knowledge of satellite communication principles, To provide students with solid foundation in orbital mechanics and launches for the satellite communication. To train the students with a basic knowledge of link design of satellite with a design examples. To provide better understanding of multiple access systems and earth station technology. To prepare students with knowledge in satellite navigation and GPS & and satellite packet communications

Unit 1 Introduction

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications. Orbital Mechanics, Look Angle determination, Orbitalperturbations, Orbit determination launches and launch vehicles, Orbital effects in communication systems performance.

Unit 2 Satellite Subsystems

Satellite Orbits Introduction, Synchronous orbit, Orbital parameters, Satellite location with respect to earth, Look angles, Earth coverage& slant range, Eclipse effect, Satellite placement in geostationary orbit, station keeping, Satellite stabilization, Attitude and orbit control system, telemetry, tracking. Command and monitoring, power systems, communication subsystems.

Unit 3 Multiple Access

Frequency division multiple access (FDMA), Intermodulation, Time division Multiple Access (TDMA) Frame structure, Examples, Satellite Switched TDMA, Onboard processing, DAMA, Code Division Multiple access (CDMA), Spread spectrum transmission and reception. Satellite antenna- Equipment reliability and Space qualification Basic transmission theory.

Unit 4 Earth Station Technology

Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods .Low earth orbit and geo-stationary satellite systems, Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations. Operational NGSO constellation Designs

Unit 5 Satellite Navigation & Global Positioning System

Radio and Satellite Navigation, GPS Position Location principles, GPS Receivers and codes, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy, Differential GPS.

Textbook

1. Satellite Communications - Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering - Wilbur L. Pritchard, Robot A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

References

1. Satellite Communications: Design Principles - M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed
3. Fundamentals of Satellite Communications - K.N. Raja Rao, PHI, 2004
4. Satellite Communications - Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

CE810403 - Multi Media Communication

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective

To get a strong theoretical foundation in multimedia systems and applications, mobile Computing, internet computing and networking. To familiarize working with all aspects of images, sounds and videos. To enhance the capacity to continue professional and career development in Multimedia.

Unit 1

Multimedia Communications: multimedia information representation, multimedia networks, multimedia applications, network QoS and application QoS.

Unit 2

Information Representation: text, images, audio and video, Text and image compression, compression principles, text compression, image compression. Audio and video compression, audio compression, video compression, video compression principles, video compression standards: H.261, H.263, P1.323, MPEG 1, MPEG 2, Other coding formats for text, speech, image and video.

Unit 3

Detailed Study of MPEG 4: coding of audiovisual objects, MPEG 4 systems, MPEG 4 audio and video, profiles and levels. MPEG 7 standardization process of multimedia content description, MPEG 21 multimedia framework, Significant features of JPEG 2000, MPEG 4 transport across the Internet.

Unit 4

Synchronization: notion of synchronization, presentation requirements, reference model for synchronization, Introduction to SMIL, Multimedia operating systems, Resource management and process management techniques.

Unit 5

Multimedia Communication across Networks: Layered video coding, error resilient video coding techniques, multimedia transport across IP networks and relevant protocols such as RSVP, RTP, RTCP, DVMRP, multimedia in mobile networks, multimedia in broadcast networks.

References

1. Fred Halsall, “Multimedia Communications”, Pearson education, 2001
2. K. R. Rao, Zoran S. Bojkovic, Dragorad A. Milovanovic, “Multimedia Communication Systems”, Pearson education, 2004

3. Raif steinmetz, Klara Nahrstedt, “Multimedia: Computing, Communications and Applications”, Pearson education, 2002
4. Tay Vaughan, “Multimedia: Making it Work”, 6th edition, Tata McGraw Hill, 2004
5. John Billamil, Louis Molina, “Multimedia : An Introduction”, PHI, 2002
6. Pallapa Venkataram, “Multimedia information systems”, Pearson education (InPress), 2005.

CE820401 - Ad HOC Networks

Total Credits: 3
Total Hours: 40
Weightage: 15

Objectives
To explore the concept and functionality of adhoc networks. To get an understanding of the routing in mobile adhoc networks.

Unit 1 Adhoc Networking
Introduction: What Are Ad Hoc Networks? Differences between Cellular and Ad Hoc Wireless Networks, Applications of Ad Hoc Wireless Networks, Characteristics of adhoc networks, Issues in Ad Hoc Wireless Networks – proactive and reactive routing protocols. MAC protocols for wireless adhoc networks-issues and design goals-classification of MAC protocols Contention based protocols: MACA and MACAW protocols.

Unit 2 Table Driven Protocols
Preview of routing protocols – DSDV Protocol – Properties and features of DSDV – Clustering – Transmission management – Backbone formation –routing efficiency.

Unit 3 On-Demand Protocols
AODV protocols – Unicast and Multicast – Optimizations and enhancements – DSR protocol – Overview – Properties – Additional features – support for heterogeneous networks.

Unit 4 Hybrid and Link Reversal Routing
Reconfigurable Wireless networks – ZPR – Intra and Interzone routing – General approach of Link reversal routing – GB algorithm – LMR – TORA – Protocol description – Properties.

Unit 5 Security & QoS in Adhoc networking
Secure Routing in Adhoc Wireless Networks: Security-Aware Adhoc Routing Protocol, Security Aware AODV Protocol. Quality of service in adhoc wireless networks - Issues and challenges, MAC Layer Solutions: IEEE802.11e, Cluster TDMA, Network Layer Solutions: QoS routing protocols, QoS Enabled Adhoc On-demand Distance Vector Routing Protocol.

Text Book:

1. Charles E. Perkins, “Adhoc Networking”, Addision-Wesley, 2001.
2. Subir KumarSarkar, T.G. Basavaraju, and C. Puttamadappa, “Ad Hoc Mobile Wireless Networks Principles, Protocols, and Applications.” Auerbach Publications, New York, 2008.

References:

1. C. Siva ram Murthy and B. S. Manoj, “Ad Hoc Wireless Networks Architecture and Protocols”, Pearson, 2005
2. Ozan K, Tonguz, Gianluigi Ferrari, “Ad HoC Wireless Networks A Communication - Theoretic Perspective”, Wiley, 2009
3. George Aggelou, “Mobile ad hoc networks”, TMGH, 2009

CE820402 - Wireless Sensor Networks & IOT

Total Credits: 3
Total Hours: 40
Weightage: 15

Objective
To understand the fundamental concepts of wireless sensor networks and the architecture of sensor nodes. To acquire basic knowledge and learn the routing protocols of sensor networks. To understand the concept, architecture and applications of IoT. To be able to program Arduino / Raspberry Pi to design & develop a real time IoT application.

Unit 1 Introduction to Wireless Sensor Networks (WSN)
Introduction, Overview of Wireless Sensor Networks, Basic Sensor Network Architectural Elements, Applications of Sensor Networks in brief, Architecture of a sensor node, Different sensing scenarios using WSN, Challenges in implementing WSNs.

Unit 2 Medium Access Control Protocols for Wireless Sensor Networks
Characteristics of WSN MAC related properties, MAC performance issues, MAC protocols for sensor networks –Schedule based and Random Access based, WSN protocols: synchronized, duty-cycled, Content based and Contention free MAC protocols.

Unit 3 Routing Protocols for Wireless Sensor Networks
Issues with the adoption of ad hoc routing protocols, Data-centric routing, Position-based / Geographic routing, Clustering-based routing algorithm, QoS based Routing Protocols.

Unit 4 IoT Intoduction & Concepts
Introduction to IoT and key features, Advantages, IoT enabling technologies, IoT Levels & Deployment Templates, Domain Specific IoTs, IoT sensors, Wearable electronics, Network protocol stack of IoT, Communication model of IoT.

Unit 5 Building IoT and Real world applications
Protocol standardization for IoT: M2M, WSN, RFID and SCADA, NFV and SDN for IoT, Real world applications of IoT- Industrial, educational, home automation and other relevant applications in real world scenario.
Build an IoT application using Arduino/Raspberry Pi.

References

1. Wireless Sensor Networks – Technology, Protocols & Applications, By Kazem Sohraby,
2. Daniel Minoli, Taieb Znati, Wiley student Edition.
3. Arshdeep Bahga, Vijay Madisetti, "Internet of Things –A hands-on approach", Universities Press, 2015
4. W. Dargie and C. Poellabauer, Fundamentals of Wireless Sensor Networks-Theory and Practice, Wiley 2010.
5. Fundamentals of Wireless Sensor Networks – Theory and Practice, By Waltenegus Dargie and Christian Poellabauer, Wiley Series on wireless Communications and Mobile Computing.
6. Adrian McEwen, "Designing the Internet of Things", Wiley Publishers,first edition 2013

CE820403 - Optical Networks

Total Credits: 3
Total Hours: 40
Weightage: 15

Objectives
To understand the principles of optical networks, including infrastructure, characteristics , networking , topologies, switching etc. To give general idea regarding the role of optical fiber and routers in the network, by focusing the concept of Wave Division Multiplexing and emphasizes on new trends. To get an understanding of current trends in optical network technologies.

Unit 1
Introduction: Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Wireless Optical Systems; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber.
Telecommunications Infrastructure: The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3 / DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks.

Unit 2
Characteristics of Optical Fiber: The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation;

Amplifier Spontaneous Emission; Chromatic Dispersion; Lasers.
Timing and Synchronization: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Building Integrated Timing Supply; Synchronization Status Messages and Timing Loops.

Unit 3
SONET and SDH: Introduction; The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes; SONET and SDH Concatenation.
Architecture of Optical Transport Networks: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; Importance of Multiplexing and Multiplexing Hierarchies; Current Digital Transport Hierarchy; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations; Generic Framing Procedure

Unit 4
WDM: The WDM Operation; DWDM, TDM and WDM Topologies; Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers.

Unit 5
Optical Routers: Optical Switching; Implementation Preferences; Key Terms; Evolution of Switching Networks; Optical Router; Optical Switching Technologies; Optical Resources; Protecting the Label Switched Paths; Protection of the OSP; Wavelength OSP and MPLS LSP; Nesting the LSPs and OSPs; Topologies for a Node Failure; Plane Coupling and De-Coupling; Some End-to-End Wavelengths and Node-to-Node Wavelengths; Granularity of Labels versus Wavelength Support; Approach to the Problem of LSP and OSP Interworking; MEMS and Optical Switching; Thermo-Optic Switches.

Text Books
1. Uyless Black: Optical Networks, Pearson Education Asia, 2002.

References
1. Rajiv Ramaswami and Kumar N.Sivaranjan: Optical Networks - A Practical Perspective, Morgan Kaufuann, 2000.
2. Paul E.Green Jr.: Fiber Optic Network, Prentice Hall, 1993.
3. Jeff Hecht: Understanding Fiber Optics, 4th Edition, PHI 1999.

16. MODEL QUESTION PAPERS

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

First Semester

CE010101 - Mathematics for Network Engineers

(2019 admissions onwards)

Time: 3Hrs Max Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Define equivalence relation.
2. Define a graph.
3. Define paths in a graph.
4. What is mean by Hamiltonian graph?
5. Define trees.
6. What is mean by cutsets?
7. What is mean by network models?
8. What is mean by CPM?
9. Define phrase structure grammar.
10. What is mean by BNF notation?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain different types of graphs with example.
12. Explain logical connectives.
13. Explain different types of functions with examples.
14. Explain matrix representation of graphs.
15. Explain any 2 binary searches.
16. Explain minimal spanning tree model.
17. What is mean by Total float, Independent float, Free float in networks?
18. Write a short note on DFA and NFA.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. (a) Give Fundamental rules of inference.
(b) Show that on set of integers the relation " x-y is divisible by 3 " is an equivalence relation.
20. Explain Dijkstra's algorithm with an example.
21. Explain Types of grammars.
22. Construct the network diagram and find the critical path, project duration, and Total float for the following.

Activity: 1-2 1-3 2-3 2-4 3-4 4-5
Duration: 20 25 10 12 6 10

(2 x 5 = 10)

QP Code

Reg. No. ……..
Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

First Semester

CE010102- Digital Logic and Microprocessors

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Find the 1's and 2's complement of (11011011)2 and (01110000)2.
2. Design a circuit to convert the given binary number (4-bit) into Excess-3 code.
3. Short notes on (i) Multiplexer (ii) Demultiplexer.
4. Differentiate between Synchronous and Asynchronous counters.
5. Distinguish between Programmable Array Logic and Programmable Logic Array.
6. Explain the use of status flags in 8085.
7. How microprocessor handles interrupts.
8. Distinguish between Instruction cycle and Machine cycle.
9. Explain the features of p2 (286) Processors.
10. Describe different trouble shooting techniques in microprocessor.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What are logic gates? Explain different logic gates with their truth table and diagram.
12. What is full adder? List the truth table of full adder and draw a logic diagram.
13. What are decoders? Explain their working.
14. Describe the working of 4-bit shift register in digital system.
15. Design 4-bit BCD Ripple Counter.
16. Describe the special purpose registers in 8085.
17. What do you mean by status flag? List different flags in 8085.
18. Explain the concepts of Intel Pentium-4 processors.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Simply the Boolean function F together with it's don't care conditions D in Sum of Product and Product of Sum forms $F(w,x,y,z)=\sum(0,1,2,3,7,8,10)$ $D= (w,x,y,z) = \sum(5,6,11,15)$.
20. Explain the working of JK Flip-Flop
21. What is an addressing mode? Explain the addressing modes of 8085.

22. Describe the operations in Intel Core Processors.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

First Semester

CE010103 - Problem solving in C

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Differentiate between flowchart and algorithms.
2. Write any four rules for naming a variable.
3. Write down the syntax of nested if.
4. What are arrays? Give it's syntax and examples.
5. Describe the syntax of arrays of strings with an example.
6. Differentiate between while and do-while loops.
7. Describe recursive functions.
8. Describe the syntax of structures.
9. Distinguish between structures and unions.
10. Describe the use of pointers.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain the tokens in C.
12. Write an algorithm for finding all the roots of a quadratic equation.
13. Explain the decision making statements in C.
14. Write a program to find all the Fibonacci numbers between two limits.
15. Explain switch-case-break statement with an example program.
16. Explain storage classes.
17. Write a program to find the occurrence of a particular digit in a 4 digit number.
18. Describe the concept and operations on files.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain various loop structures in C with syntaxes and example programs.
16. Explain the concept of array of structures. Write a structure program to prepare a rank list and use user defined functions to prepare rank list.

20. Describe switch-case statement with it's syntax. Write a program to convert a 3 digit number into it's equivalent word form (Eg. 100 = One Zero Zero).
21. Explain the file manipulation functions with syntaxes and describe one file program including most of the file manipulation functions.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

First Semester

CE010104 - Data Communication & Computer Networks

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section- A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Specify the advantages of a star topology.
2. Compare LAN and MAN.
3. Write note on address mapping.
4. Differentiate between static and dynamic routing.
5. Briefly explain transmission impairments.
6. Differentiate between broadband and base band transmission.
7. Write note on ALOHA.
8. What is subnetting? Explain.
9. Compare Intra Domain Routing and Inter Domain Routing.
10. Write short note on SNMP.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Compare digital and analog signals.
12. Distinguish between asynchronous and synchronous transmission.
13. Explain the concept of pulse code modulation.
14. Compare circuit and packet switching network.
15. Write short note on Local Area Networks.
16. Describe Carrier Sense Multiple Access Protocols.
17. Distinguish between IPV4 and IPV6 protocols.
18. Explain the concept of Socket programming.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. What are the different types of transmission media? Explain each.
20. Explain ISO/OSI reference model.
21. Explain the different networking and inter networking devices.

22. Explain advantages and disadvantages of TCP and UDP transport layer protocols.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Second Semester

CE010201 - Internet Technology & Distributed Applications

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Name any two programming languages which support network programming
2. What is meant by sockets?
3. Explain briefly about bit torrent
4. Write a short note on DNS
5. Explain CIDR
6. Discuss about the Ping command
7. Explain briefly about the ARP & RARP
8. Explain what is Ethernet briefly
9. Discuss about VPNs
10. Write a short note on VLANs

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Discuss briefly about the circuit switching and packet switching
12. Explain briefly about the protocol stack.
13. Explain briefly about HTTP, and FTP
14. Briefly explain the sub netting and super netting comparisons.
15. Explain IP datagram format with diagram
16. Briefly compare RIP, OSPF, BGP
17. Explain briefly about the Wifi and wimax
18. Explain about Firewalls

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the history of data networking
20. Explain about the email protocols: SMTP, POP3, IMAP
21. Explain with examples :IPv4 and IPv6 addressing
22. Explain about SDN **(2 x 5 = 10)**

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Second Semester

CE010202 - Java and Network Programming

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write short note on various kinds of variables in java.
2. Write short note on parameterised constructors.
3. What is synchronization and why is it important.
4. Write short note on Event source.
5. Write short note on garbage collection in java.
6. Write short note on thread priorities.
7. What is the difference between text-field and text-area controls?
8. What are the uses of break and continue statements in java.
9. What is the purpose of IntAddress class.
10. Write a brief description about UDP datagram.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain method overriding with example program.
12. Write note on interfaces in java.
13. Explain dynamic method dispatch in java.
14. Write note on layout manager in java.
15. How event handling done in java.
16. Explain the steps involved in java database connectivity.
17. How to create secure client and server sockets.
18. Explain datagram packet class and datagram socket class.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the features of java.
20. Explain the life cycle of an applet. Also write a sample program to demonstrate the working of an applet.
21. What is multithreading? What are the methods available in java for inter-thread communication? Explain with example.
22. Explain socket programming in java.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Second Semester

CE010203 - Web Technology & Cloud Computing

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is DHTML?
2. Explain any two application of cloud.
3. How to give a background color to an HTML document?
4. What is a definition list?
5. How to create a hyperlink in an HTML document?
6. Write a note on "Software as a Service "?
7. Name any two advantages of Javascript.
8. What is CSS?
9. What is cloud computing?
10. What is DNS?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Write a program in HTML to create frames.
12. Give text formatting elements in HTML.
13. Explain various cloud computing series.
14. Explain about Javascript functions.
15. Write short notes about virtualization in clouding.
16. Explain in detail about cloud components.
17. What are the features of www? Compare web and internet.
18. Explain DIV element in CSS with examples

(**6 x 2 = 12**)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain <table> tag in detail with examples.
20. Explain Javascript Objects in detail.
21. Explain in detail about cloud business benefits for cloud computing.
22. Explain with examples HTML forms. (**2 x 5 = 10)**

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Second Semester

CE010204 - Data Structures using Python

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write a recursive function (python code / pseudo code) for linear search.
2. What are the applications of a linked list?
3. Compare a linked list and array implementation of a general list.
4. Write a function (python code / pseudo code) to delete a node in singly linked list.
5. What is a double ended queue?
6. Explain any two applications of a stack.
7. What is a binary tree?
8. Write a function (python code / pseudo code) to insert an element to a binary search tree.
9. Write a note on hashing.
10. What is a graph? How to represent a graph?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Write an algorithm for evaluating a postfix expression and evaluate the following postfix expression using the algorithm AB+CD/AD-EA^ + * where A=2, B=7, C=9, D=3, E=5
12. List the properties of binary search tree. Write an algorithm to search an element from a binary search tree.
13. Write an algorithm for merge sort technique. Illustrate with an example.
14. Define hashing. What are the properties of a good hash function? With necessary examples explain four different hashing techniques.
15. Given the post order and in order traversal of a binary tree construct the original tree.
    Post Order: DEFBGLJKHCA
    Inorder: DBFEAGCLJKH
16. State the advantages of linked list over arrays. Explain the applications of Linked List
17. Write notes on threaded binary tree.
18. Differentiate balanced tree and B tree.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain radix sort and heap sort.
20. Explain in brief the insertion and deletion of nodes in various positions in a doubly linked list.

21. Explain in brief the different ways to check whether a queue is empty or not.
22. Explain different types of linked list. **(2 x 5 = 10)**

QP Code Reg. No. ……..
Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Third Semester

CE010301 - MPLS & VPN

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is label in MPLS?
2. Define frame mode.
3. What is unknown label?
4. What is the use of LDP protocol?
5. What is ATM?
6. Explain label switch controller.
7. What is the advantage of using VPN?
8. What is IPSec?
9. Explain traffic engineering.
10. What is QoS?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain MPLS architecture.
12. What is label retention mode?
13. Analyze load balancing labeled packets.
14. Differentiate Router Alert label and OAM Alert Label.
15. Explain VC-merge.
16. What are the components of IPSec?
17. Explain MPLS VRF.
18. How to solve QoS in MPLS?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the operation of LDP.
20. Discuss the architectural overview of MPLS VPN VRF.
21. How to solve fish problem in MPLS?
22. Explain the working of IPSec. **(2 x 5 = 10)**

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Third Semester

CE010302 - Operating Systems and Linux Administration & Virtualisation

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is short term scheduler?
2. Define (a) thrashing (b) Interrupt
3. What is system call? Give two examples
4. What is Belady's Anomaly?
5. What do you mean by fragmentation?
6. What are the functions of editors in Linux?
7. What is virtual memory? Give two advantages.
8. What is pipe?
9. Write any two Linux shell environment variables and their purpose.
10. Write short note on the following commands in Linux.

    a) fgrep b) ps

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain printing commands in Linux.
12. What is segmentation? How it differs from paging?
13. Discuss various file attributes.
14. Explain Loop control structures in Linux.
15. With the help of a diagram explain swapping.
16. Define mutual exclusion .How mutual exclusion can be achieved?
17. What are the features of www? Compare web and internet.
18. Explain the use of "cat" command in Linux.

. (**6 x 2 = 12**)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. What is meant by deadlock? List the conditions that lead to deadlock. How deadlock can be prevented?
20. Explain Linux file system structure in detail.
21. Describe Linux architecture in detail.
22. (a) Consider the following page reference string :

    1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2

    With four frames, how many page faults would occur for the FIFO, Optimal page replacement algorithms? Which algorithm is efficient? (Assume all frames are initially empty)

(b) Explain concept of demand paging in memory management.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Third Semester

CE010303 - Wireless Communication

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is meant by radiation pattern?
2. Which are the different types of noise?
3. What is the advantage of using smart antennas?
4. Draw a MIMO system.
5. What is a satellite orbit?
6. What are the features of 4G systems?
7. Draw a piconet and scatternet.
8. What is Zigbee standard?
9. What are the applications of Wireless LANs?
10. What are the data rate and standard of WiMAX?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What is meant by beamforming?
12. What are the propagation modes?
13. Explain CDMA.
14. What is meant by packet radio access?
15. Explain frequency division capacity allocation in satellite communication.
16. What is hand-off?
17. Compare Bluetooth and Zigbee.
18. Explain hidden and exposed terminal problems in Wireless systems.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the concept of FHSS and DSSS.
20. Discuss about the multiple access techniques in wireless systems.
21. Write in detail about frequency reuse.
22. Draw and explain the protocol stack of Zigbee.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Third Semester

CE010304 - Cryptography and Network & Cyber Security

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Use Caesar cipher with key =15 to encrypt the message "Hello".
2. What is meant by cryptography and cryptanalysis?
3. Explain briefly about block ciphers.
4. Write a short note on message authentication.
5. Explain zero knowledge concepts
6. Discuss about the state to state key agreement
7. Explain briefly about the user authentication
8. Explain different type of intruders.
9. Discuss about the nature and scope of cyber crime
10. Write a short note on viruses.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Discuss briefly about the initialization and working of Blowfish algorithm
12. Explain briefly about the RSA algorithm with a suitable example.
13. Explain briefly about the Diffie – Hellman Key exchange algorithm with a suitable example.
14. Briefly explain the hash function SHA-512, SHA – 3 with neat diagram and also do the comparisons.
15. Explain briefly about the block cipher modes
16. Explain briefly about the firewall and types of firewall.
17. Explain briefly about the Kerberos and x.509 authentication certificates
18. Write a short note on:
    a. Internet Hacking and Cracking,
    b. Virus Attacks,
    c. Software Piracy,
    d. Mail Bombs

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the working of DES, Triple DES and also differentiate between DES and AES algorithm
20. Explain briefly about the Digital signature also the explain Authentication protocols

21. Explain briefly about the Wireless LAN security and different phase of operation in WLAN
22. Discuss about the investigation the perform to find the crimes related to emails

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE800401 - Network Management & Administration

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is distributed computing?
2. What is Network provisioning?
3. What is Macros?
4. What are function model?
5. What is Remote Monitoring
6. Explain Structure of Management information model.
7. What is internet documents?
8. What is RF spectrum
9. .Explain ADSL Challenging Schemes
10. What is MIB

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What are the common network problems?
12. What is NOC?
13. Explain communication model.
14. Explain encoding structure
15. Explain SNMP Architecture
16. Explain RMON1 Textual Convention
17. Explain ADSL Encoding Schemes
18. Explain ADSL Configuration profile

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain Network Installation Maintenance
20. Explain SNMP Communication Model
21. Explain RMON1 groups and functions
22. Explain ADSL Network **(2 x 5 = 10)**

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE800402 - Internet Protocol Version 6

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write any two limitations of IPV4.
2. Write the address syntax of IPV6.
3. What is next header in IPV6?
4. Write the format of authentication header of IPV6.
5. What are the types of ICMPV6 messages?
6. Comment on auto configuration in networks.
7. What is LLMNR used for?
8. Write the functions of ICMPv6 in routing.
9. Comment on classful addressing.
10. What is IPV4 to IPV6 tunneling?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Differentiate IPV4 and IPV6.
12. Write the format of ICMPV6 header.
13. What is multicasting?
14. Differentiate classful and classless addressing.
15. List the major tunneling configurations.
16. Write on name resolution for IPV6.
17. Write any 2 routing protocols used in IPV6.
18. What are the protection mechanisms of IPV6 packets?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain IPV6 subnetting.
20. Discuss in detail on the types of ICMPV6 error messages.
21. Explain the types of IPV_6 Routing Protocols.
22. Write in detail on IPV6 transition technologies.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE800403 - Storage Area Network

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write Why use a SAN?
2. Where are SANs heading?
3. What is Data transport?
4. Explain Port address.
5. What are the types of Port?
6. Comment on Simple Network Management Protocol.
7. What is Virtualization strategies?
8. Explain the term iFCP.
9. Explain about Bridges.
10. What is Trunking?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain SAN connectivity.
12. Explain FICON address.
13. What is zoning?
14. Write on Fibre Channel topologies.
15. List the major tunneling configurations.
16. Write on Round-trip delay.
17. Write on Gigabit interface converters.
18. Explain SAN multipathing software

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain Fibre Channel architecture.
20. Discuss in detail on SAN management levels.
21. Write in detail Gigabit transport technology.
22. Explain the types IBM Total Storage family

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE810401 - Mobile Communication

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What you meant by cellular system?
2. Explain cell encoding systems.
3. Explain briefly about Wireless LAN
4. Explain the advantage and disadvantage of wireless LAN
5. Explain briefly about Frequency-Spectrum Utilization
6. What you meant by Sectorization?
7. Write down the strength and weakness of WI-FI
8. Explain the Trunking efficiency.
9. Define frame efficiency of a TDMA system
10. Explain WML deck with an example

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What are the various types of handoffs? Explain in detail
12. Discuss briefly about the Wireless LAN architecture.
13. Explain briefly about Frequency-Spectrum Utilization
14. Explain the architecture of WIMAX with a neat diagram.
15. The 2G GSM has 125 channels in the uplink and 125 channels in the downlink. Each channel has a bandwidth of 200 kHz. What is the total bandwidth occupied in both uplink and down link.
16. Explain services and features of TDMA
17. Explain briefly about the Snooping TCP.
18. Explain briefly about the GPRS procedures
19. Explain about the PDP context procedure

(**6 x 2 = 12**)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

20. Write a short note on the following :
    a. WAP Gateway
    b. WAP protocols
21. Explain the network management protocol used on TCP/IP networks.
22. Explain a simple GSM network architecture with the help of a neat diagram.
23. Write a technical note on the following :
    a. WTA architecture and application

b. WML scripts

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE810402 - Satellite Communication

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Explain the Basic Concepts of Satellite Communications
2. What is meant by Satellite Orbits
3. Explain the concepts of Look angles
4. Explain the different types of multiple access methods
5. Write a short note on Spread spectrum transmission
6. Explain the following terms:
   a. Transmitters b. Receivers
7. How GPS signal levels help to measure the communication performance.
8. What is meant by geo-stationary satellite systems
9. Explain briefly about the basic transmission theory
10. How the Satellite stabilization is achieved.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Write a short note on Orbital Mechanics and also explain the Laws of astrodynamics.
12. Explain briefly about the Attitude and orbit control system
13. Write a short note on Satellite antenna
14. Explain briefly about the Primary power test methods in earth station
15. Write a short note on GPS Position Location principles
16. Explain the Differential GPS concepts in details.
17. Explain in detail about the Tracking systems and Terrestrial interface used in the earth station technology.
18. Write a short note on Satellite Switched TDMA

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain the working of DES, Triple DES and also differentiate between DES and AES algorithm
20. Explain briefly about the Digital signature also the explain Authentication protocols

21. Explain briefly about the Wireless LAN security and different phase of operation in WLAN
22. Discuss about the investigation the perform to find the crimes related to emails

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE810403 - Multi Media Communication

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write a note on Multimedia.
2. List and explain any four multimedia applications.
3. State Nyquist sampling theorem and Nyquist rate
4. Write a note on H.263.
5. Write a note on coding of audiovisual objects of MPEG 4
6. List different profiles supported by MPEG-4
7. Comment on Synchronization in multimedia.
8. Write on presentation requirements for multimedia synchronization
9. Write a note on RTP.
10. Explain importance of multimedia in mobile networks

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Write a note on Communication modes.
12. Define Text,Image,Audio and Video
13. Compare formatted and Unformatted Text
14. List features of JPEG 2000
15. Write a short note on SMIL.
16. Write a note on Multimedia Operating systems.
17. Write note on DVMRP.
18. Explain error resilient video coding techniques.

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain Multimedia communication networks.
20. Explain the process of MPEG audio encoding.
21. Explain MPEG 21 multimedia framework
22. Explain Reference model for multimedia.

(2 x 5 = 10)

QP Code

Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE820401 - Ad HOC Networks

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. Write any two characteristics of adhoc networks.
2. What is meant by reactive routing?
3. What is clustering?
4. What is the advantage of DSDV protocol?
5. Define heterogeneous networks.
6. What is DSR?
7. Differentiate Intrazone and Interzone.
8. What is link reversal?
9. Explain what is meant by QoS?
10. What is the need of secure routing protocols?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Differentiate cellular and adhoc networks.
12. What are the design goals of MAC protocols?
13. Explain the properties of DSDV protocol.
14. Illustrate the steps involved in route discovery in AODV.
15. Explain TORA.
16. What are reconfigurable wireless networks?
17. What are the issues and challenges in designing secure routing protocols?
18. How is QoS ensured in AODV protocol?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain contention based protocols in adhoc networks.
20. Write in brief the working of AODV protocol.
21. Explain GB algorithm.
22. Explain the MAC layer solutions for providing security in adhoc networks.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE820402 - Wireless Sensor Networks & IOT

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is a sensor node?
2. Give any two applications of Wireless Sensor Networks.
3. What are the characteristics of WSN?
4. What is meant by MAC layer?
5. What is the use of geographic routing?
6. Is there any challenge in implementing WSNs?
7. Give examples of wearable electronics.
8. What are the advantages of IoT?
9. What is Arduino?
10. Define SCADA.

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. Explain WSN architecture.
12. Discuss any sensing scenarios.
13. Explain duty-cycled MAC protocol.
14. What is data centric routing?
15. Explain any QoS based routing.
16. Define NFV.
17. Give any real world example of IoT.
18. What are the features of Arduino?

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain schedule based MAC protocol for WSN.
20. Discuss clustering based routing algorithm.
21. Draw and explain the protocol stack of IoT.
22. Explain the technologies on which IoT is built.

(2 x 5 = 10)

QP Code Reg. No. ……..

Name ……...

M. Sc. Computer Engineering & Network Technology Degree (C.S.S) Examination, 2019

Fourth Semester

CE820403 - Optical Networks

(2019 admissions onwards)

Time: Three hours Max. Weight: 30

Section - A

(Answer any **eight** questions. Each question carries a weight of 1)

1. What is WDM?
2. What is wireless optical system?
3. What is wavelength?
4. What are function model?
5. What is chromatic dispersion?
6. Explain SONET.
7. What is in band control signaling?
8. What is EDF?
9. .Explain Add-Drop multiplexers.
10. What is MEMS?

(8 x 1 = 8)

Section B

(Answer any **six** questions. Each question carries a weight of 2)

11. What are the key attributes of optical fiber?
12. What is Thermo-Optic Switches?
13. Explain WDM Amplifiers.
14. Explain synchronous clock hierarchy
15. Explain SONET and SDH Multiplexing Structure
16. Explain structure of an optic fiber
17. Compare WDM and DWDM
18. Explain optical router

(6 x 2 = 12)

Section C

(Answer any **two** questions. Each question carries a weight of 5.)

19. Explain characteristics of optical fiber
20. Explain methods of clock exchange
21. Explain the WDM operation
22. Explain the OTN Layered Model

(2 x 5 = 10)