CURRICULUM

for

DIPLOMA PROGRAMME

in

INFORMATION TECHNOLOGY

2nd Year (3rd & 4th Semester)

FOR THE STATE OF HIMACHAL PRADESH

Prepared by
National Institute of Technical Teachers Training & Research,
Sector-26, Chandigarh-160019, India.

June, 2018

General Guidelines for Curriculum Implementation

1. Weightage for the internal assessment in respect of theory subjects will be as follow:
   - House Test: 40 %
   - Class Test: 20%
   - Home Assignment: 20%
   - Attendance: 20%
2. There will be two class tests in every semester and the average of the two tests will be taken into account.
3. The syllabus for the class tests will be as under:
   - Class Test-I: 30 % of syllabus
   - Class Test-II: next 30 % of syllabus
4. Class Test-I should be conducted in first week of March/September.
5. Class Test-II should be conducted in the second week of April/October.
6. The 30%, 60% and 80% contents of the syllabus will be based on the number of hours allocated for the topics in the detailed curriculum of each subject.
7. The question paper for both the class tests will be of 30 marks each and of one-hour duration.
8. Improvement test can be conducted after every class test on the basis of some genuine reason to be judged by the Head of concerned Department.
9. There will be one house test in the First week of May/November and syllabus converge will be 80%.
10. The house test will be of total 60 marks and the duration of House Test should be two hours.
11. There will be minimum two home assignments per subject per semester.
12. Weightage for the internal assessment in respect of Practical subjects should be: Practical Performance: 60% and Viva Voce : 40%
13. Weightage for Internal Assessment in respect of Drawing subjects will be as under:
    i. House Test and Class Test = 40%
    ii a) Class performance/Drawing Sheets=40%
    ii b) Attendance/punctuality = 10%
    ii c) Viva = 10%

    For iia), iib), iic) marks should be given in each drawing sheet by concerned teacher during evaluation.
14. It is suggested that students may be taken for industrial visits for industrial exposure in second year and third year.
15. **Student Centered Activities**: A provision has been made for organizing Student Centered Activities for overall personality development of students. SCA will comprise co-curricular activities like extension lectures, games, hobby clubs e.g. photography etc., seminars, declamation contests, educational field visits, cultural activities and participation in programs like technical and cultural events etc.

Distribution of marks for SCA will be as follows:

i. 20% marks shall be given for general behaviour
ii. 20% marks for attendance shall be based on the following distribution:

Attendance	Marks
Less than 65%	Nil
More than 65%	Proportionate

iii. 60% Marks shall be given for the Sports/NCC/Cultural and Co- curricular activities/other activities after due consideration to the following points:

1. For participation in sports/NCC/Cultural/ Co-curricular activities at National or above level, shall be rewarded with minimum of 40% marks
2. For participation in sports/NCC/Cultural/Co-curricular activities at Inter-polytechnic level, shall be rewarded with minimum of 30% marks
3. For participation in two or more of the listed activities, 20% extra marks should be rewarded

Note: These marks are to be sent to the H.P. Takniki Shiksha Board, Dharamsala at the end of semester along with internal assessment.

STUDY AND EVALUATION SCHEME

THIRD SEMESTER INFORMATION TECHNOLOGY

Sr. No.	Name of the Subject	Th	Pr	Internal Assessment			External Assessment					Total Marks
				Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
3.1	*Internet Technologies	3	4	30	20	50	100	3	50	3	150	200
3.2	*Operating Systems	4	4	30	20	50	100	3	50	3	150	200
3.3	Python Programming	4	4	30	20	50	100	3	50	3	150	200
3.4	Multimedia Technologies	4	4	30	20	50	100	3	50	3	150	200
3.5	*Data Communication & Computer Networks	4	2	30	20	50	100	3	50	3	150	200
	#Student Centred Activities	-	3	-	25	25	-	-	-	-	-	25
		19	**21**	**150**	**125**	**275**	**500**	**-**	**250**	**-**	**750**	**1025**

*Common with Diploma in Computer Engineering

STUDY AND EVALUATION SCHEME
FOURTH SEMESTER INFORMATION TECHNOLOGY

Sr. No.	Name of the Subject	Th	Pr	Internal Assessment			External Assessment					Total Marks
				Th	Pr	Total	Th	Hrs	Pr	Hrs	Total	
4.1	*Web Programming	4	4	30	20	50	100	3	50	3	150	200
4.2	*Relational Database Management System	4	4	30	20	50	100	3	50	3	150	200
4.3	Object Oriented Programming using Java	4	4	30	20	50	100	3	50	3	150	200
4.4	Digital Marketing	4	4	30	20	50	100	3	50	3	150	200
4.5	*Software Engineering	4	-	50	-	50	100	3	-	-	100	150
	#Student Centred Activities	-	4	-	25	25	-	-	-	-	-	25
		20	**20**	**170**	**105**	**275**	**500**	**-**	**200**	**-**	**700**	**975**

*Common with Diploma in Computer Engineering

Industrial Training - After examination of 4th Semester, the students shall go for training in a relevant industry/field organisation for a minimum period of 4 weeks and shall prepare a diary. The students shall also prepare a report at the end of training and shall present it in a seminar, which will be evaluated during 5th semester.

3.1 Internet Technologies

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Rationale

The advent of Internet has revolutionize the way of modern communication and dissemination of information. The ever increasing outreach, speed and reliability of affordable Internet is opening doors for many future technologies like ubiquitous computing and cloud computing. World-wide-web (www) is the most common and popular service provided by the Internet. HTML, CSS and JavaScript are the core languages that power the www. This course is aimed at providing students with the insight of Internet and related technologies. After pursing this course, the students will be fully acquainted with the Internet terminology, basic concepts and its most important application viz. world-wide-web.

DETAILED CONTENTS

Unit-1 : Internet and Web Basics ..... **04 Hrs** **10 Marks**

Internet and its applications, World Wide Web and its evolution, WWW vs Internet, web server, web page, web site (static and dynamic), HTTP protocol, URL, Web Browsers, Search Engine, Proxy Server.

Unit-2 : Working with HTML5 ..... **8 Hrs** **20 Marks**

HTML coding conventions, HTML5 structural elements: <html>, <head>, <body>; head elements : <title>, <meta>, <link>; body elements: <h1>..<h6>, <table>, <hr>, <p>, , ,
, <ol>, <ul>, comments, <img>, <iframe>, <form>; semantic elements: <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <nav>, <section>, <summary>, <time>; HTML attributes: accesskey, class, data-*, id, style, tabindex, title

Unit-3 : HTML Lists and Tables ..... **04 Hrs** **10 Marks**

Ordered Lists, Unordered Lists, Definition Lists, Nested Lists, Table elements: <table>, <thead>, <tbody>, <tfoot>, <tr>, <th>, <td>; using rowspan and colspan attributes.

Unit-4 : HTML Forms ..... **04 Hrs** **10 Marks**

Form elements: <input>, <select>, <option>, <optgroup>, <textarea>, <button>, <datalist>, <fieldset>, <label>, <legend>, <submit>, action attribute.

Unit-5 : Cascaded Style Sheet (CSS) ..... **8 Hrs** **20 Marks**

CSS types: inline, internal and external; CSS rule, Selectors, CSS box model, CSS attributes: border, margin, padding, height, width, color, text-align, border-collapse, border-spacing, background-color, background-image, background-repeat, background-attachment, background-position, text-decoration, text-transform, letter-spacing, word-spacing, font-family, font-style, font-size, font-variant, position, display, float, list styles, table styles, pseudo classes.

Unit-6 : JavaScript ..... **9 Hrs** **20 Marks**

JavaScript overview, <script> element, variable, lifetime and scope of variables, operators, control statements: if...else, switch...case; iteration: for, while, do...while; linking external JavaScript file with an HTML document, manipulating HTML DOM tree with JavaScript, arrays, object-oriented programming in JavaScript, built-in javascript functions, user-defind functions.

Unit-7 : jQuery **05 Hrs** **10 Marks**

Need of jQuery, Adding jQuery to a Webpage – using CDN or Local Copy; jQuery Selectors, jQuery Effects – hide(), show(), toggle(), fadeIn(), fadeOut(), fadeTo(), fadeToggle(), animate(); jQuery Events – blur(), click(), focus(), ready(), load(), on(), off().

List of Practicals

(1) To send an email to other class mates and check the received emails.
(2) To transfer files from one computer to the other using FTP.
(3) Creating a web page using basic HTML elements.
(4) Inserting images, image maps, lists and hyperlinks in web pages.
(5) Creating tables demonstrating all the table related tags.
(6) Creating forms containing all form controls.
(7) Using inline, internal and external CSS.
(8) Setting margin, border and padding of elements using CSS.
(9) Setting text and font CSS properties using CSS.
(10) Setting background color and images using CSS.
(11) Layouting webpages using elements and positioning/ resizing them using CSS.
(12) Demonstrating pseudo CSS classes.
(13) Calculating sum of two numbers using JavaScript.
(14) Write JavaScript function to check whether the given number is prime.
(15) Access HTML elements from within the JavaScript code.
(16) Sort an array of elements using inbuilt sort array function.
(17) Create objects in JavaScript code.
(18) To add jQuery library to a web page.
(19) To demonstrate different jQuery effects.
(20) To demonstrate different jQuery events.

Text Books

(i) HTML & CSS: The Complete Reference by Thomas A. Powell, Tata McGraw Hill Publication
(ii) JavaScript: The Definitive Guide by David Flanagan, O'Reilly Media Inc.

Reference Books

(i) HTML 5 Black Book by Kogent Learning Solutions Inc.
(ii) Web Design with HTML, CSS, JavaScript and jQuery Set By John Duckett, Wiley Publication
(iii) Web Programming with HTML5, CSS and JavaScript by John Dean, Jones and Bartlett Publishers

Web Resources

(i) http://www.w3schools.com
(ii) http://www.tutorialspoint.com

3.2 Operating Systems

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Rationale

An Operating System (OS) turns an otherwise a heap of computer hardware to a useful and usable unit. An OS manages all the hardware resources, provides a framework for user applications to run, and has a user interface that makes it convenient for users to interact with the computer system. Today there are a number of operating systems for different-different platforms and usages. Yet, there is a considerable commonality amongst all. This course focuses on these common aspects of various OSes. This course will make the students familiar with the concepts, terminology, functions and internal working of a typical OS.

DETAILED CONTENTS

Unit-1 : Introduction to operating system ..... **04 Hrs** **10 Marks**

Definition of Operating System. Evolution of operating systems – simple batch systems, multi programmed batch systems, timesharing systems. Functions of an operating system. Single user and multiuser operating systems. Open-source and closed-source operating systems.

Unit-2 : Process Overview ..... **08 Hrs** **14 Marks**

Definition of process, process states, process life cycle, Process Control Block (PCB), Process Scheduling – Scheduling queues, Schedulers (short term, medium term and long term). Dispatcher. Context Switch.

Unit-3 : CPU Scheduling ..... **12 Hrs** **22 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, Priority Scheduling, Round-Robin.

Unit-4 : Introduction to Deadlocks ..... **08 Hrs** **14 Marks**

Normal mode of operation - Request-Use-Release sequence, Definition of deadlock, Deadlock Characterization, Necessary and sufficient conditions – Mutual exclusion, Hold and wait, No preemption and Circular wait. Introduction to methods for handling deadlocks (without algorithms).

Unit-5 : Memory Management Techniques ..... **12 Hrs** **20 Marks**

Fixed partitioning, dynamic partitioning, memory fragmentation, simple paging, simple segmentation, virtual memory with paging, virtual memory with segmentation, page fault, thrashing. Page replacement policies – FIFO, Optimal, LRU.

Unit-6 : Storage Management ..... **12 Hrs** **20 Marks**

File concept – file attributes, file operations, file types. Access Methods – sequential access, direct access. Directory Structure – directory overview, single-level directory, two-level directory, tree-structured directories. Disk Storage Access ways – Host-Attached Storage, Network-Attached Storage, and Storage Area Network. Disk scheduling – FCFS, SSTF, SCAN, C-SCAN.

List of Practicals

(1) To install and configure MS Windows 7/8/10 on a computer.

(2) To get familiar with general Windows commands – ECHO, CLS, DIR, TREE, MD, CD, TYPE, RD, DEL, MOVE, COPY, REN, ATTRIB, COLOR, DATE, TIME, ERASE, FIND, FC, MORE, CMD, PATH, SYSTEMINFO, SHUTDOWN, TASKLIST, TASKKILL, VER, VOL, CHKDSK

(3) To use wildcard characters for copying, moving, renaming, and deleting files and directories in a given hierarchical directory structure under Windows's command prompt.
(4) To get familiar with windows control panel components.
(5) To use Windows backup and restore features.
(6) To get familiar with commonly used Windows PowerShell cmdlets like Get-ChildItem, Get-Content, Get-Command, Get-Help, Clear-Host, Copy-Item, Move-Item, Remove-Item, Rename-Item, Get-Location, Set-Location, Write-Output, Get-Process, Stop-Process.
(7) To write scripts in Windows PowerShell to automate tasks.

Text Books

(i) Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, and Gerg Gagne, Wiley India Pvt. Ltd.

Reference Books

(i) Operating Systems – Internals and Design Principles by William Stallings, Pearson Edn.

3.3 Programming using Python

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Python is a popular, widely used, general-purpose, high-level programming language. The goal of Python is to make programming easy to learn, hence making it the ideal programming language for entry-level programmers. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than other counterparts. Python is supported by all major operating systems and platforms. It is also open-source and is free to use and distribute. The objective of this course is to steadily expose the students to the world of programming.

DETAILED CONTENTS

Unit-1 : Introduction to Programming ---------- **04 Hrs** **10 Marks**

Program, programming languages generations, algorithm, flowchart, language translators – assembler, compiler, interpreter; syntax, syntax error, semantic error, debugging, documentation, comments, code indentation.

Unit-2 : Getting Started with Python ---------- **04 Hrs** **10 Marks**

Python language – need, features and advantages; Installing and configuring Python, IDLE - installation, features, menu structure; Standard Python modules, Python interactive shell, structure of a typical Python project.

Unit-3 : Basics of Python Language ---------- **12 Hrs** **20 Marks**

Python tokens – identifiers, keywords, operators, delimiters, and literals; variables, naming conventions in Python, Python statements – simple and compound; comments, reading from standard input using input(), writing to standard output using print(), Data types – numbers, strings, tuples, lists, dictionaries, ranges, and sets; mutable and immutable data types, Python numbers: integers, floating-point and complex numbers; numeric literals; String literals – quoted and triple quoted strings, multiline strings, escape sequence, type() function.

Unit-4 : Python Data Structures ---------- **10 Hrs** **20 Marks**

Sequence types – list, tuple, range, string; dictionary, set, list comprehension, set comprehension, dictionary comprehension, String methods – capitalize(), count(), find(), format(), replace(), lower(), upper(), title(); List methods – count(), index(), append(), insert(), remove(), pop(), reverse(), sort(); Set methods – add(), clear(), remove(), discard(), intersect(), copy(), difference(), union(); Dictionary methods – keys(), values(), pop(), items(), clear().

Unit-5 : Operators and Expressions ---------- **08 Hrs** **10 Marks**

Arithmetic operators – addition, subtraction, multiplication, division, truncated division, modulus, exponentiation; arithmetic expressions, comparison operators, logical operators, comparison chaining, bitwise operators, operations on sequences – concatenation, repetition, membership testing, indexing, slicing.

Unit-6 : Flow Control ---------- **08 Hrs** **10 Marks**

if statement and its variants - if, if...else, if...elif...else; loops – while, for; use of else in loops, jump statements – break, continue, pass; with statement, exception handling.

Unit-7 : Modules, Packages and Functions ---------- **06 Hrs** **10 Mark**

Python modules and packages, functions, def statement, parameters, named parameters, default values of parameters, function signatures, variable number of arguments, return statement, lambda expression.

Unit-8 : File I/O ---------- **04 Hrs** **10 Marks**

Opening a file, file opening modes, read from a file – read(), readline(); writing to a file – write(), writelines(), truncate(), flush(); navigating in a file – seek(), tell()

List of Practicals

(1) To install and configure Python and IDLE on Windows/ Linux platforms.
(2) To practice arithmetic expressions on Python interactive shell.
(3) To read data from standard input and print information on standard output.
(4) To create variables of various data types and verify them using type() function.
(5) To demonstrate various operations on strings.
(6) To demonstrate list comprehension and various operations on lists.
(7) To demonstrate set comprehension and various operations on sets.
(8) To demonstrate dictionary comprehension and various operations on dictionaries.
(9) To demonstrate various operations on ranges.
(10) To demonstrate the working of if statement and its variants.
(11) To compute the factorial of a given number using while loop.
(12) To generate first n terms of a fibonacci series using for loop.
(13) To use for loop to manipulate lists.
(14) To demonstrate exception handling mechanism of Python.
(15) To write a function to compute greatest of two numbers.
(16) To practice continue, break and pass statements.
(17) To demonstrate named parameters and default parameter values of a Python function.
(18) To demonstrate lambda functions.
(19) To copy the contents of one file into another.
(20) To demonstrate the use of with statement.

Text Books

(i) Introduction to Computer Science using Python by Charles Dierbach, Wiley Publishers
(ii) Python For Dummies by by Stef Maruch and Aahz Maruch, Pearson Education

Reference Books

(i) Programming in Python 3: A Complete Introduction to the Python Language by Mark Summerfield, Atlantic Publishers and Distributors
(ii) Python in a Nutshell: A Desktop Quick Reference by Alex Martelli et al, O'Reilly Media

3.4 MULTIMEDIA TECHNOLOGIES

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RATIONALE

This subject aims to develop a clear understanding of What is multimedia?, and how it can be used for enhancing teaching instruction methodologies, business and personal communications. It will help the students in understanding technical aspects of multimedia content creation, the processes and tools used for designing multimedia systems. This will make the students proficient in designing and developing an multimedia application.

LEARNING OUTCOME

After undergoing the subject, the students will be able to:

- Define and describe multimedia functions.
- Identify and explain the devices, hardware and software system.
- Operate and design in graphics.
- Use photo-shop software for drawing and editing photos.
- Identify the tools to create animations,
- Reduce the size of various file formats i.e. audio, video and text.

DETAILED CONTENTS

1. **Introduction to Multimedia Systems** **07 Hrs** **15 Marks**

   What is Multimedia, Elements of Multimedia, Applications of multimedia. Multimedia Hardware Devices (Digital Camera, Scanner, Projector, Printer, MIDI synthesizer, Light Pen, Touch Screen & Speakers)

2. **Image Formats & Compression** **10Hrs** **20Marks**

   TIFF, BMP, JPG/JPEG, GIF, PDF, PSD, PIC image formats, Image Compression, Need of Compression, Variable encoding, Audio encoding techniques, JPEG, MPEG Compression.

3. **Image Editing Using Graphic Tools (Photoshop /GIMP)** **15Hrs** **25 Marks**

   Basic Concepts of Image Creation −Introduction, Interface elements of the tool −Menus, Toolbox, color control icons, mode control icons, window controls icons. Creating new images, saving images and opening existing images

   Image Handling −Cropping, Adjusting image size, Adjusting the size of the work canvas, rotating selections & Scaling an object

Operations on Layers − Adding new layers, Dragging and pasting, selected objects on to layers, Dragging layers between files, Viewing Hiding, Editing, Moving, Copying, Duplicating, Deleting layers, Merging layers, Preserving layers &Using adjustment layers.

Channels and Masks −Channel palette, showing and hiding channels, splitting channels in to separate images, merging channels, creating a quick mask editing masks using quick mask mode , using filters and actions

Sound −Recording sound using Sound Recorder (Capture), sound capture through sound editing software (ex: Sound Forge), sound editing (noise correction, effect enhancement)

Importing audio files from external devices and saving them

Sound Quality − CD Quality, Radio Quality, Telephone Quality

Voice Recording Software −Audacity /Speech recorder/orecx (Mono & Stereo)

Sound File Format −AIFF (Audio Input File Format from Apple Mac), MIDI,WAV, MP3

4 Multimedia Authoring Tools **12 Hrs** **20 Marks**

Types of Authoring Tools – Icon based, Time based, Story boarding/scripting and Action-script in Macromedia flash, Approaches of Authoring tools, Use of Layers in Flash.

5 Animation Technology **12 Hrs** **20 Marks**

Definition, Types of animation, Basic principles of animation, Frame, Keyframe, Blank Keyframe, Shape Tweening, Motion Guide, Story Board, Action-script to control the Animation.

LIST OF PRACTICALS

1. Installation GIMP software and Using various features of GIMP.
2. Editing of image using various tools available in GIMP.
3. Installation of multimedia software Adobe Animate
4. Animate the objects (frame animation ,motion guide)in Adobe Animate
5. Installation of multimedia software photoshop
6. Using various Tools of photoshop
7. Installing and use of various multimedia devices :
   Scanner, Digital camera, web camera, Mike and speakers, printers, projectors
8. Using Scanner: Setting up resolution, Size, File formats of images, Grey scale and colour options & image preview

3.5 Data Communication & Computer Networks

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Rationale

Right information at right time to the right person is the key to success for any modern business. Timely dissemination of information is crucial for effective decision-making process in every enterprise. Computer networks are the result of the need to merge computers and communication together. With the advent of computer networks, the unnecessary distinction between tools to process and store information and tools to collect and transport information is disappearing. Today, a computer not connected to some network is considered as a limiting factor. In modern cloud-based service delivery era, the once tagline of the Sun Microsystems "The network is the computer" is turning out to be truer than ever. This course is aimed to provide the students with the basic concepts of computer network. On completing this course the students will be able to appreciate the importance of computer networks and have the basic idea about the working of computer networks.

DETAILED CONTENTS

Unit-1 : Fundamentals of Data Communications — **06 Hrs** | **10 Marks**

Definition of data communication, fundamental characteristics of data communication – delivery, accuracy, timeliness, jitter. Components of data communication – message, sender, receiver, transmission medium, and protocol. Data representation – text, numbers, images, audio, video. Data flow – simplex, half-duplex, full duplex.

Unit-2 : Introduction to Computer Networks — **08 Hrs** | **15 Marks**

Definition & objectives of computer network, networking models – client-server, peer-to-peer; types of network – PAN, LAN, MAN, WAN; network topologies – mesh, star, bus, ring.

Unit-3 : ISO-OSI Model — **15 Hrs** | **30 Marks**

Seven layers of OSI model; functions of physical, data link, network, transport, session, presentation, and application layers.

Unit-4 : Transmission Media — **06 Hrs** | **10 Marks**

Guided and unguided transmission media; twisted pair cable – UTP Vs STP, RJ45 connector, categories of UTP, applications; coaxial cable – coaxial cable standards, connector, and applications; optical fiber cable – construction and principle, propagation modes, connectors, applications, advantages, disadvantages; wireless transmission – radio waves, microwaves, infrared; ISM band.

Unit-5 : Network Devices — **06 Hrs** | **10 Marks**

Network Interface Card, repeater, hub, switch, bridge, router, gateway, modem, firewall.

Unit-6 : TCP/IP Model — **15 Hrs** | **25 Marks**

Layers of TCP/IP – network layer: classes of IP addressing, CIDR and subnet mask notation of IP addresses, subnetting, supernetting, IPv4 header, need of IPv6. Transport layer: TCP, UDP, concept of ports, well known ports. Application layer: SMTP, TELNET, FTP, DHCP.

List of Practicals

(1) To get familiar with the institute network topology and draw the network diagram consisting of switches, hubs, routers, firewalls etc. present in the network.

(2) To create straight-through and crossover UTP cables using EIA 568A/568B standard.
(3) To configure the IP address of a computer and identify the class of the IP address.
(4) To learn and observe usages of different networking commands IPCONFIG, PING, TRACERT, GETMAC, PATHPING, and NETSTAT.
(5) To create and test a network of two computers with and without hub/switch (Windows-Windows, Linux-Linux, Windows-Linux).
(6) To share a folder between two computers.
(7) To setup a TELNET Server and connect to it using TELNET command.
(8) To setup FTP server and practise uploading/downloading files.
(9) To setup DHCP server.

Text Books

(i) Computer Network by Andrew S. Tanenbaum, PHI
(ii) Data Communications and Networking by Forouzan, Tata McGraw Hill

Reference Books

(i) Computer Communication and Networking by John Freer, CRC Press
(ii) Data and Computer Communication by William Stallings, Pearson Publication
(iii) CompTIA Network+ Study Guide: Exam N10-006 by Todd Lammle, John Wiley

4.1 Web Programming

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Rationale

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.

DETAILED CONTENTS

Unit-1 : Dynamic Websites Basics — **08 Hrs** | **10 Marks**

Review of HTML5, CSS and JavaScript; HTTP, HTTP Request, HTTP Response, URL, Working of Web Servers and Web Browsers, Static Websites, Dynamic Websites, Web Applications, Form Data Submission Methods – GET and POST, HTTP Sessions, HTTP Cookies.

Unit-2 : Introduction to PHP — **10 Hrs** | **15 Marks**

Origin of PHP, Advantages of PHP, Working of PHP, Embedding PHP Code in Webpages, LAMP Stack, Install and Configure PHP Environment, PHP Script, PHP Syntax, Statements, Comments, Variables, Naming Variables, Variable Scope, Constants, echo and print Statements, PHP Data Types, String Literals – Single and Double Quoted Strings, Operators, PHP Control Statements, PHP Arrays.

Unit-3 : PHP Functions — **08 Hrs** | **15 Marks**

PHP Standard Library Functions: String Functions – htmlspecialchars(), ltrim(), rtrim(), trim(), strtoupper(), strtolower(), explode(), implode(), strlen(), strcmp(), strpos(); Math Functions – sqrt(), ceil(), floor(), log10(), pow(), sin(), cos(), tan(); User-defined Functions.

Unit-4 : PHP Form Processing — **06 Hrs** | **15 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 : PHP Advanced Features — **08 Hrs** | **15 Marks**

Handling Date and Time; Dealing with Multiple PHP files : include, require, include_once and require_once; HTTP Sessions and Cookies, Error and Exception Handling in PHP, PHP Mail, using HTTP Headers with header() Function, Cross-Site Scripting (XSS) Attack and its Prevention.

Unit-6 : Using MySQL Database in PHP — **10 Hrs** | **20 Marks**

Basic Database Concepts – Database, Table, Column Types, Constraints, Views, Creating Database Users and Granting Privileges; 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, Handling SQL Injection.

Unit-7 : Using XML and AJAX with PHP — **06 Hrs** | **10 Marks**

Role of XML, XML Syntax, XML Tags, XML Elements, XML Attributes, Maniplulatig XML in PHP; Role of AJAX, Handling AJAX Requests in PHP.

List of Practicals

(1) To install and configure LAMP/ XAMP server on Windows or Linux machine.
(2) To embed PHP script in a web page that displays a simple message in the browser.
(3) To use variables in PHP script and perform arithmetic calculations on them.
(4) To use if...elseif...else statement to determine the division of a student depending upon the percentage of obtained marks.
(5) To generate the multiplication table of a given number using for statement.
(6) To create an HTML form and demonstrate action attribute and submit button.
(7) To demonstrate the GET and POST form data submission methods.
(8) To demonstrate the difference between validating form data in JavaScript and PHP script.
(9) To handle uploaded files in PHP.
(10) To demonstrate the difference between single quoted and double quoted strings in PHP.
(11) To create multiple PHP web pages and demonstrate the use of include and require.
(12) To demonstrate error handling feature of PHP using set_error_handler() and trigger_error().
(13) To demonstrate exception handling feature of PHP (try...catch, throw).
(14) To demonstrate the use of header() function.
(15) To demonstrate the working of AJAX by dynamically loading a page with PHP response.
(16) To demonstrate date/time manipulation in PHP.
(17) To create a HTML form-based interface to INSERT, UPDATE, DELETE and SELECT data from MySQL database.
(18) To create a login/registration form that uses PHP Sessions and Cookies.
(19) To demonstrate the SQL injection attack and its remedy.

Text Books

(i) PHP & MySQL by Joel Murach and Ray Harris, Mike Murach & Asso. Inc.
(ii) PHP and MySQL Web Development by Luke Welling and Laura Thomson, Addison-Wesley

Reference Books

(i) Learning PHP, MySQL & JavaScript by Robin Nixon, O'Reilly Media.
(ii) PHP and MySQL for Dynamic Web Sites by Larry Ullman, Peachpit Press

Web Resources

(i) http://www.w3schools.com
(ii) http://www.php.net

4.2 Relational Database Management System

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Rationale

A Database Management Systems (DBMS) not only efficiently maintains the voluminous data, but also provides convenient and consistent interface between the data it maintains and the end-user applications. Majority of user applications are mostly driven by some database. Modern dynamic web sites are also powered by a database at the 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 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.

DETAILED CONTENTS

Unit-1 : Introduction to Database Systems — **04 Hrs** | **10 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 — **06 Hrs** | **15 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 Model — **06 Hrs** | **15 Marks**

Relational Database Model, Relations, Attributes, Tuples, Domains; Key – Primary Key, Candidate Keys, Alternate Keys, Superkey, Secondary Key, Foreign Keys; Database Constraints.

Unit-4 : Entity Relationship Model — **04 Hrs** | **10 Marks**

Entity, Entity Sets, Strong and Weak Entities, Attributes, and Keys; Association, Relationship, Roles, and Structural Constraints, ER Diagrams.

Unit-5 : Structure Query Language (SQL) using MySQL — **20 Hrs** | **25 Marks**

Object Naming Conventions, Keywords, Database, Table, View, Index, Alias; Data Types – Numeric, Date and Time, String Types; Data Definition Language(DDL): CREATE, DROP, ALTER, RENAME, Data Manipulation Language(DML): INSERT, UPDATE , DELETE, SELECT, SELECT Clauses: FROM, WHERE,ORDER BY, GROUP BY, HAVING, Operators: Arithmetic, Logical, Relational, String; Joins: Inner, Left, Right and Outer Joins; Subqueries, Set Operations: Union, Intersect, Minus, Data Control Language(DCL): GRANT, REVOKE; Transaction Control Language(TCL): COMMIT, ROLLBACK, SAVEPOINT.

Unit-6 : Dependencies and Normalization — **06 Hrs** | **10 Marks**

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

Unit-7 : Functions in SQL **10 Hrs** **15 Marks**

Numeric: ABS, ROUND, FLOOR, CEIL, SQRT, POWER, TRUNCATE, LOG; Date and Time Functions : NOW, DATE, TIME, CURDATE, CURTIME, DAY, MONTH, YEAR, DATEDIFF, DATE_SUB, DATE_ADD, DATE_FORMAT; String Functions : CONCACT, LENGTH, UPPER, LOWER, LEFT, RIGHT, LTRIM, RTRIM; Aggregate Functions: MAX, MIN, SUM, AVG, COUNT; Data Conversion Functions: CAST, STR_TO_DATE; User Defined Procedures and Functions (Introduction only).

List of Practicals

(1) To install and configure MySQL database management system.
(2) To create tables having columns with different data types, widths and precisions.
(3) To alter tables to add new columns, delete existing columns and change column names, data types and widths.
(4) To apply integrity constraints to the tables.
(5) To insert data of different data types in tables (INSERT statement).
(6) To view the data stored in different tables (SELECT statement).
(7) To demonstrate join operation on tables using left, right and inner join.
(8) To demonstrate different row functions as mentioned in Unit-7.
(9) To demonstrate group functions SUM, MAX, MIN, COUNT.
(10) To use WHERE, HAVING, ORDER BY and GROUP BY clauses with SELECT.
(11) To demonstrate different string functions as mentioned in Unit-7.
(12) To execute date & time functions as mentioned in Unit-7.
(13) To convert data from one data type to other.
(14) To write a MySQL stored procedure that accepts parameter(s).
(15) To write a MySQL function that returns whether the passed parameter is even or odd.

Text Books

(i) An Introduction to Database Systems by C.J. Date, Adison Wesley
(ii) MySQL: The Complete Reference by Vikram Vaswani, Tata McGraw Hill

Reference Books

(i) An Introduction to database systems by Bipin C. Desai, Galgotia Publications
(ii) Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan Tata McGraw Hill
(iii) Fundamentals of Database Systems by R. Elmasri and S.B. Navathe, Pearson Education
(iv) MySQL 8 Cookbook by Karthik Appigatla, Packt Publishing

4.3 Object Oriented Programming using Java

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Rationale

The course is aimed at providing students with the insight of object oriented programing. One of the most important skill in software development is designing how code is organized. This course will help the students to improve analytical skills of object oriented programming.

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DETAILED CONTENTS

Unit-1 : Introduction to Object-Oriented Programming ..... 04 Hrs 10 Marks

Limitations of procedure-oriented programming paradigm, object-oriented programming (OOP) – advantages of OOP, objects and classes; Essential characteristics of OOP languages – data abstraction, encapsulation, inheritance, polymorphism, dynamic binding.

Unit-2 : Overview of Java Language ..... 06 Hrs 10 Marks

Need of Java, brief history of Java, features of Java language, Java editions, Java programming terminology – JVM, JRE, JDK, JNI, WORA, Java compiler, Java interpreter, source code, bytecode; Downloading, installing and configuring JDK; Setting CLASSPATH, JAVA_HOME and PATH environment variables, coding conventions.

Unit-3 : Fundamentals of Java Programming ..... 10 Hrs 20 Marks

Structure of a typical Java program, comments – single-line, multi-line and documenation, role of `main()` method, Java tokens – identifiers, operators, keywords, constants, strings, special symbols; Java statements, variables – local, instance and static; scope of variables, data types, literals, type casting – widening and narrowing; Operators - Arithmetic, Logical, Relational, Bit-wise, Assignment and Conditional Operators, Operator precedence.

Unit-4 : Control Statements ..... 08 Hrs 15 Marks

Selection control structures – if, if...else, if...else if ladder, nested if, switch...case; Looping control structures – while, do...while, for; Jump statements – break, labelled break, continue, return.

Unit-5 : Arrays and Strings ..... 08 Hrs 10 Marks

Array definition, one dimensional array – declaring, initializing and accessing its elements; Multi-dimensional arrays, irregular arrays, string, string literals, escape sequence, String methods – charAt(), indexOf(), length(), substring(), toLowerCase(), toUpperCase(), replace(), trim().

Unit-6 Object-oriented Programming in Java ..... 08 Hrs 15 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.

Unit-6 : Polymorphism and Inheritance ..... 06 Hrs 10 Marks

Method overloading, method overriding, compile time versus runtime polymorphism, inheritance, abstract methods, multiple inheritance using interfaces

Unit-7 : Exception Handling ..... 06 Hrs 10 Marks

Concept of exceptions, checked and unchecked exceptions, built-in exceptions, implementing exception handling – try, catch and finally blocks, using multiple catch statements, user-defined exceptions, throw statement, throws clause.

List of Practicals

(1) To install and configure JDK on a Wndows/ Linux based computer system.
(2) To display a simple message like “Hello Java !” on the monitor.
(3) To demonstrate the use of arithmentic operators and their precedence.
(4) To demonstrate the use and difference between pre-increment and post-increment operators.
(5) To demonstrate the application of various bitwise operators.
(6) To demonstrate the working of relational and logical operators using if statement.
(7) To compute the factorial of a given number using while loop.
(8) To implement a menu-driven calculator using do...while and switch...case statements.
(9) To determine the largest element in a 1-dimensional array using for loop.
(10) To compute the sum of two matrices using nested for loops.
(11) To demonstrate the use of various string functions.
(12) To define a class and create its objects.
(13) To demonstrate the use of constructor and finalizer methods of a class.
(14) To create a hierarchy of packages.
(15) To demonstrate the use of access modifiers.
(16) To inherit new classes from existing Java classes.
(17) To demonstrate method overloading and overriding.
(18) To demonstrate the exception handling mechanism of Java.

Text Books

(i) Programming with Java: A Primer by E. Balaguruswamy, Tata McGraw Hill Publication
(ii) Java How to Program by Paul Deitel, Harvey Deitel, Pearson Education

Reference Books

(i) Java, the Complete Reference by Herbert Shildt, McGraw-Hill Education

4.4 DIGITAL MARKETING

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RATIONALE

The course is designed to help you master the essential disciplines in digital marketing, including search engine optimization (SEO), social media, conversion optimization, web analytics, content marketing, email and mobile marketing. Digital marketing is one of the world's fastest growing disciplines.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Identify core concepts of digital marketing and the role of digital marketing in business.
- Ability to develop marketing strategies based on product, price, place and promotion objectives.
- Understand how they can use digital marketing to increase sales and grow their business
- Ability to formulate marketing strategies that incorporate psychological and sociological factors which influence consumers.
- Hands on experience in using Analytics Tools eg: Google Analytics for report extraction and campaign measurement.
- Ability to analyze marketing problems and provide solutions based on a critical examination of marketing information.
- Understanding of the opportunities for deploying emerging digital marketing media and techniques.
- Successfully implement online campaigns for your business and marketing problems within the organization by learning AdWords Campaign Management

DETAILED CONTENTS

Unit-1 : Principles of Digital Marketing ..... **10 Hrs 15 Marks**

Defining Digital Marketing, Setting Digital Marketing Objectives, Set of activities of digital marketing: Search Engine Optimization, SEO, Search Engine Marketing – Google AdWords, Social Media Marketing: Facebook, LinkedIn, YouTube, Display Advertising – Contextual, Behavioral, Targeted, Content Marketing & Blogging, Lead Generation : Marketing Offer – Attractive / Relevant Offer, Landing Page – Offer's details with form, Conversion Page – Thank you page, Email Marketing, Video Marketing, Responsive Design, Google Analytics

Unit-2 : Search Engine Optimization ..... **14 Hrs** **25 Marks**

What is SEO?, Why SEO?, How Search Engine works?, Essential SEO guidelines for website owner, designer, blogger and content writer : Keyword Research - Creating Content Hierarchy, Brainstorming – Think and discuss them, Google Suggest, Related Searches, Google Keyword Planner, Keyword Tools, Google Trends – Finding Search Trends, Most Search Terms, How to translate keywords?, Organizing the keywords, Writing Headlines (Page Titles) with examples, Writing Summary (META Descriptions) with examples, SEO for Images, Structuring the Content-SEO-friendly Domain Name, SEO-friendly URL Structure, Plan your Site's Hierarchy, Internal Linking – Site Navigation, How Google reads our pages?, Localized SEO, Website Speed Testing,

HTML Improvements using Google Search Console, Links from YouTube Videos, Users' Engagement , Links to Related Stories , Enable Social Sharing , Embedding videos , Enabling site search feature

Unit-3 : Google AdWords **10 Hrs** **20 Marks**

Setting up Google AdWords Campaigns – that avails high ranking at low cost, Content Structuring, Understanding Quality Score, Finding and selecting the right Keywords, Keywords Matching Options, Campaign Setup procedure, Ads and Ad Groups, Organizing Ad Groups, Creating Effective Ads, Optimizing Landing Pages, Bid Management, Negative Keywords, Analytics – Measure and fine-tune, Remarketing Campaigns – How to configure, Setup and Monitor them?, YouTube Video Ad Campaigns

Unit-4 : Google Analytics **10 Hrs** **15 Marks**

Getting Started with Google Analytics, Understanding Dashboard – Audience | Advertising | Traffic Source | Content | Conversions, Taking decisions based on Analytics Reporting, Defining Business Goals and Objectives, Tracking Social Media Traffic, Tracking SEO Traffic, Integrating your Google AdWords campaigns into Google Analytics, Measuring Tools and Methods, Measuring your Site's ROI, Introduction to Goal Conversion – Tracking the Conversions, Configuring UTMs (Custom URLs), Google Tag Manager – a brief overview.

Unit-5 : Social Media Marketing **12 Hrs** **25 Marks**

Social Media Marketing Strategy : Setting up Goals- Finding out where your targeted people connect, Popular Social Media Networks, KnowEm – Check Social Media Username Availability, Knowing your Audience - Google Alerts – Monitoring your brands, competitions, and industry trends using, TweetDeck – a monitoring tool similar to Google Alerts for Twitter, Hashtags – Best Practices & Tools, Facebook / Instagram / LinkedIn- Setting up a Facebook Business Page, Facebook Graph Search – SEO for Facebook, Facebook Fans vs Talking about this, Promoting your Page, Boost Post, Facebook/Instagram Advertising using Facebook Ads Manager, Remarketing/Retargeting using Facebook Custom Audiences, LinkedIn Advertising: Text Ads | Sponsored Content, Measuring Success- Fans, Likes, Comments & Share, Track performance using Google Analytics, UTMs – URL Builder, Bounce Rate, Time Spent on Site and Conversions!, Tracking Offline Conversions, Tracking your emails, Viral Videos Examples, Instagram, Facebook and Pinterest – Best Practices, Tips and Tools

LIST OF PRACTICALS

1. Hosting a website on a cloud based web server.
2. Create SEO Friendly Web Pages
3. Submit Website in various search Engines
4. Build a Network of Partner Websites to Get Influence on the SERP and Jump up to 30+ Positions
5. Develop a Facebook Customized Page Tab
6. Create and Write a blog.
7. Write an email newsletter
8. Make a video and Youtube Channel
9. Create infographics
10. Create Google Adword Account and make use of Keyword Planner

11. Create and Use Google Analytics Account
12. Create “refer-a-friend” or “bookmark this page” links on your site
13. Create Google Map on Places for Business
14. Understanding Plagiarism Checker tools
15. Understanding various SEO Tools like woorank, seositecheckup, seoquake, similarweb, siteliner, etc.
16. Creating XML Sitemap and robot.txt files

RECOMMENDED BOOKS:

1) Digital Marketing by Vandana Ahuja, published by Oxford Publication
2) Fundamentals of Digital Marketing by Puneet Bhatia, published by Pearson.

4.5 Software Engineering

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Rationale

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.

DETAILED CONTENTS

Unit-1 : Introduction to Software Engineering — **06 Hrs** | **10 Marks**

Software Overview: Definition, Characteristics, Software Evolution; Software Paradigms: Software Development Paradigm, Software Design Paradigm and Programming Paradigm. Software Engineering: Definition, Need of Software Engineering, Emergence of Software Engineering and Notable Changes in Software Development Practices.

Unit-2 : Software Development Life Cycle and Models — **10 Hrs** | **20 Marks**

Software Development Life Cycle Activities: Communication, Requirement Gathering, Feasibility Study, System Analysis, Software Design, Coding, Testing, Integration, Implementation and Operation and Maintenance; Software Development Life Cycle Models: Classical Waterfall Model, Prototype Model, Rapid Application Model, Spiral Model, Comparison of Different Life Cycle Models, Selection Criteria of an Appropriate Life Cycle Model for a Project.

Unit-3 : Software Cost Estimation — **08 Hrs** | **12 Marks**

Metrics used for Project Size Estimation, Project Estimation Techniques, Empirical and COCOMO Estimation Techniques.

Unit-4 : Software Requirement Analysis and Specification — **10 Hrs** | **20 Marks**

Software Requirements: Goal of the Requirements Analysis and Specification Phase, Types of Requirements – Functional Requirements, Non-Functional Requirements and User Interface Requirements; Requirement Elicitation Process: Requirements Elicitation, Organizing Requirements, Negotiation, Discussion and Documentation; Requirement Elicitation Techniques: Interviews, Surveys, Questionnaires, Brainstorming, Requirements Analysis, Software Requirements Specification (SRS) Document, User of SRS Document, Characteristics of a Good SRS Document.

Unit-5 : Software Design — **08 Hrs** | **14 Marks**

Software Design Overview: Goals and Outcome of Software Design Phase, Characteristics of a Good Software Design, Cohesion and Coupling; Software Design Levels: Architectural Design, High-level Design and Detailed Design; Software Analysis and Design Tools (Introduction Only): Data Flow Diagram, Structure Charts. Software Design Strategies: Structured Design, Function Oriented Design, Software Design Approaches: Top Down Design, Bottom Up Design.

Unit-6 :Software Coding **06 Hrs** **10 Marks**

Software Coding Overview: Goal of Software Coding Phase, Coding Standards and Guidelines. Code Reviews: Code Walkthrough, Code Inspection and Clean Room Testing. Software Documentation: Internal Software Documentation and External Software Documentation

Unit-7 : Software Testing **08 Hrs** **14 Marks**

Software Testing Overview: Goal of Software Testing Phase, Software Verification versus Software Validation and Testing Activities, Software Testing Approach: Black Box Testing Approach and White Box Testing Approach. Software Testing Techniques: Unit Testing Technique, Integration Testing Technique and System Testing Technique.

Text Books

(i) Fundamental of Software Engineering by Rajib Mall, PHI

(ii) Software Engineering : A Practitioner's Approach, Roger S. Pressman, McGraw Hill Edn.

Reference Books

(i) Software Engineering by Pankaj Jalote, Narosa Publication.

(ii) Software Engineering, Schaum's Outline Series, Tata McGraw Hill Publication