PART A: Introduction			
Program: **Diploma**	Class: **B.Sc.**	Year: **II Year**	Session: **2022-23**

Subject: **Computer Science**		
1.	Course Code	S2-COSC1T
2.	Course Title	**Computer Networks & Information Security**
3.	Course Type (Core Course/ Elective/ Generic Elective/ Vocational	**CoreCourse -(Major – I)**
4.	Pre-Requisite (if any)	NIL
5.	Course Learning Outcomes (CLO)	**After completing this course student will be able to:** 1. Define and describe the components of Data Communications System such as various protocols, OSI Model, data transmission in analog and digital format. 2. Identify and differentiate among the network devices and drivers. 3. Learn and describe various error detection and correction methods. Define the various terminologies used in Network and Application layers. 4. Compare the various network technologies and can decide the suitable technology installation as per requirement and environment at any work place. 5. Describe the various protocols and can identify the application areas of each protocol. 6. Know the fundamentals of network and information security issues, laws, and various security technologies which can be applied on work place.
6.	Credit Value	**Theory – 4 Credits Practical – 2 Credits**
7.	Total Marks	Max. Marks: 30+70	Min. Passing Marks: **33**

PART B: Content of the Course	
No. of Lectures (in hours per week): **2 Hrs. per week**	
Total No. of Lectures (in hours):**60 Hrs.**	

Module	Topics	No. of Lectures
I	**Introduction to Computer Network:** **Use of computer network:** Access to information, person to person communication, electronic commerce, internet of things; **Types of computer network:** Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. **Network Technology:** Personal Area Network, Local Area Network,	8

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	Metropolitan Area Network, Wide Area Network, internetworks, example of network (Internet, Mobile network, wireless network-Wi-Fi); **Reference Model:** OSI, TCP/IP, Critique of the OSI and TCP/IP reference models; **Policy, Legal & Social Issues:** Online speech, net neutrality, security & privacy, disinformation. **Keywords:** IoT, Broadband, LAN, MAN, WAN, OSI, TCP/IP.	
II	**Physical Layer:** **Guided Transmission Media:** Twisted pairs, coaxial cable, Fiber Optics; **Wireless Transmission:** The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra-wideband communication; **Cellular Network:** Common concepts – cells, handoff, paging, 1G, 2G, 3G, 4G & 5G technology. **Keywords:** Coaxial cable, fiber optics, 2G, 3G, 4G, 5G.	8
III	**Data Link Layer:** **Service Provided to Network Layer:** Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error correcting codes; **Data Link Protocols:** Basic transmission and receipt, simplex link layer protocol, Full duplex, Sliding window protocol, Packet over SONET, ADSL, Point-to-Point Protocol. **Switching Techniques:** Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks, and Structure of a Switch. **Network Devices & Drivers:** Router, Modem, Repeater, Hub, Switch, Bridge and Gateways (fundamental concepts). **Keywords:** error correcting codes, error detecting codes, SONET, ADSL, point -to-point protocol, Router, Modem, Repeater, Hub, Switch, Bridge, Gateways.	12
IV	**Network Layer:** Network Layer Issues, Routing Algorithm: Optimality, principle of shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing; congestion in network, traffic management approaches; IP Addresses, IPv4 Addresses, IPv6 Addresses, **Virtual-Circuit Networks:** Frame Relay and ATM, **Transport Layer:** Process-Process Delivery: UDP, TCP. **Application layers:** DNS, SMTP, POP, ftp, http and https. Basics of Wi-Fi (Fundamental concepts only). **Streaming audio and video:** digital audio and video, streaming stored media, real-time streaming. **Keywords:** routing algorithm, IPv4, IPv6, ATM, SMTP, POP, ftp, http, https, WiFi, video streaming.	12
V	**Network Security and Information Security:** Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability), Non-Repudiation. **Overview of Security Threats and Vulnerability:** Types of attacks on	10

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	Confidentiality, Integrity and Availability. **Vulnerability and Threats:** Phishing Attacks, E-mail threats, Web-threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. **Malware:** Worms, Virus, Spams, Adware, Spyware, Trojans. **Security Technology:** Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication. **Keywords:** phishing, SQL injection, Worms, Computer virus, Spyware, Trojans, Firewall, Cipher, Cryptography.	
VI	**Computer and Cyber-crimes**: Cyber-crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes, cyber stalking, forgery and fraud, crime related to IPRs, cyber terrorism, Ransom ware attacks, computer vandalism. **Cyber Laws**- Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, Legal System of Information Technology, Social Engineering, Mail Bombs, Bug Exploits. Scope of cyber laws: e-commerce, online contracts, IPRs (copyright, trademarks and software patenting), e-taxation, e-governance and cyber-crimes, Cyber law in India with special reference to Information Technology Act, 2000 and Recent amendments. **Keywords:** cyber-crime, cyber stalking, cyber-fraud, IPR, IT laws, e-commerce, e-taxation, e-governance, mail bombs.	10

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:
- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- M. Merkow, J. Breithaupt, Information Security Principles and Practices, 2nd Edition, 2014, Pearson Education.
- G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning.
- Praveen Kumar Shukla, Surya Prakash Tripathi, Ritendra Goel "Introduction to Information Security and Cyber Laws", 2014, Dreamtech Press.
- Faiyaz Ahamad, KLSI "Cyber Law and Information Security", 2013, Dreamtech Press.

- Books published by M.P. Hindi Granth Academy, Bhopal

Reference books:
- Kurose James F., Ross Keith W., Computer Networking, A Top-Down Approach, Sixth Edition, 2017, Pearon
- Micki Krause, Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking, Fourth edition, TMH Publishing

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| Company Ltd. |
| • Basta, W.Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India. |

Suggestive digital platform web links

1. https://www.youtube.com/watch?v=qiQR5rTSshw
2. Free CCNA | Network Fundamentals - Day 1 (https://www.youtube.com/watch?v=n2D1o-aM-2s)
3. Free CCNA | Network Deviceshttps://www.youtube.com/watch?v=H8W9oMNSuwo
4. Free CCNA | OSI Model & TCP/IP Suite (https://www.youtube.com/watch?v=t-ai8JzhHuY)
5. Free CCNA | Interfaces and Cables | Day3 (https://www.youtube.com/watch?v=ieTH5lVhNaY)
6. Free CCNA | Intro to the CLI | Day 4 (https://www.youtube.com/watch?v=IYbtai7Nu2g)
7. Free CCNA | Ethernet LAN Switching (Part 1) | Day 5 (https://www.youtube.com/watch?v=u2n762WG0Vo)
8. e CCNA | Analyzing Ethernet Switching | Day 6 Lab (https://www.youtube.com/watch?v=Ig0dSaOQDI8)
9. Free CCNA | IPv4 Addressing (Part 1) | Day7 (https://www.youtube.com/watch?v=3ROdsfEUuhs)
10. Free CCNA | IPv6 Part 1 | Day 31 (https://www.youtube.com/watch?v=ZNuXyOXae5U)
11. Free CCNA | IPv6 Part 3 | Day 33 (https://www.youtube.com/watch?v=rwkHfsWQwy8
12. http://www.mphindigranthacademy.org/

Suggested equivalent online courses

NPTEL:

1. Demystifying Networking (04 weeks)
2. Cyber Security (15 Weeks)
3. https://www.edx.org/learn/computer-networking

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:
Maximum Marks : 100
Continuous Comprehensive Evaluation (CCE) : 30 marks   University Exam (UE) : 70marks

| Internal Assessment : Continuous Comprehensive Evaluation (CCE):30 | Class Test Assignment/Presentation | Total 30 |
| External Assessment : University Exam Section: 70 Time : 03.00 Hours | Section(A) : Objective Questions Section (B) : Short Questions Section (C) : Long Questions | Total 70 |

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PART A: Introduction			
Program: **Diploma**	Class: **B.Sc.**	Year: **Second**	Session: **2022-23**

Subject: **Computer Science**		
1.	Course Code	S2-COSC1P
2.	Course Title	**Computer Networks Lab**
3.	Course Type (Core Course/ Elective/ Generic Elective/ Vocational	**Core Course - (Major – I)**
4.	Pre-Requisite (if any)	Open for all
5.	Course Learning Outcomes (CLO)	**After completing this lab course, students will be able to:** 1. Learn and identify various cables used in the networking. 2. Learn, identify various connectors used to connect different cables. 3. Use the various tools for preparing the connectors for cables. 4. Configure and manage various local area networks at home and at work place.
6.	Credit Value	**Practical – 2 Credits**
7.	Total Marks	**Max. Marks: 100** **Min. Passing Marks: 33**

PART B: Content of the Course	

No. of Lab. Practicals (in hours per week): **1 Hr. per week**

Total No. of Labs: **30 Hrs.**

Suggestive List of Practicals	No. of Labs.
1. Study of UTP network cable o Study the color code of UTP cable o Categories of UTP n/w cable o Shielding of n/w cable o Electricity interference with n/w cable o Maximum length for which data cable can be used o Crimping of RJ45 connector and Punching of data n/w cable o Penta scanning of cabling work o Rules of UTP laying **2. Knowledge of Structured Cabling and its components** o Information outlet with box o Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U) o Patch Panel o Rack Management **3. Study of Optical Fiber cable**	30

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- o Different cores of OFC (6 core, 12, 24 core)
- o Multimode & Single mode OFC cable
- o Shielding of OFC
- o Splicing/Termination of OFC.
- o OTDR Testing
- o LIU fixing
- o LIU management (pigtail/fiber patchcord)
- o Media Convertor
- o SFP module
- o Rules of OFC laying

4. **Use of tools**
  - o Crimping Tool
  - o Punching Tool
  - o Nose plier
  - o Wire Stripping and Cable Cutter
  - o Multimeter
  - o RJ45 RJ11 RJ12 Cat5 Cat6 Network Cable Tester
  - o In-Line Coupler (RJ45 F/F)
  - o RJ45 NETWORK SPLITTER ADAPTER 2-way.

5. **Configuration/ Management of Local Area Network**
  - o Implementation of file and printer sharing.
  - o Installation of ftp server and client.
  - o Connect the computers in Local Area Network.
  - o Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig, getmac, hostname, nslookup, tracert, arp, pathping, systeminfo.
  - o Configure static routing using packet tracer software
  - o Configure Dynamic routing using packet tracer
  - o Configure VLAN using Managed switch Device / Packet tracer
  - o Implementation of Subnetting in Class A, B and C
  - o Ping between 2 systems using IPv6
  - o Configuration of NAT for incoming packet request
  - o Configuration of Software / Hardware firewall to block outgoing requests to facebook.com

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Suggested Readings
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Suggestive digital platform web links
https://www.edx.org/learn/computer-networking http://www.mphindigranthacademy.org/
Suggested equivalent online courses
https://nptel.ac.in/courses/106/105/106105081/

Part D-Assessment and Evaluation			
Suggested Continuous Evaluation Methods:			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction /Quiz		Viva Voce on Practical	
Attendance		Practical Record File	
Assignments (Charts/Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)		Table work / Experiments	
TOTAL	30		70

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