Three-year Diploma Curriculum

As Per

National EducationPolicy 2020
(3rd Semester)

Department of Skill Development
UT of Jammu & Kashmir

First of its kind Exercise undertaken in the country to develop Curriculum in accordance with NSQF Guidelines and as per NEP-2020 for AICTE approved Three year Diploma Courses in UT of Jammu & Kashmir.

CURRICULUM
FOR
THIRD SEMESTER
OF
THREE-YEAR DIPLOMA COURSE
IN
COMPUTER ENGINEERING

STUDY SCHEME 3RD SEMESTER

Code	Subjects	Periods Per Week			Total Hours L+T+P	CREDITS			Total Credits L+T+P
		L	T	P		L	T	P	
COPC301	Digital Electronics	4	0	0	4	4	0	0	4
COPC302	Digital Electronics Lab	0	0	2	2	0	0	1	1
COPC303	Data Structures using 'C'	4	0	0	4	4	0	0	4
COPC304	Data Structures using 'C' Lab	0	0	2	2	0	0	1	1
COPC305	Computer Networks	4	0	0	4	4	0	0	4
COPC306	Computer Networks Lab	0	0	2	2	0	0	1	1
COPC307	Operating System	4	0	0	4	4	0	0	4
COPC308	Multimedia Applications	0	0	4	4	0	0	2	2
HS309	Stress Management, Ethical Practices and Yoga	0	0	2	2	0	0	1	1
		16	**0**	**12**	**28**	**16**	**0**	**6**	**22**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC301**	Course Title: **DIGITAL ELECTRONICS**
Semester: **3rd**	Credit: **4**
Periods Per Week: **4 (L: 04, T: 0, P: 0)**	

COURSE OBJECTIVE:

The course aims at introducing the concept of digital electronics which forms the foundation to the digital world of today's era. The subject aims to give a background in the broad field of digital systems design and microprocessors. It helps to acquire the basic knowledge of digital logic levels and application of knowledge to understand the digital electronic circuits.

COURSE CONTENT:

1. Introduction

1.1 Introduction to Digital and Analog signals.
1.2 Comparison between analog and digital signals.
1.3 Applications and advantages of digital signals.

2. Number System and Codes

2.1 Binary, octal and hexadecimal number system: conversion from Octal,Decimal and hexadecimal to binary and vice-versa.
2.2 Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction.
2.3 Representation of Numbers : 8421 & BCD.

3. Logic Gates

3.1 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR,EX-OR gates.
3.2 EX-OR, NAND and NOR as universal gates.

4. Logic Simplification

4.1 Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equations for simple problems. Implementation of Boolean (logic) equation with gates.
4.2 Karnaugh map (upto 4 variables) and simple applications in developing combinational logic circuits.

5. Arithmetic circuits

5.1 Half adder and Full adder circuit, design and implementation.
5.2 Half and Full subtractor circuit, design and implementation.
5.3 4 bit adder/subtractor.

6. Latches and flip flops

7.1 Concept and types of latch with their working and applications.
7.2 Operation using waveforms and truth tables of RS, T, D, Master/Slave JKflip flops.
7.3 Difference between a latch and a flip flop

7. Introduction to Shift Registers

8.1 Serial In Serial Out (SISO)
8.2 Serial In Parallel Out (SIPO)
8.3 Parallel In Serial Out (PISO)
8.4 Parallel In Parallel Out (PIPO)

COURSE OUTCOME

After completion of this course the student will be able to:

- Do conversions between the various number systems.
- Draw basic logic gates and universal gates and illustrate realization of Boolean Expressions using them.
- Design arithmetic circuits using logic gates.
- Design and test combinational and sequential logic circuits.

RECOMMENDED BOOKS.

1. Digital Electronics by Thomas Floyd.
2. Digital Electronics and Applications by Malvino Leach, Tata McGrawHill Education Pvt. Ltd, New Delhi.
3. Digital Logic Designs by Morris Mano, Prentice Hall of India, NewDelhi.
4. Digital Electronics by R P Jain, Tata McGraw Hill Education Pvt Ltd,New Delhi.
5. Digital Electronics by K S Jamwal, Dhanpat Rai and Co., New Delhi.
6. Digital Electronics by B R Gupta, Dhanpat Rai & Co., New Delhi.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No	Time(hrs)	Marks(%age)
1.	04	10
2.	10	15
3	10	15
4	14	20
5	10	15
6	10	15
7	06	10
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC302**	Course Title: **DIGITAL ELECTRONICS LAB**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objectives are to develop practical expertise in designing and constructing digital circuits, including logic gates, flip-flops, and counters. Students will gain proficiency in using laboratory instruments for circuit analysis and measurement, while also learning troubleshooting techniques to identify and rectify circuit errors. The course aims to foster hands-on skills, promote critical thinking in circuit analysis, and equip students with the ability to implement and validate digital circuit designs.

LIST OF PRACTICALS

1. Verification and interpretation of truth tables for AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates
2. Realization of logic functions with the help of NAND or NOR gates
3. Verify De Morgan's Theorems.
4. To design a half adder using XOR and NAND gates and verification of its operation & Construction of a full adder circuit using XOR and NAND gates and verify its operation
5. 4 bit adder, 2's complement subtractor circuit using a 4 bit adder IC and an XOR IC and verify the operation of the circuit.
6. To design a NOR Gate Latch and verification of its operation
7. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops).

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC303**	Course Title: **Data Structures using C**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVE:

The objective of the "Data Structures using C" course is to provide students with a comprehensive understanding of essential data structures, including arrays, stacks, queues, linked lists, trees, graphs and different techniques for search and sorting. It also develops proficiency in implementing and manipulating these data structures using the C programming language and enhances problem-solving skills by applying data structures and algorithms to real-world scenarios.

COURSE CONTENT:

1. C-Fundamentals & Introduction

1.1 Introduction to Data Structures
1.2 Data Types
1.3 Control Structures
1.4 Concept of pointer variables and constants.
1.5 Concept of Structure

2. Arrays

2.1 Concept of Arrays and basic idea about storage(row wise /column wise, without programming)
2.2 1-D array and various operations on it(traversing, inserting, deleting).
2.3 Concept of Linear and Binary Search in 1-D Array.
2.4 2-D array and various operations on it (Adding , Subtracting and Multiplication)

3. Linked Lists

3.1 Introduction to Singly Linked list.
3.2 Representation of Linked lists in Memory.
3.3 Traversing and Searching in a Linked list.
3.4 Insertion and Deletion into a Linked list.
3.5 Introduction to Doubly Linked List
3.6 Traversing a Doubly Linked list.
3.7 Insertion and deletion into Doubly Linked list

Note: All topics to be illustrated using both pseudo code and C-Code.

4. Stacks and Queues

4.1 Introduction to Stacks.
4.2 Representation and Implementation of Stacks Using Arrays
4.3 Uses of Stacks.
4.4 Introduction to Queues.
4.5 Implementation of Queues Using Arrays
4.6 Basic idea about Implementation of Stacks and Queues using Linked Lists without Programming.

Note: All topics except 4.6 to be illustrated using both pseudo code and C-Code.

5 Trees

5.1 Concept & representation of Binary tree.
5.2 Traversing Binary Trees (Pre-order, Post-order and In order).
5.3 Searching, inserting and deleting binary Trees.

Note: All topics to be illustrated using pseudo code only

6 Sorting

6.1 Concept of Sorting.
6.2 Sorting algorithms (Bubble Sort, Insertion Sort, Merge Sort, Quick Sort) with Illustrations, Pseudo Code and C-Code using Arrays.

COURSE OUTCOME:

After the completion of the course the student will be able to:

- analyze algorithms and algorithm correctness.
- summarize searching and sorting techniques.
- describe stack, queue and linked list operations.
- Solve problems based on tree.
- Implement various techniques of sorting

RECOMMENDED BOOKS:

1. Data Structures using C and C++ by Rajesh K. Shukla, Wiley-India Pvt Ltd. Daryaganj, New Delhi.
2. Data Structures and Algorithm Using C by RS Salaria, Khanna Book Publishing Co. (P) Ltd. New Delhi.
3. Data Structure using C by Manoj Kumar Jambla, Eagle Publishing House, Jalandhar.
4. Data Structure using C by ISRD Group, Tata McGraw Hills Education Pvt Ltd , New Delhi.
5. Data Structures by Sanjiv Sofat, Khanna Publishers, New Delhi.
6. Expert Data Structures with C by R.B. Patel – Khanna Publishers, New Delhi.
7. Data structures – Schaum's Outline Series – by Lipschutz, McGraw Hill Education Pvt Ltd , New Delhi.
8. Data structures – O.G. Kakde and U.A. Deshpande.
9. Data Structures by Kruse.
10. Data Structure using Pascal by Tenenbaum, Prentice Hall of India.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	7	10
2	9	12
3	15	25
4	10	18
5	10	15
6	13	20
TOTAL	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC304**	Course Title: **Data Structures using C Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	

COURSE OBJECTIVES:

This course covers array and linked list operations (insertion and deletion), stack and queue implementations (using arrays and pointers), various searching algorithms (linear and binary search), and data structure implementations such as binary search trees and sorting algorithms (bubble sort, insertion sort, quick sort, selection sort). Additionally, students will learn expression conversion from infix to postfix notation. Gain a solid foundation in essential data structures and algorithms.

LIST OF PRACTICALS:

Write programs in C to implement

1. Inserting and deleting elements in an array.

2. Insertion and deletion of elements in linked list.

3. Insertion and deletion of elements in double linked list.

4. Stack implementation using arrays.

5. Stack implementation using pointers.

6. Queue implementation using arrays.

7. Linear search in a given list.

8. Binary search in a given list.

9. Implementation of binary tree.

10. Implementation of bubble sort algorithm.

11. Implementation of insertion sort algorithm.

12. Implementation of quick sort algorithm.

13. Implementation of Merge sort algorithm.

14. Conversion from infix and post-fix notation.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC305**	Course Title: **Computer Networks**
Semester: **3rd**	Credit: **4**
Periods Per Week: **04 (L: 04, T: 0, P: 0)**	

COURSE OBJECTIVE:

The objective of the course is to understand the fundamental concepts and principles of computer networks: The primary objective of this course is to provide students with a comprehensive understanding of the basic concepts and principles underlying computer networks. Students will learn about network topologies, protocols, architectures, and the different layers of the TCP/IP model. Students will acquire hands-on experience in configuring and troubleshooting network hardware components, such as routers, switches, and wireless access points.

COURSE CONTENT:

1. Networks Basics

1.1. Concept and Uses of Computer Networks
1.2. Reference Model overview (OSI, TCP/IP)

2. Physical Layer

2.1. Types of networks (LAN, MAN and WAN)
2.2. Different network topologies like star, ring, hybrid, tree.
2.3. Transmission techniques(Simplex duplex and Half duplex)
2.4. Basics of Physical Media (Guided /Un Guided).
2.5. Concept of hub and Repeater

3. Data Link layer(DLL)

3.1. General Functions of DLL.
3.2. Concept of MAC Address.
3.3. Error detection(Parity Check and Checksum)
3.4. Correction techniques (Hamming Code)
3.5. Concept of Switch
3.6. Switching techniques(Circuit switching, Message switching and Packet switching)

4. Network Layer

4.1. General Functions of Network Layer
4.2. IP Addressing(Class A,B, C D & E)
4.3. IPv4 Packet format
4.4. Basics of Routing Protocols ARP and RARP.
4.5. Sub-netting

4.6. Basic concept of IPV6 (Need and importance only).
4.7. Concept of Router

5. Transport Layer

5.1. General Functions of Transport Layer
5.2. Transport layer protocols TCP, UDP
5.3. Multiplexing and de-multiplexing
5.4. Congestion Control
  5.4.1. Slow Start
  5.4.2. Congestion avoidance
  5.4.3. Fast Retransmit and fast recovery
5.5. Flow Control
  5.5.1. Stop and Wait
  5.5.2. Sliding window protocol(Go-Back-N)

6. Session and Presentation Layers

6.1 General functions of session layer
6.2 General functions of Presentation layer

7. Application Layer

7.1 General functions of Application Layer
7.2 Use of application layer protocols (HTTP, FTP,SMTP, POP ,IMAP)
7.3 Working of FTP and TELNET
7.4 Basic Concept of Gateways and comparison w.r.t Hub/Switch/Router.

RECOMMENDED BOOKS:

1. W. Stallings, "Computer Communication Networks", PHI, 1999.
2. Computer Networks – Third Edition – Andrew S. Tanenbaum, Prentice Hall of India.
3. Data Communications and Networking – Behrouz A. Forouzan, Third Edition TMH.
4. TCP/IP Protocol Suite" by Behrouz A. Forouzan Publisher: McGraw-Hill.
5. Internetworking with TCP/IP" by Douglas E. Comer and David L. Stevens Publisher: Pearson.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	05	10
2	08	10
3	10	15
4	17	25
5	15	20
6	04	10
7	05	10
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC306**	Course Title: **Computer Networks Lab**
Semester: **3rd**	Credit: **1**
Periods Per Week: **02 (L:0, T: 0, P: 2)**	

COURSE OBJECTIVE:

Develop skills in network design and implementation: Students will learn how to design and implement computer networks based on specific requirements. They will be exposed to network design methodologies, sub-netting and IP addressing. Through practical exercises and projects, students will gain the ability to plan, configure, and troubleshoot network infrastructures.

LIST OF PRACTICALS:

1. Making of cross cable
2. Making of straight cable
3. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
4. Sharing the resources in wired and Wireless network.
5. To Connect two pcs using peer to peer communication/via switch/via router.
6. Study and Demonstration of sub netting of IP address. Concept of DHCP.
7. Connectivity troubleshooting using PING, IPCONFIG ,IFCONFIG etc
8. Demonstration of Packet Tracer /Wireshark or any other network software.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC307**	Course Title: **Operating System**
Semester: **3rd**	Credit: **4**
Periods Per Week: 0**4 (L: 04, T: 00, P: 00)**	

COURSE OBJECTIVES:

The course provides the students with an understanding of human computer interface existing in computer system and the basic concepts of operating system and its working. The students will also get hands-on experience and good working knowledge to work in windows and Linux environments. The aim is to gain proficiency in using various operating systems after undergoing this course. While imparting instructions, the teachers are expected to lay more emphasis on concepts and principles of operating systems, its features and practical utility.

COURSE CONTENT:

1. Overview of Operating System

1.1 Definition of Operating System and its types.
1.2 Operating System Services
1.3 System calls,
1.4 Operating System Structure

2. Process Management

2.1 Concept of process, Process State and Process Control Block
2.2 Process Scheduling, Scheduling Queues, Scheduler, Job Scheduler,
2.3 Inter process Communication: Shared Memory Systems, Message Passing Systems
2.4 Scheduling Algorithms, Preemptive and Non Preemptive, First come first serve (FCFS), Shortest Job first (SJF), Round Robin (RR)
2.5 Process Synchronization

3. Deadlock

3.1 Concept of Deadlock and Conditions for Dead lock
3.2 Methods for handling deadlocks(Dead Prevention ,Deadlock Avoidance, Deadlock detection
3.3 Deadlock recovery(Bankers Algorithm and Resource Allocation Graph)

4. Memory Management

4.1 Definition – Logical and Physical address Space,
4.2 Swapping

4.3 Memory allocation, Contiguous Memory allocation
4.4 Fragmentation
4.5 Paging – Principle of operation, Page allocation
4.6 Page replacement strategies(FIFO,LRU,LIFO, Optimal page Replacement)
4.7 Segmentation
4.8 Virtual Memory.

5. I/O management

5.1 Dedicated Devices
5.2 Shared Devices
5.3 I/O Devices
5.4 Storage Devices
5.5 Buffering and Spooling

6. File Management

6.1 Basic concepts of File system and its types
6.2 Types of File System; Simple file system, Basic file system,

COURSE OUTCOME:

After the completion of the course the student will be able to:

- describe various types and services of operating system
- identify the concept of process, various states in the process and their scheduling.
- classify different types of schedulers and scheduling algorithms
- identify the significance of inter-process communication and synchronization.
- describe deadlock and the various ways to recover from deadlock
- identify memory management techniques
- describe virtual memory and its underlying concepts

RECOMMENDED BOOKS:

1. Operating System Concepts by Silberschatz, Galvin; Wiley Publication
2. Operating System by Stallings; Tata McGraw Hill.
3. Operating Systems- A Concept Based Approach by DhamDhare; Tata McGraw Hill Education Pvt Ltd , New Delhi
4. Operating Systems by Achyut S Godbole and AtulKahate; Tata McGraw Hill Education Pvt Ltd , New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	10
2	15	25
3	15	20
4	15	25
5	06	10
6	05	10
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **COPC308**	Course Title: **Multimedia Applications**
Semester: **3rd**	Credit: **2**
Periods Per Week: **4 (L: 0, T: 0, P: 4)**	

COURSE OBJECTIVE:

This course is aimed to learn the basic concepts and develop basic skills required creating, editing and publishing multimedia content

COURSE CONTENT:

1. **Introduction**
   - 1.1 Definition of concepts like multimedia and its components like text, graphics, video , audio and animation
   - 1.2 Importance & Characteristics of Multimedia
   - 1.3 Hardware and Software Components Used In Multimedia.

2. **Image Editing (Using Adobe Photoshop)**
   - 2.1 Getting Acquainted with Photoshop i.e. Opening Images, Zooming, Scrolling, Undoing, Saving a file, Using the tools, options bar and other panels
   - 2.2 Working with Selections i.e. using the Marquee, Lasso, Quick Selection, Magic Wand tools. Moving a selected area, Manipulating selections, rotating a selection
   - 2.3 Basic Photo Corrections i.e. adjusting Resolution and image size adjusting the color Straightening and cropping the image. Brush tool, eraser tool, Clone stamp, heal tool, patch tool Spot Healing brush, blur tool, sharpen tool, smudge tool, Dodge tool, burn tool smudge tool
   - 2.4 Layer Basics i.e. using the Layers panel rearranging layers applying a gradient to a layer applying a layer style Flattening and saving files

3. **Audio editing (using Audacity)**
   - 3.1 Getting acquainted with audacity i.e. Opening files, Undoing, Saving a file, Control panel review: Start Recording, Play Recording, Stop Recording, Audacity Tools Tool Bar Use, Cursor and other options
   - 3.2 Editing i.e. Understanding Noise Floor, Zooming in/out, Cutting and Pasting, Doing Pickups, Removing breaths, Removing Plosives, removing snaps Track Control Panel functions
   - 3.3 Effects and Processing i.e. Reverb and echo, amplify, Limiter, Fades In & Out, Change pitch and tempo, Normalization, high and low pass filter, Exporting Tracks with Specific kbps Requirements

4 Animation (using Adobe Animate)

4.1 Getting Acquainted i.e. Starting Adobe Animate CC and Opening a File, Understanding Document Types, Understanding the Timeline, Using the Properties Panel, Using the Tools Panel, Undoing Steps in Animate, Previewing Your Movie, Modifying the Content and Stage, Saving Your Movie.

4.2 Creating Graphics, text and symbols i.e. Creating Shapes, Making Selections, Editing Shapes ,using Fills, Creating Curves, using Paint Brush, Creating and Editing Text, Creating Symbols, Importing Adobe Photoshop Files, Editing and Managing Symbols

4.3 Animating Symbols i.e. Animating Position, Changing the Pacing and Timing, Animating Transparency, Animating Filters, Animating Transformations, Changing the Path of the Motion, Swapping Tween Targets, Easing, Frame-by-Frame Animation, Exporting Final Movie

4.4 Tweening i.e. using Shape, Classic & Motion Tweens, Motion Guides for Classic Tweens, Copying and Pasting Tweens, Classic Tween Eases, Graphic Symbols, Manage Animation Content using Layers , Optimize the Publish Settings For The Output

****Recommended Softwares: Adobe Photoshop/GIMP, Adobe Animate/OpenToonz**

RECOMMENDED BOOKS:

1. Adobe Photoshop CC Classroom in a Book by Andrew Faulkner and Conrad Chavez
2. Adobe Photoshop 2023 Handbook by Jonjo Penney
3. Getting started with Audacity 1.3 by Bethany Hiitola , Stephen Daulton
4. The Book of Audacity – Record, Edit, Mix, and Master with the Free Audio Editor by Carla Schroder
5. Adobe Animate CC Classroom in a Book by Russell Chun
6. Beginning Adobe Animate CC: Learn to Efficiently Create and Deploy Animated and Interactive Content by Tom Green

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	20	30
2	14	25
3	30	45
Total	**64**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING	
Course Code: **HS309**	Course Title: **Stress Management, Ethical Practices and Yoga**
Semester: **3rd**	Credits: **1**
Periods Per Week :**2 (L: 0, T:0, P: 2)**	

COURSE OBJECTIVE:

The objective of the course is to help students to develop themselves as good human being and a responsible citizen, besides developing the sense of right and wrong leading to ethically correct behavior. Further to educate the students about importance of yoga for physical and mental health to attain higher level of consciousness.

COURSE CONTENT:

1. Introduction to Yoga

1.1 History of Yoga.
1.2 Misconception about Yoga, Secular nature of Yoga.
1.3 Aims and objectives of Yoga.

2. Stress Management

2.1 Definition of Stress, Causes of Stress, Symptoms of Stress.
2.2 Coping with stress.
2.3 Lifestyle management.
2.4 Yoga for lifestyle management.

3. Yoga and Yogasnas

3.1 Components of Yoga.
3.2 Basic Asans – Surya Namaskar, Child pose, Sarvasana, Bhujang asanas, Inclined plane.
3.3 Simple breathing exercises.
3.4 Pranayama and its types- Kapalbharti, Anuloma Viloma, Bhastrika.

4. Ethics & Values

4.1 Introduction to Ethics and Values.
4.2 Gender equality for social progress.
4.3 Patriotism and volunteerism as values.
4.4 Work ethics – Punctuality, cleanliness, law abidingness, rational thinking and scientific temper.

RECOMMENDED BOOKS.

1. Swami Vigyananda Saraswativ – Yoga Vigyan
2. Misra P.D. An introduction of Yoga
3. Yogasanas by Swami Sivananda.
4. Yoga and stress management by Acharaya Yetendra.
5. Meditation: The First and Last Freedom" by Osho - Penguin Books India
6. The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation by Kamlesh D. Patel and Joshua Pollock - Westland Publications
7. Light on Life: The Yoga Journey to Wholeness, Inner Peace, and Ultimate Freedom by B.K.S. Iyengar - Rodale Books India
8. The Ethics of the Sages: An Interfaith Commentary on Pirkei Avot by Rami Shapiro - Skylight Paths Publishing (Indian edition)
9. You Can Heal Your Life by Louise Hay (Indian edition) - Hay House India

CURRICULUM
FOR
ELECTIVE SUBJECTS
OF
THREE-YEAR DIPLOMA
COURSE
IN
COMPUTER
ENGINEERING
AND
INFORMATION
TECHNOLOGY

The Student has to choose amongst the following list of electives for the elective subjects to be chosen in 4th ,5th and 6th Semester. However, it is mandatory to choose the corresponding lab course of the same elective i.e. if a student chooses Data Warehousing and Mining as Elective in 5th Sem Computer Engineering, then he/she has to also chose the Course "Data Warehousing and Mining Lab" as its corresponding Elective Lab. Besides it is to be ensured that student does not choose any subject among the following electives which is otherwise a core subject in the branch.

LIST OF ELECTIVE SUBJECTS TO BE OFFERED IN 4th. 5th and 6th Semester (Computer Engineering and Information Technology).		
S.NO.	**COURSE CODE**	**SUBJECT NAME**
01	**COPE01**	WIRELESS AND MOBILE COMMUNICATION
02	**COPE02**	WIRELESS AND MOBILE COMMUNICATION LAB
03	**ITPE01**	DATA WAREHOUSE AND MINING
04	**ITPE02**	DATA WAREHOUSE AND MINING LAB
05	**COPE03**	OPEN SOURCE TECHNOLOGIES
06	**COPE04**	OPEN SOURCE TECHNOLOGIES LAB
07	**ITPE03**	BLOCK CHAIN TECHNOLOGY
08	**ITPE04**	BLOCK CHAIN TECHNOLOGY LAB
09	**ITPEO5**	ROBOTICS
10	**ITPEO6**	ROBOTICS LAB
11	**COPE05**	NETWORK SECURITY
12	**COPE06**	NETWORK SECURITY LAB
13	**ITPEO7**	CLOUD COMPUTING

14	**ITPEO8**	CLOUD COMPUTING LAB
15	**COPE07**	MACHINE LEARNING
16	**COPE08**	MACHINE LEARNING LAB
17	**ITPE09**	GRID COMPUTING
18	**ITPE10**	GRID COMPUTING LAB
19	**COPE09**	DATA COMMUNICATION
20	**COPE10**	DATA COMMUNICATION LAB
21	**COPE11**	R PROGRAMMING
22	**COPE12**	R PROGRAMMING LAB
23	**ITPE11**	E- COMMERCE
24	**ITPE12**	E- COMMERCE LAB
25	**ITPE13**	DATA AND INFORMATION SECURITY
26	**ITPE14**	DATA AND INFORMATION SECURITY LAB
27	**COPE13**	FUNDAMENTALS OF DATA SCIENCE
28	**COPE14**	FUNDAMENTALS OF DATA SCIENCE LAB
29	**COPE15**	LINUX PROGRAMMING
30	**COPE16**	LINUX PROGRAMMING LAB

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER EGINEERING AND INFORMATION TECHONLOGY	
Course Code: **COPE01**	Course Title: **wireless and mobile communication**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

The student should be able to understand the emerging technologies used in wireless and mobile communications.

COURSE CONTENT:

Unit I: Introduction:

Introduction to wireless communication and Mobile communication principals, evolution and classification. Radio frequency basics-Modulation, demodulation , Multiplexing techniques

Unit 2: Mobile communication

Introduction to advance Mobile Phone systems(AMPS), GSM(Global system for mobile communication), CDMA, cellular network, global positioning system(GPS) and Personal Network Area(PNA)

Unit 3: Wireless networks

Wireless LAN-IEEE 802.11 standard architecture-services-hiper LAN,Bluetooth and security features.

Unit 4: Security

Wireless security: Threats, Risks and protection mechanism.

Unit 5: Latest wireless technology

Advancement in wireless communication, 3G, 4G and 5G technology.

Unit 6: Mobile IP

Working of Mobile IP, components of Mobile IP
Mobile IP and Home agent-solution to mobility issues in wireless networks

RECOMMENDED BOOKS:

1. Wireless communication, principle and practicebBy Thedore S Reppaport.
2. Wireless and Mobile Communication, by T.G. Palanivelu and R.Nakeeran
3. Introduction to wireless and mobile system , by Dharma Prakash Agarwal,Qing-an Zeng
4. Wireless and mobile communication , by VK Sangar, Ishan Publications.
5. Handbook of wireless networks and Mobile computing , by Stojmenvoic, willey India Pvt. Ltd.

Unit wise Time and Marks Distribution

Unit No.	Topic	Time Allotted (Hrs)	Marks Alloted (%)
1	Introduction	07	15
2	Mobile Communication	10	20
3	Wireless networks	07	15
4	Security	07	15
5	Latest wireless technology	07	15
6	Mobile IP	10	20
Total		**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER EGINEERING AND INFORMATION TECHONLOGY	
Course Code: **COPE02**	Course Title: **wireless and mobile communication Lab**
Periods Per Week: **2 (L: 00, T: 0, P: 2)**	Credit: **1**

COURSE OBJECTIVE:

This course aims to introduce students to wireless communication and mobile network technologies, covering principles, evolution, and security. Students will learn about GSM, CDMA, 3G, 4G, and 5G technologies, as well as wireless LAN and Mobile IP, enabling them to analyze and design wireless communication systems.

LIST OF PRACTICALS:

1. Create AM and FM radio signals using simple electronics to learn about signal modulation.
2. Visit a nearby cell tower and learn about different mobile phone systems like GSM, CDMA, or 4G/LTE. Observe how mobile devices connect to the tower and switch between cells.
3. Set up a basic Wi-Fi network in lab using a router and connect devices wirelessly.
4. Identify common Wi-Fi security threats and implement basic protection measures.
5. Compare the internet speeds of 3G, 4G, and Wi-Fi networks using your smartphone.
6. Use a virtual network simulator to observe how mobile devices move across different networks.
7. Assign static IP addresses to mobile devices in a local network. Move the devices between different access points and observe how the IP address changes or remains the same using Mobile IP.
8. To understand Home Agent functionality, set up a simulation where a mobile device connects to different networks and communicates with a Home Agent to resolve mobility-related issues.

Note: Remember to prioritize safety, adhere to any guidelines, and seek guidance from qualified instructors while conducting these practical activities.

PROGRAM: THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY /INFORMATION TECHNOLOGY	
Course Code: **ITPE01**	Course Title: **Data Warehousing and Mining**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

The objective of this course is to provide diploma students with a comprehensive understanding of data warehousing and data mining concepts and techniques. Students will learn how to design, implement and generate reports from large datasets.

COURSE CONTENT:

1. **Introduction**
   - 1.1 Definition and purpose of data warehousing
   - 1.2 Difference from operational databases
   - 1.3 Differences between OLAP and OLTP.
2. **Data Warehouse**
   - 2.1 Concepts of dimensions, facts, cubes, attribute, hierarchies,
   - 2.2 Schemas for multidimensional data models (star, snowflake, fact constellation)
   - 2.3 Data warehousing architecture - A three tier Data warehouse architecture
   - 2.4 Types of OLAP systems (ROLAP, MOLAP, HOLAP)
   - 2.5 OLAP operations (roll-up, drill-down, slice & dice, pivot, etc.)
   - 2.6 Data warehouse Back-End Tools and Utilities
   - 2.7 Metadata Repository
   - 2.8 Data warehouse Implementation.
3. **Data Preprocessing**

   Data cleaning, Data integration and transformation, Data reduction, Data discritization and Concept hierarchy.
4. **Basics of Data Integration (Extraction Transformation Loading)**
   - 4.1 Concepts of data integration need and advantages of using data integration
   - 4.2 Introduction to common data integration approaches
   - 4.3 Introduction to ETL.

5. Basics of Enterprise Reporting

5.1 Introduction to enterprise reporting
5.2 Concepts of dashboards, balanced scorecards
5.3 Introduction to Reporting Architecture.

6. Data Mining architecture

6.1 Data Mining Functionalities , Interestingness of pattern, classification of data mining system, major issues Data Mining primitives
6.2 Task relevant data, interestingness measures
6.3 Presentation and visualization of patterns
6.4 Data Mining Architecture
6.5 Concept, Description, Data Generalization and Summarization
6.6 Attributed oriented induction
6.7 Analytical characterization
6.8 Mining class comparisons.

RECOMMENDED BOOKS:

1. Data Mining: Concepts and Techniques By J.Han and M.Kamber By Morgan Kaufman publishers, Harcourt India Pvt. Ltd. Latest Edition.
2. Data Mining Introductory and Advance Topics By Dunham, Pearson Education, Latest Edition.
3. Business intelligence for the enterprise by Mike Biere, Addison Weseley, Latest Edition

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Topic	Time (Hrs)	Marks (%)
1	Introduction	04	10
2	Data Warehouse	16	30
3	Data Processing	06	15
4	Basics of Data Integration (Extraction Transformation Loading)	08	15
5	Basics of Enterprise Reporting	04	10
6	Data Mining Architecture	10	20
	Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY	
Course Code: **ITPE02**	Course Title: **Data Warehousing and Mining Lab**
Periods Per Week: **2 (L: 0, T: 0, P: 2)**	Credit: **1**

COURSE OBJECTIVE:

The objective of this course is to provide comprehensive understanding of data warehousing and data mining concepts and techniques. Students will learn how to design, implement, generate reports from large datasets.

LIST OF PRACTICALS

1. To prepare multidimensional model for a given database problem.
2. To prepare concept hierarchy, star, snowflake model.
3. To use open source software such as Pentaho, Kettle for Data Integration.
4. To perform Data Transformation using Pentaho software.
5. To prepare Data Reports using Microsoft SQL server Reporting services.
6. To use Data Mining Software such as WEKA Rapid Mines or SPSS, Mathematica.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY	
Course Code: **COPE03**	Course Title: **Open-Source Technologies**
Periods Per Week: 0**3 (L: 03, T: 00, P: 00)**	Credit: **3**

COURSE OBJECTIVE:

This course enables student to build solid understanding of open-source technologies and their applications. They will be able to work with open-source operating systems, develop web applications using PHP and MySQLi, utilize open-source tools for development and collaboration, and gain insights into networking and security using open-source solutions.

COURSE CONTENT:

Unit 1: Introduction to Open-Source Technologies

1.1 Concept of open-source technologies,
1.2 Benefits and advantages of open-source software,
1.3 Introduction to various open-source licenses,
1.4 Overview of open-source communities and collaboration platforms.

Unit 2: Open-Source Operating Systems and Android

2.1 Introduction to open source operating systems (e.g., Linux distributions)
2.2 Installation and basic configuration of an open source OS
2.3 File systems and command-line interface in open source OS
2.4 Introduction to Android development using open-source tools (e.g., Android Studio)

Unit 3: Open-Source Web Technologies with PHP and MySQLi

3.1 Introduction to web development with open-source technologies.
3.2 Building dynamic webpages using HTML, CSS, and JavaScript (simple pages). Introduction to server-side scripting with PHP.
3.3 Interacting with databases using MySQLi (MySQL improved)
3.4 Deploying open source web applications

Unit 4: Open Source Tools

4.1 Introduction to popular open source development tools (e.g., Git, GitHub)
4.2 Basics of version control using Git and GitHub for collaboration
4.3 Introduction to open source networking tools (e.g., Wireshark, Nmap)
4.4 Explore open-source firewalls and their role in network protection.
4.5 Secure communication protocols in open source (e.g., OpenVPN)

COURSE OUTCOME

- Understand the concept and benefits of open-source technologies.
- Gain practical skills in using open-source operating systems, web technologies, and development tools.
- Learn to develop dynamic webpages and interact with databases using open-source tools.
- Acquire knowledge of open-source networking tools and secure communication protocols**.**

RECOMMENDED BOOKS

1 "Open Source for You: All About Open Source Software" by N. S. Shekar
2 "Open Source Technologies for Maximizing the Creation, Deployment, and Use of Digital Resources and Information" by Sushil K. Sharma and Arun K. Agarwal.
3 "The Linux Command Line" by Shotts Jr., William E.
4 "Android Application Development Cookbook" by Wei-Meng Lee
5 "PHP 7: The Complete Guide" by Malti Bansal and Kunal Chandratre
6 "MySQLi for Beginners" by Rahul Shetty
7 "Git Essentials" by Ferdinando Santacroce
8 "Network Security: A Practical Approach" by Brijendra Singh

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction to Open-Source Technologies	10	20
2	Open-Source Operating Systems and Android	14	30
3	Open-Source Web Technologies with PHP and MySQLi	14	30
4	Open Source Tools	10	20
Total		**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY	
Course Code: **COPE04**	Course Title: **Open-Source Technologies Lab**
Periods Per Week: 0**2 (L: 00, T: 00, P: 02)**	Credit: **1**

COURSE OBJECTIVE:

The aim of the course tends to explore open-source software. Practice students Install open source software. Also students will get a knowhow how to develop an Android application using Android Studio, build a webpage using HTML, CSS, and JavaScript and Set up and use repository.

LIST OF PRACTICALS :

1 Install an open-source software of your choice and explore its features

2 Install a Linux distribution (e.g., Ubuntu) on a virtual machine or dual-boot on your computer

3 Create a simple Android application that displays a welcome message on the screen using Android Studio

4 Build a simple webpage using HTML, CSS, and JavaScript to display your personal information.

5 Create a contact form on a webpage using PHP and validate user inputs. Store the form data in a MySQL database using MySQLi

6 Set up a Git repository, create a new branch, make some changes, and push them to the repository on GitHub

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING / INFORMATION TECHNOLOGY	
Course Code: **ITPE03**	Course Title: **Block Chain Technology**
Periods Per Week: **(L: 03, T: 00, P: 0)**	Credit: 03

COURSE OBJECTIVE:

This course covers blockchain technologies, technical aspects of cryptocurrencies, and distributed consensus. Students will explore applications for Bitcoin-like cryptocurrencies and learn to engineer secure software for interacting with the Bitcoin network and other cryptos, gaining a comprehensive understanding of decentralized systems.

COURSE CONTENT:

1 Introduction

1.1 Basic of Blockchain Architecture – Challenges – Applications – Block chain Design Principles
1.2 The Blockchain Ecosystem
1.3 Abstract Models for BLOCKCHAIN - GARAY model, RLA Model
1.4 Proof of Work (PoW) as random oracle - formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains - Hybrid models (PoW + PoS).

2 CRYPTOGRAPHIC FUNDAMENTALS

2.1 Cryptographic basics for crypto currency
2.2 A short overview of Hashing, cryptographic algorithm – SHA 256,signature schemes, encryption schemes
2.3 Introduction to Hyperledger- Hyperledger framework - Public and Private Ledgers

3 BIT COIN

3.1 Bit coin - Wallet - Blocks - Merkley Tree
3.2 Hardness of mining - transaction verifiability - anonymity - forks - double spending - mathematical analysis of properties of Bit coin
3.3 Bitcoin blockchain, the challenges, and solutions
3.4 Proof of work, Proof of stake
3.5 Alternatives to Bitcoin consensus
3.6 Bitcoin scripting language and their uses.

4 ETHEREUM

4.1 Ethereum - Ethereum Virtual Machine (EVM)
4.2 Wallets for Ethereum
4.3 Smart Contracts - some attacks on smart contracts

4.4 The Turing Completeness of Smart Contract Languages and verification challenges
4.5 Comparing Bitcoin scripting vs. Ethereum Smart Contracts

5 BLOCK CHAIN-RECENT TREND

5.1 Blockchain Implementation Challenges
5.2 Zero Knowledge proofs and protocols in Block chain
5.3 Succinct non interactive argument for Knowledge (SNARK)
5.4 Attacks on Blockchains – such as Sybil attacks, selfish mining

COURSE OUTCOME:

After the completion of the course the student will be able to:

- Understand emerging abstract models for Block chain Technology
- Analyse the concept of bit coin and mathematical background behind it
- Apply the tools for understanding the background of crypto currencies
- Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain
- Enumerate applications in Block Chain Technology.

RECOMMENDED BOOKS:

1. Melanie Swan, "Block Chain: Blueprint for a New Economy", O"Reilly, first edition – 2015.
2. Daniel Drescher, "Block Chain Basics", Apress; 1stedition, 2017
3. Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.
4. Imran Bashir, "Mastering Block Chain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Packt Publishing, first edition – 2012.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	INTRODUCTION	10	20
2	CRYPTOGRAPHIC FUNDAMENTALS	15	25
3	BIT COIN	12	20
4	ETHEREUM	12	15
5	BLOCK CHAIN-RECENT TREND	15	25
	Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **ITPE04**	Course Title: **Block Chain Technology Lab**
Periods Per Week: **02 (L: 00, T: 00, P: 02)**	Credit: **1**

COURSE OBJECTIVES:

This course aims to give understanding of latest advances and its applications in Block Chain Technology. Also to use one of the open source tool available for Block chain Technology in a case study

LIST OF PRACTICALS TO BE PERFORMED:

1. Understand Block chain Technology
2. Develop Block chain based solutions and write smart contract using Hyperledger Fabric and Ethereum Framework.
3. Build and deploy Block chain application for on premise architecture.
4. Build and deploy Block chain application for cloud based architecture.
5. Integrate ideas from various domains and implement them using block chain technology in different perspectives.
6. To develop any one of the block chain application.

Understand the security features in block technology and develop application

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **ITPEO5**	Course Title: **Robotics**
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVES:
The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

PRE REQUISTES: Internet of Things

Note: The student should be offered only after ensuring sufficient equipment required for the Lab is available.

COURSE CONTENT:

1. Introduction and classification:
- 1.1 Definition,
- 1.2 History of robots,
- 1.3 Application of robots,
- 1.4 Industrial applications,
- 1.5 Classification of Robots,
- 1.6 Actuators and Grippers

2. Transformations
- 1.1 Kinematic constraints,
- 1.2 Degrees of freedom and mobility,
- 1.3 Pose of a rigid body,
- 1.4 Coordinate Transformations,
- 1.5 DH Parameters

3. Kinematics
- 3.1 Forward position analyses,
- 3.2 Inverse position analyses,
- 3.3 Velocity analyses, Jacobian Matrix, Singularity,
- 3.4 Forward and Inverse Velocity analyses,
- 3.5 Acceleration analyses,
- 3.6 Manipulator Design Requirements

4. Dynamics and Control
- 4.1 Euler-Lagrange equations of motion for serial type manipulators;
- 4.2 Inverse and Forward dynamic analyses,
- 4.3 Linear control techniques,
- 4.4 Transfer function and state space representation of dynamic system,
- 4.5 A Robotic joint,
- 4.6 PID control.

COURSE OUTCOMES:

On completion of the course the student will be able to:

- list and explain the basic elements of industrial robots
- analyse robot kinematics and its control methods.
- classify the various sensors used in robots for better performance.
- summarize various industrial and non-industrial applications of robots.

Books Recommended

1. Saha S. K., Introduction to Robotics, McGraw Hill Education (India).
2. Craig J. J., Introduction to Robotics, Mechanics and Control, Pearson Education.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	20
2	8	20
3	12	30
4	12	30
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **ITPEO6**	Course Title: **Robotics Lab**
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVES:

The objectives of this course are Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.

LIST OF PRACTICALS:

1. Introduction to Robot Components:**
   - Identify and name different components of a robot (e.g., motors, sensors, wheels, microcontroller).

2. Building a Simple Robot Chassis:
   - Assemble a basic robot chassis using commonly available materials (e.g., cardboard or plastic).

3. Sensor Interfacing:
   - Connect and program sensors (e.g., ultrasonic, infrared) to measure distance or detect obstacles.
   - Display sensor data on a screen or LED.

4. Basic Motor Control:
   - Write code to control the movement of a robot using DC motors.
   - Implement forward, backward, left, and right movements.

5. Line Following Robot:
   - Build a robot capable of following a black line on a white surface using infrared sensors.
   - Program the robot to stay on the line.

6. Obstacle Avoidance Robot:
   - Develop a robot that can navigate around obstacles using ultrasonic or infrared sensors.
   - Implement collision avoidance algorithms.

These practicals cover a range of basic robotics concepts and can help students develop a strong foundation in robotics.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **COPE05**	Course Title: **Network Security**
Semester: **6th**	Credit: **3**
Periods Per Week: **3 (L: 3, T: 0, P: 0)**	

COURSE OBJECTIVE:

The main objective of this course is to provide students with a solid foundation in network security principles, practical skills in implementing security measures, and the ability to analyze and respond to security incidents. By achieving these objectives, students are prepared to contribute to the secure design, implementation, and management of network infrastructures in various professional roles.

COURSE CONTENT:

1. **Introduction to Network Security**
   - 1.1. Importance of network security in modern computing,
   - 1.2. Key security objectives: confidentiality, integrity, availability.
   - 1.3. Overview of network security concepts and principles
   - 1.4. Ethical hacking, Hacking, Threats, vulnerabilities, and risks

2. **Computer Network Attacks**
   - 2.1. Active Attacks and Passive Attacks
   - 2.2. Social Engineering, Bugs and Backdoors.
   - 2.3. Denial-of-Service Attacks, Botnets, Phishing Attacks.

3. **Cryptography and Encryption**
   - 3.1. Introduction to Symmetric and Asymmetric encryption.
   - 3.2. Overview of DES, RSA and PGP.
   - 3.3. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.

4. **Intrusion Detection System and Firewalls**
   - 4.1. IDS, Classification of IDS, Host-based IDS and Network based IDS.
   - 4.2. Anomaly Vs Signature Detection, Teardrop attacks
   - 4.3. Firewalls, Types of Firewalls and Limitations of Firewalls.

5. **Introduction to Virtual Private Network (VPN)**
   - 5.1 Definition and purpose of VPNs
   - 5.2. Types of VPNs: remote access, site-to-site, client-to-site

5.3. VPN protocols: IPsec, SSL/TLS, PPTP, L2TP

6. Wireless Network Security

6.1. Wi-Fi security standards (e.g., WEP, WPA, WPA2)
6.2. Wireless intrusion detection and prevention
6.3. Securing wireless network devices

COURSE OUTCOME

After the completion of the course the student will be able to:

- Understand the fundamental concepts of network security, including threats, vulnerabilities, and risk management.
- Identify and evaluate different types of network attacks and develop strategies to prevent, detect, and mitigate them.
- Demonstrate knowledge of various network security technologies, protocols, and tools, including firewalls, intrusion detection systems, encryption algorithms, and VPNs.
- Apply cryptography techniques to ensure confidentiality, integrity, and authenticity of network communications and data.
- Demonstrate the ability to configure and manage security solutions such as firewalls, intrusion detection systems, and VPNs.

RECOMMENDED BOOKS:

1. Cryptography and Network Security by Forouzon, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
2. Cryptography and Network Security by Atul Kahate, Tata Mc Graw Hill Education Pvt Ltd, New Delhi
3. Cryptography and Network Security by Padmanabham, Wiley India Pvt Ltd. Daryaganj, New Delhi
4. Network Security by Eric Cole, Bible, Wiley- India Pvt Ltd. Daryaganj, New Delhi
5. Network security by William Stalling

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	16
2	08	16
3	08	18
4	10	20
5	08	16
6	06	14
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **COPE06**	Course Title**: Network Security Lab**
Periods Per Week :**2 (L: 0, T: 0, P:2)**	Credits: **01**

COURSE OBJECTIVES:

The objectives for practical on Network Security are designed to provide students with hands-on experience in implementing, configuring, and managing various network security technologies and tools.

LIST OF PRACTICAL:

1. Installation and comparison of various anti-virus software
2. Installation and study of various parameters of firewall.
3. Configure a wireless access point (WAP) with WPA2 encryption and a strong password.
4. Study of VPN.
5. Practical applications of digital signature.
6. Study of various hacking tools.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING /INFORMATION TECHNOLOGY	
Course Code: **ITPEO7**	Course Title: **Cloud Computing**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

The objective of the cloud computing course is to provide students with a comprehensive understanding of cloud computing concepts, technologies, and best practices. The course aims to equip students with the knowledge and skills to effectively utilize cloud-based services, design and deploy scalable cloud architectures, and manage cloud resources efficiently. Through practical hands-on exercises and real-world case studies, students will learn to leverage cloud computing to enhance business productivity, agility, and cost-effectiveness while ensuring security and compliance.

COURSE CONTENT

1 Cloud Computing fundamentals:
- 1.1 Essential characteristics
- 1.2 Architectural Influences
- 1.3 Technological Influences
- 1.4 Operational Influences

2 Cloud Computing Architecture:
- 2.1 Cloud Delivery models
- 2.2 Cloud Software as a Service (SaaS)
- 2.3 Cloud Platform as a Service(PaaS)
- 2.4 Cloud Infrastructure as a Service(IaaS)
- 2.5 Cloud deployment models: Public Clouds, Community Clouds, Hybrid Clouds

3 Cloud Computing Software Security fundamentals
- 3.1 Cloud Information Security Objectives
- 3.2 Confidentiality, Integrity, Availability
- 3.3 Cloud Security Services
- 3.4 Relevant Cloud Security Design Principles
- 3.5 Secure Cloud Software Requirements
- 3.6 Secure Development practices

4 Cloud Computing Risk Issues:
- 4.1 The CIA Traid
- 4.2 Privacy and Compliance Risks
- 4.3 Threats to Infrastructure

4.4 Data and Access Control
4.5 Cloud Access Control Issues
4.6 Cloud Service Provider Risks.

5 Cloud Simulators- CloudSim and GreenCloud

5.1 Introduction to Simulator
5.2 Understanding CloudSim simulator
5.3 CloudSim Architecture(User code, CloudSim, GridSim, SimJava)
5.4 Understanding working platform for CloudSim
5.5 Introduction to GreenCloud

RECOMMENDED BOOKS:

1. Cloud computing a practical approach - Anthony T.Velte , Toby J. Velte Robert Elsenpeter, TATA McGraw- Hill , New Delhi – 2010

2. Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online - Michael Miller - Que 2008

3. Ronald L. Krutz, Russell Dean Vines, "Cloud Security A comprehensive Guide to secure Cloud Computing" Wiley.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	10	20
3	10	25
4	10	20
5	10	20
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY	
Course Code: **ITPEO8**	Course Title: **Cloud Computing Lab**
Periods Per Week: **1 (L:0, T: 0, P: 2)**	Credit: **1**

COURSE OBJECTIVE:

The objective of the cloud computing practical course is to enable students to gain hands-on experience in working with various cloud computing platforms and tools. The course aims to develop practical skills in provisioning and managing virtual machines, deploying applications in the cloud, configuring and securing cloud environments, and optimizing cloud resource utilization. Through practical exercises and projects, students will learn to implement and troubleshoot cloud-based solutions.

LIST OF PRACTICALS:

1 Account Setup: Students will learn how to create accounts on popular cloud platforms like Amazon Web Services (AWS), Google Cloud Platform (GCP), or Microsoft Azure. They will explore the account management interface and understand the basic navigation and settings.

2 Cloud-Based File Transfer: Students can learn how to use cloud-based file transfer services like WeTransfer or Dropbox Transfer to share large files or assignments with their peers or teachers. They can explore the process of uploading and downloading files securely.

3 Cloud-Based Photo Editing: Students can experiment with cloud-based photo editing tools like Adobe Photoshop Express or Pixlr. They can learn how to upload images, apply basic edits such as cropping or adjusting brightness, and save or share the edited images.

4 Virtual Machine Deployment: Students will provision virtual machines (VMs) on a cloud platform and learn how to configure their specifications such as CPU, memory, and storage. They will deploy a simple web server application on the VM and access it through the internet.

5 Cloud Storage: Students can create an account on a cloud storage platform such as Dropbox or Google Drive. They can learn how to upload and share files with their classmates and teachers. They can also explore features like folder organization and collaboration.

6 Cloud Networking: Students will explore cloud networking concepts like virtual networks, subnets, and security groups. They will learn how to create and configure these components to establish secure communication between different cloud resources.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/ INFORMATION TECHNOLOGY	
Course Code: **COPE07**	Course Title: **Machine Learning**
Periods Per Week: **3 (L: 03, T: 00, P: 0)**	Credit:3

COURSE OBJECTIVE:

This course aims to provide a comprehensive understanding of machine learning, covering supervised, unsupervised, and reinforcement learning. Students will learn probability, linear algebra, and various techniques, such as regression, neural networks, decision trees, and ensemble methods. By the end, students will be skilled in applying machine learning to real-world data and problem-solving.

COURSE CONTENT:

1 Introduction

- 1.1 Introduction to Machine Learning
- 1.2 Types of learning-Supervised Learning
- 1.3 Unsupervised Learning
- 1.4 Reinforcement Learning
- 1.5 Fundamentals of Machine Learning

2 Basics

- 2.1 Probability Basics
- 2.2 Linear Algebra
- 2.3 Statistical Decision Theory – Regression & Classification
- 2.4 Bias – Variance
- 2.5 Linear Regression
- 2.6 Multivariate Regression

3 Machine Learning Techniques

- 3.1 Dimensionality Reduction
- 3.2 Subset Selection
- 3.3 Shrinkage Methods
- 3.4 Principle Components Regression
- 3.5 Linear Classification
- 3.6 Logistic Regression
- 3.7 Linear Discriminant Analysis
- 3.8 Optimization
- 3.9 Classification-Separating Hyperplanes Classification

4 Advanced Machine Leaning Techniques

- 4.1 Artificial Neural Networks (Early models, Back Propagation, Initialization, Training & Validation)
- 4.2 Parameter Estimation (Maximum Likelihood Estimation, Bayesian Parameter Estimation)
- 4.3 Decision Trees
- 4.4 Evaluation Measures

4.5 Hypothesis Testing
4.6 Ensemble Methods
4.7 Graphical Models

5 Hybrid Machine Learning Techniques

5.1 Clustering
5.2 Gaussian Mixture Models
5.3 Spectral Clustering
5.4 Ensemble Methods
5.5 Learning Theory, Reinforcement Learning

COURSE OUTCOME:

After the completion of the course the student will be able to:

- Identify the characteristics of datasets and compare the trivial data and big data for various applications.
- Understand machine learning techniques and computing environment that are suitable for the applications under consideration
- Solve problems associated with batch learning and online learning, and the big data characteristics such as high dimensionality, dynamically growing data and in particular scalability issues.
- Develop scaling up machine learning techniques and associated computing techniques and technologies for various applications.
- Implement various ways of selecting suitable model parameters for different machine learning techniques.
- Integrate machine learning libraries, and mathematical and statistical tools with modern technologies

RECOMMENDED BOOKS:

1. Machine Learning for Absolute Beginners – Oliver Theobald
2. Machine Learning: A Practitioner's Approach - Vinod Chandra and Anand Hareendran S
3. "Pattern Recognition and Machine Learning" by Christopher Bishop (Publisher: Springer)
4. "Introduction to Machine Learning" by Ethem Alpaydin (Publisher: The MIT Press)
5. "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy (Publisher: The MIT Press)
6. "Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron (Publisher: O'Reilly Media)
7. "The Elements of Statistical Learning: Data Mining, Inference, and Prediction" by Trevor Hastie, Robert Tibshirani, and Jerome Friedman (Publisher: Springer)

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	15
2	08	15
3	11	25
4	11	25
5	10	20
Total	**48**	**100**

MATION TECHNOLOGY	
Course Code: **COPE08**	Course Title: **Machine Learning Lab**
Periods Per Week: **2 (L: 0, T: 0, P: 2)**	Credit:**1**

COURSE OBJECTIVE:

Course Objective: Learn basic algorithms and data analysis techniques through practical implementations in Python. Develop skills in clustering, classification, regression, prediction, and simulations for simple experiments. Build a foundation for further studies in data science and machine learning.

LIST OF PRACTICALS:

1. Guess the Output:
   Create a small dataset with input-output pairs (e.g., x -> y) where the relationship is straightforward (e.g., y = 2x + 1). Try to implement a simple algorithm that guesses the output based on the input data.

2. Grouping Objects:
   Have a small set of objects with some visible attributes (color, size, shape). Implement a basic clustering algorithm to group similar objects together based on a single attribute (e.g., grouping objects of the same color).

3. Pass or Fail Classifier:
   Build a simple pass or fail classifier using a small dataset of exam scores (e.g., pass if the score is greater than 50, fail otherwise). Use basic if-else conditions to make predictions.

4. Predicting Numeric Values:
   Create a tiny dataset with a few input-output pairs. Try to implement a basic linear regression model to predict a numeric value based on the input data (e.g., y = 2x + 3).

5. Guess the Next Number:
   Design a small dataset of sequential numbers and their corresponding next numbers. Use this data to create a simple algorithm that can predict the next number in the sequence.

6. Coin Toss Simulation:
   Simulate a coin toss experiment using random number generation. Implement a basic probability calculation to determine the likelihood of getting heads or tails.

Course Code: **ITPEO9**	Course Title: **Grid Computing**
Periods Per Week: 0**3 (L: 03, T: 00, P: 00)**	Credit: **3**

COURSE OBJECTIVES:

This course covers Grid Computing, its evolution, anatomy, and real-world applications. Students will learn about Grid Services, Tool Kits like Globus GT 4 and Hadoop, and security considerations. Gain practical skills for working with Grid Computing systems and applications.

COURSE CONTENT:

1 Introduction

1.1 Definitions of Grid Computing
1.2 Evolution of the Grid
1.3 Differences with similar efforts (Meta, cluster, heterogeneous, Internet)
1.4 Examples of usage
1.5 Scope in Grid Computing

2 The Grid Computing Anatomy

2.1 The Grid Problem.
2.2 Anatomy Computing
2.3 Business on Demand and Infrastructure Virtualization
2.4 Service-Oriented Architecture and Grid
2.5 Semantic Grids

3 Grid Services

3.1 Introduction to Open Grid Services Architecture (OGSA)
3.2 Motivation
3.3 Functionality Requirements
3.4 Practical & Detailed view of OGSA/OGSI
3.5 Data intensive grid service models
3.6 OGSA services

4 Grid Computing Tool Kits

4.1 Globus GT 4 Toolkit
4.2 Architecture
4.3 Main components and Programming model
4.4 Introduction to Hadoop Framework
4.5 Design of Hadoop file system

5 Security

5.1 Trust models for Grid security environment
5.2 Authentication and Authorization methods
5.3 Grid Security infrastructure

COURSE OUTCOME:

After the completion of the course the student will be able:

- Apply grid computing techniques to solve large scale scientific problems.
- Apply the concept of virtualization.
- Use the grid and cloud tool kits.
- Apply the security models in the grid and the cloud environment.

RECOMMENDED BOOKS:

1 Kai Hwang, Geoffery C. Fox and Jack J. Dongarra, "Distributed and Cloud Computing: Clusters, Grids, Clouds and the Future of Internet", First Edition, Morgan Kaufman Publisher, an Imprint of Elsevier, 2012.

2 Joshy Joseph & Craig Fellenstein, "Grid Computing", PHI, PTR-2003.

3 Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Charles River media – 2003.

4 Tom White, "Hadoop The Definitive Guide", First Edition. O'Reilly, 2009. Bart Jacob , "Introduction to Grid Computing", IBM Red Books, Vervante, 2005

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Introduction	08	15
2	The Grid Computing Anatomy	09	20
3	Grid Services	14	30
4	Grid Computing Tool Kits	09	20
5	Security	08	15
Total		**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND TECHNOLOGY	
Course Code: **ITPE10**	Course Title: **Grid Computing Lab**
Periods Per Week: 0**2 (L: 0, T: 0, P: 2)**	Credit: **1**

COURSE OBJECTIVE:

This course focuses on Grid computing with the Globus Toolkit. Students will learn to develop Web Services, Grid Services using Apache Axis, and secure applications. They will also create Grid portals for job submission and result retrieval. By course end, students will be skilled in deploying efficient Grid-based solutions.

LIST OF PRACTICALS:

1. Use Globus Toolkit or equivalent and do the following:
2. Develop a new Web Service for Calculator.
3. Develop new OGSA-compliant Web Service.
4. Using Apache Axis develop a Grid Service.
5. Develop applications using Java or C/C++ Grid APIs
6. Develop secured applications using basic security mechanisms available in Globus Toolkit.
7. Develop a Grid portal, where user can submit a job and get the result. Implement it with and without GRAM concept.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY	
Course Code: **COPE09**	Course Title: **Data Communication**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

This course is designed to develop an understanding of basic data communication concepts. For the transmission and reception of signals, the basic knowledge of communication engineering is essential. This course examines the important concepts and techniques related to data communication and enable students to have an insight into the technology which is involved to make the data communication possible.

COURSE CONTENT

1 Concepts of Data Communication

1.1. Introduction, basic communication models, components of data communication systems, data representation, types of communication.

1.2. Mode of communication, data flow: simplex, half-duplex, full-duplex; network attributes: performance, reliability, security; physical structure: types of connections, topologies; categories: LAN, WAN, MAN, interconnection: circuit, packet, protocols and standards; ISO OSI Reference model, a layer architecture.

2 Signals and Transmission

2.1 Introduction to analog and digital data, basic concepts of analog and digital signals, analog and digital data transmission: baseband, broadband; impairments: effect of noise, attenuation, distortion; composite signal and transmission medium, channel bandwidth: bit interval, bit rate, baud rate, data rate limits.

2.2 Transmission modes: parallel, serial, asynchronous and synchronous; classification based on the technique of transmission; modulation, need of modulation, types of modulation systems; data encoding: digital data to analog signals; digital data to digital signals; multiplexing.

3 Error Detection and Correction

3.1 Types of errors, forward error correction versus retransmission, error detection: repetition codes, parity bits, checksums, CRC error correction: automatic repeat requests, fixed size framing, variable size framing, flow and error control techniques, stop and wait, sliding window.

3.2 HDLC protocol; point to point protocol; ALOHA, CSMA, CSMA/CD.

4 Transmission Media

4.1 Guided: twisted pair, co-axial, fibre-optics; unguided: wireless – radio, micro-wave, infra-red; switched networks, circuit switching, packet switching, structure of packet switch.

4.2 Network devices: repeaters, hubs, bridges, switches, routers, gate-ways.

COURSE OUTCOME

After the completion of the course the student will be able to:

- Understand the fundamental concepts related to the data communication systems.
- Distinguish between analog, digital signals and the transmission thereof.
- Use the bandwidth in the optimal means by the learned techniques.
- Interpret how and why the errors occur during the transit of signal or data and what are the remedial techniques to correct the same.
- Understand the behavior of data communication devices and the underlying technologies involved in manufacturing of those devices.

RECOMMENDED BOOKS:

1. Dr. Sanjay Sharma, Data Communication and Computer Networks, Kataria Publications.
2. William Stallings, Data Communication and Networks, Prentice Hall India
3. Behrouz A. Forouzan, Data Communications and Networking , McGraw Hill Edn.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	16	35
3	12	25
4	10	20
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY	
Course Code: **COPE10**	Course Title: **DATA COMMUNICATION LAB**
Periods Per Week :**2 (L: 0, T: 0, P:2)**	Credits: **01**

COURSE OBJECTIVES:

The objectives of the course is to make the student familiar with the different scenarios exhibiting the implementation of data communication concepts.

LIST OF PRACTICALS TO BE PERFORMED:

1. Study of analog and digital signals.
2. Study of error detection and error correction techniques.
3. Study of twisted pair, coaxial cable and fibre-optics cable.
4. Study of lab network (type of network topology, bandwidth and switches used)
5. Demonstration of cables, crimping of a UTP cable, straight-through and cross-cable and their implementation.
6. Establish a communication between two peer-to-peer nodes connecting with a twisted pair cable.
7. Establish a communication between two or more nodes using a connecting device like a hub, repeater and switch.
8. Study of network connectivity devices: switches, routers, modems etc. installed in the lab.
9. Configuration of LAN and browser settings; assigning of point to point protocols.
10. Diagnose the local machine checking the connectivity issues using TCP/IP utility commands.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY	
Course Code: **COPE11**	Course Title: **R Programming**
Periods Per Week: **(L: 03, T: 00, P: 0)**	Credit:**3**

COURSE OBJECTIVE:

This course is designed to teach the fundamentals of R programming language. R is a popular open-source programming language used for statistical computing, data analysis, and visualization. It provides a wide range of statistical and graphical techniques, making it one of the most widely used languages for data analysis and research.

COURSE CONTENT:

1 Introduction
- 1.1 Introduction to R Programming
- 1.2 Why use R
- 1.3 Using RStudio IDE for R Programming

2 R Basics
- 2.1 R Syntax
- 2.2 R Datatypes
- 2.3 R Variables
- 2.4 R Strings
- 2.5 R Operators
- 2.6 R If…Else
- 2.7 R While Loop
- 2.8 R For Loop
- 2.9 R Functions

3 R Data Structures
- 3.1 R Vectors
- 3.2 R Lists
- 3.3 R Matrices
- 3.4 R Arrays
- 3.5 R Data Frames
- 3.6 R Factors

4 R Graphics
- 4.1 R Plot
- 4.2 R Line Graph
- 4.3 R Scatterplot
- 4.4 R Pie Charts
- 4.5 R Bars

5 R Statistics
- 5.1 R Statistics Intro

5.2 R Data Set
5.3 R Max and Min
5.4 R Mean Median Mode
5.5 R Percentiles

COURSE OUTCOME

After the completion of the course the student will be able to:

4. Use R programming for data analysis and data visualization
5. Do statistical computing and modeling
6. Use R data structures and R graphics for your own data analysis
7. Use flow control statements in R programming
8. Write functions in R programming
9. Perform basic file i/o operations in Python code

RECOMMENDED BOOKS:

1. R for Data Science - Garrett Grolemund and Hadley Wickham
2. The Art of R Programming – A Tour of Statistical Software Design - Norman Matloff
3. R for Dummies - Joris Meys and Andrie de Vries
4. Beginner's Guide for Data Analysis using R Programming – Jeeva Jose
5. R in Action - Dr Robert L. Kabacoff

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	5	10
2	8	10
3	10	25
4	15	30
5	**10**	**25**
Total	**48**	**100**

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY	
Course Code: **COPE12**	Course Title: **R PROGRAMMING LAB**
Semester:	Credits:**1**
Periods Per Week :**2 (L: 0, T: 0, P:2)**	

COURSE OBJECTIVES:

The objectives of the course is to use the learned R Programming concepts and apply them to solve problems. Student should be able to understand the basic concepts of R. They should be able to explore and create practical solutions using R data structures, R graphics, R statistics and functions.

LIST OF PRACTICAL:

1 Learn all the basics of R-Programming (Data types, Variables, Operators etc,.)

2 Write a program to find list of even numbers from 1 to n using R Loops

3 Create a function to print squares of numbers in sequence.

4 Write a R program to print the numbers from 1 to 100. Print "Fizz" for multiples of 3, print "Buzz" for multiples of 5, and print "FizzBuzz" for multiples of both

5 Create a function in R programming that will return the sum of 2 integers.

6 Write a program to join columns and rows in a data frame using cbind() and rbind() in R

7 Implement different String Manipulation functions in R.

8 Implement different data structures in R (Vectors, Lists, Data Frames, Matrices, Arrays and Factors)

9 Write a program to read a csv file and analyze the data in the file in R.

10 Create scatterplot, line graph, pie chart and bar chart using R.

11 Create a data set and do statistical analysis on the data using R. Find Max, Min, Mean, Median, Mode and Percentiles.

PROGRAM: THREE YEAR DIPLOMA IN COMPUTER ENGINEERING AND INFORMATION TECHNOLOGY	
Course Code: **ITPE11**	Course Title: **E-Commerce**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

This course aims to lay foundation knowledge of Electronic commerce and its application, to build a theoretical background of the mobile commerce systems; its characteristics and functions. It also explain different business models with examples and familiarize students with network security and numerous online payment methods, also build a sound understanding of content encryption to provide data security during electronic mode of payment

COURSE CONTENT:

1 Introduction

What is E-Commerce, Forces behind E-Commerce Industry Framework, Brief history of E-Commerce, Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, benefits of e-Commerce?

2 Mobile Commerce

Mobile Commerce systems-characteristics and functions, Mobile Computing technology-mobile clients, mobile client software, Wireless Application Protocols, payment issues, introduction to Ucommerce: the next step after m-commerce.

3 Web Security

Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, Network Security. Encryption, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPN), Implementation Management Issues.

4 Electronic Payments & Net Commerce

Overview of Electronics payments, Digital Token based Electronics Payment System (EPS), Smart Cards, Credit Card/Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking, EDA, EDI Application in Business, Legal requirement in E -Commerce, Introduction to supply Chain Management, CRM, issues in Customer Relationship Management.

COURSE OUTCOME:

After the completion of the course the student will be able to:

- Breeze through the elementary knowledge of market, buyers, sellers, traditional commerce and electronic commerce.
- Understand and classify the benefits of mobile commerce system of marketing.
- Know the objective of network security threats.
- Understand the basic issues related to online marketing management.

RECOMMENDED BOOKS:

1 Greenstein and Feinman, "E-Commerce", TMH
2 Ravi Kalakota, Andrew Whinston, "Frontiers of Electronic Commerce", Addision Wesley
3 Denieal Amor, "The E-Business Revolution", Addision Wesley
4 Diwan, Sharma, "E-Commerce" Excel
5 Bajaj & Nag, "E-Commerce: The Cutting Edge of Business", TMH

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	10	20
2	10	20
3	12	25
4	16	35
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **ITPE12**	**Course Title: E-Commerce Lab**
Periods Per Week :**2 (L: 0, T: 0, P:1)**	Credits: **01**

(* Common to Computer and IT Engineering Branches,)

COURSE OBJECTIVES

This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems about Electronic commerce and provide data security during electronic mode of payment.

LIST OF PRACTICAL:

1 Visit most popular e-commerce sites on the internet and comment on their design related issues.

2 Crate a site which enables the acceptance of credit card.

3 Create a site that includes shopping card to shop on any e-shop.

4 List down the security level of various sites their strengths and limitations.

5 How you can integrate an e-commerce site with other sites to make a distributed network.

6 Role-play an online credit card payment process, understanding the steps involved and security measures in place.

7 Set up a virtual private network (VPN) to demonstrate secure communication over a public network.

8 Learn about credit card security features and how to protect personal information.

9 Explore online banking options by logging into a demo account.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **ITPE13**	Course Title: **Data and Information Security**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	Credit: **3**

COURSE OBJECTIVE:

After completing this course the student must demonstrate the knowledge and ability to Identify the threats to information security, Show how to protect information recourses, Show how to maintaining and protecting information system.

COURSE CONTENT

1 Introduction to Data and Information Security

Introduction to Data and Information Security, attacks, computer crime, security services, security mechanisms, Cyber Crimes, Information Technology Act..

2 Data Security over internet.

Confusion, Diffusion, Introduction to basic encryption and decryption, concept of symmetric and asymmetric key cryptography, overview of DES, RSA and PGP. Introduction to Hashing: MD5, SSL, SSH, HTTPS, Digital Signatures.

3 Program Security.

Program security, Program Errors, Malicious Codes, virus, Trapdoors, program security issues, protecting programs.
Protection in OS: memory and Address protection, File protection

4 Database Security.

Database security requirements, Reliability, Integrity, Sensitive Data, Multilevel security, types of crimes, Ethical issues in Security.

5 Virtual Private Network (VPN)

Basics, setting of VPN, VPN diagram, configuration of required objects, exchanging keys.

COURSE OUTCOME:

After the completion of the course the student will be able to:

- Understand the importance of data and information security in the modern digital landscape.
- Identify and assess potential threats and vulnerabilities to data and information systems.
- Comprehend legal and ethical issues related to data protection and privacy.
- Gain practical experience with security tools and techniques through hands-on exercises.

RECOMMENDED BOOKS:

1 "Principles of Information Security" by Michael E. Whitman and Herbert J. Mattord

2 "Network Security Essentials: Applications and Standards" by William Stallings

3 "Cryptography and Network Security: Principles and Practice" by William Stallings

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	16	30
3	10	20
4	08	20
5	08	15
Total	**48**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **ITPE14**	Course Title: **Data and Information Security Lab**
Periods Per Week :**2 (L: 0, T: 0, P:2)**	Credits: **01**

COURSE OBJECTIVES:

Evaluate vulnerability of an information system and establish a plan for risk management. Demonstrate how to detect and reduce threats in Web security. Implementation of various cryptographic techniques

LIST OF PRACTICAL:

1. Transposition Techniques, using any High Level Programming Language.
2. Random Number Generation.
3. Block Ciphers and the Data Encryption Standard.
4. Hash Algorithms: MD5 Message Digest Algorithm, Authentication Protocols.
5. Firewall Configuration: Set up a basic firewall on a computer or network router to control incoming and outgoing traffic.
6. File and Folder Permissions: Create a sample folder structure and apply different levels of permissions to various user accounts.
7. Digital Signature: Generate a digital signature for a document using a tool or software that supports digital signatures.
8. VPN Setup: Set up a simple Virtual Private Network (VPN) using readily available software, and connect two devices securely.
9. Database Access Control: Create a sample database and implement user access controls to restrict different users' privileges.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **COPE13**	Course Title: **Fundamental of Data Science**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	**Credit:3**

COURSE OBJECTIVE:

This course is designed to demonstrate knowledge of statistical data analysis techniques utilized in business decision making. Apply principles of Data Science to the analysis of business problems. Use data mining software to solve real-world problems. Employ cutting edge tools and technologies to analyze Big Data.

COURSE CONTENT:

01 Introduction to Data Science

Definition
Key concept & terminology
Big Data and Data Science Hype
The Data Science Process
Role of data scientist

02 Mathematical Preliminaries and Data Munging

Mathematics and Statistics Fundamentals
Linear algebra
Probability theory
Descriptive statistics
Inferential statistics
Correlation Analysis
Properties of Data
Languages for Data Science
Collecting & Cleaning Data

03 Programming Languages and Tools

Introduction to Python or R-Programming
Basic data structures (e.g., lists, arrays, dictionaries)
Data manipulation and analysis libraries
Data visualization libraries

04 Scores and Rankings

Developing Scoring Systems
Z-scores and Normalization
Advanced Ranking Techniques

05 Statistical Analysis

Sampling from Distributions
Statistical Distributions
Statistical Significance
Permutation Tests and P-values

06 Visualizing Data:

Exploratory Data Analysis
Developing a Visualization Aesthetic
Chart Types
Great Visualizations

COURSE OUTCOME:

After the completion of the course the student will be able to:

10. Describe the significance of data science and understand the Data Science process.
11. Explain how data is collected, managed and stored for data science.
12. Build, and prepare data for use with a variety of statistical methods and models
13. Analyze Data using various Visualization techniques.

RECOMMENDED BOOKS:

1. Data Science for Business by Foster Provost and Tom Fawcett
2. Data Science from Scratch by Joel Grus
3. Python Data Science Handbook by Jake VanderPlas
4. Data Visualization: A Practical Introduction by Kieran Healy
5. Introduction to Statistical Learning with applications in R by Gareth James

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	10	20
3	10	20
4	06	15
5	08	15
6	08	15
Total	**48 hours**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **COPE14**	Course Title: **Fundamental of Data Science Lab**
Periods Per Week: **2 (L: 0, T: 0, P: 2)**	**Credit:1**

COURSE OBJECTIVE:

This course teaches essential data science skills, including statistics, data cleaning, visualization, correlation analysis, linear regression, probability simulation, Z-score calculation, and data sampling. Using Python or R, students will gain practical experience to analyze and interpret data effectively.

LIST OF PRACTICALS:

1. Descriptive Statistics: Calculate the mean, median, and standard deviation of a given dataset using Python or R.

2. Data Cleaning: Take a messy dataset and clean it by handling missing values, duplicates, and outliers.

3. Data Visualization: Create a bar chart or histogram to visualize the distribution of a categorical or numerical variable.

4. Correlation Analysis: Calculate the correlation coefficient between two numerical variables and interpret the results.

5. Linear Regression: Perform a simple linear regression using Python or R to model the relationship between two variables.

6. Probability Simulation: Simulate a simple probability experiment, such as flipping a coin or rolling a dice, and calculate the experimental probability.

7. Z-score Calculation: Calculate the Z-scores for a set of data points and identify outliers.

8. Data Sampling: Randomly sample a subset of data from a larger dataset and perform statistical analysis on the sample.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER AND INFORMATION TECHNOLOGY	
Course Code: **COPE15**	Course Title: **Linux Programming**
Periods Per Week: **3 (L: 03, T: 0, P: 0)**	**Credit:3**

COURSE OBJECTIVE:

The Objective of the course is to Introduce students to the Linux operating system and teach fundamental Linux commands and file management, besides develop in them basic scripting skills using Bash and familiarize students with Linux application development.

1. **Introduction to Linux**
   - 1.1. Introduction to the Linux operating system.
   - 1.2. History and significance of Linux.
   - 1.3. Open Source Code Vs Free Code
   - 1.4. Various Linux distributions
2. **Basic Linux Commands**
   - 2.1. Command-line interface (CLI) and Terminal.
   - 2.2. Navigating the Linux file system.
   - 2.3. Common Linux commands (ls, cd, pwd, touch, mkdir, rmdir, etc.).
3. **File Management**
   - 3.1. File permissions and ownership.
   - 3.2. Copying, moving, and deleting files and directories.
   - 3.3. File compression and archiving (tar, gzip, zip).
4. **Introduction to Bash Scripting**
   - 4.1. Shell script
   - 4.2. Writing and executing basic Bash scripts.
   - 4.3. Variables, input/output, and conditional statements in scripts.
5. **Flow Control in Bash**
   - 5.1. Loops (for and while) in Bash scripts.
   - 5.2. Conditional statements (if, else, elif) in scripts.
   - 5.3. Writing simple interactive scripts.
6. **Introduction to Linux Application Development**
   - 6.1. Overview of Linux application development tools.
   - 6.2. Introduction to C programming in Linux.
   - 6.3. Writing and compiling a simple C program in Linux.

COURSE OUTCOME:

After the completion of the course the student will be able to:

- Demonstrate Proficiency in Linux Operating Systems
- Navigate and Utilize the Linux Command Line Interface (CLI).
- Manage Files and Directories
- Develop Bash Scripts
- Implement Flow Control in Bash Scripts
- Apply Practical Bash Scripting
- Understand Basics of Linux Application Development

RECOMMENDED BOOKS:

1. "Linux Command Line and Shell Scripting Bible" by Richard Blum and Christine Bresnahan
2. "Linux Pocket Guide" by Daniel J. Barrett
3. "Linux for Beginners: An Introduction to the Linux Operating System and Command Line" by Jason Cannon
4. "Bash Pocket Reference" by Arnold Robbins
5. "The Linux Programming Interface: A Linux and UNIX System Programming Handbook" by Michael Kerrisk

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	15
2	10	20
3	10	20
4	06	15
5	08	15
6	08	15
Total	**48 hours**	**100**

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN COMPUTER ENGINEERING/INFORMATION TECHNOLOGY	
Course Code: **COPE16**	Course Title: **Linux Programming Lab**
Periods Per Week: **2 (L: 0, T: 0, P: 2)**	**Credit:1**

COURSE OBJECTIVE:

The "Linux Programming Lab" is a companion lab for the theory course, allowing students to practice what they've learned. It provides hands-on experience with Linux systems and scripting. The lab sessions should align with the corresponding theory units and may include the following practical activities:

LIST OF PRACTICALS:

Lab 1: Linux Basics
- Setting up a Linux environment (e.g., using VirtualBox).
- Basic Linux commands and file management.

Lab 2: Bash Scripting Basics
- Writing simple Bash scripts to perform file operations.
- Using variables and conditional statements in scripts.

Lab 3: Advanced Bash Scripting
- Writing more complex Bash scripts with loops.
- Creating interactive scripts.

Lab 4: Bash Scripting Projects
- Independent scripting projects and assignments.
- Debugging and troubleshooting scripts.

Lab 5: Linux Application Development
- Setting up a development environment for C programming.
- Writing and compiling C programs in Linux.

Note: In the lab, students will work with a Linux distribution of their choice, and the instructor should be available to provide guidance and support as needed during practical sessions.