

IT ESSENTIALS (Theory)
I Year B. Tech. I Semester
(IT)

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3 0 2 4

Course Outcomes (COs)

At the end of the course, the student shall be able to

CO1: Explain the architecture and components of modern computer systems and operating systems. (L2)

CO2: Demonstrate the installation, configuration, and maintenance of operating systems and software applications. (L3)

CO3: Explain networking fundamentals, Internet technologies, cloud computing, and cybersecurity concepts. (L2)

CO4: Apply Linux commands and productivity tools for solving day-to-day computing tasks. (L3)

CO5: Describe emerging technologies such as Artificial Intelligence, Internet of Things, Virtualization, and Green Computing and their applications. (L2)

UNIT-I (10 Lectures)

Computer Fundamentals: Evolution of Computers, Generations of Computers, Functional Units of a Computer, CPU Architecture, Memory Organization, Number Systems, Data Representation, Input Devices, Output Devices, Storage Devices, Motherboard Components, BIOS/UEFI, Booting Process.

Learning Outcomes

Students will be able to:

- Explain computer architecture.
- Identify hardware components.
- Describe memory hierarchy.
- Explain the booting process.

UNIT-II (10 Lectures)

Operating Systems:

Introduction to Operating Systems, Types of Operating Systems, Windows Operating System, Linux Operating System, File Systems, Process Management, Memory Management, Software Installation, Device Drivers, Software Troubleshooting, System Utilities.

Learning Outcomes

Students will be able to

- Explain OS functions.
- Compare Windows and Linux.
- Install and configure software.
- Troubleshoot common software issues.

UNIT-III (10 Lectures)

Computer Networks and Internet:

Network Fundamentals, Types of Networks, Network Topologies, Network Devices, IP Addressing, DNS, DHCP, Web Browsers, Email, FTP, Remote Access, Network Security Basics.

Learning Outcomes

Students will be able to

- Explain networking concepts.
- Identify networking devices.
- Configure basic network settings.
- Explain Internet services.

UNIT-IV (10 Lectures)

Linux, Cloud Computing and Productivity Tools:

Linux Architecture, Shell, File System, Basic Linux Commands, Cloud Computing, Google Workspace, Microsoft 365, Cloud Storage, Collaboration Tools, Git & GitHub, Virtual Machines.

Learning Outcomes

Students will be able to

- Use Linux commands.
- Manage files and directories.
- Use cloud collaboration tools.
- Understand version control basics.

UNIT-V (10 Lectures)

Cybersecurity and Emerging Technologies:

Cybersecurity Fundamentals, Malware, Antivirus, Firewall, Password Security, Multi-factor Authentication, Data Privacy, Artificial Intelligence, Machine Learning, Internet of Things, Blockchain, Green Computing, Digital Ethics.

Learning Outcomes

Students will be able to

- Identify cyber threats.
- Apply basic security practices.
- Explain AI and IoT concepts.
- Describe emerging computing technologies.

Text Books

1. Peter Norton, Introduction to Computers, 6th Edition, McGraw-Hill, 2007.

2. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 10th Edition, Wiley, 2018.
3. Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw-Hill, 2012.
4. Mark G. Sobell, A Practical Guide to Linux Commands, Editors, and Shell Programming, 4th Edition, Pearson, 2018.
5. William Stallings, Cryptography and Network Security: Principles and Practice, 7th Edition, Pearson, 2016.

Reference Books

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2010.
2. Eric S. Raymond, The Art of Unix Programming, 1st Edition, Addison-Wesley, 2003.
3. Bruce Schneier, Applied Cryptography: Protocols, Algorithms, and Source Code in C, 2nd Edition, Wiley, 1995.

IT ESSENTIALS (LAB)

1. PC Hardware Identification & Assembly Basics
2. Windows OS Installation & Configuration
3. Linux OS Installation & Navigation
4. Linux Commands & File Management (ls, cd, mkdir, chmod, grep, find, sed, awk)
5. File Permissions & User Management in Linux
6. Network Configuration & Troubleshooting (ping, traceroute, netstat, DNS)
7. Git & GitHub (Initialize repo, commit, push, pull, branching)
8. Google Workspace & Microsoft 365 Collaboration
9. Virtual Machine Setup (VirtualBox/VMware)
10. Cybersecurity Tools & Best Practices (password managers, antivirus, firewall)
11. Data Backup, Compression & Recovery (zip, tar, backup strategies)
12. AI Tools for Productivity (ChatGPT, Copilot, Gemini - responsible use)
13. System Administration & Monitoring (process management, logs, resource allocation)
14. IoT & Emerging Technologies Exploration (IoT concepts, Blockchain, Green Computing)

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1. M. Morris Mano, Digital Logic and Computer Design, 4th Edition, Pearson, 2007.
2. Andrew S. Tanenbaum, Albert S. Woodhull, Operating Systems: Design and Implementation, 3rd Edition, Pearson, 2006.
3. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2010.