

Introduction to Information Technology

Course Title: Introduction to Information Technology

Course No: CSC109

Nature of the Course: Theory + Lab

Semester: I

Full Marks: 60 + 20 + 20

Pass Marks: 24 + 8 + 8

Credit Hrs: 3

Course Description: This course covers the basic concepts of computers and information technology including introduction, hardware, software, memory, input/output, data representation, database, networks and data communication, Internet, multimedia, and computer security.

Course Objectives: The main objective of this course is to provide students knowledge of fundamental concepts of computers and information technology.

Detail Syllabus:

Unit 1	Introduction to Computers	Teaching Hours (3)
Introduction	Definition and uses of computers	1 hr
Digital and Analog Computers	Definition and uses of digital and analog computers with example. Differences between digital and analog computers. Definition of hybrid computer.	
Characteristics of Computer	Different characteristics of computers like speed, accuracy, diligence, storage capability, versatility etc.	
History of Computer	History of computers from abacus to recent development.	
Generations of Computer	Generations of computers from first to fifth along with characteristics of each generation.	1 hr
Classification of Computer	Classification of computers based on size and type: super-computer, mainframe-computer, mini-computer, micro-computer. Characteristics of each class.	
The Computer System	The four parts of computer system: hardware, software, data and users. Input-process-output concept. Components of computer hardware: input/output unit, central processing unit, and memory unit.	1hr
Application of Computers	Applications of computers in different sectors like education, health, agriculture, entertainment, scientific research, sports etc.	
Unit 2	The Computer System Hardware	Teaching Hours (3)
Introduction	Computer hardware definition. Different hardware components.	1 hr
Central Processing Unit (CPU)	CPU and its functions. Different components of CPU: arithmetic logic unit, registers, control unit	
Memory Unit	Memory and its functions. Cache memory, primary memory, and secondary memory.	
Instruction Format	What is instruction format? Concept of operation	1 hr

	code and operand code.	
Instruction Set	Definition and example of instruction set.	
Instruction Cycle	Fetching, decoding, executing, and storing steps of instruction cycle.	
Microprocessor	What is microprocessor? RISC and CISC architecture. Concept of pipeline and parallel processing.	1 hr
Interconnecting the Units of a Computer	Concept and types of bus. Concept of external ports.	
Inside a Computer Cabinet	Concept of different components inside a computer cabinet like motherboard, ports and interfaces, expansion slots, memory chips, processor, hard disk etc.	
Unit 3	Computer Memory	Teaching Hours (4)
Introduction	Definition of computer memory.	1 hr
Memory Representation	Description of bit, byte, kilobyte, megabyte, gigabyte and terabyte.	
Memory Hierarchy	Memory hierarchy from registers to magnetic tape. Internal and secondary memory.	
CPU Registers	Description of CPU registers as working memory.	1 hr
Cache Memory	Description cache memory and its levels.	
Primary Memory	What is primary memory? Different types of primary memory.	
Secondary Memory	What is secondary memory? Different types of secondary memory?	
Access Types of Storage Devices	Sequential access and direct access.	2 hr
Magnetic Tape	Description, working mechanism, and features magnetic tape.	
Magnetic Disk	Description, working mechanism, and features magnetic disc. Different types of magnetic disks.	
Optical Disk	Description, working mechanism, and types of optical disks.	
Magneto-Optical Disk	What is magneto-optical disk?	
How the Computer uses its memory	Different memory used by computers from the moment the computer is switched on till the time it is switched off.	
Unit 4	Input and Output Devices	Teaching Hours (4)
Introduction	Definition and uses of input/output devices.	1 hr
Input-Output Unit	Description of input and output unit.	
Input Devices	What is input device?	
Human Data Entry Devices	Keyboard, mouse, trackball, joystick, digitizing tablet, light pen, touch screen.	
Source Data Entry Devices	Speech recognition, digital camera, scanner, OCR, OMR, MICR, barcode reader.	2 hr
Output Devices	Hard copy devices – printer (different types), plotter. Soft copy devices – Monitor, projector,	

	speaker.	
I/O Port	Concept of I/O port. Serial, parallel, USB, firewire ports.	1 hr
Working of I/O System	Detail working of I/O system. I/O hardware and I/O software.	
Unit 5	Data Representation	Teaching Hours (6)
Introduction	Different types of data.	1 hr
Number System	Introduction to number system, different types of number systems.	
Conversion from Decimal to Binary, Octal, Hexadecimal	Conversion of both decimal integer and decimal fraction.	
Conversion of Binary, Octal, Hexadecimal to Decimal	Conversion of Binary, Octal, Hexadecimal to Decimal.	2 hr
Conversion of Binary to Octal, Hexadecimal	Conversion of Binary to Octal, Hexadecimal.	
Conversion of Octal, Hexadecimal to Binary	Conversion of Octal, Hexadecimal to Binary.	
Binary Arithmetic	Binary addition and subtraction.	2 hr
Signed and Unsigned Numbers	Signed and Unsigned Numbers, Complement (1's and 2's) of binary numbers.	
Binary Data Representation	Fixed point and floating point number representation.	
Binary Coding Schemes	Introduction to EBCDIC, ASCII, and Unicode.	1 hr
Logic Gates	What is logic gate? Basic logic gates.	
Unit 6	Computer Software	Teaching Hours (6)
Introduction	Definition of computer hardware and computer software.	3 hr
Types of Software	Classification of software: system software and application software.	
System Software	Definition and purpose of system software, system software for computer management and for developing software.	
Application Software	What is application software? Types of application software.	
Software Acquisition	The different ways in which software is made available to the users.	
Operating System (Introduction, Objectives of Operating System, Types of OS, Functions of OS, Process Management, Memory Management, File	Operating System (Introduction, Objectives of Operating System, Types of OS, Functions of OS, Process Management, Memory Management, File Management, Device Management, Protection and Security, User Interface, Examples of Operating Systems).	3 hr

Management, Device Management, Protection and Security, User Interface, Examples of Operating Systems)		
Unit 7	Data Communication and Computer Network	Teaching Hours (5)
Introduction	What is data communication? What is computer network?	2 hr
Importance of Networking	Different uses of computer network.	
Data Transmission Media	Guided (twisted pair cable, coaxial cable, and optical fiber cable) and unguided (radio, microwave, and satellite transmission) media.	
Data Transmission across Media	Transmission modes, transmission speed, electromagnetic wave, signal.	1 hr
Data Transmission and Data Networking	Point-to-point communication and switching.	
Computer Network	Introduction to computer network.	
Network Types	LAN, MAN, WAN	
Network Topology	What is network topology? Bus, ring, star, tree, mesh, and hybrid topologies.	2 hr
Communication Protocol	What is communication protocol? ISO model and its seven layers.	
Network Devices	NIC, Repeater, Bridge, Hub, Switch, Router and Getway.	
Wireless Networking	Introduction and uses of wireless networking. Bluetooth, wireless LAN and Wireless WAN.	
Unit 8	The Internet and Internet Services	
Introduction	What is Internet?	1 hr
History of Internet	History of Internet.	
Internetworking Protocol	Introduction to TCP/IP.	
The Internet Architecture	Client, ISP, Regional ISP, and Backbone.	
Managing the Internet	Governing bodies of the Internet.	1 hr
Connecting to Internet	How to connect to the Internet?	
Internet Connections	Different internet connections.	
Internet Address	IP address and domain names.	
Internet Services	WWW, Email, FTP, Telnet.	
Uses of Internet	Different uses of Internet.	2 hr
Introduction to Internet of Things (IoT), Wearable Computing, and Cloud Computing	Introduction and applications of IoT, wearable computing and cloud computing.	
Introduction to E-commerce, E-	What is e-commerce? Types of e-commerce. Introduction and applications of e-governance,	

governance, Smart City, and GIS	Smart city, and GIS.	
Unit 9	Fundamentals of Database	Teaching Hours (4)
Introduction	Introduction	2 hr
Database	What is database? File-oriented approach and database approach. Benefits of database approach. E-R model and relational model.	
Database System	Introduction, components, and architecture.	
Database Management System	What is DBMS? Database language. Database administrator.	
Database System Architectures	Centralized, client/server, and distributed databases.	1 hr
Database Applications	Different applications of database.	
Introduction to Data Warehousing, Data mining, and BigData	Introduction to Data Warehousing, Data mining, and BigData	1 hr
Unit 10	Multimedia	Teaching Hours (3)
Introduction	What is multimedia?	1 hr
Multimedia Definition	Definition of multimedia.	
Characteristics of Multimedia	Four basic characteristics.	
Elements of Multimedia	Text, graphics, audio, video, animation.	2 hr
Multimedia Applications	Different applications of multimedia	
Unit 11	Computer Security	Teaching Hours (3)
Introduction	Introduction to computer security.	1 hr
Security Threat and Security Attack	What is security threat? Security attack and its types.	
Malicious Software	Virus, worm, trojan horse.	
Security Services	Confidentiality, integrity, authentication, non-repudiation	
Security Mechanism (Cryptography, Digital Signature, Firewall, User Identification and Authentication, Intrusion Detection Systems)	What is security mechanism? What is cryptography? Introduction to secret key and public key cryptography. Introduction to hash function and digital signature. Firewall, its functions, and types. User identification and authentication - user name and password, smart card, and biometrics. Introduction to intrusion detection systems.	2 hr
Security Awareness	What is security awareness?	
Security Policy	What is security policy? Formulating security policy.	

Text Books:

1. Computer Fundamentals, Anita Goel, Pearson Education India

Reference Books:

1. Introduction to Computers, Peter Norton, 7th Edition, McGraw Hill Education
2. Computer Fundamental, Pradeep K. Sinha and Priti Sinha
3. Data Mining Concepts and Techniques, Third Edition, Jiawei Han, Micheline Kamber and Jian Pei
4. Cloud Computing Bible, Barrie Sosinsky, Wiley

Laboratory Works:

After completing this course, students should have practical knowledge of different hardware components of computer, operating systems, Word Processors, Spreadsheets, Presentation Graphics, Database Management Systems, and Internet and its services. The laboratory work includes:

1. Demonstration of different hardware components of a computer.
2. Knowledge of different operating systems like Windows, Linux, and DOS; Working with folders; Adding and removing programs.
3. Knowledge of different features of word processors like creating, saving, opening, editing, formatting, and printing documents; Using page setup; Working with bullets and numbers; Working with tables, mail merge, macros, and table of contents; Inserting pictures; Checking spelling, thesaurus and grammar.
4. Knowledge of Spreadsheet features like workbooks and worksheets, functions and formulas, cell referencing, sorting, data validation, conditional formatting; Creating charts.
5. Creating presentation slides; Adding animations; Inserting Charts, Graphics, Movies and Sound Clips.
6. Creating tables, query, reports, and forms; Understanding different data types.
7. Understanding Internet and its services like WWW and E-mail; Using search engine; Managing web browsers

Model Question:

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Section A

Attempt any two questions. ($2 \times 10 = 20$)

1. What is operating system? Discuss different functions of operating system in detail. (2 + 8)
2. Why do we need computer network? Discuss different types of network topologies along with their merits and demerits. (3 + 7)
3. What are the benefits of storing data using databases? Discuss three levels of database system architecture in detail. (3 + 7)

Section B

Attempt any eight questions. ($8 \times 5 = 40$)

4. Discuss characteristics of third generation of computers. Compare it with fourth generation. (3 + 2)
5. Discuss the components of CPU in brief. (5)
6. What is primary memory? Discuss different types of primary memory. (1 + 4)
7. Define hard-copy and soft-copy output. Differentiate between impact and non-impact printers with example. (2 + 3)
8. Convert $(AF7)_{16}$ to binary. Subtract $(1001101)_2$ from $(1100011)_2$. (2 + 3)
9. Define IP address with example. What are the benefits of using domain name? (2 + 3)
10. What are the characteristics of multimedia? Discuss. (5)
11. Define cryptography. Discuss public key cryptography in detail. (1 + 4)
12. Write short notes on: ($2 \times 2.5 = 5$)
 - a. BigData
 - b. E-governance