Output Operations, Stacks and Queues, Subroutines, Additional Instructions, Encoding of Machine Instructions

Unit II   **10 Hrs**
Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.

Unit III   **10 Hrs**
Memory System: Basic Concepts, Semiconductor RAM Memories, Read Only Memories, Speed, Size, and Cost, Cache Memories – Mapping Functions, Replacement Algorithms, Performance Considerations, Virtual Memories, Secondary Storage.

Unit IV   **10 Hrs**
Arithmetic: Numbers, Arithmetic Operations and Characters, Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed Operand Multiplication, Fast Multiplication, Integer Division, Floating-point Numbers and Operations.

Unit V   **10 Hrs**
Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hard-wired Control, Micro programmed Control. Embedded Systems and Large Computer Systems: Examples of Embedded Systems, Processor chips for embedded applications, Simple Microcontroller.The structure of General-Purpose Multiprocessors.

References
1. Carl Hamacher, ZvonkoVranesic, SafwatZaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002.
1. William Stallings: Computer Organization & Architecture, 9th Edition, Pearson, 2015

2OE-CS-3.6	1. Computer Concepts and Office Automation	
Credits: L: 4	Teaching: 4Hrs/week Total Teaching Hours : 52	Max. Marks: 100 **C1: 15; C2: 15; C3: 70**

Unit I   **12 Hrs**
Fundamentals of computer: Overview Of a Computer, Functional Components of a computer (Working of each unit), Evolution Of Computers, Generations Of Computers, Classification Of Computers, Applications Of Computers.
Hardware: Block diagram of computer, Input and Output devices, Memory and storages devices, Different ports and its uses, Different type of printers.

Unit II   **10 Hrs**
Operating system: Definition of Operating System - Functions of OS - Types of OS: Single user, Multi-User, multi-task, RTOS, Single-user, Multi-tasking, Windows 10: Windows concepts, Features, Windows Structure, Desktop, Task bar, Start Menu, My Computer, Recycle Bin, Windows Accessories, calculator, Notepad, Paint, Word pad, Character Map, Windows Explorer, Entertainment, Installation of Hardware and Software, Using scanner, system tools, communication, sharing information between computers.

Computer Networks: Data Communications, Types of Computer Networks, Local Area Networks & Wide Area Networks.

Unit III   10 Hrs
OFFICE APPLICATIONS –I
Word Processing: Typing, Editing, Proofing & Reviewing, Formatting Text & Paragraphs, Automatic Formatting and Styles, Working with Tables, Graphics and Frames, Mail Merge, Automating Your Work & printing Documents.
Excel Spreadsheet: Working & Editing in Workbooks, Creating Formats & Links, Formatting a Worksheet & creating graphic objects, Creating Charts (Graphs), formatting and analyzing data, Organizing Data in a List (Data Management), Sharing & Importing Data, Printing.

Unit IV   10 Hrs
OFFICE APPLICATIONS –II
MS Power point: Introduction to presentation – Opening new presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts. Creating a presentation - Setting Presentation style, Adding text to the Presentation.Formatting a Presentation - Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout. Adding Graphics to the Presentation- Inserting pictures, movies, tables etc into presentation, Drawing Pictures using Draw. Adding Effects to the Presentation- Setting Animation & transition effect. Printing Handouts, Generating Standalone Presentation viewer

Unit V   12 Hrs
INTERNET & ADVANCED COMMUNICATION
Internet and Web Browsers: Definition & History of Internet - Uses of Internet - Definition of Web Addressing-URL-Different types of Internet Connections; Dial up connection, Broad band (ISDN, DSL, Cable), Wireless (Wi-Fi, WiMax, Satellite, Mobile) naming convention, browsers and its types, internet browsing, searching - Search Engines - Portals - Social Networking sites- Blogs - viewing a webpage, downloading and uploading the website; Creating an email-ID, e-mail reading, saving, printing, forwarding and deleting the mails, checking the mails, viewing and running file attachments, addressing with cc and bcc.

References

1. Fundamentals of computers - V. Rajaraman - Prentice- Hall of india
2. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd.,
3. Computer Fundamentals - P. K. Sinha Publisher: BPB Publications
4. Discovering the Internet: Complete - Shelly Cashman 4th Edition - Course Technology
5. Computer & Internet Basics Step-by-Step - Etc-end the Clutter - Infinity Publishing

Unit III   **10 Hrs**

Program modeling concepts in single and multiprocessor systems – software – development process: modeling process for software analysis – programming model for event controlled or response time constrained real time program- modeling of multiprocessor systems. Multiple processes – sharing data by multiple tasks and routines – inter process communications.

Unit IV   **10 Hrs**

Real time operating systems: OS services – IO sub systems – Real time and embedded operating systems – Interrupt routines in RTOS environment – RTOS task scheduling models, Interrupt latency and response times of the task as performance metrics – performance metrics in scheduling models.

Unit V   **10 Hrs**

Hardware Software code design: Embedded system project management – Embedded system design and Co-design Issues – Design Cycle – uses of target system – use of software tools for development – use of scopes and logic analysers for system hardware tests – issues in embedded system design.

References

1. Embedded systems – Architecture, Programming and Design By Raj Kamal – TMH, 2008.
2. Mohamed Ali Maszidi& Janice GillispieMaszidi, "The 8051 Microcontroller and Embedded System", Pearson Publishers
3. Wayne Wolf, Computers as Components: Principles of Embedded Computer System Design – Elsevier, 2005.
4. Tammy Noergaard, Embedded Systems Architecture –Elsevier, 2005.
5. Steve Heath, Embedded Systems Design, 2nd Edition, Elsevier, 2003.
6. Dr. K.V.K.K. Prasad,, Embedded/Real-Time Systems: Concepts, Design and Programming: The Ultimate Reference, Dreamtech Press, 2004.
7. Michael J.Point, Embedded C, Pearson Education, 2002.

2OE-CS-4.5	1. Statistical Computing Using R	
Credits: L: 4	Teaching: 4Hrs/week Total Teaching Hours : 52	Max. Marks: 100 C1: 15; C2: 15; C3: 70

Unit I   **10 Hrs**

Getting Started and Basics: An introductory R session, R as a calculator, Vectors and matrices, Getting help and loading packages, Data entry and exporting data.

Unit II   **12 Hrs**

Exploratory Data Analysis with R: Summary statistics, Probability and Distribution- Generate numbers- the built-in distribution for cumulative distribution functions, quantiles and random numbers, Graphics in R - histograms, empirical cumulative distribution, QQ-plots, box plots, bar plots, dot charts and pie charts.

Unit II   **08 Hrs**

R as a programming language, Grouping, loops and conditional execution, Functions.

Unit IV   **12 Hrs**

Classical tests: One-sample tests- t-test, Wilcoxon signed-rank test; Two-sample tests- t-test and Wilcoxon test, paired t-test; Tests on more than two sample, Interpret the results.

Regression and correlation: Simple regression and correlation, Multiple regression, Regression diagnostics.

Unit V   **10 Hrs**
Tabular data and analysis of Categorical data: Single proportion, Two independent proportions, K proportions.

References

1. An Introduction to R, Notes on R: A Programming Environment for Data Analysis and Graphics. W. N. Venables, D.M. Smith and the R Development Core Team. Version 3.0.1 (2013-05-16). URL: https://cran.r-project.org/doc/manuals/r-release/R-intro.pdf
2. P. Dalgaard. Introductory Statistics with R, 2nd Edition. (Springer 2008)
3. Kleinman, Horton. SAS & R: Data Management, Statistical Analysis, Graphics (CRC 2009)
4. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data, 1st Edition by Hadley Wickham, and Garrett Grolemund.
5. Modern Data Science with R, 1st Edition by Benjamin S. Baumer, Daniel T. Kaplan, and Nicholas J. Horton.
6. Gardener, M (2012) Beginning R: The Statistical Programming Language, Wiley Publications.

2OE-CS-4.5	**2. Information Technology**	
Credits: L: 4	Teaching: 4Hrs/week Total Teaching Hours : 52	Max. Marks: 100 **C1: 15; C2: 15; C3: 70**

Unit I   **10 Hrs**
Web Applications
Networking Fundamentals, The Internet, The World Wide Web, Digital Technology and Media Devices, Introduction to Instant Messaging - Using Instant messaging, Instant messaging providers, Chatting with a Contact – Google Talk., Creating and Publishing Web Pages – Blog, Using Offline Blog Editors, online Transactions, Internet Security.

Unit II   **08 Hrs**
Web Browsing Softwares - Popular Web Browsing Softwares; Search Engines - Popular Search Engines / Search for content, Accessing Web Browser, Using Favourites Folder, Downloading Web Pages, Printing Web Pages.

Unit III   **12 Hrs**
Web Designing- Introduction to Web Design & HTML, Introduce with CSS, Work with tables and cells Work with images, Insert and work with hyperlinks, Insert and work with hyperlinks using images, Insert and work with audio & video content, Working with frames, inline frames and layers, Insert Hover effect, meta elements & watermark Create and work with forms, Introduce with CSS, Work with code view, add-ins, snippets and page transitions

Unit IV   **12 Hrs**
Spreadsheets (Advanced): Introduction to Spreadsheets, Conditional Formatting, Hide / Unhide / Freeze Rows and Columns, Create Modify and Format Charts, Sort and Filter Data, Analyze data with

Logical and Lookup functions, Calculate Data across Worksheets, Using Multiple Workbooks and Linking Cell, Sharing Worksheet Data, Create data tables, Use Goal Seek and Solver, Analyze data using pivot tables and pivot charts, Create and use pivot charts, Protect spreadsheet and add comments to cells, Merge workbooks.

Unit V   **10 Hrs**
Data Base Development : Database Concepts, Data Storage, Manipulating Data, Creating a Database Object, Creating a Table, Building Forms, Create and Manage Queries, Design Reports.

References

1. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd
2. Computer & Internet Basics Step-by-Step - Etc-end the Clutter - Infinity Publishing
3. Information Technology Nsqf Level-2, CBSE, Central Board of Secondary Education, Delhi, Sheel Packers Printing Press, 2015.
4. Information Technology NVEQF Level 1 Students Handbook, CBSE, Central Board of Secondary Education, Delhi, Akashdeep Printers, New Delhi.
5. Elizabeth Castro , HTML, XHTML, and CSS, Sixth Edition, Peachpit Press
6. Elisabeth Robson, Head First HTML and CSS, Orielly Publications

Continuous Assessment Scheme

C1:   Test   : 10 marks
       Seminar/assignment   : 05 marks

C2:   Test   : 10 marks
       Seminar/assignment   : 05 marks

Semester End Examination (C3)
Theory Question Paper Pattern

Time: 3 Hrs.   Max . Marks: 70
   ❖ There shall be one compulsory question consisting of 10 sub questions each of 1 mark.
   ❖ There shall be seven questions of 12 marks each.
        o Each question may have sub questions (a),(b) **/** (a),(b),(c)
   ❖ The student has to answer any five full questions out of remaining seven questions