GUJARAT TECHNOLOGICAL UNIVERSITY

Program Name: Engineering

Level: Diploma

Branch: Instrumentation & Control Engineering

Course / Subject Code: DI01017021

Course/Subject Name: Basics of Information Technology Systems

w. e. f. Academic Year:	2024-25
Semester:	1st
Category of the Course:	ESC-01

Prerequisite:	Basic knowledge of Computer and Internet
Rationale:	The syllabus provides diploma Instrumentation Engineering students with foundational IT knowledge crucial for modern instrumentation systems. It covers key concepts, networking, and internet applications, ensuring students are well-versed in its role, enhancing their capability to integrate and manage advanced technological solutions in instrumentation engineering.

Course Outcome:

After Completion of the Course, Student will able to:

No	Course Outcomes	RBT Level
CO-1	Understand and describe the fundamental concepts of Information Technology, including the data processing cycle and key components of computer systems.	U
CO-2	Classify different types of computer networks and topologies, and identify the functions of various network devices.	U
CO-3	Apply knowledge of internet protocols and web technologies to effectively use and navigate internet services.	A
CO-4	Identify the impact of IT on society by listing examples of e-learning, e-governance, and digital financial services, and recognize common information security challenges.	R

**Revised Bloom's Taxonomy (RBT)*

Teaching and Examination Scheme:

Teaching Scheme (in Hours)			Total Credits L+T+ (PR/2)	Assessment Pattern and Marks				Total Marks
				Theory		Tutorial / Practical		
L	T	PR	C	ESE (E)	PA / CA (M)	PA/CA (I)	ESE (V)	
2	0	2	3	70	30	20	30	150

Course Content:

Unit No.	Content	No. of Hours	% of Weightage
1	**Introduction to Information Technology and Computer Systems**	08	25
	1.1 Define Information Technology (IT). **1.2** The role of IT in modern society and business. **1.3** The Block Diagram of IT-Enabled Systems. **1.4** Define Data and Information. **1.5** Data Processing Cycle (How Raw Data converted to Information) **1.6** Components of Computer-Based Processing Systems. **1.4.1** Input Devices **1.4.2** Central Processing Unit (CPU) **1.4.3** Memory **1.** Random Access Memory (RAM) **2.** Read-Only Memory (ROM) **3.** Cache Memory **1.4.4** Hard Disk Drives (HDDs) **1.4.5** Solid State Drives (SSDs) **1.4.6** Output Devices **1.4.7** Motherboard **1.4.8** Power Supply Unit (SMPS) **1.7** System Software **1.5.1** Operating Systems (Windows, macOS, Linux) **1.5.2** Utilities (Antivirus Software, Disk Management Tools) **1.8** Application Software **1.9** Open Source vs Proprietary Software		
2	**Basics of Computer Networks and Devices.**	10	35
	2.1 Introduction of computer network. **2.2** Advantages of computer network. **2.3** Types of Computer Networks : LAN, MAN, WAN **2.4** Types of Computer Topology : Star, Bus, Mesh ,Ring **2.5** Network Interface Devices : NIC, Hub, Switch, Router, Repeater, Bridge **2.6** Communication Modes : Simplex , Half-Duplex , Full-Duplex **2.7** Signal transmission media :		

	2.7.1 Guided Media : Twisted pair, Coaxial cable, Fiber optics **2.7.2** Unguided Media : Radio waves, Microwaves, Satellite		
3	**Basics of Internet and Services**	06	20
	3.1 Introduction to Internet. **3.2** Common Applications of the Internet. **3.3** Glossary for Internet Basics **3.3.1 Protocols and Standards** • TCP/IP (Transmission Control Protocol/Internet Protocol) • HTTP (Hypertext Transfer Protocol) • HTTPS (Hypertext Transfer Protocol Secure) • FTP (File Transfer Protocol) • DNS (Domain Name System) • IP Address • URL (Uniform Resource Locator) **3.3.2 Web Concepts** • WWW (World Wide Web) • HTML (Hypertext Markup Language) • CSS (Cascading Style Sheets) • JavaScript • Webpage • Website • Web Browser **3.3.3 Communication and Services** • Email (Electronic Mail) • VoIP (Voice over Internet Protocol) • Streaming **3.3.4 Search and Navigation** • Search Engine • Hyperlink		
4	**The Societal Impacts of IT And Challenges**	06	20
	4.1 E-Learning Platform **4.1.1** Online Courses (Examples: Coursera, edX, Udemy, LinkedIn Learning)		

	4.1.2 Learning Management Systems (LMS) (Examples: Moodle, Blackboard, Google Classroom) **4.1.3** Educational Apps and Tools: (Examples: Kahoot, Quizlet, Grammarly) **4.1.4** Virtual Classrooms (Examples: Zoom, Microsoft Teams, and Google Meet) **4.2 E-Governance Platform** Examples: Passport, Sarathi, OJAS, Aadhar card, Digi locker **4.3 Digital Financial Services** **4.3.1** Internet Banking **4.3.2** Mobile Banking **4.3.3** Digital Payments **4.4 Challenges for information security** 4.4.1 Malware (Ex. Ransomware, Trojan, Worm, Spyware, Key Logger, Virus) 4.4.2 Social Engineering Attack (Phishing, Vishing, Smishing) 4.4.3 Network Threat (Sniffer, Botnet, Pharming) **4.5 Combating information security Threat** 4.5.1 Firewall 4.5.2 Data Backup 4.5.3 Virtual Private Network 4.5.4 Encryption 4.5.5 Antivirus Software **4.6 Cyber Security Laws** IT Amendment Act 2008 (Section 66 & 67-Introduction Only)		
	Total	**30 Hrs.**	**100 %**

Suggested Specification Table with Marks (Theory):

Distribution of Theory Marks (in %)					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
20	**60**	**20**	**-**	**-**	**-**

Where R: Remember; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (as per Revised Bloom's Taxonomy)

References/Suggested Learning Resources:

(a) Books:

Sr.	Title of Book	Author Name	Publication/ISBN
1	Introduction To IT system with Lab manual	Prashant Joshi	Khanna Book Publication ISBN: 978-93-91505-58-5
2	Operating systems	Silberschatz , Galvin, Gagne	Wiley & Sons publication ISBN: 978-0-470-12872-5
3	Data Communications and Networking	Behrouz Forouzan	Tata McGraw Hill ISBN: 978-0-07-296775-3
4	Information Technology	Dennis P. Curtin, Kim Foley	Tata McGraw Hills. ISBN-13 : 978-0074635582
5	Introduction to Information Technology	Turban, Rainer	Wiley ISBN-13: 978-0471347804
6	Computer Course	R. Taxali	Tata McGraw Hills. ISBN: 9780070700376, 0070700370
7	Fundamentals of Computers	V. Rajaraman	Prentice Hall India Learning Private Limited. ISBN-13 : 978-8120350670
8	A Computer Laboratory Referral For Diploma & Engineering	T.R.Jagadeesh, M.A. Jayaram,	Universities Press Isbn-13: 978-8173712586
9	Information Technology: Principles and Applications	A. S. Godbole	Tata McGraw Hill - 978-0070609273
10	Information Technology Essentials: An Introduction to Information Technology	O'Brien, Marakas	McGraw-Hill Education -978-0073526237

(b) Open-source software and website:

No.	Resource Name	Web Address
1	OLabs	http://www.olabs.edu.in/
2	Virtual Labs	https://www.vlab.co.in/
3	Swayam Portal	https://swayam.gov.in/
4	Gujarat Cyber Crime	https://gujaratcybercrime.org/eng/
5	Information Technology Act 2000	https://www.meity.gov.in/content/information-technology-act-2000-0
6	Intellectual Property India	https://ipindia.gov.in/
7	TechTerms: Computer Networks	https://www.techterms.com/category/computer-networks

8	Geeks for Geeks: Computer Science	https://www.geeksforgeeks.org/computer-science/
9	Coursera: IT Fundamentals	https://www.coursera.org/learn/it-fundamentals
10	edX: Introduction to Computer Science	https://www.edx.org/course/introduction-to-computer-science
11	MIT Open Courseware: Computer Science	https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/
12	Codecademy: Learn IT Basics	https://www.codecademy.com/learn/learn-it-basics
13	open source aicte EBooks platform	https://ekumbh.aicte-india.org/

Suggested Course Practical List: If any

Sr. No.	Practical Outcomes (PrOs)	Unit No.	CO	Approx. hours required.
1	To disassemble a computer system and identify key components including the motherboard, CPU, SMPS, expansion slots, drives, and storage devices.	1	1	2
2	To install Windows operating system on a identify machine and explore various option selection during installation.	1	1	2
3	Create a flowchart illustrating the data processing cycle and write a brief explanation of each stage, detailing how raw data is converted into information.	1	1	2
4	Create a table comparing open source and proprietary software based on characteristics such as cost, availability, and licensing etc.	1	1	2
5	Installation, Connection, and Utilization of Computer Peripherals.	1	1	2
6	Installation and Uninstallation of Application Software in windows operating system.	1	1	2
7	To create various types of documents and presentations using word processing and presentation software, and to use spreadsheet software for creating a mark sheet of class 10^{th} result sheet.	1	1	4
8	To identify various network interface devices and configure them for basic network communication.	2	2	4
9	Draw a neat Layout of the network setup of a given laboratory area or department.	2	2	2
10	To set up a Local Area Network (LAN) using various network devices and topologies.	2	2	4
11	To learn basic network troubleshooting techniques and tools.	2	2	2

12	To understand IP addressing and configure static and dynamic IP addresses.	3	3	2
13	To explore and understand basic web concepts such as WWW, HTML, CSS, webpages, websites, and web browsers.	3	3	4
14	To explore common applications of the Internet, including email, VoIP, and streaming.	3	3	2
15	To understand and explore various Internet protocols and standards.	3	3	4
16	To gain practical knowledge of digital financial services like internet and mobile banking.	4	4	2
17	To learn how to apply, remove, and change the password of a given computer system to enhance security.	4	4	2
18	Install and use antivirus software to scan for malware.	4	4	4
19	To explore various E-governance portals under the Digital India initiative, understand their features, and identify the services offered.	4	4	2
20	To explore various E-learning portals under the Digital India initiative, understand their features, and identify the services offered.	4	4	2
21	Explore security features of operating systems and tools, try using them and see what happens.	4	4	2
	Minimum 12 Practical Exercises			**30 Hrs**

List of Laboratory / Learning Resources Required:

1. Computers or Laptops
2. Mobile Devices (Smartphones/Tablets)
3. Printers / Scanners
4. External Storage Drives (USB Drives, External HDD/SSD)
5. Routers and Switches
6. Network Cables (Ethernet cables)
7. Projector or Display Screens
8. Web Browsers (e.g., Chrome, Firefox, Edge)
9. Online Course Platforms (e.g., Coursera, edX, Udemy)
10. Learning Management Systems (e.g., Moodle, Google Classroom)
11. Educational Apps (e.g., Kahoot, Quizlet, Grammarly)
12. Virtual Classroom Software (e.g., Zoom, Microsoft Teams)
13. E-Governance Portal Accounts (e.g., Aadhar, DigiLocker, Passport Seva)
14. Antivirus Software (e.g., Norton, McAfee, Avast)

15. Firewall Software (e.g., Windows Defender Firewall)
16. Encryption Tools (e.g., VeraCrypt, BitLocker)
17. Backup Software (e.g., Acronis True Image, Backblaze)
18. Digital Payment Apps (e.g., PayPal, Google Pay)
19. Document Editing Software (e.g., Microsoft Word, Google Docs)
20. Presentation Software (e.g., Microsoft PowerPoint, Google Slides)
21. Spreadsheet Software (e.g., Microsoft Excel, Google Sheets)

Suggested Project List:

The projects serve as practical learning experiences for students in the field of Instrumentation and Control Engineering. These projects integrate theoretical knowledge with hands-on application, fostering competency development across various Course Outcomes (COs). Below are guidelines for designing and executing micro-projects:

1. Digital India Platform: Awareness Campaign
Objective: Demonstrate various Digital India initiatives to raise awareness about digital literacy.
Description: Create a presentation or video showcasing key Digital India initiatives, their benefits, and how they enhance digital literacy among Indian citizens.

2. Linux Operating System Installation
Objective: Install a Linux operating system using virtualization software.
Description: Use VMware or Virtual Box to install a Linux OS (e.g., Ubuntu) and configure basic settings.

3. Networking Devices Report
Objective: Prepare a report on various network connecting devices used at home or in the institute lab.
Description: Identify and document network devices such as routers, switches, hubs, and NICs, including their functions and configurations.

4. Information Security Case Study
Objective: Prepare a case study on various cyber-attacks currently prevalent in the marketplace.
Description: Research and analyse recent cyber-attacks, their impacts, and mitigation strategies.

Suggested Activities for Students: If any

In addition to classroom and laboratory learning, students are encouraged to engage in co-curricular activities that enhance their understanding and practical skills. These activities can be conducted in groups and should be documented in 5-page reports. Collecting physical evidence of their work will also contribute to their portfolio, which can be valuable during placement interviews.

1. Digital India Portfolio

Objective: Create a portfolio that identifies and details digital services available for Indian citizens under the Digital India initiative.

Description: Compile information on various digital services, including e-governance, digital financial services, and e-learning platforms.

2. Seminar on Latest Technologies

Objective: Conduct a seminar on the latest technologies and applications in demand.

Description: Present current technological trends, their applications, and future outlooks.

3. Home Network Structure Identification

Objective: Identify and document the existing network structure of your home.

Description: Analyse the network setup at home, including devices and their configurations.

4. Cyber-Crime Case Study

Objective: Prepare a case study on cyber-crime, focusing on recent incidents and trends.

Description: Research recent cyber-crime cases, their impact, and preventive measures.

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