Information Technology Fundamentals

Course Title: Information Technology Fundamentals
Course No.: CSIT.112
Nature of the Course: Theory+Lab
Level: B.Sc. CSIT
Year: First
Semester: First

Credit: 3
Number of hours per week: 3
Total hours: 48

1. Course Introduction

Fundamental concept of Information technology, Computer systems, computer hardware and Software, input, output and storage devices, Binary system, programming languages, Data files and DBMS, fundamental concept of telecommunication, networking and internet and application of computer systems.

2. Objectives

This course introduces fundamental concepts of Information Technology and Computer Systems.

3. Contents in detail with Specific objectives

Specific Objectives	Contents
• What is data and information? • Describe processing cycle. • Describe what is hardware and software. • Understand the evolution of computers, from refining of abacus to supercomputers. • Understand the advancement in technology that has changed the way computers operate, efficient, size, and cost. • Classify different computers, networks, software's • Understand computer programming languages • Classify different programming languages • Understand the purpose of programming languages, facilities and various common examples.	**Unit I: Computer Concepts (4 Hrs)** Ideas of Information, Information Processing and Data. The Data Processing Cycle. Examples of computer applications. Definition of Hardware; broad classes of computers (mainframe, mini and microcomputers) and networks. Computer programs. The computer as a programmable device. Classes of software (system and application). Programming languages: purpose, facilities and common examples.
• Understand the basic units of computer system (Anatomy of a Digital Computer) • Understand how the basic digital computer is organized • Describe the purpose of basic units of computer systems.	**Unit II: Computer Hardware (4 Hrs)** The Central Processing Unit (Control Unit, Arithmetic and Logic Unit, Main Memory). Peripherals. The organization of a simple computer. The storage of programs and data. Data and Control paths in the computer (buses or highways). The Fetch-execute Cycle.

• Learn about the digital symbols, base. • Understand with the coding schemes for the internal storage of characters. • Understand what are on-line and off-line peripherals and data. • Understand what is verification and validation of data.	**Unit III: Data (2 Hrs)** Its Representation and Input: The Stages (collection, Preparation, verification, input methods). Input Devices and Media. On-line and Off-line peripherals. Verification and Validation methods.
• Familiarise with the various types of input devices along with their advantages, disadvantages, and applications.	**Unit IV: Input Devices (2 Hrs)** Description of common input devices and media (such as keyboards, light pens, mice, magnetic stripe readers, punched media, magnetic and optical character recognition, mark readers...), including simple physical principles of operation and practical applications.
• Familiarize with the various types of output devices to get desired result that may be in various from viz text, graphics, audio, and video; along with their advantages, disadvantages, and applications.	**Unit V: Output Methods, Devices and Media (2Hrs)** Description of Displays, Printers, Plotters and Computer Output on Microfilm, including simple physical principles of operation and applications.
• Understand the purpose of memory. • Familiarize with the different category of memories, units of storage, access time. • Discuss various types of primary and secondary memories with their storage organization.	**Unit VI: Computer Storage (4 Hrs)** Levels of storage: register, main and backing store. Units of storage (bytes and words) and capacities (Kbytes, Mbytes, Gbytes and TBytes). Definition of Access Time. Principles of construction of magnetic tape drives, magnetic disc drives (floppy and hard drives), CD-ROM and DVD; recordable and rewritable compact discs: CD-R and CD-RW.
• Learn about the binary number system and its advantages. • Representation of various number systems, methods of number system conversions. • Specify the rules to perform four principle arithmetic operations-addition, subtraction, multiplication, division of binary numbers with the help of suitable examples • Define two types of real numbers viz. fixed point representation, floating point representation; within floating point(non-normalized and normalized) and their representations in computer	**Unit VII: The Binary System (5 Hrs)** Reasons for employing binary in a computer. The advantages and disadvantages of binary. The binary representation of numbers, characters and program instructions. Octal and Hexadecimal forms. Conversion between decimal, binary, octal and hexadecimal integers. Binary addition. Arithmetic overflow. Boolean logic. Simple AND, OR and NOT functions in two and three variables. Truth Tables. Half-adder and Full-adder logic. Logic diagrams.

memory • Understand truth table and half-adder and full-adder operations	
• Discuss the prominent concepts to natural languages and computer languages. • Acquaints with the different generations of programming languages with their advantages and disadvantages • Elaborates the stages required during translation process (HLL, Assembly language to machine code). • Understand the concept of visual programming language and platform independent. • Outlook on the basic role of operating system in modern day computers; • Learn about the different types of operating systems; • Provide an overview of UNIX/LINUX operating system.	**Unit VIII: Programming Languages (7 Hrs)** Ideas of generations of programming languages: fourth generation (4GL), third generation ('high level'), assembly and binary machine code. Suitable applications for each level; comparisons between the levels. Translator programs - compilers, interpreters and assemblers; source code and object code. The concept of 'visual' languages. Java and the platform independence of its programs. The concept of operating system, functions of operating system, component of operating system, types of operating system. An overview of UNIX operating system.
• Understand the concept behind database, file, record, field and character. • Understand different types of data files and access methods.	**Unit IX: Data Files (4 Hrs)** Definitions of file, record, field and character. The concepts of file organization file access and file processing (updating). The main types of data file such as master and transaction. Serial, sequential and indexed sequential organization. Direct access and serial access. Updating sequential (tape or disc) files and indexed sequential files. Concepts of a simple database.
• Explain the computer related terms, communication networks, and flow of information through different forms of channel. • Understand the concept of serial and parallel transmission, different transmission modes.	**Unit X: Simple Telecommunications (4 Hrs)** Serial and Parallel transmission compared. Simplex, Half-duplex and Duplex modes. Modems and Multiplexors. Simple Interfaces. Character Codes. Basic communications facilities and the concept of bandwidth.
• Understand the various applications of computer systems in different organizations in terms of purpose, hardware, data, processes, outputs, advantages and limitations.	**Unit XI: Common Applications of Computer Systems (4 Hrs)** Non-technical descriptions (purpose, hardware, data, processes, outputs, advantages and limitations) in banking, education, engineering, police, hospitals, credit reference, meteorology, airline reservation and stock control.

• Describe computer networks and its various types. • Discuss various computer network topologies. • Understand the concept of WWW, Internet in terms of their uses, advantages and disadvantages. • Learn about the different browsers and its uses. • Learn various internet application viz email, FTP. • Understand fundamental concepts of HTTP and its uses.	**Unit XII: Networking and the Internet (6 Hrs)** Concepts of Local Area Networks, Wide Area Networks and the Internet. Computer network topologies. The World Wide Web: the concept, its uses and possible disadvantages. Internet Service Providers. Web pages: construction and access; the role of Hypertext Markup Language (HTML) and Java. The concept of electronic mail and its basic uses. The basic functions of browsers.

Evaluation System:

Undergraduate Programs				
External Evaluation	**Marks**	**Internal Evaluation**	**Weightage**	**Marks**
End semester examination	60	Assignments	10%	40
(Details are given in the separate table at the end)		Quizzes	10%	
		Attendance	10%	
		Presentation	10%	
		Term papers	10%	
		Mid-Term exam	40%	
		Group work	10%	
Total External	60	Total Internal	100%	40
Full Marks 60+40 = 100				

External evaluation

End semester examination: It is a written examination at the end of the semester. The questions will be asked covering all the units of the course. The question model, full marks, time and others will be as per the following grid.

Full Marks: 100, Pass Marks: 50, Time: 3 Hrs

Nature of question	Total questions to be asked	Total questions to be answered	Total marks	Weightage	External exam marks
Group A: multiple choice*	20	20	20×1 = 20	20%	12
Group B: Short answer type questions	11 questions	8	8×5 = 40	40%	24
Group C: Long answer type question/case studies	6 questions	4	4×10 =40	40%	24
			100	100%	60

*Scoring scheme will not follow negative marking.

Each student must secure at least 50% marks in internal evaluation in order to appear in the end semester examination. Failing to get such score will be given NOT QUILIFIED (NQ) and the student will not be eligible to appear in the end semester examinations.
Practical examination: Practical examination will be taken at the end of the semester. Students must demonstrate the knowledge of the subject matter.

Internal evaluation

Assignment: Each student must submit the assignment individually. The stipulated time for submission of the assignment will be seriously taken.
Quizzes: Unannounced and announced quizzes/tests will be taken by the respective subject teachers. Such quizzes/tests will be conducted twice per semester. The students will be evaluated accordingly.
Attendance in class: Students should regularly attend and participate in class discussion. Eighty percent class attendance is mandatory for the students to enable them to appear in the end semester examination. Below 80% attendance in the class will signify NOT QUALIFIED (NQ) to attend the end semester examination.
Presentation: Students will be divided into groups and each group will be provided with a topic for presentation. It will be evaluated individually as well as group-wise. Individual students have to make presentations on the given topics.
Term paper: Term paper must be prepared by using computer in a standard format of technical writing and must contain the required number of pages. It should be prepared and submitted individually. The stipulated time for submission of the paper will be seriously taken as one of the major criteria of the evaluation.
Mid-term examination: It is a written examination and the questions will be asked covering all the topics in the session of the course.
Discussion and participation: Students will be evaluated on the basis of their active participation in the classroom discussions.
Instructional Techniques: All topics are discussed with emphasis on real-world application. List of instructional techniques is as follows:

- Lecture and Discussion
- Group work and Individual work
- Self study
- Assignments
- Presentation by Students
- Term Paper writing
- Quizzes
- Guest Lecture

Students are advised to attend all the classes and complete all the assignments within the specified time period. If a student does not attend the class(es), it is his/her sole responsibility to cover the topic(s) taught during that period. If a student fails to attend a formal exam/quiz/test, there won't be any provision for re-exam. Unless and until the student clears one semester he/she will not be allowed to study in the following semesters.