

**CURRICULUM**

FOR

**DIPLOMA PROGRAMME**

IN

**Computer Engineering & IoT**

FOR THE STATE OF HIMACHAL PRADESH

**2<sup>nd</sup> Year (3<sup>rd</sup> and 4<sup>th</sup> Semester)**



**N-2022**

Prepared by :

**Composite Curriculum Development Centre**  
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**SALIENT FEATURES**

Programme	Diploma in Computer Engineering & IoT
Duration	Three years (Six Semesters)
Entry Qualification	As prescribed by H.P. Takniki Shiksha Board/AICTE
Intake	As approved by H.P. Takniki Shiksha Board
Pattern	Semester System

## **PROGRAM OUTCOMES (POs)**

**PO-1:Basic and Discipline Specific Knowledge** : Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems.

**PO-2:Problem Analysis** : Identify and analyze well-defined engineering problems using codified standard methods.

**PO-3:Design/ Development of Solutions** : Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs.

**PO-4:Engineering Tools, Experimentation and Testing** : Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

**PO-5:Engineering Practices for Society, Sustainability and Environment** : Apply appropriate technology in context of society, sustainability, environment and ethical practices.

**PO-6:Project Management** : Use engineering management principles individually, as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities.

**PO-7:Life-long Learning** : Ability to analyse individual needs and engage in updating in the context of technological changes.

## **PROGRAM SPECIFIC OUTCOMES (PSOs)**

**PSO-1:** Ability to proficiently handle, install, maintain, operate and troubleshoot computer hardware, software and networking devices.

**PSO-2:** Ability to analyze real-world computational problems and design, develop, test and implement their software solutions adhering to the principles of software engineering and project management.

**PSO-3:** Ability to apply different IoT technologies to devise the solution of primitive real world problems.

## COURSE CODING SCHEME

### Course code and definition:

Course Code	Definition
L	Lecture
T	Tutorial
P	Practical
DCS	Doubt Clearing Session
HS	Humanities & Social Sciences Courses
BS	Basic Science Course
ES	Engineering Science Course
PC	Programme Core Course
PE	Programme Elective Course
OE	Open Elective Course
AU	Audit Course
SI	Internship
PR	Project
SE	Seminar

### Course level coding scheme:

Three-digit number (odd numbers are for the odd semester courses and even numbers are for even semester courses) used as suffix with the Course Code for identifying the level of the course e.g.

101, 102 ... etc. for first year

201, 202 .... etc. for second year

301, 302 ... etc. for third year

## STUDY AND EVALUATION SCHEME

### THIRD SEMESTER

Sr. No.	Category	Code	Subject	Study Scheme Hours/ Week				Credits	Evaluation Scheme			Total Marks
				Th	Pr	DCS	Total		Internal Assessment	External Assessment		
									Marks	Marks	Hrs	
1.	PC	ITPC201	Computer Programming using 'C'*	3	-	1	4	3	40	60	3	100
2.	PC	ITPC209	Operating Systems*	3	-	1	4	3	40	60	3	100
3.	PC	IoTPC201	Data Communication & Computer Networks**	3	-	1	4	3	40	60	3	100
4.	PC	IoTPC203	Electronics for IOT	3	-	1	4	3	40	60	3	100
5.	PC	IoTPC205	Web Technologies**	2	-	1	3	2	40	60	3	100
6.	PC	ITPC211	Computer Programming using 'C' Lab*	-	4	-	4	2	40	60	3	100
7.	PC	ITPC217	Operating Systems Lab*	-	4	-	4	2	40	60	3	100
8.	PC	IoTPC207	Data Communication & Computer Networks Lab**	-	2	-	2	1	40	60	3	100
9.	PC	IoTPC209	Electronics for IOT Lab	-	2	-	2	1	40	60	3	100
10.	PC	IoTPC211	Web Technologies Lab**	-	4	-	4	2	40	60	3	100
11.	-	-	Student Centered Activities	-	2	-	2	-	25	-	-	25
<b>TOTAL</b>				<b>14</b>	<b>18</b>	<b>5</b>	<b>37</b>	<b>22</b>	<b>425</b>	<b>600</b>		<b>1025</b>

\* Course is common with Computer Engineering, Information Technology, and Computer Engineering & IoT

\*\* Course is common with Computer Engineering and Computer Engineering & IoT

\*\*\* The students shall undergo Internship-I at the end of 3<sup>rd</sup> semester (During semester break after board examinations of duration 04 weeks) which will be evaluated and reflected in study and evaluation scheme of 4<sup>th</sup> semester.

## FOURTH SEMESTER

Sr. No.	Category	Code	Subject	Study Scheme Hours/ Week				Credits	Evaluation Scheme			Total Marks
				Th	Pr	DCS	Total		Internal Assessment	External Assessment		
									Marks	Marks	Hrs	
1.	PC	ITPC206	Database Management System*	3	-	1	4	3	40	60	3	100
2.	PC	ITPC216	Database Management Systems Lab*	-	4	-	4	2	40	60	3	100
3.	PC	IoTPC202	Microprocessors and Microcontrollers	2	-	1	3	2	40	60	3	100
4.	PC	IoTPC204	Microprocessors and Microcontrollers Lab	-	2	-	2	1	40	60	3	100
5.	PC	IoTPC206	Software Engineering	3	-	1	4	3	40	60	3	100
6.	PE	IoTPE202	PROGRAM ELECTIVE-I IoTPE202-I : Web Programming IoTPE202-II : OOP using C++ IoTPE202-III : OOP using Java	2	-	1	3	2	40	60	3	100
7.	PE	IoTPE204	PROGRAM ELECTIVE-I LAB IoTPE204-I : Web Programming Lab IoTPE204-II : OOP using C++ Lab IoTPE204-III : OOP using Java Lab	-	2	-	2	1	40	60	3	100
8.	PE	IoTPE206	PROGRAM ELECTIVE-II IoTPE206-I : Cloud Computing IoTPE206-II : Digital Marketing Techniques IoTPE206-III : Information Security*	3	-	1	4	3	40	60	3	100
9.	PR	PR202	Minor Project	-	4	-	4	2	40	60	3	100
10.	AU	AU202	Essence of Indian Knowledge and Tradition	2	-	-	2	-	40	60	3	100
11.	SI	SI-I	Internship - I (after 3 <sup>rd</sup> Semester)	-	-	-	-	2	40	60	3	100
	-	-	Student Centered Activities	-	2	-	2	-	25	-	-	25
<b>TOTAL</b>				<b>15</b>	<b>14</b>	<b>5</b>	<b>34</b>	<b>21</b>	<b>465</b>	<b>660</b>		<b>1125</b>

\* Course is common with Computer Engineering, Information Technology, and Computer Engineering & IoT

\*\* The students shall undergo Internship-II at the end of 4<sup>th</sup> semester (During semester break after board examinations of duration 06 weeks) which will be evaluated and reflected in study and evaluation scheme of 5<sup>th</sup> semester.

# **DETAILED CONTENTS**



# **DETAILED CONTENT**

## **THIRD SEMESTER**

Course Code	:	<b>ITPC201</b>
Course Title	:	<b>Computer Programming using 'C'</b> <i>(Common to IT, CO and CO&amp;IOT)</i>
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

Programming is one of the core skills that a diploma holder student must possess. This course is designed to enable students to design structured solutions to basic computational problems. The practical component of this course is designed to provide adequate hands-on practice to the students in implementing the designed solutions as programs in C language.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand the basic terminology of computer programming.
- CO-2. Write algorithms and draw flowcharts for simple computational problems.
- CO-3. Write, edit, compile, debug, run simple programs in 'C'.
- CO-4. Make use of flow control structures in programs.
- CO-5. Organize complex programs around a set of functions.

### Course Content

#### Unit 1: Introduction to Programming ..... 6 Marks

Program Design Tools - Algorithm, Flowchart, Pseudocode; Evolution of Programming Languages, Programming Terminology - Program, Compiler, Interpreter, Linker, Source Code, Libraries, Syntax and Semantic Errors, Bugs.

#### Unit 2: Introduction to C Language ..... 9 Marks

Brief History of C Language, Features of C Language, Character Set, Identifier, Keywords, Literals, Variables, Constants, Structure of a 'C' Program, Comments, Preprocessor Directives, Data Types, Type Casting, Storage Classes

#### Unit 3: Input/ Output ..... 9 Marks

Standard Input, Standard Output, Standard Error, I/O Redirection, Unformatted I/O Functions - getchar(), putchar(), gets(), puts(); Formatted I/O Functions - printf(), scanf(), Format Specifier

**Unit 4: Operators ..... 9 Marks**

Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Assignment Operators, Conditional Operator, Special Operators, Expressions, Associativity and Order of Precedence of Operators

**Unit 5: Flow Control Statements ..... 12 Marks**

Selection Statements: if, if...else, Nested if, if...else if Ladder, switch...case; Loops - while, do...while, for; Jump Statements - goto, break, continue, return; Nested Loops, Infinite Loops

**Unit 6: Arrays, Structures, Unions and Pointers ..... 9 Marks**

Array, Memory Representation, One-Dimensional Arrays and Two-Dimensional Arrays: Declaration and Initialization; Enumeration, Strings, String Constants, Escape Sequences, Standard String Functions - strlen(), strcpy(), strcmp(), strncpy(), strcat(); Structures, Unions, Pointer - Declaration, Initialization, Assignment; Dynamic Memory Allocation: malloc(), calloc(), free()

**Unit 7: Functions ..... 6 Marks**

Definition of Function, Function Prototype, Formal and Actual Parameters, Function Call, Call by Value and Call by Reference, Arrays as Function Arguments, Recursion

**Reference Books**

1. Problem Solving and Programming in C, R.S. Salaria, Khanna Publications
2. Programming in ANSI C, E. Balagurusamy, Tata McGraw-Hill
3. The C Programming Language, Brian Kernighan and Dennis Ritchie, Pearson
4. How to Solve it by Computer, R. G. Dromey, Pearson
5. Outline of Programming with C, Byron Gottfried, Schaum, McGraw-Hill

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1: Introduction to Programming	8 Hrs	6
Unit 2: Introduction to C Language	10 Hrs	9
Unit 3: Input/ Output	8 Hrs	9
Unit 4: Operators	10 Hrs	9
Unit 5: Flow Control Statements	12 Hrs	12
Unit 6: Arrays, Structures, Unions and Pointers	10 Hrs	9
Unit 7: Functions	6 Hrs	6
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	: <b>ITPC211</b>
Course Title	: <b>Computer Programming using 'C' Lab</b> (Common to IT, CO and CO&IOT)
Number of Credits (Teaching Load)	: 2 (L : 0, T : 0, P : 4)
Prerequisites	: -
Course Category	: PC (Program Core)

### Course Outcomes

After the completion of this course students will be able to implement the concepts learned in the theory of "Computer Programming using 'C'".

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To set up and get familiar with the programming environment (Editor, Compiler, Linker)
2.	To declare, initialize and use variables of various data types in 'C'.
3.	To demonstrate printf() and scanf() functions with different format specifiers.
4.	To demonstrate various arithmetic operators and arithmetic expressions.
5.	To demonstrate various bitwise operators.
6.	To use if...else statement to check whether a given year is a leap year.
7.	To use switch...case statement to print the numbers entered by the user (1-10) in words.
8.	To use while statement to reverse the digits of a given number.
9.	To use for statement to print the multiplication table of a given number.
10.	To implement a menu driven arithmetic calculator using do while loop.
11.	To read the marks of 10 students in an array and calculate their average.
12.	To read two matrices and compute their sum using 2-Dimensional arrays.
13.	To reverse the characters of a given string.
14.	To demonstrate strlen(), strcat(), strcmp() functions.
15.	To swap values of two variables using a function.
16.	To compute the factorial of a given number using recursion.
17.	To read the data of a student in a structure and print it.
18.	To count the number of vowels in a given string using a pointer.

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Course Code	:	<b>ITPC209</b>
Course Title	:	<b>Operating Systems</b> (Common to IT, CO and CO&IOT)
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

Every computing device ranging from powerful supercomputers to handheld mobile devices to tightly constrained wireless sensor nodes are controlled and managed by appropriate operating systems. Without an appropriate operating system, any computing hardware is nothing more than a pile of electronic devices. The objective of this course is to make students understand the basic functionalities provided by an operating system.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand the terminology related to the domain of operating systems.
- CO-2. Explain the role and functions of an operating system.
- CO-3. Understand the architecture of modern operating systems.
- CO-4. Understand basic techniques used by an OS to manage computing resources.

### Course Content

#### Unit 1 : Overview of Operating Systems ..... 12 Marks

Objectives and Functions of Operating Systems, Operating Systems Evolution - Batch Processing Systems, Multiprogramming Systems, Multiprocessing Systems, Time Sharing Systems, Personal Computer Operating Systems, Handheld Computer Systems, Real Time Systems, Distributed Systems; Operating System Architecture - Monolithic vs Microkernel

#### Unit 2 : Processes and Threads ..... 12 Marks

Process, Process States, Process Life Cycle, Process Control Block (PCB), Threads, Multithreading, Inter-process Communication, Process Synchronization, Race Condition, Critical Section Problem and its Solutions, Deadlocks - Characterization, Necessary Conditions, Deadlock Avoidance, Prevention and Recovery

**Unit 3 : CPU Scheduling** ..... **12 Marks**

CPU Scheduler, Preemptive and Non-preemptive Scheduling, Scheduling Criteria - CPU Utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling Algorithms - First Come First Serve, Shortest Job First, Shortest Remaining Time First, Priority Scheduling, Round-Robin; Multiprocessor Scheduling

**Unit 4 : Memory Management** ..... **12 Marks**

Memory Hierarchy, Address Space, Address Translation, Memory Protection, Swapping, Contiguous Memory Allocation, Fixed Partition and Variable Partition Schemes, Memory Allocation Strategies, Fragmentation, Compaction, Non-Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Thrashing, Page Replacement Policies

**Unit 5 : Storage Management** ..... **6 Marks**

Storage Devices - Magnetic Tapes, Magnetic Disks, Optical Disks, Flash Storage; Sequential and Direct Access, Disk Scheduling - SCAN, CSCAN

**Unit 6 : Linux Operating System** ..... **6 Marks**

Features of Linux OS, GNU Project, Linux Architecture - Kernel, System Calls Interface, System Libraries, Shell

**Reference Books**

1. Modern Operating Systems by Andrew S. Tanenbaum
2. Operating System Internal and Design Principles by William Stallings
3. Operating System Concepts by Abraham Silberschatz, Wiley India Pvt. Ltd.
4. Linux with Operating System Concepts By Richard Fox, Chapman and Hall

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Overview of Operating Systems	12 Hrs	12
Unit 2 : Processes and Threads	12 Hrs	12
Unit 3 : CPU Scheduling	12 Hrs	12
Unit 4 : Memory Management	12 Hrs	12
Unit 5 : Storage Management	8 Hrs	6
Unit 6 : Linux Operating System	8 Hrs	6
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>ITPC217</b>
Course Title	:	<b>Operating Systems Lab</b> (Common to IT, CO and CO&IOT)
Number of Credits (Teaching Load)	:	2 (L : 0, T : 0, P : 4)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Outcomes

After completing this course the students will be able to practically demonstrate the following experiments related to operating systems.

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To install and configure MS Windows 10/11 on a computer system.
2.	To install and configure Linux on a computer system.
3.	To get familiar with the Windows 10/11 graphical user interface.
4.	To get familiar with Windows 10/11 directory structure and role of each directory.
5.	To get familiar with Linux directory structure and role of each directory.
6.	To get conversant with various operations on files and folders in Windows 10/11.
7.	To connect a computer to the LAN/ WiFi network and Internet in Windows 10/11 and demonstrate file transfer and remote login.
8.	To carry out basic file operations using command prompt/ terminal in Windows 10/11.
9.	To get familiar with various components of the Control Panel in Windows 10/11.
10.	To get conversant with various shortcut keys in Windows 10/11 to carry out various tasks.
11.	To view and terminate running processes in Windows 10/11.
12.	To simulate FCFS and SJF scheduling algorithms in any programming language.

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Course Code	:	<b>IoTPC201</b>
Course Title	:	<b>Data Communication &amp; Computer Networks</b> (Common to CO and CO&IOT)
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

Computer networks have transformed the way we communicate, socialize, learn, work, entertain and trade. Computer networks are found everywhere from homes to schools to highways to offices. This course is designed to enable the students to understand the underlying technologies in modern computer networks.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand the terminology used in the domain of computer networks.
- CO-2. Explain the underlying principles of computer networks.
- CO-3. Identify and use common networking devices and cables.
- CO-4. Understand the working of TCP/IP as a case study.

### Course Content

#### **Unit 1 : Overview of Data Communication ..... 12 Marks**

Data Communication, Data Communication Characteristics - Delivery, Accuracy, Timeliness, Jitter; Components of Communication System, Data Flow - Simplex, Half-Duplex, Full-Duplex; Analog and Digital Signals, Peer-to-Peer and Client-Server Networks, Characteristics of Analog Signals - Frequency, Amplitude, Wavelength; Composite Signal, Phase, Bandwidth; Low Pass and Band Pass Channels, Baseband and Broadband Transmission, Data Rate Limit

#### **Unit 2 : Computer Networks ..... 12 Marks**

Objectives of Computer Networks, Applications, Network Protocols, Packet Switching, Circuit Switching, Network Topologies, Types of Computer Networks - PAN, LAN, MAN, WAN, Internetworks, Internet - History, Internet Infrastructure, DNS, Internet Routing Hierarchy



**Unit 3 : ISO OSI Reference Model ..... 12 Marks**

Advantages of Layered Network Architecture, ISO OSI Reference Model, Principles of OSI Reference Model, Functions of OSI Layers, Overview of Basic Protocols at Physical, Data Link, Network and Transport Layers

**Unit 4 : Transmission Media and Networking Devices ..... 12 Marks**

Wired Media – Coaxial, UTP, STP, Optical Fibre Cables; Wireless Media – Infrared, Radio Waves, Microwaves; Terrestrial and Satellite Wireless Communication; Transmission Impairments, Networking Devices - Repeater, Hub, Bridge, Switch, Router, Gateway, Modem

**Unit 5 : TCP/IP Protocol Suite ..... 12 Marks**

Layers in TCP/IP Protocol Suite, TCP/IP Protocol Data Units, IPv4 and IPv6 addresses, IPv4 CIDR Notation, Netmasks and Subnets, IPv4 Address Classes and Reserved Ranges, TCP and UDP, Ports, Well-known Ports, Telnet, FTP, SNMP, DHCP and DNS, Overview of Routing - Flooding, Distance Vector, Link State

**Reference Books**

1. Computer Networks, Andrew S. Tanenbaum, PHI
2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addison Wesley
3. Data and Computer Communications, William Stallings, PHI
4. An Engineering Approach to Computer Networking, S. Keshav, Addison Wesley/Pearson
5. An Integrated Approach to Computer Networks, Bhavneet Sidhu, Khanna Publishing House
6. Data Communication and Computer Networks by Behrouz Forouzan.

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Overview of Data Communication	14 Hrs	12
Unit 2 : Computer Networks	14 Hrs	12
Unit 3 : ISO OSI Reference Model	14 Hrs	12
Unit 4 : Transmission Media and Networking Devices	12 Hrs	12
Unit 5 : TCP/IP Protocol Suite	10 Hrs	12
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPC207</b>
Course Title	:	<b>Data Communication &amp; Computer Networks Lab</b> (Common to CO and CO&IOT)
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Outcomes

After completing this course the students will be able to practically demonstrate the following experiments related to data communication and computer networks.

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To get familiar with various types of Networking Cables, Connectors and Tools and create UTP CAT5 patch cords using a crimping tool.
2.	To get familiar with various types of Networking Devices NIC, Hub, Switch, Router, WiFi Access Point and find out their technical specifications.
3.	To install and configure Network Interface Card and determine its MAC address.
4.	To find out and draw the Network Layout with its topology for the LAN of your Institution.
5.	To study and practice different networking commands - IPCONFIG, PING, TRACERT, GETMAC, HOSTNAME, ROUTE, PATHPING, NETSTAT, NSLOOKUP, ARP
6.	To configure the networking of a PC/ Laptop and explore different configuration options and their impact – IP address, Subnet mask, Gateway, DNS.
7.	To establish and test a physical network of two computers with hub/ switch.
8.	To set up a FTP Server and transfer a file to the server from another computer on the network.
9.	To create a WiFi hotspot using a wireless access point and configure the options of DHCP and security.

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Course Code	:	<b>IoTPC203</b>
Course Title	:	<b>Electronics for IoT</b>
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

A strong foundation of electronic circuits and digital electronics is important for the Internet of Things. This course is aimed to impart a thorough understanding of binary number systems, logic gates, boolean concepts, combinational and sequential logic circuits. This course is designed to provide a thorough exposure to the students to the important aspects of electronics especially with applications in IoT.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand and examine the structure of various number systems and its application in digital design.
- CO-2. Understand the functions of logic gates.
- CO-3. Understand the basics of the Internet of Things.
- CO-4. Understand, analyze and design various combinational and sequential circuits.

### Course Content

#### **Unit 1: Introduction** ..... **10% Marks**

Analog and Digital Data, Signals, Analog Signals - Examples, Advantages, Disadvantages and Applications; Digital Signals - Advantages, Disadvantages and Applications

#### **Unit 2: Overview of Digital Electronics** ..... **20% Marks**

Number System - Decimal, Binary, Octal and Hexadecimal; Conversion from one Number System to Other, Signed Binary Numbers: Sign Magnitude Representation, One's Complement Representation and Two's Complement Representation; Binary Arithmetic: Addition, Subtraction, Binary Arithmetic using One's and Two's Complement, Binary Codes. Boolean Algebra, Basic Theorems and Properties of Boolean Algebra

**Unit 3: Logic Gates and Circuits** ..... **25% Marks**

Logic Gates - Symbols and Truth Tables; Universal Gates, Boolean Algebra, Logic Circuit, De-Morgan's Theorem, Combinational and Sequential Circuits; Half Adder, Full Adder, Latch, Flip Flop - SR, D, JK , Counter, Register

**Unit 4: Introduction to Internet of Things** ..... **25% Marks**

Evolution of Internet of Things (IoT), M2M Communication, IoT Enabling Technologies - Smart Objects and Smart Environments; IoT Applications - Home Automation, Smart Cities, Smart Grids, Industrial IoT, Smart Farming; IoT Framework, IoT Challenges, Advantages of IoT, IoT Functional Block

**Unit 5: Electronic Components for IoT** ..... **20% Marks**

Overview of Microcontroller, Transducer, Sensor and Actuator, LED, Stepper Motor, Servo Motor, Accelerometer, Gyroscope, Temperature and Humidity Sensors

**Reference Books**

1. Digital principles & Applications by Malvino & Leach, McGraw Hill Education
2. Basic Electronics (Solid State) by B L Theraja, S. Chand Publication
3. Internet of Things: A Hands-on Approach, by A. Bahga, Universities Press

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
Unit 1: Introduction	14 Hrs	6
Unit 2: Overview of Digital Electronic	14 Hrs	12
Unit 3: Logic Gates and Circuits	12 Hrs	15
Unit 4: Introduction to Internet of Thing	12 Hrs	15
Unit 5: Electronic Components for IoT	12 Hrs	12
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPC209</b>
Course Title	:	<b>Electronics for IoT Lab</b>
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Outcomes

After completing this course the students will be able to practically demonstrate the following experiments related to electronics for IoT.

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To study various logic gates and verify their truth tables (using breadboard).
2.	To realize logic functions with the help of NAND or NOR gates.
3.	To realize and verify the De Morgan theorem using a digital circuit.
4.	To design a half adder using XOR and NAND gates and verify its output.
5.	To design a full adder using XOR and NAND gates and verify its output.
6.	To identify various IoT components - sensors, actuators.

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Course Code	:	<b>IoTPC205</b>
Course Title	:	<b>Web Technologies</b> (Common to CO and CO&IOT)
Number of Credits (Teaching Load)	:	2 (L : 2, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

The Internet is the enabling technology for many services like email, world-wide-web, cloud computing, e-commerce, IoT etc. The objective of this course is to expose the students to the Internet enabled technologies with special emphasis on the world-wide-web.

### Course Outcomes

After completing this course the students will be able to :

CO-1. Understand the Internet and WWW terminology.

CO-2. Utilize the Internet services like email, www and FTP.

CO-3. Connect a computer to the Internet and troubleshoot common network issues.

CO-4. Develop basic static websites using HTML, CSS and Javascript.

### Course Content

#### Unit 1 : Internet and World Wide Web ..... 9 Marks

Brief History of the Internet, Structure of the Internet, Internet Services and Applications, Different Ways to Connect to the Internet, Common Internet Connection Issues and their Solutions, World Wide Web, HTTP, Familiarization with the Key Terms - Network Protocol, Web Server, Web Browser, Website, Web Application, Hypertext, Hyperlink, Search Engine, Proxy Server, URL, DNS

#### Unit 2 : HTML 5 ..... 9 Marks

HTML, HTML Coding Conventions, HTML Tag, Structure of HTML Element, Global Attributes - id, class, style, title, tabindex; Structure of a Web Page - <html>, <head>, <body>, <!DOCTYPE>, <title> and <meta> Elements; HTML Comments, Document Object Model (DOM)

#### Unit 3 : HTML Basic Elements ..... 12 Marks

Headings - <h1> ... <h6>; Paragraphs - <p>, Special Text Elements - <pre>, <code>, <q>, <var>; Lists : Ordered Lists (<ol>), Unordered Lists (<ul>); Attributes of List

Elements: type, start; Nested Lists, Line Break (<br>) and Horizontal Rule (<hr>); Text Formatting Elements - <b>, <strong>, <em>, <i>, <mark>, <u>, <sub>, <sup>; Tables - <table>, <thead>, <tbody>, <tfoot>, <tr>, <th>, <td>, <colgroup>, <col>; Table Attributes - cellpadding, cellspacing, border, rowspan, colspan; Images - <img>; Image Attributes - src, alt; Hyperlink - <a>; Hyperlink Attributes - href, target;

#### **Unit 4 : HTML Layout Elements ..... 9 Marks**

Block and Inline Elements, Creating Sections - <div>, <span>; Identifying Elements - id, class and name attributes; Frames - <iframe>; HTML5 Semantic Elements - <main>, <header>, <footer>, <article>, <section>, <nav>, <aside>, <details>, <summary>, <time>, <figure>

#### **Unit 5 : Cascading Style Sheets ..... 12 Marks**

CSS Types - Inline, Internal, External; <style> and <link> elements; CSS Rule, Selector and Declaration; CSS Length Units; CSS Box Model; Setting Margins, Borders and Padding of Elements; CSS Colors - Color Names, RGB and HEX Formats; Setting Colors of Text, Background and Border; Styling Text - font-family, font-size, font-style, font-weight, font-transform, font-decoration, text-align; CSS Layout - position and float; Flexbox and Grid layouts; Styling Tables and Lists; Basic Animation using CSS, CSS Pseudo Elements and Pseudo Classes

#### **Unit 6 : Javascript ..... 9 Marks**

Role of Javascript in a Web Page, Embedding Javascript Code in Web Page, Javascript Variables - Naming, Scope and Lifetime, Hoisting; Javascript Operators, Control Statements; Javascript Arrays; Linking External Javascript File; Accessing and Manipulating HTML DOM Elements with Javascript; JavaScript, Builtin Javascript Functions, User-defined Functions

### **Reference Books and Web Resources**

1. Web Technologies - A Computer Science Perspective, Jeffrey C.Jackson,
2. Web programming - Building Internet Application, Chris Bales
3. HTML & CSS: Design and Build Websites, John Ducket, Wiley Publishing
4. <https://www.w3schools.com> - HTML, CSS and Javascript Tutorials
5. Mozilla MDN Network Tutorials on HTML, CSS and Javascript
6. Modern JavaScript Tutorials at <https://javascript.info>

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Internet and World Wide Web	8 Hrs	9
Unit 2 : HTML 5	8 Hrs	9
Unit 3 : HTML Basic Elements	10 Hrs	12
Unit 4 : HTML Layout Element	6 Hrs	9
Unit 5 : Cascading Style Sheets	8 Hrs	12
Unit 6 : Javascript	8 Hrs	9
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTTPC211</b>
Course Title	:	<b>Web Technologies Lab</b> (Common to CO and CO&IOT)
Number of Credits (Teaching Load)	:	2 (L : 0, T : 0, P : 4)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Outcomes

After completing this course the students will be able to practically demonstrate the following experiments related to Internet technologies and website development.

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To send, receive, reply and forward emails with attachments.
2.	To connect the computer system to the Internet using at least two methods.
3.	To install and configure Visual Studio Code for static website development.
4.	To create a web page consisting of text elements <h1> - <h6>, <p>, <pre>, <code>, <q>, <var> and set their background colors using inline CSS.
5.	To create a web page consisting of ordered and unordered lists and set their fonts and other text properties using internal CSS.
6.	To create a web page using HTML and CSS consisting of different <div> elements arranged in a grid structure with each <div> containing a different image. The experiment must also demonstrate the CSS box model.
7.	To create a web page containing hyperlinks to the web pages created in the first five experiments. The experiment must demonstrate different values of the target attribute.
8.	To create a web page using semantic elements <main>, <header>, <footer>, <article>, <section>, <nav>, <aside>, <details>, <summary> with each element properly positioned as per standard web page layout.
9.	To create a web page to demonstrate basic CSS animation.
10.	To create a web page to find out the sum of two numbers using Javascript.
11.	To create a web page consisting of a label, a text field, a command button and write Javascript code to find out whether the number entered in the text

	field is a prime number.
12.	To dynamically add HTML elements to a web page using Javascript.
13.	To change the CSS properties of a text element using Javascript.
14.	To demonstrate frequently used Javascript builtin functions (at least 10).

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# **DETAILED CONTENTS**

## **FOURTH SEMESTER**

Course Code	:	<b>ITPC204</b>
Course Title	:	<b>Database Management Systems</b> <i>(Common to IT, CO and CO&amp;IOT)</i>
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

A Database Management Systems (DBMS) not only efficiently maintains the voluminous data, but also provides a convenient and consistent interface between the data it maintains and the end-user applications. Modern dynamic web sites are powered by a database at their backend. Information and Communication Technology (ICT) is continuously improving the speed and accuracy in the collection, storage, processing and transmitting of data. Hence, database approach is all set to power the future data-intensive applications. This course is designed with the purpose of enabling the learners to get acquainted with the basic terminology and concepts of modern DBMS. After completing this course, the students will be able to design, implement and use a basic database in MySQL.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand the basic terminology associated with database management.
- CO-2. Design an optimal database for a given basic application.
- CO-3. Apply normalization techniques while designing databases.
- CO-4. Use SQL commands to carry out various database operations.

### Course Content

#### **Unit 1 : Introduction to Database Systems ..... 9 Marks**

Database Systems, Database and its Purpose, Comparison of Database Approach with File-based and Traditional Record Keeping Approaches, Advantages and Disadvantages of Database Approach, Classification of Database Users, Role of DBA

#### **Unit 2 : Database System Concepts and Architecture ..... 9 Marks**

Data Models, Schemas, and Instances; ANSI/SPARC Architecture of a Database System, External Level, Conceptual Level, Internal Level, Mappings; Data Independence, Logical Data Independence, Physical Data Independence

**Unit 3 : Relational and E-R Models ..... 12 Marks**

Relational Database Model, Relations, Attributes, Tuples, Domains; Prime and Non-prime Attributes, Key – Primary Key, Candidate Keys, Alternate Keys, Superkey, Secondary Key, Foreign Keys; Database Constraints, Entity Relationship Model - Entity, Entity Sets, Strong and Weak Entities, Attributes, and Keys; Association, Relationship, Roles, Structural Constraints, ER Diagrams

**Unit 4 : Database Dependencies and Normalization ..... 6 Marks**

Functional Dependencies, Trivial and Non-trivial Dependencies, Non-Loss Decomposition, Normalization, First, Second and Third Normal Forms, Boyce-Codd Normal Form

**Unit 5 : Overview of MySQL ..... 12 Marks**

MySQL, Features of MySQL, Database Objects - Database, Table, View, Index, Alias; MySQL Object Naming, Keywords, User-defined Variables, Data Types - Numeric, Date and Time, String Types; Operators: Arithmetic, Logical, Relational, String; MySQL System Schema, MySQL Database Users and Roles, Database Privileges, Access Control and Account Management, MySQL Server and MySQL Client

**Unit 6 : Structure Query Language using MySQL ..... 12 Marks**

SQL, DDL Statements : CREATE, DROP, ALTER, RENAME; DML Statements: INSERT, UPDATE , DELETE, SELECT; SELECT Clauses - FROM, WHERE, ORDER BY, GROUP BY, HAVING; Join Operations - Inner, Left, Right and Outer Joins; Subqueries, Set Operations - Union, Intersect, Minus; GRANT and REVOKE Privileges; Transaction Statements - COMMIT, ROLLBACK, SAVEPOINT; Prepared Statements, SQL Functions - ABS, ROUND, FLOOR, CEIL, SQRT, POWER, TRUNCATE, LOG, NOW, DATE, TIME, CURDATE, CURTIME, DAY, MONTH, YEAR, DATEDIFF, DATE\_SUB, DATE\_ADD, DATE\_FORMAT, CONCAT, LENGTH, UPPER, LOWER, LEFT, RIGHT, LTRIM, RTRIM, MAX, MIN, SUM, AVG, COUNT, CAST, STR\_TO\_DATE

**Reference Books and Web Resources**

1. Fundamentals of Database Systems by Elmasri Ramez & Navathe Shamkant, Pearson Education
2. An Introduction to Database Systems by C.J. Date, Pearson Education
3. Database System Concepts by Abraham Silberschatz & Henry F. Korth, McGraw Hill Education

4. Murach's MySQL by Joel Murach, Mike Murach & Associates Inc.
5. MySQL online documentation at <https://dev.mysql.com/doc/>
6. MySQL tutorials at <https://www.w3schools.com/mysql>

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Introduction to Database Systems	8 Hrs	9
Unit 2 : Database System Concepts and Architecture	12 Hrs	9
Unit 3 : Relational and E-R Models	10 Hrs	12
Unit 4 : Database Dependencies and Normalization	10 Hrs	6
Unit 5 : Overview of MySQL	12 Hrs	12
Unit 6 : Structure Query Language using MySQL	12 Hrs	12
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>ITPC208</b>
Course Title	:	<b>Database Management Systems Lab</b> <i>(Common to IT, CO and CO&amp;IOT)</i>
Number of Credits (Teaching Load)	:	2 (L : 0, T : 0, P : 4)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Outcomes

After completing this course the students will be able to practically demonstrate the following experiments related to database management.

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To install and configure MySQL database server on Windows or Linux machines.
2.	To create database tables having columns with different data types, widths and precisions.
3.	To alter existing database tables to add new columns, delete existing columns and change column names, data types and widths.
4.	To apply integrity constraints - PRIMARY KEY, NOT NULL, UNIQUE, CHECK, FOREIGN KEY, to the database tables.
5.	To insert data in a table having columns of different data types (INSERT statement).
6.	To view the data stored in different tables using the SELECT statement. Apply WHERE, HAVING, ORDER BY and GROUP BY clauses with SELECT.
7.	To demonstrate join operation on tables using left, right and inner join.
8.	To demonstrate at least 10 SQL row functions in queries.
9.	To demonstrate SUM, MAX, MIN, COUNT aggregate functions and also demonstrate the use of HAVING and GROUP BY clauses in SELECT statement.
10.	Case Study : Student Database – The case study project must identify various entities related to the students in a typical academic institution, draw E-R diagrams, Apply Database Normalization, Create Tables, Apply Database Constraints, Insert data, Delete Data and Query the Database etc.

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Course Code	:	<b>IoTPC202</b>
Course Title	:	<b>Microprocessors and Microcontrollers</b>
Number of Credits (Teaching Load)	:	2 (L: 2, DCS: 1, P: 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### Course Learning Objectives

The objective of the course is to impart knowledge on:

1. The architecture of 8085, 8086, ARM and 8051
2. The addressing modes & instruction set of 8085,8086, ARM and 8051
3. The need and use of Interrupt structure
4. Simple programs and commonly used peripheral/ interfacing ICs.

### Course Outcomes

After completion of the course the students are expected to be able to:

- CO-1. Understand block diagram, interrupt structure of 8086 and other processors.
- CO-2. Interface ICs like 8255 PPI, 8279 Display and Keyboard Interface, Programmable Interrupt controller and DAM Controller
- CO-3. Understand memory organization and interrupt structure in 8051.
- CO-4. Understand Block diagram and Thumb Instruction set of the ARM processor.

### Course Content

#### **Unit 1 : 8085 Microprocessor** ..... **20% Marks**

8085 Microprocessor, Architecture, Addressing Modes, Instruction Set, Interrupts and Simple programs: String Operations, Manipulations, Sorting of Array. Numeric Data Processor 8087 and I/O Processors 8089- Architecture.

#### **Unit 2 : x86 Microprocessors** ..... **20% Marks**

Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386, real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386. The coprocessor 80387

#### **Unit 3 : 8051 Microcontroller** ..... **20% Marks**

Features of Microcontroller, Internal Block Diagram of 8051, Memory organization, Timer and Counters, I/O ports, Interrupt Structure



**Unit 4 : 8051 Interfacing** ..... **20% Marks**

Addressing modes of 8051, Instruction set of 8051, Counter and Timer Programming in 8051, Serial Communication, Interrupt Programming, Keyboard and Display Devices Interfacing, Sensor Interfacing, Stepper Motor

**Unit 5 : ARM Processor** ..... **20% Marks**

ARM Processor Fundamentals, ARM Instruction Set, THUMB Instruction Set, Exception and Interrupt Handling, Writing and Optimizing ARM Assembly Code. Pentium Processor Architecture and Functional Description, RISC Processor, RISC Addressing Modes

**Reference Books**

1. Microprocessor 8086: Architecture, Programming and Interfacing by S. Mathur
2. Microprocessors and Microcontrollers Architecture, Programming and System Design 8085,8086, 8051, 8096 by Krishna Kant
3. The Intel Microprocessors, Architecture, Programming and Interfacing by Barry B. Brey
4. Advanced Microprocessor and Peripherals by I. K. Bhurchandi and A.K.Ray
5. Microcontrollers: Principles and Applications by Ajit Pal

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : 8085 Microprocessor	10 Hrs	12
Unit 2 : x86 Microprocessors	8 Hrs	12
Unit 3 : 8051 Microcontroller	10 Hrs	12
Unit 4 : 8051 Interfacing	10 Hrs	12
Unit 5 : ARM Processor	10 Hrs	12
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPC204</b>
Course Title	:	<b>Microprocessor and Microcontroller Lab</b>
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To implement following operations on 8085 microprocessor: <ul style="list-style-type: none"> <li>● 2's compliment of 8-bit number.</li> <li>● 2's compliment of 16-bit number.</li> <li>● Addition of two 16-bit numbers.</li> </ul>
2.	To write an assembly language program to shift a block of data from one memory location to another.
3.	To interface an ADC chip with a microprocessor kit and verify its operation.
4.	To interface an ADC chip with a microprocessor kit and verify its operation.
5.	To write a program to add two BCD numbers.
6.	To write a program to perform the subtraction of two numbers.
7.	To write a program to initiate 8251 and to check the transmission and reception of character.
8.	To write a program using 8051 to split a byte into two nibbles and show results.
9.	To design a circuit to interface LCD with microcontroller.

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Course Code	:	<b>IoTPC206</b>
Course Title	:	<b>Software Engineering</b>
Number of Credits (Teaching Load)	:	3 (L:3; DCS:1; P: 0)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### **Course Learning Objectives**

Software engineering is a detailed study of engineering to the design, development and maintenance of software. Software engineering was introduced to address the issues of low-quality software projects. Problems arise when a software generally exceeds timelines, budgets, and reduced levels of quality. It ensures that the application is built consistently, correctly, on time and on budget and within requirements. The demand of software engineering also emerged to cater to the immense rate of change in user requirements and environment on which application is supposed to be working. After undergoing this course, the students will have a thorough understanding of the software processes and will be able to handle a small-scale software development project.

### **Course Outcomes**

After completing this course the students will be able to :

- CO-1. Understand the basic terminology associated with software engineering.
- CO-2. Explain various software life-cycle processes.
- CO-3. Understand software project management principles and best practices.
- CO-4. Understand the software testing and quality assurance.

### **Course Content**

#### **Unit 1 : Introduction to Software Engineering ..... 9 Marks**

Software Definition, Software Characteristics, Software Crisis, Attributes of Good Software, Program Versus Product, Exploratory Style of Software Development, Shortcomings, Software Engineering, Software Development Life Cycle, Software Process Framework, Framework Activities - Communication, Planning, Modeling, Construction, and Deployment; Software Application Domains - System Software, Application Software, Scientific/ Engineering Software, Embedded Software, Web Applications

**Unit 2 : Software Life Cycle Models ..... 12 Marks**

Classical Models - Waterfall Model, Iterative Waterfall Model, V-Model, Prototyping Model, Incremental Model, Evolutionary Model; Rapid Application Development (RAD), Agile Development Models - Extreme Programming, Scrum, Lean; Spiral Model

**Unit 3 : Software Project Management ..... 12 Marks**

Software Project Manager - Skills and Responsibilities; Project Planning - Sliding Window Planning, SPMP Project Planning; Project Size Estimation - Lines of Code, Function Point, Project Estimation Techniques - Empirical, Heuristic and Analytical Estimation Techniques; Expert Judgment, COCOMO, COCOMO 2, Project Scheduling - PERT and Gantt Charts; Staffing, Risk Management, Software Configuration Management

**Unit 4 : Requirement Analysis and Specifications ..... 12 Marks**

Requirements Gathering, Requirement Elicitation Techniques: Interviews, Surveys, Questionnaires, Brainstorming; Requirements Analysis, Software Requirements Specification (SRS) - Role of SRS, Characteristics of SRS Document, Functional and Non-functional Requirements, Traceability

**Unit 5 : Software Design ..... 9 Marks**

Overview of the Design Process, Outcome of the Design Process, Abstraction, Design Pattern, Refactoring, Classification of Design Methodologies, Cohesion and Coupling, Software Design Approaches - Function-oriented, Object-oriented; User Interface Design, User Experience

**Unit 6 : Coding and Testing ..... 9 Marks**

Software Coding, Coding Standards, Code Review - Code Walkthrough, Code Inspection, Software Documentation, Internal and External Documentation, Software Testing : Testing activities, Unit, Integration, System and Acceptance Testing, Black Box and White Box Testing

**Reference Books**

1. Fundamentals of Software Engineering , By Rajib Mall, PHI.
2. Software Engineering by Pankaj Jalote, Narosa, Publication.
3. Software Engineering, Schaum's Outline Series, TMH Publication.
4. Software Engineering : A Practitioner's Approach, By Roger Pressman.
5. NPTEL course on Software Engineering.(www.nptel.ac.in)

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Introduction to Software Engineering	8 Hrs	9
Unit 2 : Software Life Cycle Model	8 Hrs	12
Unit 3 : Software Project Management	8 Hrs	12
Unit 4 : Requirement Analysis and Specifications	8 Hrs	9
Unit 5 : Software Design	8 Hrs	9
Unit 6 : Coding and Testing	8 Hrs	9
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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# **IoTPE202/ IoTPE204**

## **Program Elective-I**

Course Code	:	<b>IoTPE202-I</b>
Course Title	:	<b>Web Programming</b>
Number of Credits (Teaching Load)	:	2 (L : 2, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PE (Program Elective)

### Course Learning Objectives

Dynamic websites are powered by some server-side scripting language and a database. PHP has emerged as the most popular server-side scripting language due to its simplicity. MySQL is a popular open-source DBMS known for its wide acceptance. PHP and MySQL together form the most popular combination for dynamic website backend. This course is designed to cover the most essential aspects of dynamic websites using PHP and MySQL. After completing this course, the students will be fully conversant with the web programming terminology and will be able to develop simple websites running on LAMP stack.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Analyze the basic structure of a web application.
- CO-2. Distinguish between static and dynamic websites.
- CO-3. Understand the components of the LAMP stack.
- CO-4. Develop dynamic websites using LAMP stack.

### Course Content

#### **Unit 1 : Dynamic Websites** ..... **12 Marks**

Review of HTML5, CSS and JavaScript; HTTP, HTTP Request, HTTP Response, Working of a Web Server, Static Websites, Dynamic Websites, Web Applications, Form Data Submission Methods - GET and POST, HTTP Sessions, HTTP Cookies.

#### **Unit 2 : Introduction to PHP** ..... **12 Marks**

Origin of PHP, Advantages of PHP, Embedding PHP Code in Web Pages, LAMP Stack, Install and Configure PHP Environment, PHP Syntax, Comments, Variables, Naming Variables, Variable Scope, Constants, echo statement, PHP Data Types, String Literals - Single and Double Quoted Strings, PHP Operators, PHP Control Statements, PHP Arrays

**Unit 3 : PHP Functions .....** **12 Marks**

PHP Standard Library Functions: String Functions - htmlspecialchars(), ltrim(), rtrim(), trim(), strtoupper(), strtolower(), explode(), implode(), strlen(), strcmp(), strpos(); Math Functions – sqrt(), ceil(), floor(), log(), pow(), sin(), cos(), tan();  
User-defined Functions

**Unit 4 : PHP Form Processing .....** **12 Marks**

HTML Form Element, action and method Attributes, submit and clear Buttons, Form Elements, name and id attributes, Hidden Input, Client-side Form Validation, PHP Superglobals - \$GLOBALS, \$\_SERVER, \$\_REQUEST, \$\_POST, \$\_GET, \$\_FILES, \$\_ENV, \$\_COOKIE, \$\_SESSION; Server-side Validation, Handling Uploaded Files

**Unit 5 : Using MySQL Database with PHP .....** **12 Marks**

Basic Database Concepts - Database, Table, Column, keys & Constraints, Connecting PHP to MySQL, Executing Simple SQL Statements -INSERT, UPDATE, DELETE and SELECT, Retrieving and Processing Query Results, mysqli\_real\_escape\_string() function, Handling MySQL Errors

**Reference Books**

1. PHP & MySQL by Joel Murach and Ray Harris, Mike Murach & Asso. Inc.
2. PHP and MySQL Web Development by Luke Welling and Laura Thomson, Addison-Wesley Books
3. Learning PHP, MySQL & JavaScript by Robin Nixon, O'Reilly Media.
4. PHP and MySQL for Dynamic Web Sites by Larry Ullman, Peachpit Press

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Dynamic Websites	08 Hrs	12
Unit 2 : Introduction to PHP	10 Hrs	12
Unit 3 : PHP Function	08 Hrs	12
Unit 4 : PHP Form Processing	10 Hrs	12
Unit 5 : Using MySQL Database with PHP	12 Hrs	12
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPE204-I</b>
Course Title	:	<b>Web Programming Lab</b>
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	To be offered with IoTPE202-I only
Course Category	:	PE (Program Elective)

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To setup PHP development environment: <ul style="list-style-type: none"> <li>● To Install and Configure PHP Environment (LAMP/XAMP server) on Windows/Linux machine.</li> <li>● To embed PHP code into a web page</li> </ul>
2.	To implement basics of PHP: <ul style="list-style-type: none"> <li>● To demonstrate the use of php operators</li> <li>● To demonstrate the use of php control statements.</li> <li>● To demonstrate the use of php in-built functions.</li> <li>● To demonstrate the use of php user defined functions.</li> </ul>
3.	To Implement various superglobals in PHP <ul style="list-style-type: none"> <li>● Uploading files using php.</li> <li>● Handling multiple php files.</li> <li>● Handling date and time using PHP.</li> </ul>
4.	To implement session and cookie management in PHP.
5.	To demonstrate database access through PHP.
6.	Implement a CRUD project in PHP.

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Course Code	:	<b>IoTPE202-II</b>
Course Title	:	<b>OOP using C++</b>
Number of Credits (Teaching Load)	:	2 (T : 2, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PE (Program Elective)

### Course Learning Objectives

Object Oriented Programming (OOP) provides a more realistic programming model of real-world problems. Nearly all the modern day programming languages are either object-oriented or support object-oriented programming paradigm. The objective of this course is to introduce the concepts of OOP paradigm to the students using C++.

### Course Outcomes

After completing this course the students will be able to :

CO-1. Appreciate the object-oriented programming paradigm.

CO-2. Understand and implement essential characteristics of OOP.

CO-3. Understand the syntax of C++ programming language.

CO-4. Write programs about basic problems in C++.

### Course Content

#### Unit 1 : Object Oriented Programmings ..... 12 Marks

Procedural Programming, Limitations of Procedural Programming, Structured Programming, Object Oriented Programming (OOP), Advantages of OOP Paradigm, Essential Characteristics of OOP - Abstraction, Encapsulation, Inheritance and Polymorphism; Class and Object

#### Unit 2 : C++ Programming Language ..... 12 Marks

Structure of a C++ Program, Data Types, Declaration of Variables, Expressions, Operators, Operator Precedence, Type Conversions, Input and Output Statements, Flow Control Statements, Jump Statements, Arrays, Functions, Pointers, Preprocessor Directives

#### Unit 3 : Classes and Objects in C++ ..... 12 Marks

Class - Declaring Class, Class Members, Access Modifiers, Constructors, Destructors, Static Members, Member Functions, Inline Functions, Constant Member Functions, Friend Functions and Friend Classes, Scope Resolution Operator; Object - Declaring

Objects, Accessing Members, Dynamic Objects

**Unit 4 : Polymorphism and Inheritance** ..... **12 Marks**

Function Overloading, Constructor Overloading, Operator Overloading - Using Member Function and Friend Function, Copy Constructor, Inheritance, Multiple Inheritance, Virtual Functions, Abstract Classes, Function Overriding

**Unit 5 : Input-Output and Manipulators** ..... **12 Marks**

C++ Stream Classes, Unformatted and Formatted Input/Output, Manipulators, File Streams, Opening and Closing a File, File Opening Modes, Checking End of File, Reading and Writing in a File, Random Access in File, Error Handling

**Reference Books**

1. Mastering C++ by KR Venugopal, Tata McGraw Hill Publication
2. Object Oriented Programming in C++ by E. Balaguruswamy, TMH Publishing
3. C++ by Robert Lafore, Galgotia Publications Pvt. Ltd.
4. Object Oriented Programming and C++ by R Rajaram; New Age Publishers

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Object Oriented Programmings	08 Hrs	12
Unit 2 : C++ Programming Language	10 Hrs	12
Unit 3 : Classes and Objects in C++	10 Hrs	12
Unit 4 : Polymorphism and Inheritance	10 Hrs	12
Unit 5 : Input-Output and Manipulators	10 Hrs	12
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPE204-II</b>
Course Title	:	<b>OOP using C++ Lab</b>
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	To be offered with IoTPE202-II only
Course Category	:	PE (Program Elective)

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To setup C++ development environment in Windows/ Linux.
2.	To write a program in C++ to demonstrate formatted input/ output and manipulators.
3.	To write a program in C++ to declare a class, demonstrate access specifiers and create objects.
4.	To write a program in C++ to demonstrate inline and friend functions.
5.	To write a program in C++ to demonstrate single and multiple inheritance.
6.	To write a program in C++ to demonstrate function overloading and function overriding.
7.	To write a program in C++ to demonstrate virtual functions and abstract base classes.
8.	To write a program in C++ to demonstrate operator overloading.
9.	To write a program in C++ to demonstrate file input/ output.

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Course Code	:	<b>IoTPE202-III</b>
Course Title	:	<b>OOP using Java</b>
Number of Credits (Teaching Load)	:	2 (T : 2, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PE (Program Elective)

### Course Learning Objectives

Object Oriented Programming (OOP) provides a more realistic programming model of real-world problems. Nearly all the modern day programming languages are either object-oriented or support object-oriented programming paradigm. Java is arguably the most popular OOP language used in a variety of applications. The objective of this course is to introduce the concepts of OOP paradigm to the students using Java.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Appreciate the object-oriented programming paradigm.
- CO-2. Understand and implement essential characteristics of OOP.
- CO-3. Understand the syntax of Java programming language.
- CO-4. Write programs about basic problems in Java.

### Course Content

#### **Unit 1 : Object Oriented Programming ..... 12 Marks**

Procedural Programming, Limitations of Procedural Programming, Structured Programming, Object Oriented Programming (OOP), Advantages of OOP Paradigm, Essential Characteristics of OOP - Abstraction, Encapsulation, Inheritance and Polymorphism; Class and Object, Brief History of Java, Features of Java, Java Programming Terminology - JVM, JRE, JDK, Java Compiler, Java Interpreter, Source Code, Bytecode, Coding Conventions

#### **Unit 2 : Java Programming Language ..... 12 Marks**

Structure of a Java Program, Comments - Single-line, Multi-line and Documentation; Role of main() Method, Java Tokens - Identifiers, Operators, Keywords, Constants, Strings, Special Symbols; Java Statements, Variables - Local, Instance and Static; Scope and Lifetime of Variables, Data Types, Literals, Console based I/O using System.in and System.out, Operators - Arithmetic, Logical, Relational, Bit-wise,

Assignment and Conditional Operators, Special Operators, Operator Precedence and Associativity

**Unit 3 : Control Statements** ..... **12 Marks**

Selection Control Structures - if, if...else, if...else if ladder, Nested if, switch...case;  
Looping Control Structures - while, do...while, for, for each; Jump Statements - break, labeled break, continue, return

**Unit 4 : Object-oriented Programming in Java** ..... **12 Marks**

Basic OOP Concepts - Class, Instance Variables, Methods, Object, Constructor; Creating Objects, Static Members, Final Variables and Methods, Final Classes, Garbage Collection, Finalizer Method, Packages, Access Modifiers, Wrapper Classes, Compile time versus Runtime Polymorphism, Method Overloading, Inheritance, Method Overriding, Abstract Methods, Abstract Class, Multiple Inheritance using Interfaces

**Unit 5 : Arrays, Strings and Exception Handling** ..... **12 Marks**

Array Definition, One Dimensional Array, Multidimensional Arrays, String, String Literals, Escape Sequences, String Methods - charAt(), indexOf(), length(), substring(), toLowerCase(), toUpperCase(), replace(), trim(); Exceptions, Checked and Unchecked Exceptions, Built-in Exceptions, Exception Handling - try, catch and finally Blocks, Multiple catch Statements, User-defined Exceptions, throw Statement

**Reference Books**

1. Programming with Java: A Primer by E. Balaguruswamy, TMH Publication
2. Java, How to Program by Paul Deitel, Harvey Deitel, Pearson Education
3. Java, the Complete Reference by Herbert Schildt, McGraw-Hill Education

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Object Oriented Programmings	08 Hrs	12
Unit 2 : Java Programming Language	10 Hrs	12
Unit 3 : Control Statement	10 Hrs	12
Unit 4 : Object-oriented Programming in Java	10 Hrs	12
Unit 5 : Arrays, Strings and Exception Handling	10 Hrs	12
<b>TOTAL</b>	<b>48 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPE204-III</b>
Course Title	:	<b>OOP using Java Lab</b>
Number of Credits (Teaching Load)	:	1 (L : 0, T : 0, P : 2)
Prerequisites	:	To be offered with IoTPE204-III only
Course Category	:	PE (Program Elective)

### List of Laboratory Experiments

S.No.	Experiment Objective
1.	To install and configure JDK on a Windows/ Linux based computer system.
2.	To use System.in and System.out for basic console input and output.
3.	To demonstrate various operators in Java.
4.	To demonstrate the use of different control statements: (a) To display the grades of a student based on the marks obtained using 'if...else if' ladder. (b) To compute the factorial of a given number using while loop. (c) To implement a menu-driven calculator using do...while and switch...case statements. (d) To determine the largest element in a 1-dimensional array using 'for each' loop. (e) To compute the sum of two matrices using nested for loops.
5.	To use arrays and demonstrate various array methods in a Java program.
6.	To use strings and demonstrate various string methods in a Java program.
7.	To practice classes and objects: (a) To define a class and create its objects. (b) To add constructor and finalizer methods in a class. (c) To demonstrate access modifiers. (d) To demonstrate method overloading.
8.	To demonstrate inheritance: (a) To create a hierarchy of classes using inheritance. (b) To demonstrate multiple inheritance using interfaces. (c) To demonstrate method overriding.

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# **IoTPE206**

## **Program Elective-II**



Course Code	:	<b>IoTPE206-I</b>
Course Title	:	<b>Cloud Computing</b>
Number of Credits (Teaching Load)	:	3 (L:3; DCS:1; P: 0)
Prerequisites	:	-
Course Category	:	PE (Program Elective)

### **Course Learning Objectives**

Cloud computing is one of the disrupting technologies for the coming decade. The pay-per-use model for on-demand provisioning of computing resources liberates the organizations from hassles of procuring, operating and maintaining IT infrastructure in addition to the cost saving. This course is designed to provide an insight to the students into the basics of Cloud Computing and its enabling technologies.

### **Course Outcomes**

After completing this course the students will be able to :

CO-1. Understand the concepts of cloud computing and its enabling technologies.

CO-2. Explain various service and deployment models of cloud computing.

CO-3. Understand commercial cloud computing services like EC2, S3, DynamoDB.

CO-4. Understand the concepts of SLA.

### **Course Content**

#### **Unit 1 : Introduction to Cloud Computing ..... 12 Marks**

Evolution of cloud computing; The NIST definition of cloud computing; Essential Characteristics: On-demand Self-service, Broad Network Access, Resource Pooling, Rapid Elasticity, Measured Service; Advantages, Disadvantages and Applications of Cloud Computing; Challenges in Cloud Computing

#### **Unit 2 : Service models and Deployment Models ..... 12 Marks**

Service Models: Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Characteristics, Benefits, Applications and Vendors for SaaS, Paas, and IaaS; Deployment Models: Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud; Advantages and Disadvantages of Private Cloud, Community Cloud, Public Cloud, Hybrid Cloud

#### **Unit 3 : Virtualization ..... 12 Marks**

Virtualization, Advantages and Disadvantages of Virtualization; Types of

Virtualization: Full Virtualization, Para-virtualization, OS-level Virtualization; Pitfalls of Virtualization, Type I and Type II Hypervisors; Virtual Machine Life Cycle

**Unit 4 : Amazon EC2, S3 and DynamoDB ..... 12 Marks**

Amazon EC2: Features, Benefits, and Applications; Amazon S3: Features, Storage Classes; Overview of Amazon DynamoDB

**Unit 5 : Migration, Scheduling and SLA ..... 12 Marks**

Migrating into the Cloud, Challenges in Cloud Migration, Cloud Resource Management and Scheduling, Scheduling: Static Scheduling - Min-Min, Max-Min, and Suffrage Algorithm; Service Level Agreement: Need & Types of SLA, Life Cycle of SLA

### Reference Books

1. Cloud Computing : Principles and Paradigms by Rajkumar Buyya, Wiley Inc.
2. Cloud Computing: A Hands-On Approach by Arshdeep Bahga, Univ. Press
3. Cloud Computing : Theory and Practice by Dan C. Marinescu, Elsevier
4. Enterprise Cloud Computing - Technology, Architecture, Application by Gautam Shroff, Cambridge University Press

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Introduction to Cloud Computing	10 Hrs	12
Unit 2 : Service models and Deployment Models	12 Hrs	12
Unit 3 : Virtualization	14 Hrs	12
Unit 4 : Amazon EC2, S3 and DynamoDB	14 Hrs	12
Unit 5 : Migration, Scheduling and SLA	14 Hrs	12
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>IoTPE206-II</b>
Course Title	:	<b>Digital Marketing Techniques</b>
Number of Credits (Teaching Load)	:	3 (L : 3, DCS : 1, P : 0)
Prerequisites	:	-
Course Category	:	PE (Program Elective)

### **Course Learning Objectives**

Digital marketing has an unparalleled influence on people's interactions, work, purchases and life habits especially on the millennials and generation Z. Modern companies utilize the digital universe to maximize their brand awareness and impact. This course is designed to make students aware about the founding concepts of digital marketing. After completion of this course, the students will have a sound understanding about the application of digital marketing in reaching out to the potential customers and boosting brand value of the company.

### **Course Outcomes**

After completing this course the students will be able to :

- CO-1. Understand the basic concepts and terminology of digital marketing.
- CO-2. Appreciate the new processes and practices in modern marketing.
- CO-3. Enumerate various tools for digital marketing.
- CO-4. Select appropriate modes for digital marketing for a given product.

### **Course Content**

#### **Unit 1 : Introduction to Digital Marketing ..... 12 Marks**

Traditional Marketing, Traditional Marketing Methods, Marketing Funnel Stages, 4Ps of Marketing, Internet and World Wide Web, Digital Marketing - Evolution, Definition, Factors Behind the Rise of Digital Marketing, Online Consumers, Advantages over Traditional Marketing, Applications and Benefits; Pull and Push Digital Marketing, B2B and B2C Marketing

#### **Unit 2 : Customer Relationship Management ..... 6 Marks**

Consumer vs. Customer, Types of Customers, Customer Orientations, Customer Life Cycle, CRM, CRM Components, Objectives of CRM, Types of CRM - Operational, Analytical, Collaborative; Tools for Customer Acquisition, Strategies for Customer Retention

**Unit 3 : Principles of Digital Marketing** ..... **18 Marks**

ASCOR Digital Marketing Framework, Setting Digital Marketing Objectives, Digital Marketing Strategy, Digital Marketing Campaign, Digital Marketing Channels - Search Engine Marketing, Social Media Marketing, Influencer Marketing, Affiliate Marketing, Display Advertising - Contextual, Behavioral, Targeted; Content Marketing & Blogging, Pay-per-click (PPC), Web Analytics, Lead Generation, Marketing Offers, Email Marketing, Video Marketing, Google Analytics, CRO

**Unit 4 : Important Digital Marketing Tools** ..... **12 Marks**

Overview of Google Analytics, Google Keyword Planner, Google Trends, Google Webmaster Tools, Google Alerts, Google Ads, Google Calendar

**Unit 5 : Social Media Marketing** ..... **12 Marks**

Popular Social Media Networks, Overview of Facebook, Twitter, Instagram, Youtube, LinkedIn, WhatsApp; Social Media Marketing Strategy, Social Media Lead Generation, Influencer Marketing, Paid Social Media, Effective Images and Videos for Social Media, Chatbots and Automation

**Reference Books & Online Resources**

1. Fundamentals of Digital Marketing by Puneet Bhatia, Pearson Education
2. Social Media & Mobile Marketing by Puneet Bhatia, Wiley Publishers
3. Digital Marketing by Dave Chaffey, Pearson Education
4. CRM For Dummies by Lars Helgeson, For Dummies Series
5. Online tutorials for various tools by Google

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Introduction to Digital Marketing	14 Hrs	12
Unit 2 : Customer Relationship Management	10 Hrs	6
Unit 3 : Principles of Digital Marketing	14 Hrs	18
Unit 4 : Important Digital Marketing Tools	14 Hrs	12
Unit 5 : Social Media Marketing	12 Hrs	12
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	: <b>ITPE202-I</b>
Course Title	: <b>Information Security</b> (Common to IT, CO and CO&IOT)
Number of Credits (Teaching Load)	: 3 (L : 3, DCS : 1, P : 0)
Prerequisites	: -
Course Category	: PE (Program Elective)

### Course Learning Objectives

Information security is crucial than ever before to all organizations to protect their information and IT resources. Securing IT assets is becoming more and more challenging due to a paradigm shift towards cloud computing and the need for ubiquitous access to IT resources. This course is meant to sensitize the students about the importance of information security and various techniques for safeguarding the vital information resources.

### Course Outcomes

After completing this course the students will be able to :

- CO-1. Understand the fundamental terminology related to information security.
- CO-2. Develop understanding of various security threats to information systems.
- CO-3. Apply the information security principles/ tools to prevent common attacks.
- CO-4. Understand various information security laws, acts and standards.

### Course Content

#### Unit 1 : Introduction ..... 6 Marks

Information Security, Cybersecurity, Need for Cybersecurity, Aspects of Information Security (PAIN), Malware - Worm, Virus, Trojan Horse, Bots & Botnets, Ransomware, Spyware, Keylogger, Spamming and Phishing; Security Features of Operating Systems - Authentication, Logs, Audit Features, File System Protection, User Privileges, RAID Options, Anti-Virus Software, OS Security Patches

#### Unit 2 : Basics of Cryptography ..... 9 Marks

Cryptography, Symmetric and Asymmetric Ciphers, Substitution Cipher, Caesar Cipher, Transposition Technique, Steganography, Stream and Block Ciphers (Introduction Only), Public Key Cryptography

#### Unit 3 : Cybersecurity Framework ..... 9 Marks

NIST Definition of Computer Security, CIA Triad, NIST Framework for

Cybersecurity, Cybersecurity Framework Components, Framework Core - Functions, Categories, and Subcategories; Framework Implementation Tier

**Unit 4 : Information Security Architecture ..... 12 Marks**

OSI Security Architecture, Definitions of Security Attack, Security Mechanism, Security Service, Threat and Attack; Active and Passive Attacks, Security Services - Authentication, Access Control, Data Confidentiality, Data Integrity and Non-repudiation; Security Mechanisms - Encipherment, Digital Signature, Access Control, Data Integrity, Authentication Exchange, Traffic Padding, Routing Control and Notarization

**Unit 5 : Network and Internet Security ..... 12 Marks**

Network Classification : Trusted, Semi-trusted, Untrusted & Unknown Networks; Network Attacks Classification : Interruption, Interception, Modification & Fabrication; Network Attacks : Password Stealing, Packet Sniffers, IP Spoofing, Denial-of-Service (DoS), Man-in-Middle, Session Hijacking; Security Weaknesses in Networks, Network Access Control, IEEE 802.1x, VLAN, Firewall, Extensible Authentication Protocol, Network Security Protocols - TLS, SSL, HTTPS, IPSec and SSH, Ingress Filtering, VPN, Firewalls, Internet Security Threats : Privacy Breach, DNS Spoofing, Email Spam, Cross-site Scripting (XSS); Web Browser Security Settings : Cookies, Website Certificates, Browsing History, Plugins, Parental Control, Form Autofill, CAPTCHA; Strong Passwords

**Unit 6 : Cyber Laws ..... 9 Marks**

Cyber Crime, Cyber Crime against Person, Property and Government, Major Provisions under Indian IT Act-2000 (Sections 65, 66, 67, 69); Intellectual Property Rights, Patent Law, Copyright Law, Digital Signatures

**Reference Books & Online Resources**

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws)
3. Cyber Security By Nina Godbole, Wiley
4. Information Security: The Complete Reference By Mark Rhodes, McGraw-Hill
5. Cryptography and Network Security : Principles and Practice by William Stallings, Pearson Education

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Introduction	10 Hrs	9
Unit 2 : Basics of Cryptography	10 Hrs	9
Unit 3 : Cybersecurity Framework	10 Hrs	9
Unit 4 : Information Security Architecture	12 Hrs	12
Unit 5 : Network and Internet Security	14 Hrs	12
Unit 6 : Cyber Laws	08 Hrs	9
<b>TOTAL</b>	<b>64 Hrs</b>	<b>60</b>

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Course Code	:	<b>PR202</b>
Course Title	:	<b>Minor Project</b>
Number of Credits (Teaching Load)	:	2 (L : 0, T : 0, P : 4)
Prerequisites	:	-
Course Category	:	PC (Program Core)

### **Course Learning Objectives**

Main objective of a minor project is to provide the students with an opportunity to showcase their ability to develop a complete project by applying the principles of Software Engineering and the experience gained during their industrial training. Project work inculcates skills like problem-solving, creative thinking, time-management, planning, teamwork, leadership, presentation, report-writing, communication etc.

### **Course Outcomes**

After completing this course the students will be able to :

CO-1. Apply basic software engineering processes in developing a small project.

CO-2. Work in a team to solve a common problem.

CO-3. Present the work carried out in the project in front of reviewers.

CO-4. Write a project report.

### **Guidelines**

The students may be encouraged to choose a project from any of the following identified areas:

1. To build a basic desktop application with GUI, database support and report generation.
2. To develop web applications using popular frameworks like CodeIgnitor, Laravel, Magento, Django etc.
3. Undertake a hardware project using commercially available platforms (Arduino/ Raspberry Pi).
4. Undertake an IOT project with open source development boards and COTS sensors/ actuators.

The students should be encouraged to undertake projects to solve some real-world problems like library management, hostel management, student record maintenance,



institute management system, employee leave record system, payroll system, timetable preparation etc. The preference should be given to such minor projects which could be continued as major projects during 5<sup>th</sup> semester. The list of project areas given above are tentative only, the students are free to select any project of their choice based on technologies relevant to their diploma stream.

Note: The teachers must guide/ help students to identify their minor project work and chalk out their plan of action well in advance. As a minor project activity each student is supposed to study the project clearly and prepare a detailed project report of the observations/ processes/ activities observed by him/ her. The students should be guided by the respective subject teachers. The teachers will conduct performance/ assessment of the students on a continuous basis on the evaluation parameters.

<b>SUGGESTED DISTRIBUTION OF MARKS (Internal Assessment)</b>	
<b>Project Component</b>	<b>Marks Allotted (%)</b>
1. Synopsis and Project Title Selection	10%
2. Initiative in Performing Project Tasks	10%
3. Attendance and Punctuality	20%
4. Final Outcome as per Project Objectives	40%
5. Report Writing	20%

<b>SUGGESTED DISTRIBUTION OF MARKS (External Assessment)</b>	
<b>Project Component</b>	<b>Marks Allotted (%)</b>
1. Project Demonstration	40%
2. Project Presentation	20%
3. Project Report	20%
4. Viva	20%

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Course Code	:	<b>AU202</b>
Course Title	:	<b>Essence of Indian Knowledge &amp; Tradition</b>
Number of Credits (Teaching Load)	:	0 (L: 2, DCS:0; P:0)
Prerequisites	:	-
Course Category	:	AU (Audit Course)

### Course Learning Objectives

The objective of this course is to expose the students with the concepts of Indian traditional knowledge and to make them appreciate the importance of the roots of indigenous knowledge system.

### Course Outcomes

After completing this course the students will be able to:

- CO-1. Identify the concept of Indian Knowledge System (IKS).
- CO-2. Understand the need and importance of protecting traditional knowledge.
- CO-3. Compare the Indian traditional knowledge and modern science.
- CO-4. Understand the use of Yoga in stress management, mental health, mindfulness, healthy eating, weight loss and quality sleep.
- CO-5. Aware of the general knowledge of Himachal Pradesh.

### Course Content

#### Unit 1 :Indian Knowledge System (IKS) ..... 15 Marks

- Introduction and Function of Indian Knowledge System(IKS).
- The Basic Structure of Indian Knowledge System(IKS) (only Introduction)
  1. The 4 Vedas, Namly ऋग्वेद (Rigveda), यजुर्वेद (Yajurveda),सामवेद (Samaveda), अथर्ववेद (Atharvaveda).
  2. The 4 UpVedas, Namely आयुर्वेद (Ayurveda (health-care)), धनुर्वेद (Dhanurveda (archery)), गंधर्ववेद (Gandharva-veda (dance, music etc.)) and स्थापत्यवेद (Sthapatya Veda (architecture)).
  3. The 6 Vedagangs, namely Shiksha (शिक्षा), Kalpa (कल्प), Vykarana (व्याकरण), Chhandas छंदस्, Nirukta (निरुक्त), and Jyotisha( ज्योतिष).
  4. Itihasa (इतिहास) ( Ramayana रामायण and Mahabharata महाभारत ) and Purana पुराण (Vishnupurana (विष्णुपुराण) , Bhagavata Purana (भागवत पुराण) etc.)

5. Dharmashatra धर्मशास्त्र (Manusmriti मनुस्मृति, Yajnavalkya-smriti याज्ञवल्क्य स्मृति, etc.).
6. Darshan दर्शन (आस्तिक तथा नास्तिक).
7. Nyaya न्याय (Logic तर्कशास्त्र and Epistemology ज्ञानमीमांसा).

**Unit 2 : Modern Science** ..... **12 Marks**

- Modern science: Introduction, Characteristics, importance and Example
- Difference between modern Science and Indian knowledge system
- Role of IKS in modern science

**Unit 3 : Traditional Knowledge** ..... **9 Marks**

- Traditional knowledge: Definition, nature, characteristics, scope and importance
- Indigenous Knowledge (IK): characteristics
- Traditional knowledge vis-a-vis Indigenous knowledge
- Traditional knowledge Vs western knowledge
- The need for protecting traditional knowledge

**Unit 4 : Yoga and Holistic Health** ..... **15 Marks**

- Yoga: Meaning and Importance of Yoga
- Yoga and physical health, Yoga and psychological health, Yoga and intellectual health, Yoga and spiritual health, Yoga and social approach.
- Introduction to Ashtanga Yoga, Yogic Kriyas (Shat Karma)
- Pranayama and its types; Active lifestyle and stress management through Yoga
- Physical Fitness, Health and wellness: Meaning and Importance of Wellness,
- Components of Wellness, Health and physical Fitness;
- Traditional sports & Regional Games for promoting wellness;
- Leadership through Physical Activity and Sports; Introduction to First Aid.

**Unit 5 : Himachal Pradesh: A Basic Information** ..... **9 Marks**

- History, Culture, Heritage/ Tradition, Customs & Manners
- Regional Knowledge, Geographical Features, Constitutional History
- Tourism Place & Scope
- Festivals and Fairs

**Suggested Text/ Reference Books**

1. Cultural Heritage of India-Course Material by V. Sivaramakrishna Bharatiya, Vidya Bhavan, Mumbai, 5th Edition, 2014
2. Modern Physics and Vedant by Swami JitatanandBharatiya, VidyaBhavan

3. The wave of Life by Fritz of Capra
4. Tao of Physics Fritz of Capra
5. Tarkasangraha of Annam Bhatta, International by V N Jha, Chinmaya Foundation, Velliarnad, Ernakulam
6. Science of Consciousness Psychotherapy and Yoga Practices by RN Jha, Vidyanidhi Prakashan, Delhi, 2016
7. Himachal Pradesh History, Culture & Economy by Mian Goverdhan Singh & Prof. Dr. C.L. Gupta.

<b>SUGGESTED DISTRIBUTION OF MARKS</b>		
<b>Unit No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted</b>
Unit 1 : Indian Knowledge System (IKS)	8 Hrs	15
Unit 2 : Modern Science	6 Hrs	12
Unit 3 : Traditional Knowledge	5 Hrs	9
Unit 4 : Yoga and Holistic Health	8 Hrs	15
Unit 5 : Himachal Pradesh: A Basic Information	5 Hrs	9
<b>TOTAL</b>	<b>32 Hrs</b>	<b>60</b>

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Course Code	:	<b>SI-I</b>
Course Title	:	<b>Internship-I</b>
Number of Credits (Teaching Load)	:	2 (L: 0; T:0; P:0)
Prerequisites	:	-
Course Category	:	SI (Internship)

### **Guidelines**

An internship of 3-4 weeks after 3<sup>rd</sup> semester during vacations should be undertaken in an industry/ Govt. or Pvt. Certified Agencies which are in social sector/ Govt. Skill Centres/ Institutes/ Schemes. The assessment of internship will be carried out in 4<sup>th</sup> semester. The faculty members must visit the internship site during the course of internship to monitor the progress of the students.

### **Evaluation Criteria**

The internal assessment of internship is to be carried out by the industry/ organization where the students have undergone the internship. The internal assessment done by the industry/ organization may be rationalized by the Department, if needed. The external assessment is to be done at the institute. The department shall finalize external assessment within a month of the beginning of the 4<sup>th</sup> semester. The students have to prepare a daily diary of their internship period and the same has to be submitted at the institute after completion of the internship. The students have also to present the experience gained during internship in a seminar for the purpose of external evaluation.

(a) The assessment criteria (Internal Assessment) by the industry/ organization where the students have undergone the internship is as follows:

- Attendance and general behavior : 20%
- Daily diary maintenance : 20%
- Initiative and participative attitude during internship : 20%
- Performance in the assigned activities by the industrial supervisor : 40%

(b) The assessment criteria (External Assessment) by the institute is as follows:

- Seminar : 50%
- Viva : 50%

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Course Code	:	<b>SI-II</b>
Course Title	:	<b>Internship-II</b>
Number of Credits (Teaching Load)	:	3 (L: 0; T:0; P:0)
Prerequisites	:	-
Course Category	:	SI (Internship)

### **Guidelines**

An internship of six weeks during vacations after 4<sup>th</sup> semester is to be undertaken by the students in relevant industry. The objective of this mandatory internship is to expose the students to the real world of work and get experience with the latest tools, best practices, work & culture, etiquettes and ethics followed in modern industries. The assessment of internship will be carried out in the 5<sup>th</sup> semester. The faculty members must visit the internship site during the course of internship to monitor the progress of the students.

### **Course Outcomes**

After completing this course the students will be able to :

- CO-1. Get first hand experience of the culture and practices of real world of work
- CO-2. Appreciate time management, teamwork, adaptability and project management
- CO-3. Improve skills, confidence, competency in specific area of career interests
- CO-4. Able to earn a job reference for their behavior and performance in real projects

### **Evaluation Criteria**

The internal assessment of internship is to be carried out by the industry/ organization where the students have undergone the internship. The internal assessment done by the industry/ organization may be rationalized by the Department, if needed. The external assessment is to be done at the institute. The department shall finalize external assessment within a month of the beginning of the 5<sup>th</sup> semester. The students have to prepare a daily diary and report of their internship period and the same has to be submitted at the institute after completion of the internship. The students have also to present the experience gained during internship in a seminar for the purpose of external evaluation using a presentation.

- (a) The assessment criteria (Internal Assessment) by the industry/ organization where the students have undergone the internship is as follows:

- Attendance and general behavior : 20%

- Daily diary maintenance : 20%
- Initiative and participative attitude during internship : 20%
- Assessment of internship by the industrial supervisor : 40%

(b) The assessment criteria (External Assessment) by the institute is as follows:

- Presentation : 60%
- Report : 20%
- Viva : 20%

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