# Semester II

## Introduction to Computing Systems and Web design

## (Stream A & B)

| Course Code | Teaching hours per week | | | | Credits | Exam hours | Course Type | CIE Marks | ESE Marks |
|---|---|---|---|---|---|---|---|---|---|
| | L | T | P | R | | | | | |
| 26ABNES201 | 2 | 0 | 2 | 0 | 4 | 2 Hrs. 30 Mins | Theory | 40 | 60 |

**Preamble:** This course provides learners with an understanding of the fundamental components of IT infrastructure, including computing systems, peripheral devices, operating systems and computer networks. It also introduces the concepts and technologies required for designing, developing and deploying simple and dynamic web applications, thereby equipping students with essential skills for modern computing environments.

**Prerequisites:** Nil

**Syllabus**

| Module Number | Syllabus Description | Contact Hours |
|---|---|---|
| 1 | **Introduction to Hardware**<br>Computer Hardware – CPU-Architecture, Components, Types of CPU, Memory Unit – Types, Memory hierarchy. Registers, Cache, RAM, Virtual Memory, Motherboard – Components, Computer Peripherals - I/O devices.<br>**Storage devices and Communication**<br>Storage devices- HDDs: Components, SSDs, Optical Drives: -Pits and Lands, I/O communication and device management, Interface cards: -Types – Buses: -Types. | 11 |
| 2 | **Number and Character Representation**<br>Number System - Decimal and Binary representation of numbers, Conversion, Integer Representation - Signed and Unsigned, Data storage units - bits, bytes, kilobytes, Megabytes, Gigabytes, ASCII and Unicode.<br>**CPU Architecture and Instruction Set**<br>Basic CPU architecture - ALU, Registers, Control unit, CISC and RISC architecture, Instruction format - Instruction Cycle, Fetch - Execute Cycle and Assembly language (basics only) - Data Transfer Instructions and Arithmetic Instructions. | 11 |

| | | |
|---|---|---|
| 3 | **Overview of Computer System Software**<br>Firmware - Boot process - Operating Systems - Components, Basic commands in Linux.<br>**Computer Communications**<br>Computer Networks - Uses, LAN, MAN, WAN, Client/Server networks, Peer-to-Peer networks, Topologies, Basics of IP addresses, DHCP and NAT, DNS, Internet, WWW, Web servers, Overview of Network Security. | 13 |
| 4 | **Design of Web** (Basics of HTML, CSS and JavaScript) – Understanding the web content delivery, Understanding HTML (headings, paragraphs, links, DIV) and XHTML Connections, Understanding Cascading Style Sheets (colours, fonts, layout, margin, selectors), Understanding JavaScript (FORM events). | 13 |
| | **Total hours** | **48** |

**Practical Sessions :**

1. Familiarization with computer hardware: CPU cabinet, motherboard, processor, chipset, interface cards, card slots, hard disk, cables, SMPS, NIC, various ports etc. Computer Peripherals - I/O Devices. Storage devices, Interface cards – Buses.
2. Familiarization of the Boot Process and system startup procedures.
3. Practice of basic Unix/Linux commands such as ls, mkdir, cp, mv, grep, rmdir, chmod, useradd, passwd, history, dmesg, cpuinfo, uname, du, time, write, and fdisk.
4. Familiarization with networking hardware: RJ45 connectors, UTP cables, fibre optics, switches, NICs, routers, wireless access points and modems.
5. Familiarizing basic networking commands - ifconfig, netstat, ping, arp, traceroute, nslookup, ssh, scp, telnet, ftp.
6. Create a basic webpage using HTML elements including headings, paragraphs, lists, tables, images and hyperlinks.
7. Structure a webpage using semantic HTML elements and `<div>` containers to organize content.
8. Apply CSS selectors and properties to style webpages using colours, fonts, backgrounds, borders, margins, and padding.
9. Design webpage layouts using CSS positioning and layout properties.
10. Develop simple JavaScript programs to perform arithmetic operations, conditional statements and iterative computations within a webpage.
11. Develop a simple interactive website by integrating HTML, CSS and JavaScript concepts. (eg:- Develop a webpage that performs arithmetic calculations and displays the results using JavaScript.)
12. Introducing Repositories - Git / Bitbucket

**Course Assessment Method**

**(CIE: 40 marks, ESE: 60 marks)**

**Continuous Internal Evaluation Marks (CIE) :**

| Attendance | Continuous Assessment (Accurate Execution of Programming Tasks) | Internal Examination-1 (Written Examination) | Internal Examination-2 (Written Examination) | Internal Examination-3 (Lab Examination) | Total |
|---|---|---|---|---|---|
| 5 | 5 | 10 | 10 | 10 | 40 |

**End Semester Examination Marks (ESE) :**

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions.

| Part A | Part B | Total |
|---|---|---|
| ● 2 Questions from each module.<br>● Total of 8 Questions, each carrying 3 marks<br><br>**(8x3 =24 marks)** | ● Each question carries 9 marks.<br>● Two questions will be given from each module, out of which 1 question should be answered.<br>● Each question can have a maximum of 3 subdivisions.<br><br>**(4x9 = 36 marks)** | **60** |

**Course Outcomes**

At the end of the course students should be able to:

| Course Outcomes | | Blooms Taxonomy Level |
|---|---|---|
| CO1 | Identify the fundamental components and functions of computer hardware. | K2 |
| CO2 | Interpret various data representation techniques and CPU architectures to explain computer operations. | K2 |
| CO3 | Apply the concepts of system software and the fundamental principles of computer communication to identify, configure and utilize in common networking devices. | K3 |
| CO4 | Design basic interactive web pages using HTML, CSS and JavaScript with appropriate input validation. | K3 |

*Note: K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5- Evaluate, K6- Create*

**Mapping of Course Outcomes with Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| CO2 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| CO3 | 3 | 3 | - | - | - | - | - | - | - | - | - |
| CO4 | 3 | 3 | 3 | 2 | 3 | - | - | - | - | - | 2 |

*Note: 1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High), - : No Correlation*

**Text Books**

| Sl No | Title of Book | Name of Author/s | Publisher | Edition and Year |
|---|---|---|---|---|
| 1 | Invitation to Computer Science | G. Michael, Schneider, Judith Gersting | Cengage | 2/e , 2020 |
| 2 | The Architecture of Computer Hardware, Systems Software & Networking: An Information Technology Approach | Irv Englander | Wiley | 5/e, 2014 |
| 3 | HTML, CSS, and JavaScript All in One, Sams Teach Yourself | Julie C. Meloni Jennifer Kyrnin | Pearson | 1/e, 2020 |

**Reference Books**

| Sl No | Title of Book | Name of Author/s | Publisher | Edition and Year |
|---|---|---|---|---|
| 1 | The Elements of Computing Systems, Building a Modern Computer from First Principles | Noam Nisan and Shimon Schocken | The MIT Press | 2/e, 2021 |
| 2 | Web Design with HTML, CSS, JavaScript and Jquery | Jon Duckett | Wiley | 1/e, 2014 |
| 3 | Fundamentals of Computers | Rajaraman V and Adabala N | PHI Learning | 6/e, 2015 |
| 4 | Your UNIX/Linux: The Ultimate Guide | Das. S | McGraw-Hill Education | 3/e, 2013 |

**Video Links or any other Reference Materials**

| Sl No | Details Like Weblink, Publication Details | Module |
|---|---|---|
| 1 | https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_cs88 | 1 |

| Sl No | Details Like Weblink, Publication Details | Module |
|---|---|---|
| 2 | https://onlinecourses.nptel.ac.in/e-learning/preview/noc23_cs67 | 2 |
| 3 | https://www.coursera.org/learn/computer-hardware-software?specialization=introduction-computer-infosystems | 1, 3 |
| 4 | https://onlinecourses.swayam2.ac.in/e-learning/preview/nou24_cs09 | 4 |

**Continuous Assessment (5 Marks)**

**Accurate Execution of Programming Tasks**

- Correctness and completeness of the program
- Efficient use of programming constructs
- Handling of errors
- Proper testing and debugging 2. Model Question Paper

**Evaluation Pattern for Lab Examination (10 Marks)**

- Algorithm (2 Marks)
  Algorithm Development: Correctness and efficiency of the algorithm related to the question.
- Programming (3 Marks)
  Execution: Accurate execution of the programming task.
- Result (3 Marks)
  Accuracy of Results: Precision and correctness of the obtained results.
- Viva Voce (2 Marks)
  Proficiency in answering questions related to theoretical and practical aspects of the subject.

**Model Question Paper**

| **MODEL QUESTION PAPER** | | | |
|---|---|---|---|
| **FEDERAL INSTITUTE OF SCIENCE AND TECHNOLOGY(FISAT) (Autonomous)<br>FIRST SEMESTER B. TECH DEGREE EXAMINATION (2026 Scheme)** | | | |
| **Course Code: 26ABNES201<br>Course Name : Introduction to Computing Systems and Web Design** | | | |
| **Programme : CSE/CSD/ECE/EEE/EIE** | | | |
| **Max. Marks: 60** | | **Duration: 2 hours 30 minutes** | |
| **PART A** | | | |
| ***(Answer all questions. Each question carries 3 marks)*** | | **CO** | **Marks** |
| 1 | List the different components of Motherboard. | CO1 | (3) |
| 2 | Explain the boot process in a computer, from power-on to loading | CO1 | (3) |

| | | | | |
|---|---|---|---|---|
| | | the operating system. | | |
| 3 | | Explain how a CPU executes an arithmetic operation (e.g., addition of two numbers) using the fetch-execute cycle. | CO2 | (3) |
| 4 | | Illustrate unsigned integer representation and signed integer representation with an example. | CO2 | (3) |
| 5 | | Consider a multi-office company with each office site within the city. The offices are equipped with a network of computers. Explain the possible type of networks involved in the communication between two computers of the company. | CO3 | (3) |
| 6 | | Explain the features of WWW. | CO3 | (3) |
| 7 | | Create an unordered list and a hyperlink using HTML. | CO4 | (3) |
| 8 | | In what situations would JavaScript be more useful than HTML and CSS alone? Provide an example. | CO4 | (3) |
| **PART B** | | | | |
| ***(Answer any one full question from each module, each question carries 9 marks)*** | | | | |
| **Module - I** | | | **CO** | **Marks** |
| 9 | a) | Discuss the memory hierarchy in a computer system, explaining the functions of registers, cache memory, RAM and virtual memory. | CO1 | (5) |
| | b) | What are the advantages of using SSDs over HDDs for data storage? | CO1 | (4) |
| 10 | a) | Explain the hardware architecture of a computer. | CO1 | (5) |
| | b) | Explain the different types of interface cards and buses? | CO1 | (4) |
| **Module - II** | | | **CO** | **Marks** |
| 11 | a) | A new character encoding system is being developed for a multilingual application. Explain why Unicode would be preferred over ASCII for such purposes. | CO2 | (5) |
| | b) | Describe the function of an instruction set and explain how it facilitates software – hardware interaction. | CO2 | (4) |
| 12 | a) | Explain the fetch-decode-execute cycle in detail and describe the sequence of events that occur during instruction execution in a CPU. | CO2 | (5) |
| | b) | Illustrate the addition of two 4-bit binary numbers and explain the | CO2 | (4) |

| | | | | |
|---|---|---|---|---|
| | | process step by step. | | |
| **Module - III** | | | **CO** | **Marks** |
| 13 | a) | A company has multiple offices in different cities and requires seamless data sharing. Compare the suitability of client-server and peer-to-peer networks for this purpose, and recommend the better option. | CO3 | (5) |
| | b) | Provide the Linux commands for the following operations:<br>1. Create a directory<br>2. List all the files and sub folders in a directory<br>3. Copy the contents of a text file<br>4. Change the access permissions of files and directories. | CO3 | (4) |
| 14 | a) | Compare star, mesh and ring network topologies with suitable diagrams. | CO3 | (5) |
| | b) | Examine the components of the World Wide Web, including HTTP and HTTPS protocols. | CO3 | (4) |
| **Module - IV** | | | **CO** | **Marks** |
| 15 | a) | Create an HTML structure for a student registration form. Include the following fields : Name (text input), Age (number input), Gender (radio buttons), and Submit button. | CO4 | (5) |
| | b) | Write a JavaScript program to display an alert box that shows the current date and time when a button is clicked. | CO4 | (4) |
| 16 | a) | Design a webpage using HTML and CSS for an online bookstore. Include a title, a heading, a list of book categories and a basic style. | CO4 | (5) |
| | b) | Write a CSS rule to style a paragraph with the following properties: Font colour: Dark green, Font size: 16px, Line height: 1.5. | CO4 | (4) |
| ****** | | | | |

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